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ARTICLE

**Determining the effect of reducing procrastination tendency
on the academic achievement in physics course**

Naki Erdemir

Full Length Research Paper

Determining the effect of reducing procrastination tendency on the academic achievement in physics course

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In this research, the effect of reducing procrastination tendency on the academic achievement of pre-service science teachers in the physics course was investigated. In this, a quasi-experimental research design was used, which included the experimental and control groups. Each group consisted of 35 pre-service science teachers. Both groups were taught a physics course at the undergraduate level by the same lecturer. While reducing procrastination tendency activities and strategies were applied in the experimental group, the conventional teaching method was applied in the control group. Data were collected by Physics Achievement Tests developed by the researcher for use in previous researches. Data analysis was tested, using IBM SPSS 22.0 statistical package program by taking into account the importance level between pre-test and post-test. After analyzing the data, in light of the findings of the research, the academic achievement of pre-service science teachers in the experimental group was found to be higher than the academic achievement of the candidates in the control group. Thus, it has been determined that special strategies and sanctions related to reducing procrastination tendency in the experimental group have a positive effect on achievement. For this reason, special strategies and positive sanctions can be applied to decrease procrastination tendency to increase the achievement in physics course of pre-service science teachers.

Key words: Achievement in physics course, pre-service science teacher, procrastination tendency.

INTRODUCTION

It is known that the accession of the countries to the level of contemporary civilization depends on the researches and discoveries made in the field of science. Today, science and technology and sub-branches of science constitute the substructure of a modern world-view characterized by objective, rational, scientific-technological tools. In particular, the research methods and outcomes of physics affect other branches of science

and, due to this fact; find wide application in practice (Nalcaci et al., 2011). The fact that physics has a wide application area and increase its effect on the prevalence, it affects both thought system and view of nature as well as events in nature (Landau, 2006).

Physics is the understanding of nature, learning the causes and consequences of natural phenomena and expressing them with mathematical methods. Physics is

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a science that tells us what we know about the universe, how the information that has reached the day-to-day emerges, and what kind of situations have come to fruition in a forthcoming new invention (Bozkurt and Sarikoç, 2008). In addition, issues such as the defense of an individual against foreign powers, the effective use of their resources and the attainment of economic freedom depend on technological developments in the field of science that the country will develop. These technological developments are possible only with the development of science fields like physics. For this reason, it is obvious that physics has a great proposition in achieving the levels of contemporary civilization that society's desire, in producing science and developing themselves. The fact that physics has such a vital prescription and its use in many areas of everyday life has made it obligatory for this science to be taught in educational institutions as a course (Cepni et al., 1997).

However, there are many opinions on how to learn such an important course, that there are some difficulties in teaching, that it is difficult to understand, and that it does not reach the desired level. Within this context, considering the LGS (High School Entrance Exam) and YKS (Higher Education Institutions Examination) exams conducted for the transition from secondary education to the undergraduate level in the whole country, it is argued that students are more challenged in physics courses than the other courses. In the research carried out by Tortop (2012), it is stated that the achievement obtained from the physics course is considerably lower than the achievement obtained from the other courses, and cannot be meaningful in this case. Based on these premises, PISA (Program for International Student Assessment) and TIMSS (Trends in International Mathematics and Science Study) programs are widely used to compare countries' educational performances on an international platform. When the points gained from Turkey's PISA and TIMSS program is considered, it is seen that they are below the average score of OECD countries. It is known that in 2015, it ranked 54th among the 72 countries participating in PISA. Thus, Turkey's average in science remained at a very low level (Ayvaci and Bebek, 2018).

When the literature is examined, the problems of teaching and learning of physics are discussed. Studies have been carried out stating that the abstraction of the concepts involved in the program (Bozkurt and Sarikoç, 2008) is due to lack of knowledge of the teachers and infrastructure facilities (Landau, 2006), lack of cooperation between courses (Eraslan, 2008; Scher and Ferrari, 2007), excess of class presence (Landau, 2006) and the negative attitudes of the students (Kurnaz and Yiğit, 2010). However, sufficient and detailed studies have not been carried out on how to overcome this failure in physics.

Physics courses are perceived and accepted as difficult

courses that many students understand. Consequently, students have lower achievement in it than other courses in secondary education. These students are studying in a memorable manner for a few days, not because they are not indifferent or intelligent, but because they see it as a compulsory subject (Uzun, 2009). Therefore, one of the most important problems encountered in formal education is that effective teaching does not take place in physics classes and similar courses. As a result, physics courses are seen as producing anxiety for many students, and the course-work is always procrastinated (Alptekin et al., 2009).

