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Full Length Research Paper

Examining university students' mind-sets in physics class, their confidence and exhaustion levels for the forecast of their educational achievement in physics lessons

Serouse A. Tiffany

Mersin University, Faculty of Education, Department of Education Sciences, Mersin, Turkey.

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The purpose of this study is to find out whether university students' attitudes towards physics lesson, their self-efficacy beliefs and burnout levels predict their academic success in physics lessons. The research group consists of 641 university students of which 307 are girls (47.1%) and 334 boys (52.9%). The research data were collected using "Physics Attitude Scale" developed by Özyürek and Eryılmaz, "Physics Self-Efficacy Scale" developed by Çalışkan et al., "Maslach Burnout Inventory-Student Survey" developed by Schaufeli et al., which was adapted to Turkish by Çapri et al. and "Personal Information Form" developed by the researcher. "Multiple Regression Analysis" and "Stepwise Regression Analysis" were used for the analysis of the data. The analysis indicated statistically significant findings that predicted the academic success in physics lessons of the university students. The findings are discussed in accordance with the literature.

Key words: University student, attitudes towards physics, physics self-efficacy beliefs, academic success in physics, students' burnout.

INTRODUCTION

According to Fisbane (1996 as cited in Islim, 2006), in the present era of technology, science and physics lessons construct the fundamentals of a modern world view equipped with more objective, rational, scientific, and technological tools. In particular, the methods used in physics research and the results obtained can affect other disciplines, and due to this feature; in practice, it is found in wide fields of application. According to Inan (1988), physics contributes to the development of all the sciences and cooperates with them on many issues. From this perspective, learning "physics" creates an obligation for the students in many disciplines, and therefore, they can understand the physics methods used in their branches and can be successful in their own fields.

Physics lessons, however, are troublesome for many students. The initial step to solve a problem is to determine the factors behind the problem, so the factors behind the students' success in physics are of great importance (Abak et al., 2002). Among these factors, "attitude" is one of the most important ones. Attitude is a psychological structure seen as an important and critical predictor with its cognitive, affective and behavioral dimensions (Anderson, 1988). Many studies conducted to date have reported that a significant relationship exists between attitude and success, and that attitude scores significantly predict academic success (Akpınar, 2006; Aşkar and Erdem, 1987; Çapri et al., 2012; Drake, 2009;

E-mail: burhancapri@gmail.com. Tel: +903243412815. Fax: +903243412823.

Karakoyun and Kavak, 2008; Levin et al., 1991; Özyürek and Eryılmaz, 2001; Shrigley et al., 1988).

Similarly, self-efficacy beliefs, another variable considered as a strong predictor of academic success (Ahyoung and In-Young, 2000; Britner and Pajares, 2001; Lane et al., 2004; Pajares and Miller, 1994; Zimmerman et al., 1992; Zeldin and Pajares, 2000), are defined as

"the beliefs in one's capabilities to organize and execute the lessons of action required to produce given attainments" (Bandura, 1997). In theory, it is stated that self-efficacy beliefs relate to specific activities (Bandura, 1977). Physics self efficacy beliefs are among the specific self efficacy areas based on a special activity. The studies investigating the relationship between physics self-efficacy beliefs and academic success have indicated different findings in the literature. Among these studies, there are some that show that academic success has a significant relationship with physics self-efficacy beliefs (Çalışkan et al., 2010; Çapri et al., 2012; Selçuk et al., 2008). Also, some studies show that academic success has no effect on physics self-efficacy beliefs (Abak et al., 2002; Shaw, 2004).

In the last decade, many studies (Balogun et al., 1995, 1996; Chang et al., 2000; Çapri et al., 2011; Çapulcuoğlu, 2012; Gold et al., 1989; Gündüz et al., 2012, Kutsal and Bilge, 2012; McCarthy et al., 1990; Schaufeli et al., 2002a, 2002b; Yang, 2004) have focused on students' burnout, which is a source of an important level of stress and tension. Students' burnout is defined as the students having demands and expectations from lessons and studies, having an insensitive and distant attitude towards lesson and studies, and the feeling of inadequacy as a student (Schufeli et al., 2002a). The studies, especially examining the relationship between students' burnout, academic success and academic performance indicated different findings. While some of these studies revealed no significant relationship (Balogun et al., 1996; Garden, 1991), some others indicated that the relationship is significant (McCarthy et al., 1990; Neumann et al., 1990; Nowack and Hanson, 1983; Schaufeli et al., 2002a).

