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The Effect of Project Based Learning Approach on Elementary School Students' Motivation Toward Science and Technology Course

Proje Tabanlı Öğrenme Yaklaşımının İlköğretim Öğrencilerinin Fen ve Teknoloji Dersine Yönelik Motivasyonlarına Etkisi

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ABSTRACT: In this study, it has been aimed to determine the effect of project based learning approach applied at 7th grade Science and Technology Lesson of Elementary School to motivation levels of students against this lesson. This study has been executed by total 75 students of 7th grade in an Elementary School. 39 of these students has formed the experimental group and 36 of them has formed the control group. For the experimental group, project based learning approach has been used and for the control group, traditional learning approach has been applied. At the study, Motivated Strategies for Learning Questionnaire has been used to collect data. At the end of the study, a statistically meaningful difference on behalf of motivation levels of experimental group students over whom project based learning approach has been applied, has been observed for science and technology when compared by motivation levels of control group students over whom traditional learning approach has been applied. Besides, after the application, there has been a statistically meaningful difference on behalf of experimental group; at linear direction when regarding self – organization, cognitive strategy usage, self – sufficiency, intrinsic value sub dimensions of motivation and at adverse direction when regarding exam stress sub dimension.

Keywords: Project based learning, motivation, teaching approach

ÖZ: Bu çalışmada, ilköğretim 7. sınıf fen ve teknoloji dersinde proje tabanlı öğrenme yaklaşımının öğrencilerin derse yönelik motivasyon düzeylerine etkisini belirlemek amaçlanmıştır. Araştırma bir İlköğretim Okulu'nda toplam 75 yedinci sınıf öğrencisi ile yürütülmüştür. Bu öğrencilerden 39'u deney grubunu, 36'sı ise kontrol grubunu oluşturmuştur. Deney grubunda proje tabanlı öğrenme yaklaşımı, kontrol grubunda ise geleneksel öğrenme yaklaşımı uygulanmıştır. post test Araştırma sonucunda, proje tabanlı öğrenme yaklaşımının uygulandığı deney grubundaki öğrenciler ile geleneksel öğrenme yaklaşımının uygulandığı kontrol grubundaki öğrencilerin fen ve teknoloji dersine yönelik motivasyon düzeyleri arasında deney grubu lehine istatistiksel olarak anlamlı bir fark gözlenmiştir. Ayrıca deney grubu öğrencileri ile kontrol grubu öğrencileri arasında uygulama sonrası motivasyonun öz-düzenleme, bilişsel strateji kullanımı, öz-yeterlik, içsel değer alt boyutları açısından doğrusal, sınav kaygısı alt boyutu açısından ters yönde deney grubu lehine istatistiksel olarak anlamlı bir fark gözlenmiştir.

Anahtar sözcükler: Proje tabanlı öğrenme, motivasyon, öğretim yaklaşımı

1. INTRODUCTION

Education systems aim to give competence to the individual who will require it through his / her whole life. For today's human beings, to understand and comply with the continuously increased developments in science and technology is only possible by developing the knowledge, skill, attitude and values in parallel with the emergent requirements. At this point, the system of education aims to give to the individual the competence which will be required by the individual during his / her whole life and the effort to remove all deficiencies by questioning the systems of education is within primary studies for all countries.

Science and technology assumes by all means an important function regarding educating individuals against developments. MEB (2005) which has been inserted to the curriculum in our country as is through the whole world aims to educate all students regardless of their individual differences as science and technology literate. For this reason, the program has been developed in

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such a manner to help students to improve their research – examine, critical thinking, problem solving and deciding skills and to help them to be continuously learning individuals and to own skill, attitude, value, understanding and knowledge related with science required to sustain their curiosity about their environment and whole world. It is quite difficult for the students who are prepared to be science and technology literates to improve these earnings through traditional methods of education. In this context, it is required to have a medium where the students are able to structure the knowledge, where they are interaction with the environment, where they are able to actively participate to the process of education, where they are able to perform research and where the teacher is just a guide and leads them. One of the approaches which realize the role switching at students and teacher in a proper structure and which assist in developing of many skills is project based learning approach.