Many factors affect the student's attitude towards physics and their achievement in physics courses. One of the prominent factors is the tendency to postpone due to the difficulty of the course, leaving the classes to be worked on day by day and leaving it to the last day, making it the mandatory coordination between the examining evening work habit and the other course of physics and mathematics. It is seen that students who are successful in mathematics lessons are more successful in physics course and the students who are successful in physics and mathematics courses have higher positive attitude towards physics (Adesoji, 2008).

Procrastination and achievement relationship

One of the most important reasons underlying behind academic failure in physics course, which educators and psychologists emphasize intensively, is academic procrastination. Academic procrastination is a common problem among students and is a problem that negatively affects the academic performance of students. Procrastination behavior in academic life; it is seen that students postpone working in classes, leaving the task to prepare their homework to the last moment, missed the deadline of submission of important projects, and delayed administrative duties related to academic life (Scher and Ferrari, 2007). In a survey conducted by Owens et al. (2000) on the subject, 70% of university students showed procrastination behaviors in academic life; in Turkey, in a similar research, they were found to show procrastinating behavior at 54% a rate of the students (Uzun, 2009).

Research has shown that academic procrastination negatively affects academic performance (Balkis and Duru, 2010; Beck et al., 2000; Wang and Englander, 2010) and students with academic procrastination behaviors have lower academic achievement (Scher and Ferrari, 2007; Tuckman et al., 2002). Students who are prone to academic procrastination (Jackson et al., 2001) to fulfill academic duties such as completing assignments, studying in class and preparing for exams are likely to be unsuccessful in the academic sense.

Although studies on this area are limited, Giavrimis and Papanis (2008) reported that in their studies with

university students, students showed less procrastination behavior than those who postpone assignments and do not force their capacities. Another issue is that studies have been carried out that those who have higher level of education have higher procrastination (Rosario et al., 2009; Yesil and Sahan, 2012). In relation to the subject, Beck, et al. (2000) found that university students showed more general and academic procrastination behaviors than high school students did.

When one look at the reasons for the tendency to procrastination, the factors such as habit, ignorance, disregard and lack of motivation (Franziska et al., 2007), inability of the individual to manage time (Celik and Odaci, 2015), believe that a job is difficult, low self-esteem, unrealistic expectations (Beck et al., 2000; Howell and Watson, 2007) and working habits may be delayed. Fear of failure and lack of motivation are the most common reasons for not having an important task postponed, not working day by day (Celik and Odaci, 2015). When people tend to approach the tasks they think they can achieve, they tend to avoid tasks that they believe are difficult, or they tend to postpone them permanently. When researches in this context are examined, it can be said that one of the important factors in exhibiting academic procrastination behavior is failure anxiety and self-efficacy belief (Scher and Ferrari, 2007; Steel, 2007; Wang and Englander, 2010).

In their study, Ackerman and Gross (2005) emphasized that students were less likely to procrastinate academic duties when the course attracted the attention of the students and the students were rewarded for studying. Thus, the activities that students are interested in and enjoy are a fact that is known to tend to postpone less. It can be said that rewarding to start work also reduces the level of tendency.

In Beck et al. (2000), there was a meaningful relationship between the students who worked in the research and the students who worked for a few days in the past 24 hr in their research of academic tendency and the effect of this behavior on the academic performance. Students who have tendency to procrastinate are less prepared for exams and have lower scores than exams. Similarly, Nartgun and Cakir (2014) stated that students with high procrastination tendencies were less successful than those who had a low tendency to postpone. It was stated that academic postponement was perceived as a common problem among all students (Balkis and Duru, 2010; Howell and Watson, 2007). In parallel with this, Elvers et al. (2003) stated that 70% of university students had an academic procrastination problem.

It was also found that people with a tendency to postpone tend to attribute their achievements to external factors, while those with a low tendency to postpone tend to attribute their achievements to internal factors. At the same time, procrastination is considered a motivation problem. Students having procrastination behavior may

not be lazy, but are sufficiently unmotivated to work. For this reason, they could not use their time effectively and willingly (Tuckman et al., 2002; Wikman, 2003).

