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# The Mediator Role of Learning Strategies in the Relationship between Academic Self-Efficacy and Test Anxiety

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## Abstract

The purpose of this study was to determine the mediator role of learning strategies in the relationship between academic self-efficacy and test anxiety. This research was done in a descriptive-correlational manner. The sample of study consisted of 350 public high school students from four high schools in Kerman selected through random multistage cluster sampling method. To gather the data, the academic self-efficacy Scale (Jinks - Morgan, 1999), learning strategies scale (Kember & et al., 2004), and the test anxiety scale (Friedman-Jacob, 1997) were used. Path analysis results showed that Academic self-efficacy had both direct ($\beta$=−.20), and indirect effects, mediated by Deep and Surface strategies ($\beta$=−.08). Deep learning strategy was the strongest predictor, with a direct effect value of -0.32. The explanatory power of the predictors on test anxiety was medium (R2= 0.36). Considering the results, the learning strategies (deep) and academic self-efficacy had a significant effect on students' test anxiety. Therefore, strengthening of this individual feature in students can lead to the better performance of students in the exam situation by decreasing test anxiety.

*Keywords:* learning strategies, academic, self-efficacy, test anxiety

## Introduction

Situations where individuals are allowed personal evaluation are termed evaluative situation, which will potentially result in performance efforts geared towards high standards leading to test anxiety. Test anxiety is a strong emotional reaction that an individual experiences before and during a test (Akca, 2011). These reactions can severely hinder an individual's ability and negatively affects their feelings about themselves and school (Salend, 2012). Many studies suggested that test anxiety contributes to impaired performances on examinations (e.g. Putwain & Aveyard, 2018). Since test results in most academic and occupational settings have important practical implications for a person's goals and future career, test anxiety is frequently reported to be a meaningful factor influencing test scores.

Test anxiety has been investigated extensively and intensively regarding its relationship to academic achievement, as well as other psychological and social constructs. Several studies have investigated the relationship between self-related beliefs (such as self-concept, self-efficacy, self- confidence, and self-regulation) and academic achievement with test anxiety (Asayesh et al., 2016; Bonaccio & Reeve, 2010; Gbollie & Keamu, 2017; Lindsay, 2010; Malekshahi et al., 2018; Salar et al., 2016). Therefore, it is important to explore multifarious antecedent of test anxiety that causes detrimental functioning and poor mental health.

Nevertheless, individual differences variables may also be important in understanding anxious behavior. Academic self-efficacy is one of the individual difference variables that may be related to test anxiety. Academic self efficacy is operationally defined as a student's belief for his/her own capabilities and that he/ she can accomplish a given task and can produce desired outcomes (Bushra & Lubna, 2014). Studies assessing the relationship between self-efficacy and test anxiety have been conclusive in the finding that test anxiety and self-efficacy are negatively related (Asayesh et al., 2016; Bonaccio & Reeve, 2010; Gbollie & Keamu, 2017; Malekshahi et al., 2018; Salar et al., 2016). Test-anxious students were likely to performe poorly in the past; they may perceive themselves as dysfunctional individuals.

In addition to academic self-efficacy, another potentially important individual difference variable that may affect test

