Searching for the relationship between secondary schools students' motivation and science achievement

Orhan Ercan[1], Evrim Ural[2] and Bünyamin Kamalak[3]

[1]*(Science Education Department, Kahramanmaraş Sütçü İmam University, Turkey)*
[2]*(Science Education Department, Kahramanmaraş Sütçü İmam University, Turkey)*
[3]*(Science Education Department, Kahramanmaraş Sütçü İmam University, Turkey)*

ABSTRACT *: This study aims to search students' science learning motivation in relation with some variables (such as having a separate study room at home and a personal computer) and the effect of motivational factors on students' science achievement. In the study, descriptive corelational survey model has been used to examine students' motivation in relation with some variables and to search the relationship between students' science learning motivation and their TEOG exam scores. The sample of the study consisted of 232 8th grade students attending 3 state secondary schools in Kahramanmaraş during 2013-2014 academic year. Students' motivation level has been determined by administering SMTSL. Students' average scores of the TEOG exam have been considered as their science achievement. The findings show that female students' motivation level is higher than the male students. In addition, it has been observed that female students' motivation is higher in sub-categories of active learning strategies, science learning value and achievement goal. There is a direct relationship between the students' motivation and their TEOG scores. This shows that students with higher levels of motivation have higher success in TEOG.*
KEYWORDS - *Science achievement, motivation, secondary school students*

I. Introduction

The There are many factors effect students learning in science education. These factors are not just cognitive but also affective factors [1]. Motivation is one of these affective factors. Generally motivation can be determined as the personal interest to participate in an activity, to learn or study a subject [2] [3] [4]. The motivation level of a student can be determined by some academic behaviors such as doing the assignments, continuing the lectures regularly [5].

Motivation isn't a concept with a single dimension, it has many sub-dimensions. Although the dimensions of motivation collect under different names in various studies, there are some sub-dimensions generally accepted in the literature. One of them is self efficacy. Individual's beliefs about the capability of themselves to cope with particular situations can be defined as self -efficacy [6] [2] [7]. According to Pajares (2003), students' perceptions relating to themselves holds an important place in academic success or failure [8]. Also, students' previous success or failure affects their self-efficacy. Self-Efficacy effects student's willingness to participate in an academic task, effort spent in fulfilling the task and it also affects the level of anxiety in the academic activities. Self-confident students have less anxiety during an academic assignment.

Niemczyk and Savanye (2001) state that, when compared with students low self-efficacy, students with high self efficacy beliefs don't give up when faced with difficulties and even work patiently longer [7]. According to Linnenbrink and Pintrich (2002), students' self-efficacy beliefs effect their academic achievement [2]. According to Tuan, Chin, Tsai and Chen (2005), students construct new information on their previous learning by using their own learning strategies and these learning strategies have connections with their motivation towards learning [9]. Science learning value is one of the motivational factors. Howey (1999) identifies science learning value as the level of students' evaluation of an academic achievement as interesting and important [10]. When the science learning value is greater, the participation of students in the learning task is greater. Individual's goals towards learning tasks can be defined as performance goal and achievement goal [9]. In the literature, the concept of intrinsic motivation can be used instead of the concept of performance goal. Intrinsic motivation can be defined as participating in a learning activity for learning more about a subject or just for curiosity [11] [4] [12] [3]. Students with high intrinsic motivation have higher academic achievement. The studies [13] [14] [15] [16] display that intrinsic motivation effects academic achievement positively. The other name of achievement goal is extrinsic motivation. Extrinsic motivation can be defined as participating in a learning assignment to to be more successful than others, demonstrate the others his/her ability, to get a reward [11] [17] [3] [18].When the studies relating to the motivation and its' sub-dimensions investigated, it is seen that students perform better when they are motivated [11].

Studies reveal that there is a positive relationship between motivation and academic achievement [19]. For example, Hardwick (1996) searched for the 5th, 8th and 11th graders exam performance and their motivation, the results of the study displayed that motivation was one of the factors that affect students' performance and the students with higher motivation had higher academic performance when compared with the others [20]. Similarly, İflazoğlu and Tümkaya (2008) searched for the relationship between 4th year pre service primary school teachers academic achievement and motivation in drama class [21]. The results of the study displayed that there was a positive correlation between motivation and academic achievement.