Project based learning is a comprehensive approach designed to attract the attention of students in research of realistic problems at learning and teaching inside the classroom (Blumenfeld at al., 1991). Krajcik, Blumenfeld, Marx, and Soloway have mentioned that project based learning is assumed as such a method at which students ask questions and internalize the questions, find solutions for real problems, design and execute their own research, collect and analyze information and data, interpret over the found data, prepare reports related with the found information and data (cited in Schneider, et al., 2002).

Projects for which every day time is spent and study is performed increase the success of the students and support meaningful learning by intrinsic motivation. Whenever learning process is executed through intrinsic motivation, it becomes a willing and intentional activity. According to Kilpatrick has emphasized that learning is realized by intentional practices. As much as intentions are powerful, learning occurs so powerful. Projects improve self respect of the students since they allow students to go after their own interests. Since students perform studies over the subjects they want to perform studies, different results are obtained from different subjects. This situation creates variety at the class environment and allows sharing of a rich content. Since the formation of models at the ends of the projects is left to the student's will, creativity and imagination of students are fed (cited in Wolk, 2001). Whenever students understand that their studies or their projects are as valuable as a real problem required to be solved, this perception effects other students also and they are motivated to study harder (Solomon, 2003). At this point, it is supported by the researchers that project based learning is one of the effective approaches to increase the motivation of the student (Blumenfeld et al.,1991).

Raffini describes in general the motivation as attracting the attention of the student and to attract him / her into the learning process (cited in Ongun, 2006), Watters and Ginns (2000) have mentioned that the motivation is a complicated psychological structure trying to explain the attitude and effort applied through different activities. Motivation concept is closely related with the attitudes, feelings and thinking methods of students at the school. Motivation plays a critical role at the successes and learning of students. In general, according to the findings over the learning of students at specially math and science (Pintrich and Schunk, 2002; Pintrich and Maehr, 2004), it is shown that motivations, excitements, strategies and faith in knowledge of the students over these disciplines effect their learning and performances (cited in Conley et al., 2006).

It is a common belief among students that science and technology is a lesson which is difficult to understand when compared with other disciplines. For this reason, motivations of students are very important in order to provide meaningful understanding of this lesson. Motivations of students for science education have a multi dimensional structure which is affected from individual properties of teachers and students, education methods and techniques, education medium and curriculum.

Studies related with motivational theories and learning status of students (Brophy 1998, Pintrich and Schunk 1996) show that self – efficacy, aims of individuals against task or work to be performed, value given for the task and learning environments affect learning motivations of students. Motivation theories and constructivist learning have been merged and it has been mentioned that self – efficacy of students, aims of individuals against task or work to be performed, value given for the task and learning strategies are important motivational factors to compose motivation to learn science (Tuan et al., 2005).

Theoretic structure to conceptualize the motivation of the student is an adaptation of general expectation – value model of motivation. This model suggests three motivational elements which can correlate by three different elements of self – regulatory learning. These elements are; expectation element including faith of students about their own talents to realize a task; value element including goals and faiths of students related with the importance of the task and affective element including emotional reactions of students against the task (Pintrich, De Groot, 1990).

At the expectation – value model of motivation, three different elements of self – regulatory learning which is related with explained three motivational elements are suggested. Self – regulatory learning model includes strategies specified in three general categories. These strategies (Pintrich,1999) are; cognitive learning strategies, self – regulatory strategies to control cognition and strategies to administer resources. Weinstein and Mayer (1986) have mentioned that repeating, interpreting and organizing strategies are important ones among cognitive learning strategies related with inner class performance of students. These strategies are applied at operations requiring simple memory to remember the information or at more complicated processes requiring comprehending the information. Using meta-cognition strategies which is the second element of self – regulatory learning model plays an important role at the success of the students besides cognitive learning strategies. Meta-cognition has two general views as information related with cognition and self – regulation of cognition. Pintrich, Wolters and Baxter (1999) have asserted that meta-cognition information is limited by the knowledge of students about person, task and strategy variables. Self – regulation includes following, controlling and organizing the cognitive activities of students. Strategy to administer resources which is another element of self – regulatory learning can be used by the students to control and administer the environment. Usage of assist requesting strategy includes controlling and administering time, effort, study environment, teachers and friends. These strategies are used to assist for them to change their study environments in accordance with their goals and requirements (Pintrich,1999).