In short, the result is the same regardless of the postponed work; postponed work affects another business. Postponed things that are not done can become inconceivable, as they get overdue. Procrastination is actually a significant problem. Many students postpone their homework at some stage and experience a low academic performance or stress due to the procrastination (Kagan et al., 2010; Kandemir, 2014; Rosario et al., 2009). For this reason, the problem of systematically failing to work or postpone studying for students' academic achievement is one of the main problems that has kept the agenda of parents and teachers busy for years. Similarly, educators and psychologists have always kept the question of how one can motivate students to study. Because the most important problem with the study is that, the brain does not like to study. For this, human beings must be determined and diligent. Despite the pleasurable aspects of learning, studying is an extremely tedious and undesirable activity. Although it is difficult for people to learn to learn, while studying intrinsically is an intrinsic orientation, learning is an external demand (Filimonov, 2017). For this reason, systematic work for long-term goals requires great patience and perseverance. In addition to a strong will for pleasure, it should never be postponed when studying in a patient-oriented manner in order to achieve academic achievement. In order to be ready for exams, continuous reading activity should be continued in a systematic manner. It has been pointed out that the level of achievement of a student who is unable to read effectively and cannot understand what he or she has read in the first step of each lesson is lower (Uzun, 2009). Accordingly, as the level of comprehension of the students increases, the academic achievement increases (Nartgun and Cakir, 2014). From this point of view, the psychological dimension of the tendency of procrastination in reading should be motivated.

Motivation is defined as orientation and action to specific purpose, willingly. It is divided into internal and external motivation. Children with high internal motivation want to know their goals and work in a planned manner. They can focus on their goals when they set them and they can act towards their goals with patience and determination. However, when the inner motivation is excessive, one is faced with ambition. The most important thing for academic achievement is that students should be supported with a sense of perseverance (Filimonov, 2017).

Researches related to internal motivation show that individuals have successful strategies in self-direction, directing their mental state in a positive way and self-monitoring, motivation to work (Tice and Baumeister, 1997). For this reason, it can be said that what students

really need is not working hard, but have will, a correct and conscious sense of working on time (Ayvaci and Bebek, 2018). There are research findings that education based on voluntariness, timely and systematic working habits have improved academic achievement (Nartgun and Cakir, 2014). The conscious worker in his / her courses evaluates his / her ability and skills in the best way (Uzun, 2009).

If the external motivation is high in students, the result is focused. They often need to be guided by trainers. Most of the time they get bored quickly and they can break the work they started. There are endless excuses. One of the most typical pretexts is that they tend to postpone the work that needs to be done the next day. In order to gain success in their academic endeavors, the students must taste the sense of achievement, and therefore ways to improve internal motivation by reducing external motivation should be sought. Thus, the belief that the students who have difficulty in studying the course will be successful must be preserved. Because the most dangerous approach to the student in academic achievement is to lose hope for the student to succeed. For this reason, it is best to start with the topics that students can achieve, rather than the topics they cannot achieve. Because students are more likely to be strong, productive and insistent when they believe they can be successful academically, they are using more of their work strategies (Ackerman and Gross, 2005; Tice and Baumeister, 1997). Thus rewarding can be regarded as a kind of motivation. The student is rewarded with one of the most effective methods of disciplining the course, raising academic achievement, gaining new habits and adopting new behaviors. It is then possible to switch from external motivation to internal motivation.

The most obvious indicators embodying academic achievement are grades given by teachers. In accordance with these grades, the student is defined as "successful" or "unsuccessful" according to the determined achievement standard. In the research conducted in the field of education means academic achievement that the students' grades in the theoretical sense are above a certain average. Academic failure is the difference between the points that the students have to take and the score they have received under their capacity (Sezgin et al., 2016; Keskin and Yapıcı, 2008). Considering academic achievement in this respect, four variables are emphasized. These are academic skills, field knowledge, motivational factors and learning strategies. Taking into account the motivational factors that attention is being drawn to, the reasons that affect academic achievement are the same as those that affect efficient and systematic study habits. These reasons include lack of motivation, lack of prior knowledge, slow reading, mental occupation, working at the wrong time of day, lack of confidence and excessive stress, not being able to understand the integrity of the subject, music,

television and telephone effects (<http://sgb.meb.gov.tr>).

In short, it is known that there are serious problems in the academic achievements of physics students at national and international level. The attitudes of students towards physics, the thoughts and beliefs about the course, the habits of studying and constantly postponing tendency are very influential. Personality traits (Keskin and Yapıcı, 2008), academic characteristics of students at national and international level related to academic failure in physics class, tendency of academic demotivation and procrastination (Scher and Ferrari, 2007; Steel, 2007) family characteristics and participation (Rafiq et al., 2013), emotional intelligence, self-efficacy (Rosario et al., 2009) environmental and social problems (Giavrimis and Papanis, 2008; Köksal et al., 2013) were investigated in various researches.