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anxiety is learning strategy. Strategies to learning refer to the learners' different ways of relating to the learning task (Shelly, 2009). Researchers have broadly categorized learning into deep and surface approaches (Liang et al., 2010). The deep strategy involves wide reading and an attempt to integrate new material into previous knowledge. Surface strategy is a reproductive one in which the focus is on recalling the essential element of content through rote learning. Several studies (e.g. Peleg, 2009; Senel, 2014) show that test anxiety was negatively associated with Deep strategy and moderately positively associated with Surface strategy, supporting the findings of a limited number of previous studies which found evidence suggesting that highly anxious students tend to encode information at a more surface level resulting in poorer learning of the relevant material (Senel, 2014). Naturally, dysfunctional strategies during the preparation phase will lead to eventual failure in test performance. Therefore, students may initially perform poorly on test because of insufficient studying (Peleg, 2009). Hills and Benlow (2008) noted that learning skill is correlated with anxiety as it can impact on person's ability to study and pass tests. Inadequate and inefficient learning strategies can intensify the anxiety that a student may experience during test (Cassady, 2010). One common demonstration of reduced cognitive processing ability among students with test anxiety is the inability to employ effective learning strategies. Studies show (e.g. Chiou & Liang, 2012; Lin & Tsai, 2012; Phan, 2011) that academic self-efficacy is related to learning strategies. Students' level of self-efficacy and attributions for academic achievement partially determine their learning strategies. High self-efficacy by using learning strategies are usually correlated with deep process such as elaboration and organization strategies (Chiou & Liang, 2012; Fenollar et al., 2007; Liem et al., 2008; Lin & Tsai, 2012; Phan, 2011, 2007; Prat-Sala & Redford, 2010; Rocher, 2018; Sins et al., 2008). In Phan's study (2007), it was found that undergraduate students' usage of deep learning strategies positively predicted their self-efficacy. Liem et al. (2008) found that students with high self-efficacy applied deep learning strategies and also obtained better academic achievement. In contrast, students with lower levels of self-efficacy tended to avoid the tasks and activities they believe to be beyond their capabilities. By and large, a positive relationship has been found between learners' self-efficacy and deep strategies to learning and a negative relationship between self-efficacy and surface strategies (Moneta et al., 2007; Prat- Diseth, 2011; Sala & Redford, 2010). In other words, it might be possible that learners who apply deep strategies to learning are more likely to possess higher self-efficacy, while those who utilize a surface strategy are prone to have lower learning self-efficacy (Phan, 2007). In general, empirical evidence from a voluminous body of research studies to date ascertained the combined effects of these two constructs i.e., academic self-efficacy and learning strategies, on test anxiety.

To our knowledge, no study has examined the relationship between academic self-efficacy and learning strategies on test anxiety. In the previous studies like those cited, some studies assessed the impact of the above constructs on test anxiety independently. Previous studies have not generally emphasized the shared role of academic self-efficacy and learning strategies as core to test anxiety. Also, these studies have not directly examined the relationships between academic self-efficacy, learning strategies, and test anxiety. Based on the interpretation of previous research, in the present study, we aimed to examine the possible links between academic self-efficacy, learning strategies, and test anxiety. The hypotheses to be tested in this study include:

1) Academic self-efficacy and learning strategies had a direct effect on test anxiety.

2) Academic self-efficacy had an indirect effect on test anxiety through learning strategies. This model is represented schematically in Figure 1.

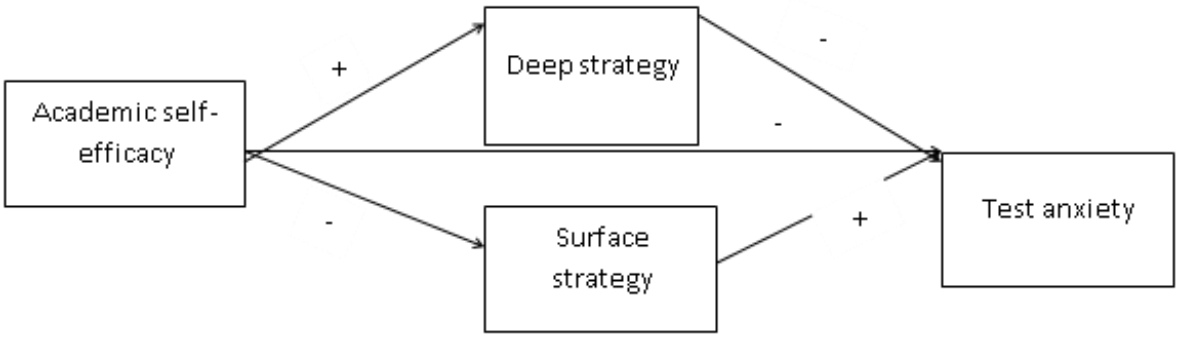


**Figure 1.**

*Hypothesized Model of the relationships between Academic self-efficacy, Learning strategies and Test anxiet*

## Method

Firstly, Ethics committee of Education organization in Kerman approved this study and written informed consents were obtained before conducting the study. Then, participants were informed of the purpose and of the voluntary nature of the study and were ensured anonymity for all given responses.

**Participants**

The sample consisted of 350 public high school students aged between 15 and 19 years (135 males and 215 females, mean age: 17± 0.65) drawn from four high schools in Kerman who were selected by random multistage cluster sampling method in 2017. The participants answered the validated Persian translations of the questionnaires according to the instructions.