Schaufeli et al. (2002a) reported that there is a negative correlation between academic performance and burnout. They also reported that student's burnout predicts academic performance significantly. Moreover, it was indicated that there is a positive relationship between academic performance and efficacy beliefs, and that the more the students see themselves as competent the higher their academic performance is.

As summarized above, the number of studies on the relationships between attitude, self-efficacy, burnout, academic success and academic performance has increased to a significant level in recent years. However, it is clear that there is a need for a research to determine to what extent the students' attitudes towards physics, their self efficacy beliefs and burnout have an impact on their academic success in these lessons, which they overcome with great difficulty. From this perspective, the investigation of students' attitudes that affect their academic success, their self-efficacy beliefs contributing to the development of positive or negative attitudes and their burnout in physics lessons can be useful.

In the light of the results obtained in this research, it will be possible, in particular, to determine the degree of impact of the students' attitudes towards physics lesson, their self-efficacy and burnout on their academic success in physics lessons. Thus, in accordance with the findings on students developing a positive attitude towards physics lesson, their feeling of being more competent in physics lesson and also on lowering the levels of burnout stress due to such feelings as stress, fear and anxiety, the gain for increasing students' academic success in physics lessons can be transferred and used in the educational environment.

Additionally, as a result of this research, problems such as students' prejudices towards the topics encountered in physics teaching as reported previously (Gönen and Kocakaya, 2006) and their dislike of physics topics or perceiption of them as difficult (Çepni and Azar, 1999) can be overcome by taking educational measures. Besides, students' perspective for physics lessons can also be altered as the gain transferred to the educational field.

Hence, the aim of this research is to reveal the contributions of the university students' attitudes towards physics lesson, their self-efficacy beliefs and burnout levels in the prediction of their academic success in physics lessons.

Problem statement

Do university students' attitudes towards physics lesson, their self-efficacy beliefs and burnout levels predict their academic success in physics lessons?

METHOD

This research is a descriptive-predictive study which uses a methodically relational model procedure.

Research group

The research group is a total of 641 volunteer university students, consisting of 307 girls (47.1%) and 334 boys (52.9%), studying in different departments at Mersin University.

Measures

Physics attitude scale (PAS)

The scale was developed by Özyürek and Eryılmaz (2001) and consists of totally 24 items of which 17 are positively and 7 are negatively worded. For each attitude item, "Absolutely Agree", "Agree, "Undetermined", "Disagree", "Absolutely Disagree" expressions were used. Scores for positively worded attitude items in the attitude scale are; 5 for "Absolutely Agree", 4 for "Agree", 3 for "Undetermined", 2 for "Disagree" and 1 for "Absolutely Disagree". For negatively worded items, scoring is the reverse.

Cronbach alpha reliability coefficient of the scale is 0.90.

Physics self-efficacy scale (PSES)

The scale developed by Çalışkan et al. (2007) is a 5-point Likert-type scale with 30 items which consist of 5 subscales. The expressions for each item are "Strongly Agree", "Agree, "Undecided", "Disagree", "Strongly Disagree". The subscales are: 1. Self-efficacy towards solving physics problems (SESPP), 2. Self-efficacy towards learning physics (SELP), 3. Self-efficacy towards application of physics knowledge (SEAPK), 4. Self-efficacy towards memorizing physics knowledge (SEMPK) and 5. Self-efficacy towards physics laboratory (SEPL). The items, except 16th and 20th, are scored as 5 for "Strongly Agree", 4 for "Agree, 3 for "Undecided", 2 for "Disagree" and 1 for "Strongly Disagree". The highest score of this scale is 150 and the lowest score is 30. The Cronbach's alpha reliability coefficients of the subscales are: r= .91, .79, .76, .70, .86, respectively.