In this study, it has been aimed to examine the effect of project based learning approach which is used in science and technology lesson of 7th grade of Elementary School for motivations of students against science and technology lesson. Answers have been tried to be found out for the following sub problems within this aim:

1. Is there any statistically significant difference before starting the application in between motivation levels of students against science and technology lesson for whom project based learning approach has been used and for whom traditional learning approach has been used?
2. Is there any statistically significant difference after the application in between motivation levels of students against science and technology lesson for whom project based learning approach has been used and for whom traditional learning approach has been used?
3. Is there any statistically significant difference before and after the application in between motivation levels of students against science and technology lesson at the class where project based learning approach has been used?
4. Is there any statistically significant difference after the application in between average points received from each one of self – regulation, cognitive strategy usage, self –

efficacy, intrinsic value and exam anxiety sub – dimensions of "Motivated Strategies for Learning Questionnaire" for students for whom project based learning approach has been used and for whom traditional learning approach has been used?

1.1.Purpose of the Study

In this study aiming to examine the effects of project based learning approach applied for Elementary School 7th Grade at Science and Technology Lesson over the motivations of students, first of all Elementary School Science and Technology Lesson curriculum has been regarded. Dimensions described for science and technology literacy which is one of the important goals of the Curriculum. It has been also emphasized that affective factors are also included within these dimensions. It has been mentioned that in the development of science and technology literacy, the education process should be in a manner to increase the motivations of the students. Within these causes, the current study has been regarded as an independent variable considering the importance of motivation concept which is specifically emphasized in the study. In order to provide the students to learn the earnings available in the program that has been prepared in accordance with the constructive learning approach, project based learning approach at which the student actively participates in teaching and learning process has been placed to the center of the study. Whenever the literature is scanned, it has been observed that there are many studies over project based learning approach related with academic success, attitude, problem solving competence, creativity, logical thinking competence but there is not enough survey over motivation of students against science and technology lesson. In this context, this study is thought to provide contribution over the studies available at the literature at national and international level.

2. METHODOLOGY

In this study, it has been aimed to determine the effect of project based learning approach applied at 7th Grade Science and Technology Lesson of Elementary School to motivation levels of students against this lesson. In this study, pre-experimental model, static- group comparison design (Campbell and Stanley,1963).

has been used.

2.1.Study Group

This study has been executed by total 75 students who are in two different randomly selected classes of 7th Grade in an Elementary School located at Çankaya District of Ankara. One of the classes with 39 students has been determined as the experimental group and the other class with 36 students has been determined as the control group. In order to determine the pre – learning levels related with science and technology lesson of students who are available at the groups where the pre application study is executed, the first school term school report grades and equivalence at the education levels of parents of the students have been controlled by using student records and it has been observed that there are no significant differences in between students.

2.2.Experimental Process

Science and technology teacher has applied for the experimental group the daily plans and activities which have been prepared in accordance with project based learning approach. Necessary discussions and explanations have been made about how the process will be executed. For the control group, the teaching method of the teacher has not been intervened and the lessons have been given as planned by the teacher and by using activities proper with the traditional learning approach.

In order to determine the equivalence regarding the intervening variable which can affect specially dependent variable and which is described in the study problem of the student at experimental and control group, "Motivated Strategies for Learning Questionnaire" has been applied over both of the groups and it has been controlled if there are any difference in between groups. So the operations performed over the experimental group have been summarized as below.