Sankaran and Bui (2001) searched for the motivation and the academic performance of university students, and the results of the study reveal that motivation was a significant predictor of academic achievement [17]. As seen in the given studies, motivation is a factor affecting students' academic achievement in levels of education. Therefore, searching for the relationship between motivation and its' sub-dimensions with students' science achievement will provide important data for determining the factors effecting learning and designing learning environments.

II. Aim of the Study
The study aims to search students' science learning motivation in relation with some variables (such as having a separate study room at home and a personal computer) and the effect of motivational factors on students' science achievement.

III. Method
In the study, descriptive corelational survey model has been used to examine students' motivation in relation with some variables and to search the relationship between students' science learning motivation and their TEOG exam scores.

3.1. Samples
The sample of the study consisted of 232 8th grade students attending 3 state secondary schools in Kahramanmaraş during 2013-2014 academic year. 86 of the students attend in a school located in a closer small town to Kahramanmaraş (School 1), 89 of the students attend in a school located in suburban parts of Kahramanmaraş (School 2) and 57 of them attend in a school located in the city center (School 3). The schools have been chosen by considering convenience sampling method and in these schools the students have been chosen randomly for the study. The demographic characteristics of the students have been given as percentage and frequency in Table 1.

Table 1. The Demographic Characteristics of the Students

	Feature	**N**	**%**
Schools	School 1	86	37,1
	School 2	89	38,4
	School 3	57	24,6
Gender	Male	116	50
	Female	116	50
Study room	Yes	149	64,2
	No	83	35,8
Computer	Yes	105	45,3
	No	127	54,7

3.2. Data Collection Tools
3.2.1. Student Motivation towards Science Learning Questionnaire (SMTSL): Students' motivation level has been determined by administering SMTSL. The SMTSL has been developed by Tuan, Chin & Shieh (2005) [1] to determine students' motivation and adapted by Yılmaz and Huyugüzel-Çavaş (2007) to Turkish [22]. The questionnaire is consisted of 33 items (25 of the positive statements , 8 of them negative statements). It is a five point likert type questionnaire and consisted of six sub-scales. The sub-scales and number of its' items are given below:
STMSL 1: Self efficacy (7 items)
STMSL 2: Active learning strategies 7 items)
STMSL 3: Science learning value (5 items)
STMSL 4: Performance goal (3 items)
STMSL 5: Achievement goal (5 items)
STMSL 6: Learning environment stimulation (6 items).

The Cronbach Alpha Coefficient of the original version of the questionnaire is 0,89, the Cronbach alpha coefficient of the Turkish version is 0,87 and for this study is is calculated as 0,92. The positive statements in the questionnaire are coded as "completely agree=5, agree=4, undecided=3, disagree=2 and completely disagree=1" and the negative statements are coded in reverse. In this study, there hasn't been any efforts to increase students' science learning motivation, the current situation has taken into consideration.

3.2.2. TEOG Exam

TEOG exam has been prepared by the Ministry of Education and administered to 8th grade students. Is aims to determine students' academic achievement in science class. The exam is implemented in the autumn and spring semesters. The exam is consisted of 20 multiple choice items and the results are evaluated by the Ministry of Education. Students take 5 points for each of the right answer and null point for the wrong ones. The average of the autumn term TEOG exam and the spring term TEOG are considered as students science achievement. The validity and reliability analysis of the TEOG exams have been calculated by Ministry of Education.

Correlation and regression analysis have been conducted for data analysis. Prior to the regression analysis, if there is a relationship between dependent and independent variables should be determined by correlation analysis [23]. Therefore, in this study, Pearson correlation analysis has been conducted to determine the relationship between students SMTSL scores and TEOG scores. Basic regression analysis has been conducted to determine if the SMTSL scores of the students are predictive of their science achievement. Additionally, in the study independent samples t-test, %, frequency and arithmetic mean values have been used. $p<0,05$ has been considered to be significant. While evaluating arithmetic mean scores, the score range is determined as $4/5 = 0,80$ by considering Range/Group number" formula [24]. According to this scores between 1,00-1,80 in the range of completely disagree; scores between 1,81-2,60 in the range of "disagree"; scores between 2,61-3,40 in the range of "undecided"; scores between 3,41-4,20 in the range of "agree"; scores between 4,21-5,00 in the range of "completely agree" are determined.