Maslach burnout inventory-student survey (MBI-SS)

The scale was developed by Schaufeli et al. (1996) and it is the adapted form so that it can be used on the students. It is a 7-point Likert type scale which consists of 16 items and three subscales (Schaufeli et al., 2002a). One of these subscales is Exhaustion (EX) consisting of 5 items; the second subscale, Cynicism (CY) includes 5 items and the last subscale, Efficacy (EF), has 6 items. All the items are scored ranging from 0 (*never*) to 6 (*always*). High scores on EX and CY and low scores on EF are indicative for burnout. In this study, the Turkish adapted version of the MBI-SS was used (Çapri et al., 2011).

Personal information form

This form was created to collect information about the university students' academic success in physics lessons and about their gender variable.

Procedures and data analysis

After the participants were informed about the purpose of the research, the applications were applied to the participants during the course breaks. After the applications, data sets were examined one by one, and erroneous or incomplete data were removed. Remaining data were analyzed using SPSS 17.0. In order to determine the contributions of the independent variables that predict dependent variables, multivariate statistical techniques "Multiple Regression Analysis" and "Stepwise Regression Analysis" were used. The upper limit of error margin in the analysis was accepted as 0.05.

RESULTS

In this section, the findings of the research are presented.

Results related to the prediction of the university students' academic success in physics lessons

To determine the contributions of the university students' attitudes towards physics lesson, their self-efficacy beliefs and burnout levels for the prediction of their academic success in physics lessons, multiple regression analysis was performed in the initial step to reveal the predictive power of all the independent variables on the dependent variables. Then stepwise regression analysis was performed to identify the level of contributions of the variables which contributed significantly. The results of multiple regression analysis predicting the university students' academic success in physics lessons are given in Table 1.

As can be seen in the table, the zero-order correlations between the dependent and independent variables were significant and ranged from .335 to .073. All correlation coefficients obtained between dependent and independent variables appeared to have a positive direction. As seen in the table of the results of multiple regression analysis, the independent variables introduced into the model predicted the dependent variables significantly ($R = .40$, $R^2 = .16$, $p < 0.05$). From the analysis of the results of t-test for significance of the regression coefficients, the most significant contribution for the prediction of cognitive flexibility was provided by the scores obtained from self-efficacy towards solving physics problems (SESPP) of PSES, the efficacy (EF) subscale of MBI-SS, self-efficacy towards learning physics (SELP) of PSES and physics attitude scale (PAS), respectively.

In order to determine the statistical contribution levels of the four contributing independent variables individually for the prediction of academic success in physics lessons, stepwise regression analysis was applied to the data. In the stepwise regression analysis, the variables were introduced to the multiple regression analysis according to their contributions (Table 2).

When the R^2 values in Table 2 were analyzed, self-efficacy towards solving physics problems (SESPP) was 11% of the total observed variance subscale [$F(1,639) = 80.81$, $p < 0.05$]. In the second stage, the efficacy (EF) subscale participation in prediction, the total variance increased up to15% [$F(2.638) = 55.97$, $p < 0.05$]; in the third stage, self-efficacy towards learning physics (SELP) increased up to 16% [$F(3.637) = 39.64$, $p < 0.05$] and at the final stage increased up to 16.3% [$F(4.636) = 30.97$, $p < 0.05$], with the scores of attitude scale towards physics lesson (PAS). In other words, as a result of stepwise regression analysis, the most important contribution to prediction came from the subscale of self-efficacy towards solving physics problems (SESPP) and it was followed by the efficacy (EF) subscale, self-efficacy towards learning physics (SELP) subscale and physics attitude scale (PAS), respectively.

When the results are evaluated according to the direction of the relationship between the variables in Multiple and Stepwise regression analysis, these four variables for academic success in physics lessons are effective and positive increases in these variables can be said to lead to an increase in academic success in physics lessons. According to the results of the regression analysis, the regression equations for predicting the

Table 1. The multiple regression analysis results of the prediction of the university students' academic success in physics lessons.