Briefly, when literature is examined, the effects of different teaching methods and instruments on different subjects and levels of physiology are examined. Studies that investigate the reasons behind the academic failure in physics in some educational environments have not yet reached a satisfactory level. In addition, there have been very few studies related with these problems, and suggestions of problems that have been encountered in the teaching and learning of physics by including students in the process of academic failure of students. When the relevant literature is examined, the relationship between academic achievement and procrastination tendency, especially in physics courses, has not been found to be based on compelling evidence in Turkey or abroad. In this respect, the procrastination tendency is an important issue with respect to obtaining achievement in the physics course.

Research focus

Partial studies on "procrastination tendency", which educators and psychologists emphasize intensively, the problem related with the academic achievement and the tendency of academic procrastination in the physics course attracts attention to the lack of qualified studies which could provide solution. In physics where students are difficult to believe, it is necessary to determine whether the tendency to postpone academic achievement is the effect and if so, what the direction is. For this reason, this research was conducted to test the academic achievement in physics courses by reducing the tendency of procrastination of pre-service science teachers in physics in the faculty of education. The tendency to postpone the course-work was reduced to a minimum with a number of special applications and sanctions (strategies), ensuring that students work day by day. Although the course in the daily activity is boring and stressful, the students have been oriented to the activities they have done during the course to which they have

been compelled, rewarded, motivated, and made to believe to show promising scores in the future. Therefore, every student tried to come to the lesson well prepared. In this way, it has been accepted that the tendency of academic procrastination is reduced to a minimum.

For this reason, the following questions were answered

In order to test whether there is any difference between the academic achievements in the physics course of the students who postpone and do not postpone the study, the following four questions have been sought to be answered.

1. Is there a statistically significant difference between the pre-test and post-test scores of the experimental and control groups?
2. Is there a statistically significant difference between the pre-test and post-tests cores of the experimental group?
3. Is there a statistically significant difference between the pre-tests cores of experimental and control group?
4. Is there a statistically significant difference between the post-tests cores of experimental and control group?

MATERIALS AND METHODS

General background

The question of whether there was any effect of reducing procrastination tendency on the academic achievement of pre-service science teachers in physics course was handled. While reducing procrastination tendency was accepted as an independent variable, academic achievement in the physics course was considered as a dependent variable. Therefore, the method of quasi-experimental research design was used in the current research. In this design, there were two groups of subjects, one was the experimental group and the other was the control group. At the beginning of the research, both groups were applied pre-test. After different applications carried out on the experimental group, the post-test was applied to both groups to determine the effect of the dependent variable. Thus, the two groups were measured two times and the points obtained were compared to each group in a cross-sectional manner (Fraenkel et al., 2012).

Sample of research

This research was carried out with 70 pre-service science teachers taking the physics course in the fall semester of the 2017-2018 academic year in Education Faculty in the YüzüncüYıl University in Turkey. These pre-service science teachers will become science teachers in secondary schools (fifth, sixth, seventh and eighth grades) when they graduate from the faculty. Pre-service science teachers enrolled in the first year of the faculty of education consisted of two groups. One of which is A, and the other group is B. The pre-service science teachers of both groups have the same university entrance scores, and their socio-economic

conditions are close to each other. For this reason, one of the groups was chosen as the experimental group and the other as the control group. In both groups had these candidates to take the physics course four hours a week in the first year.

Each group in the research consisted of 35 pre-service science teachers. Of the 70 pre-service science teachers participating in the research, 40 were female and 30 were male. In addition, pre-service teachers were willing to investigate, and their age range was around 17-24 ($M = 20.12$, $SD = 4.12$). In addition, pre-service science teachers constituting the research sample were of Kurdish origin in a percentage of 95% in Turkey. Their socioeconomic status was below the average in Turkey. For this reason, in order to become teachers when they graduate from the faculty, their achievement levels in KPSS (Public Personnel Selection Exam) are above the average in Turkey. Because, there are no alternatives other than becoming a public servant. The university in which pre-service science teachers are registered to participating in the research is the region's best university, and the faculty members working in every province in Turkey are from various cities of the country.