Considering that the students of the experimental group may have lack of information related with properties of project based learning approach, these students have been clearly informed about the approach before starting the study process. This information provision has been performed within total two periods and information has been related with project based learning approach and its properties. Project groups have been composed and project explanation forms have been distributed to students. It has been requested from each project groups to think about specific projects and to perform studies over these projects. It has been requested from students to fill out the explanatory form after they determined their projects. According to the information written over the project explanation forms, project subjects have been determined by making reviews with students. Tasks of student within the groups have been determined and students have written their duties and responsibilities over the distributed project team forms and have signed these forms. For groups which have been composed from the student of experimental group specific days of the weeks have been determined by the researcher. The students at each group have performed studies at the specific days which have been assigned for them under the supervision of the researcher at science and technology laboratory. Studies supporting the project studies and allowing the groups to reach at the sources, to perform researches have been executed. During the studies, various forms related with project based learning approach such as research plan, project team product plan, project design form have been distributed to the students. Students have filled out these distributed forms every week. Explanations related with the performed studies have been made to the students and information about the missing parts has been given to them. Each one of the meetings performed has been documented by meeting agenda form constructed by the researcher.

At the end of the application, students have presented their projects to their teachers, project consultant and trainee teachers at the science and technology laboratory. Project groups have been evaluated by "Project Group Evaluation Form". Information has been given to the students after their presentations. After the application, "Project Study Evaluation Form" has been distributed to the students in order them to evaluate both themselves and the other students within the same group. In order to evaluate if there is any change in the motivations of the students for science and technology lesson, measurement tool which has been given as a pre – test instruments has been re – administrated.

2.3.Data Collection Instrument

In the study, in order to determine the motivation levels of the students against science and technology lesson; *Motivated Strategies for Learning Questionnaire (MSLQ))* has been used. This questionnaire has been developed by Pintrich and De Groot (1990) and has been translated and adapted to Turkish by Üredi (2005) and it has 44 items. Articles. Evaluation of the questionnaire has been made in a 7 degree interval in between "not at all true of me" and "very true of me". The scale was scored out of 168 points.

Questionnaire instrument is formed from two dimensions as motivational faiths and self regulatory learning strategies. Regarding motivational faiths, there are three sub questionnaires; self – efficacy (9 item), intrinsic values (9 item) and exam anxiety (4 item) and regarding self – regulatory strategies, there are two sub questionnaires; cognitive strategy usage (13 item) and self – regulating (9 item). Reliability coefficients which have been calculated by Cronbach alpha directed to the sub questionnaires are; 0,84 for self – regulatory questionnaire, 0,92 for self –

efficacy questionnaire, 0,88 for intrinsic values questionnaire and 0,81 for exam anxiety questionnaire. (Üredi, 2005)

3. RESULTS

Analysis results due to sub problems described to determine the affect of the project based learning approach over the motivations of students against science and technology lesson are as follows;

1.Related with the question of "Is there any statistically significant difference before starting the application in between motivation levels of students against science and technology lesson for whom project based learning approach has been used and for whom traditional learning approach has been used?, it has been calculated by t – test for independent groups that there is no meaningful difference in between grades received by the students both at experimental group and the control group from the pre – test of the "Motivated Strategies for Learning Questionnaire". The obtained findings have been given in Table 1.

Table 1. Preliminary Test MSLQ Grades of Students at Experimental Group and Control Group

Group	N	$\overline{X}$	Ss	t	p
Experimental	39	203,79	29,31	0,69	0,48
Control	36	207,75	19,29		(p>0,05)

According to these results, the difference in between MSLQ averages of preliminary test grades of experimental group and control group is not meaningful. So under the context, it can be stated that the motivation levels against science and technology lesson of the students in both experimental and control groups are equivalent with each other.

2. The question of "Is there any statistically significant difference after the application between motivation levels of students against science and technology lesson for whom project based learning approach has been used and for whom traditional learning approach has been used?", it has been calculated by t – test for independent groups that there is no meaningful difference in between averages of grades received by the students both at experimental group and the control group from the post test of the "Motivated Strategies for Learning Questionnaire". The obtained findings have been given in Table 2.

Table 2. Preliminary Test and Post test MSLQ Grades of Students at Experimental Group and Control Group

Group	Preliminary Test			Post test			
	N	$\overline{X}$	Ss	$\overline{X}$	Ss	t	p
Experimental	39	203,79	29,31	251,17	17,92	10,47	0
Control	36	207,75	19,29	199,66	23,94		(p<0,05)

Whenever the average grades are regarded, it has been observed that averages of MSLQ grades of control group students have been slightly decreased and of experimental group students

these averages have been increased. Whenever the grades obtained from the post tests are compared, it has been analyzed whether there is any difference in between groups by t – test and t value has been calculated as 10,47. Whenever the obtained t value is considered, it has been found that there is a meaningful difference in 0,05 level of significance. Whenever the average grades of the groups are analyzed, it is seen that there is a meaningful difference on behalf of experimental group.