## Instruments

### Academic self-efficacy scale (MJSES)

Academic self-efficacy scale (Jinks & Morgan, 1999) is a 30-item self-report scale using a 4-point Likert scale (1=really agree, 4= really disagree). Some example items were "I am smart, I am a good science student, and my friends ask me for help with their homework"). In the present study, results of confirmatory factor analysis indicated that the model was well fit ($x^2$ =67.50, DF = 40, NNFI = .94, CFI = .99, IFI = .95, and RMSEA = .058). For the reliability of the Iranian version of the MJSES the internal consistency coefficient was calculated. The Cronbach's Alphas Internal consistencies were .75 for the whole academic self-efficacy scale.

### Learning strategies scale (R-SPQ-2F)

Learning strategies was assessed using 22 items from Revised learning Process Questionnaire (R-SPQ-2F (Kember et al., 2004). Participants responded to each item on a 5 -point Likert scale (1= never, 5= always) which has two sub-scales: deep-strategy (eleven items), and surface-strategy (eleven items). In the present study, the results of confirmatory factor analysis demonstrated that the items loaded on two factors. Also, it was shown that the two dimensional model was well fit (x2= 67.69, DF = 45, NNFI =.90, NFI = .91, CFI = .91, IFI = .91, RFI = .90, GFI = .95, RMSEA = .054). For the reliability of the Iranian version of the R-SPQ-2F, the internal consistency coefficient was calculated. The Cronbach's Alphas Internal consistencies were .66, .81, and .87 for deep-strategy, surface-strategy, and for the whole learning strategies questionnaire respectively. The corrected item-total correlations of R-SPQ-2F ranged from .39 to .65.

### Test anxiety scale (FTA)

Test anxiety scale (Friedman-Jacob, 1997) is a 23-item self-report scale using a 4-point Likert scale (1= strongly agree, 4= strongly disagree). Some example items were ("If I fail a test I am afraid I'll be rated as stupid by my friends, if I fail a test I am afraid people will consider me worthless). In the present study, Results of confirmatory factor analysis indicate that the model was well fit ($x^2$ =59.23, DF = 34, NNFI = .91, CFI = .98, IFI = .95, and RMSEA = .052). For reliability of the Iranian version of the FTA the internal consistency coefficient was calculated. The Cronbach's Alphas Internal consistencies were .91 for the whole Test anxiety scale**.**

## Data Analysis

The questionnaires were inspected and processed in order to exclude copies with incomplete answers. Valid copies were then assigned numbers and filed. To test the hypothetical model, structural equation modeling (SEM) was used. Using SEM, all the parameters of models can be tested simultaneously in one step. The variables which were entered in structural equation modeling were measured by summing the items of each scale and the specifications on the model which were direct and indirect paths from academic self-efficacy, and learning strategies to test anxiety. This analysis was carried out via LISREL 8.54 (Joreskog & Sorbom, 1996).

## Findings

The descriptive statistics and zero-order correlations among the variables are briefly presented. Means and standard deviations were obtained. Zero-order correlations were conducted between achievement goals, academic self-efficacy and test anxiety.

**Table 1.**
*Descriptive statistics and zero-order correlations among variables*

| Variable | M | SD | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|
| **1. Academic self-efficacy** | 30.18 | 7.44 | - | | | |
| **2. Deep strategy** | 25.22 | 4.08 | 0.55** | - | | |
| **3. Surface strategy** | 23.83 | 3.83 | -0.22** | -0.18** | - | |
| **4. Test anxiety** | 54.60 | 15.64 | -0.23** | -0.24** | 0.19** | - |

**p<0.0

The assumptions of SEM were investigated before applying it. Multivariate normality tests which check a given set of data for similarity to the multivariate normal distribution were conducted via LISREL. Several indices may be considered to assess the model fit. Though no index is perfectly reliable separately, it is advised that several fit indices should be used in conjunction to make a decision. It is recommended that the ratio of chi square ($x^2$) to degrees of freedom (df), root mean square error of approximation (RMSEA), goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and normed fit index (NFI) should be used to assess the model fit in general (Kline 2005). The model demonstrated good fit ($\chi 2$/df= 1, 64, GFI= .99, AGFI= .91, CFI= .95, NFI= .95, RFI= .96, and RMSEA= .05). The standardized coefficients in Figure 2 clearly showed that Variables were found to have a direct effect on test anxiety: Academic self-efficacy ($\beta$= -.20), Deep strategy ($\beta$= -.32), and Surface strategy ($\beta$= .11). Academic self-efficacy was both direct ($\beta$=−.20), and indirect, mediated by Deep and Surface strategies ($\beta$=−.08). Deep learning strategy was the strongest predictor, with a direct effect value of -0.32. The explanatory power of the predictors on test anxiety was medium ($R^2$= 0.36).