IV. Findings
Students' arithmetic means of SMTSL and TEOG exam scores have been given in Table 2.

Table 2. Arithmetic means of SMTSL and TEOG exam scores

	N	M	SS
SMTSL 1	232	3,74	0,71
SMTSL 2	232	3,86	0,80
SMTSL 3	232	3,94	0,83
SMTSL 4	232	3,20	0,90
SMTSL 5	232	3,96	0,95
SMTSL 6	232	3,59	0,83
Total SMTSL	232	3,75	0,61
TEOG	232	56,20	20,27

Table 2 displays that the mean of students' SMTSL scores (M = 3,75) are in the range of "agree". The mean scores of the sub-scales are in the range of "agree" except of the SMTSL 4. The mean score of SMTSL 4 is in the range of "undecided". Accordingly, it can be said that students have a high level of motivation to learn science. The mean scores of Teog exam is 56.20. The mean scores of the SMTSL and its' sub-scales according to gender are displayed in Table 3.

Table 3. The mean scores of SMTSL according to gender

	Gender	N	M	SS	df	t	p
SMTSL 1	Female	116	3,82	0,72	230	1,772	0,078
	Male	116	3,66	0,70			
SMTSL 2	Female	116	4,00	0,73	230	2,830	0,005
	Male	116	3,71	0,85			
SMTSL 3	Female	116	4,06	0,77	230	2,185	0,030
	Male	116	3,82	0,87			
SMTSL 4	Female	116	3,22	0,87	230	0,411	0,682
	Male	116	3,18	0,94			
SMTSL 5	Female	116	4,15	0,84	230	3,037	0,003

		N	M	SS	df	t	p
SMTSL 6	Male	116	3,78	1,01			
	Female	116	3,69	0,83	230	1,796	0,074
	Male	116	3,50	0,83			
Total SMTSL	Female	116	3,87	0,57	230	2,898	0,004
	Male	116	3,64	0,63			

Table 3 displays that the SMTSL scores of male and female students are statistically different (t(230) = 2,898; p = 0,004 < 0,05). The SMTSL score of the female students are statistically higher thn the scores of the male students. When the scores of the subscales compared, for the SMTSL 2(t(230) = 2,830; p = 0,005 < 0,05); for the SMTSL 3 t(230) = 2,185; p = 0,03 < 0,05) and for the t(230) = 3,037; p = 0,003 < 0,05), there is a significant difference in favor of the female students. But there is no statistically meaningful difference for the SMTSL 1 t(230) = 1,772; p = 0,078 > 0,05); for the SMTSL 4 (t(230) = 0,411; p = 0,682 > 0,05) and for the SMTSL 6 (t(230) = 1,796; p = 0,074 > 0,05). The mean scores of the SMTSL and its' sub-scales according to having a study room are displayed in Table 4.

Table 4. The mean scores of SMTSL according to having a study room

	Study room	N	M	SS	df	t	p
SMTSL 1	Yes	149	3,78	0,71	230	1,127	0,261
	No	83	3,67	0,72			
SMTSL 2	Yes	149	3,93	0,74	230	1,751	0,081
	No	83	3,73	0,9			
SMTSL 3	Yes	149	3,97	0,81	230	,660	0,510
	No	83	3,89	0,87			
SMTSL 4	Yes	149	3,12	0,95	230	-1,789	0,075
	No	83	3,34	0,8			
SMTSL 5	Yes	149	4,04	0,88	230	1,625	0,106
	No	83	3,83	1,04			
SMTSL 6	Yes	149	3,67	0,83	230	1,909	0,057
	No	83	3,46	0,82			
Total SMTSL	Yes	149	3,80	0,57	230	1,513	0,132
	No	83	3,67	0,68			

Table 4 shows that students' total SMTSL scores and its' sub-scale scores aren't differed by having a study room (t(230) = 1,513; p = 0,132 > 0,05). The mean scores of the SMTSL and its' sub-scales according to having a computer are displayed in Table 5.