Research instrument

In this research, physics achievement test was used as a measurement tool. The researcher for other studies developed this physics achievement test. The physics achievement test developed by the researcher had also been used before in the researches for different purpose and sample. Here, one will not statistically explain the development of the test in detail since it was explained in detail in previous studies. The physics achievement test (the latest form) consisted of 20 items related to the topic on mechanics in physics. Briefly, the process of developing test, the researcher prepared 25 items, multiple-choice test. In order to test the validity and reliability of the physics achievement tests, the tests were applied to 40 pre-service mathematics teachers attending the same faculty. After this application, sentences and concepts that were not understood in the test questions were corrected. In addition, two measurement and evaluation experts reviewed unclear and unanswered questions. The reliability coefficient of the test (Cronbach's alpha) was found to be .89 using SPSS 22.0 statistical package program.

Procedures

A quasi-experimental method was used in the research. The prepared measuring instruments were applied as pre-test and post-test for both groups. The experimental procedure lasted for nine weeks during the fall semester of the 2017-2018 academic year. Both groups were taught in the weekly course schedule (total of 4 h in a week). In a nine-week experimental research, both groups were taught the same subjects (particle dynamics I and particle dynamics II, motion in one dimension, vectors, planar motion (two dimensions) by the same lecturer. After a two-week course presentation to the students, a pre-test was applied to the experimental and control group to determine whether there was a difference between the pre-test scores of the groups at the beginning of the research. This test, which was applied to both groups, consisted of twenty questions. At the beginning of the subject of physics (vectors and motion in one dimension), it was found that the achievement levels of the groups were very close to each other. For the control group, the lecture was taught using PowerPoint for timesaving by conventional teaching method. Conventional teaching: Classroom methods such as narration, question-answer and classical teaching materials such as writing board and textbook are used in the teaching processes (Aperson

et al., 2006). The lecturer orally elaborated the subjects during the course presentation. The activities were limited to the activities carried out in the classroom. The lecturer who conducted the course presented most of the topics and materials with oral expression, question-answer technique. Only basic text, tables and diagrams, slides are projected onto the screen. The lecturer was not involved in out-of-class activities by limiting his course in class activities of pre-service science teachers in the control group. The same lecturer taught both groups, and the same physics problems were solved during the course presentation.

There were no activities such as giving homework, verbally speaking, doing the examinations every two weeks, summarizing the previous lesson by choosing the students randomly and motivating the students in the control group. In addition, the students in the control group had to take a midterm and a final exam in the normal program of faculty to be successful.

In addition to the conventional teaching method, different strategies were applied to the Experimental Group. These different strategies comprise giving homework to students, checking homework, giving a score to the student doing homework, giving a viva exam score at the beginning of each course to a few students chosen randomly (each student will have a viva oral score by the end of the semester). It also comprise making a short presentation related to subject, reading literary books related to the course to facilitate understanding, suggesting at least two-three source at the end of each course, giving a leaf test related to subject when the section is finished, making students solve relevant leaf test at home, evaluating by collecting solved leaf test, discussing concepts related to the subject in classroom and analyzing.

In addition, the students were given motivational advice as to getting high scores when they worked for 10-15 min, the importance of the course for pedagogical improvement in educational environment and the fact that they should not leave the study on the exam day. This was to present a different application for the students, to make a random oral test from the subject described in the previous lesson, to make an examination in two weeks. This affects the achievement of student in the course to help summarize, by choosing any student who will be present at the commencement of each lesson. These strategies continued as in-class and out-of-class activities. During this kind of activities, students were chosen randomly. As students chosen randomly were representing the same probability of the total number of students, and the students were prepared for the course. The experimental group was informed about how the course was to be taught before the study was started and the planned topics were taught. The requirements of the course to be successful were explained. Outside of the classroom, the students were informed about what kind of activities could be done. Participants were told that they would be rewarded. The experimental study continued for nine weeks (36 h). After the trial was over, the Physics Achievement Test was applied to both groups and the final data were collected.

Data analysis

Whether there was any effect the reducing procrastination tendency in pre-service science teachers' academic achievement in physics course was researched by using IBM SPSS 22.0 package program. Dependent (two sample paired) *t* – test was used to determine whether there was a significant difference between the pre-test and post-test scores of each group. In addition, independent *t*-test was used to determine whether there was a meaningful difference between the pre-test and post-test scores of the experimental and control groups. The importance level was determined as .05.