**Table 2.**
*Direct, Indirect, Total Effects and $R^2$ OF Achievement goal orientations, and Academic Self-efficacy on Test Anxiety*

| Effect | Direct Effect | Indirect Effect | Total Effect | $R^2$ |
|---|---|---|---|---|
| **On test anxiety** | | | | 0.36 |
| **Of self-efficacy** | -0.20 | -0.08 | -0.28 | |
| **Of deep strategy** | -0.32 | - | -0.32 | |
| **Of surface strategy** | 0.11 | - | 0.11 | |

Note: all estimated parameters are standardized and all were statistically significant (p<0.001).

The results of multivariate normality tests showed sufficient evidence to prove that the distributions of data are multivariate normal. According to this model, learning strategies is predicted by achievement goal orientations. Figure 2 presents the results of SEM analysis.

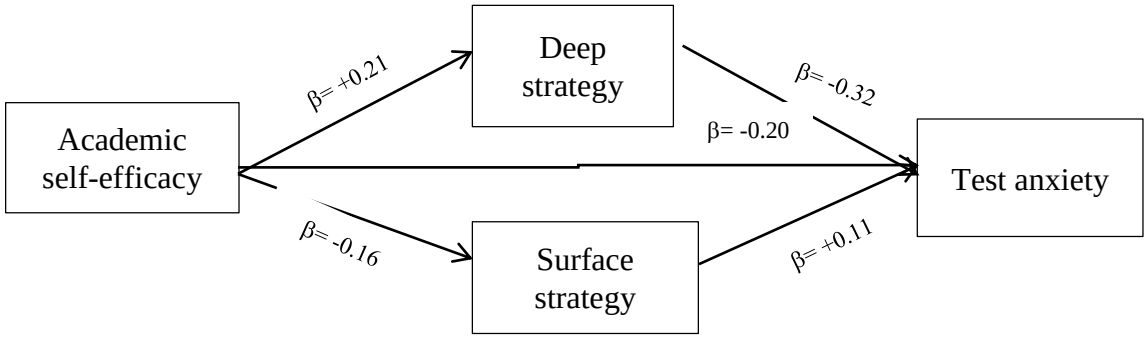


**Figure 2.**
*Final Integrated Model of Academic self-efficacy and Learning strategies with Test anxiety*

## Discussion and Conclusion

In this study, we modeled the concurrent effects of two learning experience-related variables on students' test anxiety. The results from SEM showed academic self-efficacy and learning strategies as two significant determinants of test anxiety. In interpreting the results of the present findings, several plausible explanations exist. First, academic self-efficacy directly and indirectly showed powerful relationships with test anxiety. As predicted, academic self-efficacy was significantly and directly related to test anxiety. This result is parallel with previous studies (Asayesh et al., 2016; Bonaccio & Reeve, 2010; Gbollie & Keamu, 2017; Malekshahi et al., 2018; Pintrich & DeGroot, 1990; Putwain et al., 2010; Salar et al., 2016). Self-perception of the test taker is a significant consideration that determines whether individuals who take the tests believe that they are able to pass the standards of the test and feeling of whether they are adequately prepared for the exam, both perception of low self-efficacy and incompetence (Bonaccio & Reeve, 2010; Putwain, Woods, & Symes, 2010). Students with higher academic self-efficacy showed lower levels of test anxiety. Thus it appears that low self-efficacy of test-anxious individuals may be explained by the past poor performance of the test-anxious individuals. Second, learning strategies was significantly and directly related to test anxiety. This result is parallel with previous studies (Senel, 2014; Spada et al., 2006). Ineffective strategies during the preparation phase will lead to eventual failure in test performance. Several studies show students may initially perform poorly on test because of insufficient studying and tend to encode information at a more superficial level resulting in poorer knowledge of the relevant material (Peleg, 2009; Senel, 2014). Third, as expected, the interaction between academic self-efficacy and learning strategy was significant in predicting test anxiety. There was the positive effect of academic self-efficacy on deep learning strategy and the negative effect of deep learning strategy on test anxiety. Confirming the existing research results that students who possess high level of academic self-efficacy and employ effective learning strategy have low test anxiety (Pintrich & De Groot, 1990). Students with higher academic self-efficacy may believe that they can learn well and that they have sufficient cognitive resources to achieve success in examinations, thus leading to lower levels of anxiety (Chiou & Liang, 2012; Fenollar et al., 2007; Liem, Lau & Nie, 2008; Lin & Tsai, 2013; Phan,2007, 2011; Prat-Sala & Redford, 2010; Rocher , 2018; Sins et al., 2008). On the other hand, the negative effects of academic self-efficacy on surface learning strategy as well as the positive effect of surface learning strategy were observed on test anxiety. One common demonstration of reduced cognitive processing ability among students with test anxiety is the inability to employ effective study skills. Students who utilize a surface approach are prone to have lower learning self-efficacy (Phan, 2007) and ineffective strategy (Surface strategy) would be construed as a threat and would therefore increase their anxiety levels. This study demonstrated, however, that it may increase students' test anxiety levels when their academic self-efficacy is low and employ ineffective learning strategy. On a more general level, our study suggests that in order to understand the complex patterns of the relationship between variables, researchers are advised to focus not only on the main effects of antecedent variables on outcomes, but also on identifying and testing how moderators interact with antecedents to produce differential relations.