Predicted variable	Predictor variables	B	Std. error	Beta	T	P	Zero-order
Academic success in physics lessons	Constant	14.940	5.586	-	2.675	.008*	-
	Self-efficacy towards solving physics problems (SESPP)	.719	.184	.221	3.911	.000*	.335
	Efficacy (EF)	1.360	.276	.185	4.937	.000*	.260
	Self-efficacy towards learning physics (SELP)	1.093	.417	.145	2.624	.009*	.324
	Physics Attitude Scale (PAS)	-.144	.069	-.083	-2.080	.038*	.073

Multiple R= .404; R^2= .163; Adj. R^2 = .158; F(4.636) = 30.969, p< .000. *p< .05.

Table 2. The stepwise regression analysis results of the prediction of the university students' academic success in physics lessons.

Predicted variable	Stepwise analysis stage	Predictor variables	R	R^2	Adjusted R^2	Standard error of the estimate	F
Academic success in physics lessons	1	Self-efficacy towards solving physics problems (SESPP)	.335	.112	.112	19.73	80.81*
	2	Efficacy (EF)	.386	.149	.037	19.33	55.97*
	3	Self-efficacy towards learning physics (SELP)	.397	.157	.008	19.26	39.64*
	4	Physics Attitude Scale (PAS)	.404	.163	.006	19.21	30.97*

*p< .05.

academic success in physics lessons are given as follows:

Academic success in physics lessons = 14.940 + 0.719 *SESPP* + 1.360*EF* + *1*.093*SELP* - 0.144*PAS*

DISCUSSION

University students' attitudes towards physics lesson, their self-efficacy beliefs and burnout levels pointed out to have significant contributions in predictions of their academic success in physics. According to the findings, the independent variables that significantly predicted the dependent variables resulted in approximately 16.3% of the academic success of university students in physics lesson.

Stepwise regression analysis revealed that the most important predictive contribution comes from self-efficacy towards solving physics problems (SESPP) and it is followed by the efficacy (EF) subscale of MBI-SS, self-efficacy towards learning physics (SELP) subscale and physics attitude scale (PAS) scores, respectively. According to these results, self-efficacy beliefs both in solving physics problems and in learning physics coupled with feeling of efficacy and having positive attitudes towards the physics lesson can be said to be effective for the success of university students in physics lessons.

At this point, when specific self-efficacy belief in certain areas is considered to express 15.7% of the variance of academic success in physics lessons, the results are similar with the studies (Çalışkan et al., 2010; Çapri et al., 2012; Selçuk et al., 2008) that show significant relationship with physical self-efficacy beliefs and academic success; but it differs from the studies in which academic success is reported to have no effect on physical self-efficacy beliefs (Abak et al., 2002; Shaw, 2004). However, the results obtained in this study are parallel to the published papers in Turkey and abroad whose results show that self-efficacy belief is a powerful predictor of academic success (Britner and Pajares, 2001; Çapri et al., 2012; Hackett, 1985; Zimmerman et al., 1992, Andrew, 1998; Baykul, 1990, Kan and Akbaş, 2006; Levin et al., 1991; Pajares and Miller, 1994; Pintrich and DeGroot, 1990; Schunk, 1985; Smist,

1993; Witt-Rose, 2003; Zeldin and Pajares, 2000).

On the other hand, the results of the attitude towards physics lesson which has a very low percentage (0.006%) for explaning the variance of academic success in physics lessons pointed out a consistency with similar studies indicating that attitudes towards physics lesson are predicted meaningfully (Akpınar, 2006; Çapri et al., 2012; Drake, 2009; Karakoyun and Kavak, 2008; Özyürek and Eryılmaz, 2001). Besides, in many studies related to the field of education, there is a significant relationship between attitude and success, and also the results obtained from studies reporting that attitude scores predict academic success in a meaningful way may be considered parallel (Aşkar and Erdem, 1987; Bloom, 1976; Cannon and Simpson, 1985; Çapri et al., 2012; Germann, 1988; Hough and Piper, 1982; Marjoribanks, 1976; Schibeci and Riley, 1986; Shrigley et al., 1988; Levin et al., 1991; Talton and Simpson, 1987).