3. The question of "Is there any statistically significant difference before and after the application in between motivation levels of students against science and technology lesson at the class where project based learning approach has been used?", it has been calculated by t – test for dependent groups that whether there is a meaningful difference in between averages of grades received by the students both at experimental group and the control group from the preliminary and post test of the "Motivated Strategies for Learning Questionnaire". The obtained findings have been given in Table 3.

Table 3. Preliminary Test and Post test MSLQ Grades of Students at Experimental

Measurement	**N**	$\overline{X}$	**Ss**	**t**	**p**
Preliminary Test	39	203,79	29,31	17,02	0
Post test	39	251,17	17,92		(p<0,05)

Whenever the average grades of the students at experimental group are analyzed, it is seen that there is a meaningful difference on behalf of post test. According to the results obtained from second and third sub problems of the study, it can be said that project based learning approach is more effective in developing the motivations of students for lessons at science and technology lesson.

4. Related with the question of "Is there any statistically significant difference after the application in between average points received from each one of self – regulation, cognitive strategy usage, self – efficacy, intrinsic value and exam anxiety sub – dimensions of "Motivated Strategies for Learning Questionnaire" for students for whom project based learning approach has been used and for whom traditional learning approach has been used?", it has been calculated by t – test for independent groups that whether there is a meaningful difference in between averages of grades received by the students at the independent groups. The obtained findings have been given in Table 4.

Table 4. Post test Grades of the Students at Experimental Group and Control Group for MSLQ

Self - Regulatory	**N**	$\overline{X}$	**Ss**	**t**	**p**
Experimental Group	39	51,97	5,74	11,5	0
Control Group	36	36,11	6,15		(p<0,05)
Cognitive Strategy Usage					
Experimental Group	39	77,43	5,28	9,81	0
Control Group	36	63,75	6,65		(p<0,05)
Self – Efficacy					
Experimental Group	39	53,87	5,02	6,93	0
Control Group	36	44,36	6,65		(p<0,05)
Intrinsic Value					
Experimental Group	39	54,64	3,73	8,11	0
Control Group	36	44,81	6,33		(p<0,05)
Exam Anxiety					
Experimental Group	39	13,69	3,88	2,61	0
Control Group	36	10,63	5,92		(p<0,05)

The students at the experimental group from Motivated Strategies for Learning Questionnaire, self – regulatory, cognitive strategy usage, self - efficacy, intrinsic value, exam anxiety sub – dimensions has been calculated. Whenever the obtained t value is considered, it has been found that there is a meaningful difference in 0,05 level of significance and this value is meaningful on behalf of the experimental group.

4. CONCLUSION AND DISCUSSION

At the end of the study it has been determined that project based learning approach predicts motivation levels of elementary school students towards against science and technology lesson as meaningful.

These results obtained at the end of the study are parallel with the studies performed in foreign countries. Blumenfeld et al. (1991) have mentioned that since these projects include finding solutions for real problems, working in cooperation and performing realistic models, they may increase interests of the students. Whenever the projects are focused over the questions to which students esteem and whenever these projects include various activities, it has been observed that students participate more in process of project based learning approach. Besides, it has been emphasized that interests of the students against the problem in the project increase their motivations against the project. In another study Paris and Turner (1994:230) have mentioned that project based learning which is one of the innovative learning approaches develops motivations and learning style of the students by creating positions supporting the perceptions of them against selection, problem, control and cooperation. They have also emphasized that whenever students have the selection and control responsibility and assume responsibility to reach at the aim, they will also show a proper and progressive motivations. Besides they have explained that experimental studies performed over the motivations of students, interclass duties and evaluations also affect the motivation and learning level of students in a remarkable manner.