Several limitations are associated with the present study. This study showed that effects of academic self-efficacy and learning strategies on test anxiety are significant. However, our results might be partly limited due to the fact that the present study focused on the psychological belief constructs (e.g. academic self-efficacy, learning strategies, and test anxiety) measured by self-reports and the correlational nature of the study does not allow us to infer causal relationship.

Nevertheless, the findings of this study adds information to the educational psychology field and further emphasizes on the importance of learning strategies as well as academic self-efficacy for the progress and achievement. Future studies might investigate different perspectives of learning strategies and involve other variables in the relationship between academic self-efficacy and test anxiety.

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## References

1. Akca, F. (2011).The relationship between test anxiety and learned helplessness. *Social Behavior and Personality, 39*(1), 101-112.
2. Asayesh, H., Hosseini , M.A., Sharififard , F., & Taheri Kharameh, Z. (2016). The relationship between self-efficacy and test anxiety among the paramedical students of Qom University of Medical Sciences.

*Journal of Advances in Medical Education, 1*(3), 15-23.
3. Biggs, J.B., Kember, D., & Leung, D.Y.P. (2001). The Revised Two Factor Study Process Questionnaire: R-SPQ-2F. *British Journal of Educational Psychology. 71,* 133-149.
4. Bonaccio, S., & Reeve, C. L. (2010). The nature and relative importance of students' perceptions of the sources of test anxiety. *Learning and Individual Differences, 20,* 617-625.
5. Bushra, A., & Lubna, G. (2014). Self-efficacy and academic performance of the students of Gujarat university. *Pakistan, Academic Research International, 5*(1), 283-290.
6. Cassady, J. C. (2010). *Test anxiety: Contemporary theories and implications for learning.* In J.C. Cassady (Ed.), Anxiety in Schools: The causes, consequences, and solutions for academic anxieties (pp. 7-26). New York, NY: Peter Lang.
7. Chiou, G. L., & Liang, J. C. (2012). Exploring the structure of science self-efficacy: A model built on high school students' conceptions of learning and approaches to learning in science. *The Asia-Pacific Education Researcher, 21*(1), 83–91.
8. Diseth, A. (2011). Self-efficacy, goal orientations and learning strategies as mediators between preceding and subsequent academic achievement. *Learning and Individual Differences, 21*(2), 191–195.
9. Fenollar, P., Rom´an, S., & Cuestas, P. J. (2007). University students' academic performance: An integrative conceptual framework and empirical analysis. *British Journal of Educational Psychology, 77,* 873–891.
10. Fridman, I., & Bendas-Jacob, O. (1997). Measuring perceived test anxiety in adolescents: A self-report scale. *Educational and Psychological Measurement, 57,* 1035-1046.
11. Gbollie, C., & Keamu, H. P. (2017). Student Academic Performance: The Role of Motivation, Strategies, and Perceived Factors Hindering Liberian Junior and Senior High School Students Learning. *Education Research International, 1789084*, 1-11.
12. Hills, J.P., & Benlow, H. (2008). *Effective study skills*: London: Ben Book Co.
13. Jinks, J., & Morgan, V. (1999). Children's perceived academic self-efficacy: An inventory scale. *Clearing House, 72*(4), 224-230.
14. Joreskog, K. G., & Sorbom, D. (1996). *LISREL 8 reference guide.* Lincolnwood, IL: Scientific Software International.
15. Liang, J. C., Lee, M. H., & Tsai, C. C. (2010). The relations between scientific epistemological beliefs and approaches to learning science among science-major undergraduates in Taiwan. *The Asia-Pacific Education Researcher, 19*, 43-59.
16. Liem, A.D., Lau, S., & Nie, Y. (2008). The role of self-efficacy, task value, and achievement goals in predicting learning strategies, task disengagement, peer relationship, and achievement outcome. *Contemporary Educational Psychology, 33*, 486–512.