In another result, no predictive relation was found between the academic success in physics lessons and in the perspective of exhaustion (EX) and cynicism (CY) that lie in the center and are the most important subscales of MBI-SS which are the source of stress for students. These results are similar with the studies (Balogun et al., 1996; Garden, 1991) that try to find a significant relationship between burnout levels, academic success and academic performance; nevertheless, these results indicate no similarities with the results of the studies (McCarthy et al., 1990; Neumann et al., 1990; Nowack and Hanson, 1983; Schaufel et al., 2002a) that suggest meaningful relationship. However, in terms of the efficacy (EF) subscale, obtained predictive results can be considered parallel with these studies in the literature. At this point, in results obtained from the subscales exhaustion (EX) and cynicism (CY) of MBI-SS which are the most important predictors of burnout levels, the university students are considered not to be affected negatively enough to feel burnout through the process of physics education.

Related to the studies of science and physics education, these lessons were generally disliked, feared, or difficult to understand and as the leading lessons taken and failed (Bakaç et al., 1994; Bakaç and Kumru, 1998). Additionally, students' negative attitudes towards physics lesson are due to their prejudices towards the lesson (Gönen and Kocakaya, 2006). Considering the findings of this study, when students have a positive attitude towards physics lesson and feel they are highly competent both in solving physics problems and in their self-efficacy beliefs in learning physics, then they will be exposed to lesser burnout, which affects their academic success in physics lessons positively. Students with an increasing academic success in physics may be considered to have a diminishing fear, anxiety and burnout in physics lesson and thus no prejudgements against physics lesson can be improved.

In this study, it is concluded that the major contribution to the prediction process comes from self-efficacy towards solving physics sub-scale and it is followed by efficacy (EF) subscale scores of MBI-SS, self-efficacy towards learning physics subscale scores (SELP) and attitude scale towards physics lesson scores (SAP), respectively. All of the independent variables that significantly predicted the dependent variables expressed approximately 16.3% of academic success of university students in physics lessons. Considering the results obtained, the following suggestions can be made:

- The independent variables examined in this study are considered to result in 16.3% of the academic success variance in physics lessons of university students, but new studies are needed to reveal the variables explaining the other 83.7%.
- In this study, since the independent variables on the dependent variable were found to be effective, conducting deeper research on larger sample groups can be useful.
- In this study, for increasing the university students' academic success in physics lessons, variables like attitude towards physics lesson, self-efficacy beliefs towards solving physics problems and self-efficacy beliefs towards learning physics were found to be effective. Therefore, it can be useful for the academic staff, who teach university students, to take these variables into account during planning and carrying out the process of education.
- Within the process of helping the students experiencing burnout due to the failure in physics lessons to cope with these problems, it would be beneficial to perform both individual and group counseling practices by experts from psychological counseling and guidance centers by taking their their self-efficacy beliefs and attitudes towards physics lesson into account.

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REFERENCES

Abak A, Eryılmaz A, Fakıoğlu T (2002). Determining university students' selected affective characteristics. V. National Science and Mathematics Education Congress, 16-18 September, Ankara, Turkey.

Ahyoung K, In-Young P (2000). Hierarchical structure of self-efficacy in terms of generality levels and its relations to academic performance: General, academic, domain-specific, and subject-specific self-efficacy. Paper presented at the Annual Meeting of the American Educational Research Association, April 24-28, New Orleans, LA.

Akpınar M (2006). The effect of students attitudes towards physics lesson to their academic success in physics lessons. Unpublished