Johari and Bradshaw(2008) have observed at the end of a study they had performed that a project based education using computer medium at the basement for university students activates

and supports intrinsic motivation. Mioduser and Betzer (2007) have examined the motivation levels and attitudes of highly successful high school students against technology in a study in order to observe project based learning and technologic information formation process. At the end of the study, it has been observed that project based learning highly motivates students and students have developed positive attitudes against technology. In a study performed by Toci (2000), it has been analyzed whether technology supported project based learning medium has a positive effect over the intrinsic motivations of the students or not. According to the findings of the study, it has been observed that students have presented a positive tendency against intrinsic motivation at "Curiosity, Courage and Being Independent" sub – dimension of the applied questionnaire (Korkmaz, 2002). Doppelt (2003) has observed in a study which has been performed over high school students that project based learning approach supported by science and technology has increased the motivations and successes of the students. Barak and Raz (2000) have fount out in a study which has been performed over high school students that hot air balloon project has positively affected the motivations of the students and this project has increased the interest of the students against science and technology subjects.

Since the opportunity is given to students to evaluate themselves and to monitor the process during project based learning approach, it may be said that this method is effective over the increase of self – regulatory, cognitive strategy using abilities and self – efficacies of the students. Zimmerman (2000) has mentioned that whenever students are able to interpret their successes by pride, their proficiencies and perceptions related with their talents will increase. Schunk and Ertmer (2000) have emphasized that providing feedback to the students about learning purposes and process causes high level of self – efficacy, motivated strategy usage and success (Paris and Paris,2001). Blumenfeld et al.(1991), have mentioned that students are responsible to use upper cognition strategies and planning during their project performances and teachers are responsible to support upper cognitive levels of students and to present computer based medium to support upper cognition levels of students and to expand opportunities presented to the successes of the students (Nesbit and Winne, 2003). Whenever students make their own selections abut what to read, what to write and projects to be executed, they will be interested in their duties in a more careful manner. Performed selections cause deep interest and strategic thinking over the performed duties. Freedom in selection of goals affects the formation of intrinsic motivation and matured goal (Paris and Turner,1994). It has been mentioned that whenever the matured goals are emphasized at classes, the students more use effective learning strategies, they prefer difficult duties causing problems and like their classes more (Ames and Archer,1988). Under this context, it may be said that allowing students to select their own responsibilities and tasks and to study over a subject they are curious about and informing them about the purpose during project based learning approach may be effective over increasing the intrinsic motivation. Paris and Turner (1994) have mentioned that there is a positive effect of esteeming study abilities with other students, control strategies related with will, assuming risk and selection chances of students during project based learning approach and it has a positive effect of evaluating the motivation of students together with their learning levels. It has been emphasized that since students are compared with each other and they are valued over unreal test situations at traditional evaluations, these evaluations may damage motivation and learning levels of students and increase exam anxiety of students during tests.

Liu and Hsiao (2002) has performed a study using project based learning approach and has provided secondary school students to work as multimedia designers. They had researched whether such a learning media effects the motivations of students against learning process or not and whether it affects their abilities to use cognitive strategies or not. At the end of the studies, it has been observed that the applied learning media has a positive effect over the usage of cognitive strategies and motivation levels of students. Increases over values given to the task, controls of learning faiths and self-efficacy levels have been observed for the students. Also increases have

been observed in peer learning and help request dimensions which are queried for cognitive strategy usage. Liu and Rutledge (1997) have observed in a study performed to allow high school students to design multimedia projects that there is an increase in participation and interests in projects of the students. It has been observed that times spent by students for projects increases and students are motivated for learning. Besides it has been emphasized that self – efficacies of students have increased and they have obtained more positive images related with themselves (Liu and Hsiao, 2002). Meyer, Turner and Spencer (1997) have performed a study over 5th and 6th grade students related with project based math learning. In the study the following matters and relations in between have been analyzed; attitudes against assuming risk, goal directions perceived, self – efficacies and strategy usages. Also the relation in between selections of the students during the projects, reactions against the results of their selections and the presented reports explaining the selections and the results has been analyzed. At the end of the study, the participation ratios and self – efficacies of the students who are more willing for studies have been higher than the other students and it has been observed that they had used more effective and meaningful strategies.