17. Lin, T. J., & Tsai, C. C. (2013). A multi-dimensional instrument for assessing Taiwan high school students' learning self-efficacy in relation to their approaches to learning science. *International Journal of Science and Mathematics Education, 11*(6), 1275-1301.
18. Lindsay, P.C. (2010). *Assessing the relationships among goal orientation, test anxiety, self-efficacy, metacognition, and academic performance*. M.A. Thesis, Northern Illinois University, USA.
19. Malekshahi, F., Farhadinia, M., Qulipor, P., & Jalilvand, M. (2018). Relationship learning strategies and academic self-efficacy with academic achievement of students in Lorestan University of Medical Sciences in 2016. *Journal of Yafteh, 19*(5), 9-17.
20. Moneta, G. B., Spada, M. M., & Rost, F. M. (2007). Approaches to studying when preparing for final exams as a function of coping strategies. *Personality and Individual Differences, 43*(1), 191–202.
21. Peleg, O. (2009). Test anxiety, academic achievement, and self-esteem among Arab adolescents with and without learning disabilities. *Learning Disability Quarterly, 32*, 11-20.
22. Phan, H.P. (2007). An examination of reflective thinking, learning approaches, and self-efficacy beliefs at the University of the South Pacific: A path analysis. *Educational Psychology, 27(*6), 789–806.
23. Phan, H. P. (2011). Interrelations between self-efficacy and learning approaches: A developmental approach. *Educational Psychology, 31*(2), 225–246.
24. Pintrich, P. R., & De Groot, E. V. (1990). Motivational and Self-Regulated Learning Components of Classroom Academic Performance. *Journal of Educational Psychology, 82*(1), 33-40.
25. Prat-Sala, M., & Redford, P. (2010). The interplay between Motivation, Self-Efficacy and Approaches to Studying. *British Journal of Educational Psychology, 80*(2), 283-305.
26. Putwain, D. W., & Aveyard, B. (2018). Is perceived control a critical factor in understanding the negative relationship between cognitive test anxiety and examination performance? *SCH Psychol Q, 33*(1), 65-74.
27. Putwain, D. W., Woods, K. A., & Symes, W. (2010). Personal and situational predictors of test anxiety of students in post-compulsory education. *British Journal of Educational Psychology, 80*, 137-160.
28. Rana, R. A., & Mahmood, N. (2010).The relationship between test anxiety and academic achievement. *Bull Educ Res, 32*, 63-74.
29. Rocher, A. R. (2018). Active learning strategies and academic self-efficacy relate to both attentional control and attitudes towards plagiarism. *Active Learning in Higher Education, 00*(0), 1-14.
30. Salar, A. R., Baghaei, R., Sadegh Zare, S., & Salar, E. (2016). The survey of the relationship between test anxiety and self-efficacy among the city of Urmia's medical sciences university students in 2016.

*International Journal of Medical Research & Health Sciences, 5*(9), 591-595.
31. Salend, S. J. (2012). Teaching students not to sweat the test. *Phi Delta Kappan, 93*(6), 20-25.
32. Senel, E., Yeniyol, C., & Kole, O., & Adilogullari, I. (2014). Examination of the relation between school of physical education and sport students' approach to learning and studying and test anxiety. *Nigde University Journal of Physical Education and Sport Sciences, 8*(1), 140-148.
33. Shelly, U. (2009). Goal orientation and learning strategies in relation to academic achievement of elementary school students. *Journal of All India Association of Educational Research, 21*(2), 70-76.
34. Sins, P. H. M., Van Joolingen, W. R., Savelsbergh, E. R., & Van Hout-Wolters, B. (2008). Motivation and performance within a collaborative computer-based modeling task: Relations between students' achievement goal orientation, self-efficacy, cognitive processing, and achievement. *Contemporary Educational Psychology, 33*, 58–77.
35. Spada, M. M., Nikcevic, A., Moneta, G. B., & Ireson, J. (2006). Metacognition as a mediator of the effect of test anxiety on a surface approach to studying. *Educational Psychology, 26*(5), 615–624.