RESULTS OF RESEARCH

The effect of decreasing the procrastination tendency on the academic achievement of pre-service science teachers in physics courses was studied. Therefore, the arithmetic mean and standard deviation of the pre-test and post-test scores of both groups were calculated. For this, the *t*-test was used to determine whether there was a significant difference between the scores of the groups. In the first step of our trials, as shown in Table 1, when arithmetic mean values of the pre-test scores and standard deviations of the Readiness Test were calculated, the achievement mean of the experimental and control groups were found the same and as expected, as can be seen from Table 1. These results indicated that the physics achievement levels of both student groups were the same before the research. After pre-test achievement mean values were analyzed as they can be seen in Table 1, the mean scores of the experimental group was found as $\bar{X} = 61.02$, and the mean score of the control group was $\bar{X} = 60.92$, and standard deviations of the pre-test of the control and the experimental groups were determined as $SD = 13.48$, $SD = 13.39$, respectively. Consequently, it was shown that there was no statistically significant difference between the pre-test scores of the experimental and control groups when achievement mean values of both groups were calculated ($t_{(72)} = 0.00$, $p < 0.317$).

In the second step of our trials, as shown in Table 2, the post-test mean score of the experimental group was = 75.59, and that of the control group was $\bar{X} = 63.52$, and standard deviations of the experimental and control groups were $SD = 15.05$, $SD = 12.57$, respectively. The mean score of the experimental group was found to be higher than the mean of the control group, as can be seen from the results in Table 2. Therefore, the difference between the achievement mean values of groups was found to be in favor of the experimental group. These results are significant from the statistical point of view ($t_{(72)} = 11.85$, $p < 0.005$). This significant difference indicated that reducing procrastination tendency brought about a positive effect on the academic achievement of pre-service science teachers in physics course.

In the third step of our trials, as shown in Table 3, the *t*-test was conducted in order to determine whether or not there was any statistical difference between pre-test and post-test mean scores of the experimental group. The result of the test indicated that the pre-test mean score of the experimental group was $\bar{X} = 61.02$ before application, and the post-test mean score was $\bar{X} = 75.59$ after application, and standard deviations of post-test and pre-test scores of the experimental group were calculated as $SD = 15.05$, $SD = 13.39$ respectively. It was determined

Table 1. T-test results of the pre-test scores of the experimental and the control groups.

Groups	N	\bar{X}	SD	fd	t	p	Significance level
Experimental group	35	61.02	13.39	72	0.00	0.317	$p < 0.05^*$
Control group	35	60.92	13.48				

*Significant at level $p < 0.05$.

Table 2. T-test results of the post-test scores of the experimental and the control groups.

Groups	N	\bar{X}	SD	fd	t	p	Significance level
Experimental Group	35	75.59	15.05	72	11.85	0.005	$p < 0.05^*$
Control Group	35	63.52	12.57				

*Significant at level $p < 0.05$.

Table 3. The difference between pre-test and post-test scores of the experimental group.

Variable	N	\bar{X}	SD	fd	t	p	Significance level
Pre-test	35	61.02	13.39	72	-6.41	0.000	$p < 0.05^*$
Post-test	35	75.59	15.05				

*Significant at level $p < 0.05$.

Table 4. The difference between pre-test and post-test scores of the control group.

Variable	N	\bar{X}	SD	fd	t	p	Significance level
Pre-test	35	60.92	13.48	72	3.22	.055	$p < 0.05^*$
Post-test	35	63.52	12.57				

*Significant at level $p < 0.05$.

that there was a significant difference between mean scores of pre-test and post-test of the experimental group. This significant difference between the scores of the experimental group is statistically meaningful ($t_{(72)} = 6.41, p < 0.000$).

Finally, as shown in Table 4, while the mean pre-test score of the control group was $\bar{X} = 60.92$, the post-test mean score was $\bar{X} = 63.52$. The standard deviation of the pre-test and post-test scores was $SD = 13.48$ and $SD = 12.57$, respectively. The t-test was used to determine whether there was a statistically significant difference between the pre-test and post-test mean scores of the control group. It was determined that there was little or no important value. The difference between post - test and pre-test scores of the control group was calculated to determine the meaningfulness ($t_{(72)} = 3.22, p < 0.055$).