According to this study, it may be said that a science education placing project based learning approach to the basement has a positive effect in development of the motivations of elementary school students against the lesson. In this context, it is thought that the application of project based learning approach in science and technology lesson will have a positive effect over the motivations of the students.

In this study, the effect of project based learning approach over motivation levels of elementary school students in science and technology lesson has been analyzed. The effect of this approach over the same variable should also be analyzed for other lessons. Besides, this study has been executed by 7th Grade students. It is required to research whether this study will be effective in elementary school primary stage, high school and university levels or not. Whenever the literature is examined, it can be understood that studies about the effect of project based learning approach over self – regulation, cognitive strategy usage, self – efficacy, intrinsic value and exam anxiety sub – dimensions of motivation are quite few, so it is thought that it is required to perform more studies over this area.

Motivation during learning process has been determined as a critical factor to develop the academic achievement and to have a successful school life (The National Research Council,2004; akt. Heo, 2007). Besides, it has been emphasized that education process should be such to increase the self – confidence and motivations of students during 2005 Elementary School Science and Technology Lesson Curriculum. In this context, it is suggested for the teachers to pay attention to plan their lessons to develop self – regulatory abilities and self – efficacies of students, to increase intrinsic values of them and to develop the cognitive strategy usage abilities of students.

It has been observed that exams create anxiety for students and this anxiety causes difficulty for them to remember and to state the knowledge they have already known. For this reason, it is thought that teachers should re-prepare their activities and lesson evaluations to recover the exam anxiety and to provide feedback to students related with the results of these studies.

Important responsibilities are assumed by teachers in the efficiency of the project based learning approach. It is required in this process for the teachers to take care to have projects to activate the ingenuity and exploratory souls of the students, to help them to gain multi directional point of view and high level of thinking abilities. Besides, teachers should be careful about the discovery or product emerged at the end of the project to be genuine ideas of the students themselves and should discriminate such ideas from the other copied ideas.

Studies to determine the factors preventing motivations of students against science and technology lesson and the teaching medium can be re-arranged by the found results. It is thought that teachers should bring individual differences of the students in the foreground to increase the motivations of them and should accordingly organize applications for inner and outer classroom.

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Uzun Özet

Bu çalışmada, proje tabanlı öğrenme yaklaşımının ilköğretim 7. sınıf fen ve teknoloji dersinde öğrencilerin derse yönelik motivasyon düzeylerine etkisini belirlemek amaçlanmıştır. Araştırma bir İlköğretim Okulu'nda toplam 75 yedinci sınıf öğrencisi ile yürütülmüştür. Bu öğrencilerden 39'u deney grubunu, 36'sı ise kontrol grubunu oluşturmuştur. Deney grubunda proje tabanlı öğrenme yaklaşımı, kontrol grubunda ise geleneksel öğrenme yaklaşımı uygulanmıştır. Araştırmada, proje tabanlı öğrenme yaklaşımının uygulandığı sınıftaki öğrenciler ile geleneksel öğrenme yaklaşımının uygulandığı sınıftaki öğrencilerin uygulama öncesi ve uygulama sonrası fen ve teknoloji dersine yönelik motivasyon düzeyleri arasında farklılık olup olmadığını belirlemek amaçlanmıştır. Araştırmada veri toplama amacıyla "Öğrenmeye İlişkin Motivasyonel Stratejiler Ölçeği" kullanılmıştır. Ayrıca araştırmada kullanılan Öğrenmeye İlişkin Motivasyonel Stratejiler Ölçeği'nin öz-düzenleme, bilişsel strateji kullanımı, öz-yeterlik, içsel değer ve sınav kaygısı alt boyutları bakımından uygulama sonrası deney ve kontrol grupları arasında anlamlı bir farklılık olup olmadığına bakılmıştır.