Master's Thesis. Ankara: Gazi University Institute of Education Sciences.
Anderson LW (1988). Attitudes and their measurement. In Keves JP (Eds.), Educational research methodology and measurement: An international handbook. New York: Pergamon Press pp.421-426
Andrew S (1998). Self-efficacy as a predictor of academic performance in science. J. Adv. Nurs. 27:596-603.
Aşkar P, Erdem M (1987). Attitude scale towards teaching profession. Çağdaş Eğitim 121:8-11.
Bakaç M, Kumru MN, Doğan Y (1994). The importance of laboratory practice in the teaching and the education of science. I. National Science Education Symposium Summaries Book, 15-17 September, İzmir, Turkey.
Bakaç M, Kumru MN (1998). Defining goals in science education. III. National Science Education Symposium Summaries 23-25-September, Trabzon, Turkey.
Balogun JA, Helgemoe S, Pellegrini E, Hoeberlein T (1995). Test-retest reliability of a psychometric instrument designed to measure physical therapy students burnout. Percept. Motor Skill 81:667-672.
Balogun JA, Helgemoe S, Pellegrini E, Hoeberlein T (1996). Academic performance is not a viable determinant of physical therapy students' burnout. Percept. Motor Skill. 83:21-22.
Bandura A (1977). Social learning theory. Englewood Cliffs, N.J. Prentice Hall.
Bandura A (1997). Self-efficacy: The exercise of control. New York: W.H. Freeman.
Bloom SB (1976). Human characteritics and school learning. New York: McGraw-Hill.
Britner SL, Pajares F (2001). Self-efficacy beliefs, motivation, race, and gender in middle school science. J. Women Minor. Sci. Eng. 7(4):271-285.
Cannon RK, Simpson RD (1985). Relationships among attitude, motivation and achievement of ability grouped, seventh-grade, life science students. Sci. Educ. 69:121-138.
Chang EC, Rand KL, Strunk DP (2000). Optimism and risk for burnout among working college students: Stress as a mediator. Pers. Indiv. Differ. 29:255-263.
Çalışkan S, Selçuk GS, Erol M (2007). Development of physics self-efficacy scale, sixth international conference of the balkan physical Union, AIP Conference Proceedings pp.483-484.
Çalışkan S, Selçuk GS, Özcan Ö (2010). Self-efficacy beliefs of physics student teachers': Effects of gender, class level and academic achievement. Kastamonu Education Journal, 18(2): 449-466.
Çapri B, Gündüz B, Gökçakan Z (2011). Turkish adaptation of Maslach Burnout Inventory – Student Survey (MBI-SS): Validity and reliability study. Çukurova University J. Faculty Educ. 40:134-147.
Çapri B, Özkendir OM, Özkurt B, Karakuş F (2012). Investigation of pre-service teachers' attitudes towards physics lesson and self-efficacy beliefs according to their gender, departments and perceived success in physics. Procedia–Soc. Behav. Sci. 47:1034-1039.
Çapulcuoğlu U (2012). An investigation of coping with stress, test anxiety, academic self-efficacy and parental attitudes in predicting student burnout. Unpublished Master's Thesis. Mersin: Mersin University Institute of Education Sciences.
Çepni S, Azar A (1999). Analysis of asked questions in high school physics examination. III. National Science Education Symposium Summaries, 23-25-September, Trabzon, Turkey.
Drake CT (2009). African-American college student attitudes toward physics and their effect on achievement. Unpublished Doctoral Dissertation, The University of Southern Mississippi, Hattiesburg.
Garden AM (1991). Relationship between burnout and performance. Psychol. Rep. 68:963-977.
Germann PJ (1988). Development of the attitudes toward science in school assessment and its use to investigate the relationship between science achievement and attitude toward science in school. J. Res. Sci Teach. 25(8):689-703.
Gold Y, Bachelor P, Michael WB (1989). The dimensionality of a modified form of the Maslach Burnout Inventory for university students in a teacher-training program. Educ. Psychol. Meas. 49:549-561.
Gönen S, Kocakaya S (2006). Physics teachers' opinions towards physics instruction activities and content of physics textbooks. J. Turkish Sci. Edu. 3(1):86-96.
Gündüz B, Çapri B, Gökçakan Z (2012). Examining of the burnout level of university students. Dicle University J. Ziya Gökalp Faculty Educ. 19:38-55.
Hackett G (1985). Role of mathematics self-efficacy in the choice of math-related majors of college women and men: A path analysis. J. Couns. Psychol. 32(1):47-56.
Hough LW, Piper MK (1982). The relationship between attitudes toward science and science achievement. J. Res. Sci. Teach. 19(1):33-38.