DISCUSSION

This research was conducted to determine the effect of decreasing procrastination tendency on the academic achievement of pre-service science teachers in the physics course, through various strategies and activities. Therefore, different trials and strategies were applied to the experimental and control groups; pre-test and post-test were also applied to both groups. Findings of the research show that the relationships between variables are in the expected direction. As seen in Table 1, the mean scores of the experimental and control groups were found the same. Consequently, there was not any significant difference between the pre-test scores of the experimental and control groups when the mean achievement of both groups were analyzed, as expected. It can be expressed that readiness levels of the pre-

service science teachers related to physics course were the same as the pre-test. This feature is an expected outcome for experimental studies (Fraenkel et al., 2012).

According to the results of final test, after the different applications and strategies, and after the procrastination tendency was reduced, students were more successful than traditional methods. That is, the post-test score of experimental group is higher than the post-test score of the control group. It was determined that using the reducing of procrastination tendency method in the experimental group posed an effect on the students' achievement in the physics course. This result is produced ample evidence that reducing of procrastination tendency method had a positive effect on student achievement in the physics course, and this result was supported by the other studies conducted in the field of science (Nalçacı et al., 2011; Wang and Englander, 2010). These researches pointed out that reducing procrastination tendency had an effect on the academic achievement of student in science courses. Moreover, it has been observed that the reduction of procrastination tendency in students who are more willing and happier to learn in the lecture delivery process in the classroom. The students in the experimental group during learning in the class, they feel away from the formal atmosphere of the school and find themselves in a friendlier learning environment.

Due to the nature of the physics course, students are generally taught theoretically in the classroom with conventional methods. These methods make the lectures monotonous, impractical and memory dependent. Therefore, according to other courses students accept the physics lecture as the hardest lecture (Akinsola et al., 2007; Belkıs and Duru, 2010). The first reason for this is that the student does not work on the day and postpone studying, and the teaching of the physics in a way, which does not match, with the nature of the physics and the perception of the students. The ineffective application of planned techniques can be shown as the second reason for the problem. The combination of these problems causes the failure of the students in physics course. To overcome this failure, reducing procrastination tendency in the learning methods helps students to increase academic achievement by correcting misunderstanding about the difficulty of physics when reducing at the first step. This result of the research was supported by other studies made in the field of science, as it was shown in the works of Landau (2006) and Alptekin et al. (2009), who suggested that reducing procrastination tendency in physics course encourages the student's active participation in learning physics. When students learned physics course by reducing of procrastination tendency they are able to interpret and understand the physical terms, principles and concepts based on their acquired knowledge and self-confidence.

On the other hand, all different applications and

strategies have strengths and weaknesses, and they have effects on learning depending on the purpose of using them in instruction. Lecturers in higher education must pay attention to different applications and different strategies used in the workplace, and pre-service science teachers in their courses may use these different applications and strategies when they become teachers in the future. They teach it the same way, just as pre-service science teachers learn when they were students in university. Since pre-service science teachers may use the reduction of procrastination tendency in the classrooms and use them creatively in order to promote effective learning for students and satisfy students' learning needs and objectives. Different researches have shown that reducing the tendency of procrastination is used as an alternative teaching strategy to improve students' success and knowledge in physics course (Howell and Watson, 2007; Scher and Ferrari, 2007).

As physics course is not understood by science teacher candidates it can be boring in terms of their. Students' attention and interests may be attracted to learn again in a short time, as this boredom is eradicated with the reducing of procrastination tendency. In addition, present research conducted has indicated that reducing procrastination tendency facilitates learning, draws student's attention and enhances their motivation. Students can perceive fine details, distinctive features and critical points in physics topics in learning with the reducing of procrastination tendency. Moreover, it improves student's skills in problem solving and encourages student's active participation in the learning process. This result supported by Wang and Englander (2010) and Wolters (2003), who highlighted that the reducing of procrastination tendency enhances an adult student's attention, achievement and motivation.

One of the essential conditions for the students to be more successful in the academic sense of the experiment group is to fulfill the duties and responsibilities given in time. It is also confirmed with the findings that it is important to study on a daily basis, not to leave their works to the last day before the exam. Also, to start working earlier and to prepare the assignments given before the deadline, not on the last day of the deadline, has an important role in the academic achievement of the students. Many researchers emphasize that academic procrastination is related to academic achievement in the negative way (Scher and Ferrari, 2007; Nartgun and Cakır, 2014). The reason of the failure in the control group was that pre-service science teachers could not use meaningful learning strategies and could not imagine abstract forms that they could not more understand the physics topics for they were boring, and they hesitated to ask about unknown topics due to misunderstanding. If students are to transfer and apply conceptual information and formulas to the problem solving and their living experiences, physics courses should be presented with