Table 5. The mean scores of SMTSL according to having a computer

	Computer	N	M	SS	df	t	p
SMTSL 1	Yes	105	3,76	0,70	230	0,475	0,635
	No	127	3,72	0,72			
SMTSL 2	Yes	105	3,89	0,78	230	0,549	0,584
	No	127	3,83	0,82			
SMTSL 3	Yes	105	3,97	0,83	230	0,518	0,605
	No	127	3,92	0,83			
SMTSL 4	Yes	105	3,04	0,98	230	-2,504	0,013
	No	127	3,33	0,82			
SMTSL 5	Yes	105	4,04	0,93	230	1,098	0,273
	No	127	3,90	0,96			
SMTSL 6	Yes	105	3,69	0,78	230	1,650	0,100
	No	127	3,51	0,87			
Total SMTSL	Yes	105	3,78	0,59	230	0,707	0,480
	No	127	3,73	0,63			

Table 4 shows that students' total SMTSL scores and its' sub-scale scores aren't differed by having a computer ($t(230) = 0,707$; $p = 0,480 > 0,05$). For the sub-scales, there is no statistically meaningful difference for the SMTSL 1 ($t(230) = 0,475$; $p = 0,635 > 0,05$); SMTSL 2 ($t(230) = 0,549$; $p = 0,584 > 0,05$); SMTSL 3 ($t(230) = 0,518$; $p = 0,605 > 0,05$); SMTSL 5 ($t(230) = 1,098$; $p = 0,273 > 0,05$) and SMTSL 6 ($t(230) = 1,650$; $p = 0,10 > 0,05$). But for the SMTSL 4, there is a significant difference in favor of the students who doesn't have a computer. Students who doesn't have a computer have higher performance goal level than the students who have a computer. Prior to the searching if the SMTSL scores predict TEOG scores, basic hypothesis of the regression analysis have been tested. According to this, Table 6 displays the correlation analysis and the Figure 1 displays the scatter plot diagram.

Table 6. The correlation between SMTSL and TEOG scores

		TEOG
Pearson Correlation	SMTSL 1	,409(**)
Sig. (2-tailed)		,000
Pearson Correlation	SMTSL 2	,358(**)
Sig. (2-tailed)		,000
Pearson Correlation	SMTSL 3	,361(**)
Sig. (2-tailed)		,000
Pearson Correlation	SMTSL 4	,021
Sig. (2-tailed)		,747
Pearson Correlation	SMTSL 5	,404(**)
Sig. (2-tailed)		,000
Pearson Correlation	SMTSL 6	,272(**)
Sig. (2-tailed)		,000
Pearson Correlation	Total	0,439
Sig. (2-tailed)		0,000

** Correlation is significant at the 0.01 level (2-tailed).

Table 6 displays that there is a high positive correlation between students total SMTSL scores and TEOG scores (Pearson $r = 0,439$; $p = 0,000 < 0,01$). When the correlations of TEOG scores with the sub-dimensions of SMTSL, except of the SMTSL 4, there are high positive correlations between TEOG scores and all other sub-dimensions.
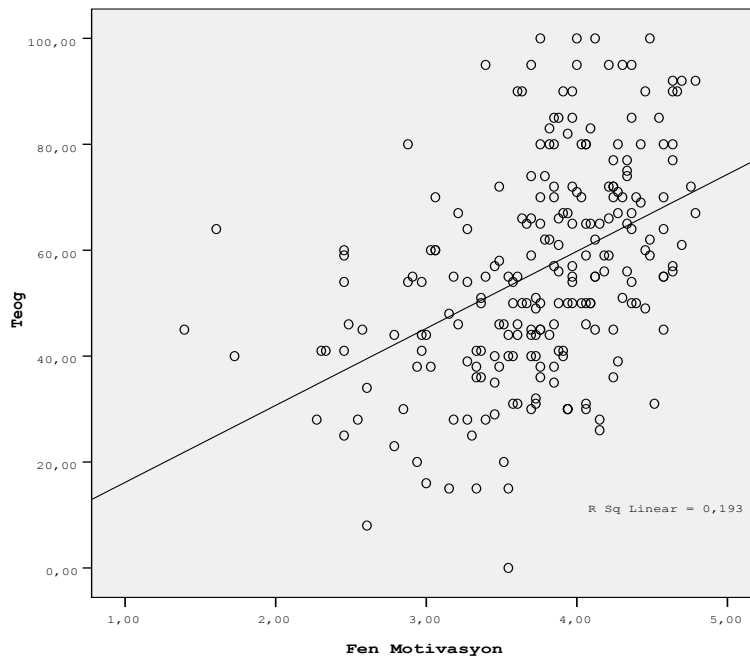

Figure 1. Scatter plot Diagram

When the Fig. 1 examined, it is seen that there is a linear correlation between students' motivation score (SMTSL) and their science achievement score (TEOG). The plots which defines students' achievement and motivation scores have been gathered around a linear line. The data of correlation analysis and scatter plot diagram display that regression analysis can be conducted. Table 7 shows the regression analysis results which is conducted to determine the effect of students' motivation level on their science achievement.