Inan D (1988). Physics I-Kinesis. (2. Ed.). Ankara: Hacettepe University Publishing.
Islim Ü (2006). The effect of students affective characteristics to their success in physics lessons. Unpublished Master's Thesis. Konya: Selçuk University Institute of Science.
Kan A, Akbaş A (2006). Affective factors that influence chemistry achievement (attitude and self efficacy) and the power of these factors to predict chemistry achievement-I. J.Turkish Sci. Educ. 3(1):76-85.
Karakoyun F, Kavak MT (2008). Advantage of web survey and the application of web survey to the physics attitude scale as an example of practice. Dicle University J. Ziya Gökalp Faculty Educ. 11:129-141.
Kutsal D, Bilge, F (2012). A study on the burnout and social support levels of high school students. Egit. Bilim 37(164):283-297.
Lane J, Lane AM, Kyprianou A (2004). Self-efficacy, self-esteem and their impact on academic performance. Soc. Behav. Personal. 32(3):247-256.
Levin T, Naama S, Zipora L (1991). Achievements and attitudinal patterns of boys and girls in science. J. Res. Sci. Teach. 28(4):315-328.
Marjoribanks K (1976). School attitudes, cognitive ability, and academic achievement. J. Educ. Psychol. 68:653-660.
McCarthy ME, Pretty GM, Catano V (1990). Psychological sense of community and student burnout. J. Col. Student Dev. 31:211-216.
Neumann Y, Finaly-Neumann E, Reichel A (1990). Determinants and consequences of students' burnout in universities. J. High. Educ. 61(1):20-31.
Nowack KM, Hanson AL (1983). The relationship between stress, job performance, and burnout in college student resident assistants. J. Col. Student Person. 24:545-550.
Özyürek A, Eryılmaz A (2001). Factors affecting students towards physics. Egit. Bilim 26(120):21-28.
Pajares F, Miller MD (1994). The role of self-efficacy and self-concept beliefs in mathematical problem-solving: A path analysis. J. Educ. Psychol. 86:193-203.
Pintrich PR, De Groot E (1990). Motivational and self-regulated learning components of classroom academic performance. J. Educ. Psychol. 82(1):33-50.
Schaufeli WB, Leiter MP, Maslach C, Jackson SE (1996). Maslach Burnout Inventory–General Survey. In: Maslach C, Jackson SE, Leiter MP (Eds.), The Maslach Burnout Inventory-Test manual (3rd ed.). Palo Alto, CA: Consulting Psychologists Press.
Schaufeli WB, Martinez I, Marques-Pinto A, Salanova M, Bakker A (2002a). Burnout and engagement in university students: A cross-national study. J. Cross Cult. Psychol. 33:464-481.
Schaufeli WB, Salanova M, Gonzalez-Roma V, Bakker A (2002b). The measurement of burnout and engagement: A confirmatory factor analytic approach. J. Happiness Stud. 3:71-92.
Schibeci RA, Riley JP (1986). Influence of students' background and perceptions on science attitudes and achievement. J. Res. Sci. Teach. 23:177-187.
Schunk DH (1985). Self-efficacy and classroom learning. Psychol. Schools 22:208-223.
Selçuk GS, Çalışkan S, Erol M (2008). Physics self-efficacy beliefs of student teachers': The relationships with gender and achievement perception. Balkan Physics Letters. Turkish Physical Society 24th International Physics Congress.
Shaw KA (2004). The Development of a physics self-efficacy instrument for use in the introductory classroom, AIP Conference Proceedings 720(1):137-140.
Shrigley RL, Koballa TR, Simpson RD (1988). Defininig Attitude For The Science Educatiors. J. Res. Sci. Teach. 25(8):659-678.
Smist JM (1993). General chemistry and self-efficacy. Paper presented

at the National Meeting of the American Chemical Society, Chicago, IL, August.

Talton EL, Simpson RD (1987). Relationships of attitude toward classroom environment with attitudes toward and achievement in science among tenth grade biology students. J. Res. Sci. Teach. 24:507-525.

Witt-Rose DL (2003). Students self-efficacy in College Science: An investigation of gender, age and academic achievement. Unpublished Master's Thesis. University of Wisconsin-Stout, Stout, Wisconsin.

Yang HJ (2004). Factors affecting student burnout and academic achievement in multiple enrollment programs in Taiwan's technic al-vocational colleges. Int. J. Educ. Dev. 24:283-301.

Zeldin A, Pajares F (2000). Against the odds: Self-efficacy beliefs of women in mathematical, scientific and technological careers. Am. Educ. Res. J. 37:215-246.

Zimmerman BJ, Bandura A, Martinez-Pons M (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. Am. Educ. Res. J. 29:663-676.