the most appropriate styles of learning by dramatizing mechanics topics with reducing procrastination tendency. This research has discussed how to present the course, how to use the reducing of procrastination tendency and how to separate the students from the conventional classroom environment during lesson presentation, and how to make the students focus on working and comprehensive learning for the reduction of procrastination tendency can positively effect on achievement. Thus, the students may focus solely on the physics topic presented with the reduction of procrastination tendency and pay attention to the elaboration provided by the lecturer. To overcome this, different applications and strategies of the pre-service science teachers, the “intelligent use” of reducing of procrastination tendency was conducted by the lecturer in teaching of physics topics in the classroom. The reduction of procrastination tendency was achieved after a short presentation, explanations were made and the lecturer asked different questions related to presentation of the topics. Thus, the information presented by lecturer was associated with physics topics or overlapped by them, and the lecturer for better recalling of pre-service science teachers in the future elaborated information based on the reduction of procrastination tendency in physics course. When the teacher candidates are not motivated and the activities and strategies that will enable the student to work day by day are not developed, the academic procrastination behavior is increasing; increasing procrastination behaviors reduce the achievement of the individual; when achievement falls, the belief that physics is hard is dominant. Students are failing academically due to the final assignment (Jackson et al., 2001) and procrastination of these obligations in limited time (Tice and Baumeister, 1997), such as completion of assignments, preparation of lectures and preparation for exams; thus, they believe that the lesson is difficult.

Pre-service science teachers fail in the academic sense because they are exhibiting academic procrastination behaviors science they do not work on time, day-by-day, leave the lessons they need to work to last hour, not just because physics is difficult. Failure to fulfill their responsibilities on time increases academic procrastination behaviors and increasing procrastination behaviors decrease academic achievement. This interpretation is in coherence with studies that support the academic procrastination and tendency-academic achievement (Balkis and Duru, 2010; Fritzsche et al., 2003). From this finding, it can be said that the tendency of academic procrastination arising from the lack of fulfillment of responsibilities is an important variable in academic achievement.

Conclusions

In this research, which investigated the effect of reducing

procrastination tendency in teaching physics course, it was shown that reduction of procrastination tendency had a positive effect on academic achievement. It was concluded that the low achievement of the students in the control group was due to lack of knowledge, lack of self-confidence based on knowledge related to physics topics, misuse of a formula, and insufficiency of information related to memorizing formula in solving physics problems. It was found that reducing the tendency of procrastination was useful for the achievement of pre-service science teachers in the physics lesson, which was perceived as difficult and complex based on the lack of knowledge and self-confidence.

It is seen that physics teacher motivates the student in the lesson, encourages them to focus on the course, provides working activities day-to-day and asking questions topics taught in the previous lesson for the first 5-10 min. In addition the teacher gives the students frequent test, rewarding the students, giving the student a score for the lesson, giving the homework and checking of the homework of the students plays an important role in the learning of physics course. Thus, it has been concluded that this method, which focuses on the reduction of procrastination trend, has a positive effect on academic achievement in the physics course.

It has been concluded that decreasing the tendency of procrastination affects the students' interest towards the lesson positively, and helps students raise awareness about meaningful learning, self-confidence and how to learn and where to use their knowledge and skills. In addition, it was concluded that the experimental group, in which the procrastination tendency was reduced, was able to remember the information they had learned compared with the students in the control group completely and easily. As a result, it was concluded that physics course teachers at all levels of education before entering the class should have special strategies and sanctioning skills, in order to reduce the students' procrastination tendency and increase the academic achievement of the physics course.

IMPLICATIONS

The following suggestions were made based on the findings of the research. As students learn and apply effective and productive strategies, they learn on their own, eliminating the idea that lessons are difficult as they learn, and can be individuals who can solve problems. However, at this point, teachers have great duties. This is because a good teacher should know how to motivate their students, how they will learn day to day activities, how they will remember, how they will learn, how they will be taught, and how they will reduce the tendency to postpone. When the student believes that he can succeed in the lessons, he can succeed. The results of the research provide some important findings to the

psychological counsellors whose works are related to procrastination tendency in the academic achievement, to the educators and to the academicians who do theoretical and empirical researches. For this reason, mixed researches of qualitative and quantitative methods can be conducted in order to obtain a more detailed outcome on future interrelationships between variables. Furthermore, research that is more extensive can be conducted to determine if the reduction of procrastination tendency has a positive effect on the academic achievements of the students in different levels of education and the strategies and sanctions used in the research.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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