Table 7. Regression Analysis

Dep.var.	Indep.var.	R^2	t	β	F	p
TEOG	SMTSL	0,193	7,419	0,439	55,043	0,000

The findings display that SMTSL scores predict students' science achievement statistically meaningful. SMTSL scores explain approximately 19 % of the total variance in science achievement ($p = 0,000 < 0.001$).

V. Results and Discussion

Within the scope of the study, it has been researched whether there is a relationship between the motivations of 8th grade students and having a study room and computer and between the motivations of students and academic success in their science lessons. The findings show that female students' motivation level is higher than the male students. In addition, it has been observed that female students' motivation is higher in sub-categories of active learning strategies, science learning value and achievement goal (Table 2).

The motivation levels of students do not change in accordance with whether they have a study room or not. While a difference in the students' motivation levels have not been observed depending on whether they have a computer or not, it has been observed that students who do not have a computer have higher levels of performance goal.

There is a direct relationship between the students' motivation and their TEOG scores. This shows that students with higher levels of motivation have higher success in TEOG. In other words, as the motivation levels of students increase, their academic success in science lessons also increase. Studies in literature support the findings of this study as well. For example, Rana, Mahmood and Reid (2015) display that students' motivation has a significant effect on their academic performance [25]. Additionally, Areepattamannil, Freeman, Klinger (2011) examine the effect of motivation on students' science learning and their results display that motivation effects science learning, science beliefs and achievement [26]. There are some more researches which display that students' motivation play an important role on their academic achievement [27] [28] [5] [17] [19].

The findings have shown that with the exception of performance goal, there is a significant relationship between TEOG and all of the sub-factors. In other words, as self efficacy, use of active learning strategies, science learning value, achievement goal and learning environment stimulation increase, students' academic success in science lessons increase as well. Beliefs of self-sufficiency are beliefs an individual has about his own skills while carrying out any kind of task. When the self-sufficiency beliefs of the individual are high, the individual trusts himself more and acts with more courage in carrying out a task. An individual's trusting himself increases his success as well. When the literature studies are analyzed, it can be seen that similar results have been achieved in various studies as well. For instance, Douglas (2006) has conducted a research on the course grades of college students from different grade levels and motivation factors and has discovered that self-sufficiency with academic success gave the highest correlation [29]. Klomegah (2007) in his study has shown that there is a high correlation between the academic performances of college students and their self-sufficiency [30].

The findings of the study show that students' academic success in science lessons increases in accordance with how they use active learning strategies. Students structure information themselves when they are learning. Therefore, it is important that students use their own learning strategies which structuring their learning.

The findings of the study show that students' academic success in science lessons increases as the science learning value level increases. Students' valuing the work they do, seeing the lesson as important increases their approach to learning and learning itself as well.

The findings of the study show that there is no significant relationship between performance goal and academic success. Similarly, in a study in which he has analyzed the relationship between course grades of college students and motivation factors, Douglas (2006) has not been able to find a significant relationship between course grades of students and their extrinsic motivation [29]. Performance goal or in other words extrinsic motivation expresses that students participate in a learning activity with the expectation to be rewarded or with the purpose of competition. Students' extrinsic motivation is not desired to be high; because it is difficult to provide the continuation of extrinsic motivation. In performance goal or extrinsic motivation, the reward put forward for the student may not be appealing or it may lose its appeal by time.

Although rewards are given for the desired behaviors to be gained within the class environment, their efficiency is a subject of argument [12]. If a student is told that he will be given a desired reward if he participates in a task or completes a task successfully, when the student comes face to face with the same situation again and no reward is given, he may wish to carry out the task less. Being tied to a reward very strictly and very frequently damages the realization of the desired task in the long run [12]. Therefore, it is a pleasing result that a significant relationship has not been found between the extrinsic motivations of students and their success.

The findings of the study have shown that there is a meaningful relationship between students' achievement goals and their academic success. Another term used for achievement goal is intrinsic motivation. It has been observed that as students' intrinsic motivations increase, their academic success in science classes increase as well. Similarly, Jurišević, Glažar, Pučko and Devetak (2008) search for the intrinsic motivation of primary school teachers for science learning and their academic achievement and their findings display that there is a significant correlation between intrinsic motivation and academic achievement [31]. Also, Bryan, Glyn and Kittleson (2011) examine students' science learning motivation [32]. The findings of the study reveal that there are significant correlations between intrinsic motivation, self efficacy and academic achievement. It is seen in other works as well that intrinsic motivation is an important characteristic of academic success [33][13] [34].

The findings show that there is a significant relationship between learning environment stimulation and the academic success of students in science classes. It is seen that the encouragement of learning environment increases the success of students. Evaluation of learning environment as appealing by the students positively affects learning. Students learn better when they are interested in and curious about a subject. Therefore, a well designed learning environment encourages students to learn.

VI. Conclusion and Suggestions

As it can be seen in the findings of the study and in other studies in literature and in studies mentioned above, motivation and motivation factors influence students' success. As students' motivation towards their course increases, their academic success in that course increases as well. Therefore, it is important to increase students' motivation towards science classes. Highly motivated student are more willing to participate in the lesson. For this reason, teachers need to arrange their teaching methods as to increase the motivations of students. It is important to identify the skills and learning needs of students in increasing their motivations. Therefore, if it is desired for students to value the work they do, then activities directed towards their needs should be carried out. In order to be able to increase students' science learning value levels, the place of the information which they will be learning and where they can use this information should be explained to them. When students do not understand how the information taught is related to their lives, they may not give importance to these subjects and may experience fear when they think that many of the things taught to them are not related to life. Students are motivated by their interests. In order to stimulate this interest, teachers should allow students to work on projects which are related to them and which can be applied to real life situations [11] This will motivate students towards learning and will increase their intrinsic motivation as well. In order to develop student's self-esteem, students need to be allowed to experience the feeling of success. Therefore, making sure that students are present before teaching the lessons will allow education to be given in accordance with the levels of students. When education is given in accordance with the levels of students, students will progress in line with their accumulation and skills and thus will not experience the feeling of failing.

References

[1]   H.L. Tuan, C. C. Chin, & S. H. Shieh, The development of a questionnaire to measure students' motivation towards science learning. *International Journal of Science Education*, 27(6), 2005, 639-654.
[2]   E. A. Linnenbrink, & P. R. Pintrich, Motivation as an enabler for academic success. *School Psychology Review*, 31(3), 2002, 313–327.
[3]   D. L. Brunsma, V. T. Khmelkov, E. E. McConnell, & A. J. Orr, Increasing the motivation of secondary school students. *American Secondary Education*, 25, 1996, 10–15.
[4]   P. R. Pintrich, & D. Schunk, Motivation in education: Theory, research, and applications (2nd ed.), 2002, Upper Saddle, NJ: Prentice-Hall, Inc.
[5]   K. Singh, M. Granville, & S. Dika, Mathematics and science achievement: effects of Motivation, interest, and academic engagement. *The Journal of Educational Research*, 95(6), 2002, 321–332.
[6]   A. Cavaco, V. Chettiar, & I. Bate, Achievement motivation and self-efficacy perception amongst portuguese pharmacy students. *Pharmacy Education*, 3 (2), 2003, 109–116.
[7]   M. C. Niemczyk, & W. C. Savenye,The Relationship of Student Motivation and Self Regulated Learning Strategies to Performance in an Undergraduate Computer Literacy Course. Annual proceedings of selected research and development papers presented at the national convention of the association for educational communications and technology. Atlanta, Georgia, November 8–12, 2001.
[8]   F. Pajares, Self-efficacy beliefs, motivation, and achievement in writing: A review of the literature. *Reading & Writing Quarterly*, 19, 2003, 139–158.
[9]   H. L. Tuan, C. Chin,C. Tsai,& S. Cheng, Investigating the effectiveness of inquiry instruction on the motivation of different learning styles students. *International Journal of Science and Mathematics Education,* 3, 2005, 541–566.

[10]   S. C. Howey, The Relationship Between Motivation and Academic Success of Community College Freshmen Orientation Students. Doctoral Dissertation, Kansas State University, 1999.
[11]   K. Cialdella, C. Herlin, & A. Hoefler, Motivating student learning to enhance academic progress. Saint Xavier University, Report, 2002, 73 p.
[12]   P. C. Dev, Intrinsic motivation and academic achievement what does their relationship imply for the classroom teacher? *Remedial and Special Education*, 18, 1997, 12–19.
[13]   Y. Eshel & R. Kohavi, Perceived classroom control, self-regulated learning strategies, and academic achievement. *Educational Psychology*, 23(3), 2003, 249–260.
[14]   A. Woolfolk, *Educationalpsychology. 1998,* Boston: Allyn & Bacon.
[15]   Deci, E. L., & Ryan, R. M. (1985). Intrinsic motivation and self-determination in human behavior. New York: Plenum Press.
[16]   P. R. Pintrich, & E. V. DeGroot, Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology*, 82(1), 1990, 33–40.
[17]   S. R. Sankaran, & T. Bui, Impact of learning strategies and motivation on performance: a study in web-based ınstruction. *Journal of Instructional Psychology*, 28(3), 2001, 191–198.
[18]   T. Garcia & P. R. Pintrich, Critical Thinking and Its Relationship to motivation, Learning Strategies, and Classroom Experience. Paper presented at the annual meeting of the american psychological association (Washington, August 14–18, 1992).
[19]   C. C. Shih & J. Gamon, Web-based learning: Relationships among student motivation, attitude, learning styles, and achievement. *Journal of Agricultural Education*, 42(4), 2001, 12–20.
[20]   Hardwick, J. M. Jr. (1996). A three year study of motivation (MMI) and learning environments (ILEQ) as per TAAS Scores of high, middle, and low performing students. Paper presented at the Annual Meeting of the American Educational Educational Research Association (New York, NY, April 8-12, 1996). Reports-Research/Technical
[21]   A. İflazoğlu & S. Tümkaya, Öğretmen adaylarının güdülenme düzeyleri ile drama dersindeki akademik başarıları arasındaki ilişkinin incelenmesi. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi*, 2008, Sayı 61.
[22]   H.Yılmaz & P. Huyugüzel Çavaş, Reliability and validity study of students' motivation toward science learning (SMTSL) questionnaire, *Elementary Education Online*, 6(3), 2007, 430-440.
[23]   B. Sipahi, E. S. Yurtkoru, M. Çinko, Sosyal Bilimlerde SPSS'le Veri Analizi. Betaş Yayınları, 2007, Istanbul.
[24]   H. Tekin, Eğitimde Ölçme ve Değerlendirme, 1996, Yargı Yayınları, Ankara.
[25]   R. A. Rana, N. Mahmood, & N. Reid, Motivation and science performance: Influence on student learning in science. *Sci.Int(Lahore)*, 27(2), 2015, 1445-1452.
[26]   S. Areepattamannil, J. G. Freeman, D. A. Klinger, Influence of motivation, self-beliefs, and instructional practices on science achievement of adolescents in Canada, *Soc Psychol Education*, 14, 2011, 233–259. DOI 10.1007/s11218-010-9144-9
[27]   Yen, H-C, & Tuan, H-L., & Liao, C-H. (2011). Investigating the influence of motivation on students' conceptual learning outcomes in web-based vs. classroom-based science teaching contexts. *Res Sci Educ* , 41, 211–224. DOI 10.1007/s11165-009-9161-x
[28]   A. Tella, The impact of motivation on student's academic achievement and learning outcomes in mathematics among secondary school students in Nigeria. *Eurasia Journal of Mathematics, Science & Technology Education,* 3(2), 2007, 149-156.
[29]   J. L. Douglas, Motivational factors, learning strategies and resource management as predictors of course grades. *College Student Journal*, 40(2), 2006, 423–428.
[30]   R. Y. Klomegah, Predictors of academic performance of university students: an application of the goal efficacy model. *College Student Journal*, 41(2), 2007, 407–415.
[31]   M. Jurišević, S. A. Glažar, C. R. Pučko, & I. Devetak, Intrinsic motivation of pre-service primary school teachers for learning chemistry in relation to their academic achievement. *International Journal of Science Education*, 30(1), 2008, 87-107.
[32]   R. R. Bryan, S. M. Glyn, & J. M. Kittleson, Motivation, achievement, and advanced placement intent of high school students learning science. *Science Education,* 95(6), 2011, 1049-1065
[33]   J. C. Kaufman, M. D. Agars, & M. C. Lopez-Wagner, The role of personality and motivation in non-traditional students at a hispanic-serving institution. *Learning and Individual Differences*, 18, 2008, 492–496.
[34]   M. A. Church, A. J. Elliot,& S.L. Gable, Perceptions of classroom environment, achievement goals, and achievement outcomes. *Journal of Educational Psychology*, 93, 2001, 43−54.