Araştırma sürecinde ilköğretim okulunda görevli olan fen ve teknoloji öğretmeni deney grubunda proje tabanlı öğrenme yaklaşımına uygun olarak hazırlanan günlük planları ve etkinlikleri uygulamıştır. Sürecin nasıl yürütüleceği hakkında gerekli tartışma ve açıklamalar yapılmıştır. Kontrol grubunda ise öğretmenin ders işleyişine müdahale edilmemiş, ünite öğretmenin planladığı şekilde, geleneksel öğrenme yaklaşımına uygun etkinliklerle yürütülmüştür.

Deney grubundaki öğrencilerin proje tabanlı öğrenme yaklaşımının özellikleri hakkında bu gruptaki öğrenciler araştırma sürecine başlamadan önce yeterince bilgilendirilmişlerdir. Bu bilgilendirme proje tabanlı öğrenme yaklaşımı ve özelliklerine yönelik olarak yapılmıştır. Öğrenciler ile proje grupları oluşturulmuş ve öğrencilere proje açıklama formu verilmiştir. Her bir gruptan düşündükleri proje konularına yönelik araştırma yapmaları istenmiştir. Öğrencilerden konularını belirledikten sonra, projelerini açıklayan formu doldurmaları istenmiştir. Proje açıklama formlarında yazan bilgiler doğrultusunda öğrencilerle birlikte görüşmeler yapılarak proje konuları belirlenmiştir. Gruptaki öğrencilerin görevleri belirlenmiş ve öğrenciler kendilerine dağıtılan proje ekibi formlarına görevlerini ve sorunluluklarını yazıp imzalamışlardır. Deney grubundaki öğrencilerle oluşturulan gruplar araştırmacı tarafından haftanın belirli günlerine bölünmüştür. Gruplardaki öğrenciler, her hafta kendileri için belirlenen günde araştırmacı ile fen ve teknoloji laboratuarında çalışmışlardır. Grupların kaynaklara ulaşmaları, araştırmalarını yapmaları ve proje çalışmalarını destekleme amacıyla çalışmalar yürütülmüştür. Çalışmalar sırasında öğrencilere araştırma planı, proje takımı ürün planı, proje tasarı formu gibi proje tabanlı öğrenme yaklaşımı ile ilgili çeşitli formlar verilmiştir. Her hafta öğrenciler kendilerine dağıtılan formları doldurmuşlardır. Öğrencilere yaptıkları çalışmalarla ilgili açıklamalar yapılmış, eksik kalan kısımlarda bilgiler verilmiştir. Yapılan her toplantı, toplantı gündemi formu ile belgelendirilmiştir.

Araştırmada, öğrencilerin fen ve teknoloji dersine yönelik motivasyon düzeylerini belirlemek amacıyla; *Öğrenmeye İlişkin Motivasyonel Stratejiler Ölçeği (ÖİMSÖ)-(Motivated Strategies for Learning Questionnaire (MSLQ) k*ullanılmıştır. Ölçek Pintrich ve De Groot (1990) tarafından geliştirilmiş, Üredi

(2005) tarafından Türkçe'ye adapte edilmiş olup, 44 maddeden oluşmaktadır. Ölçme aracının değerlendirilmesi "bana tamamen uyuyor" ve "bana hiç uymuyor" uçları arasında belirlenen 7 dereceye göre gerçekleştirilmiştir.

Ölçme aracı, motivasyonel inançlar ve öz-düzenleyici öğrenme stratejileri olmak üzere iki alt ölçekten oluşmaktadır. Motivasyonel inançlar boyutunda ölçme aracı öz- yeterlik (9 madde), içsel değerler (9 madde) ve sınav kaygısı (4 madde) olmak üzere üç alt ölçekten; öz-düzenleyici öğrenme stratejileri boyutunda ise bilişsel strateji kullanımı (13 madde) ve öz-düzenleme (9 madde) olmak üzere iki alt ölçekten oluşmaktadır. Alt ölçeklere yönelik Cronbach alfa ile hesaplanan güvenirlik katsayıları sırasıyla; öz-düzenleme ölçeği için 0,84, öz-yeterlik ölçeği için 0,92, içsel değerler ölçeği için 0,88 ve sınav kaygısı ölçeği için ise 0,81 olarak hesaplanmıştır (Üredi, 2005).

Araştırma sonucunda proje tabanlı öğrenme yaklaşımının ilköğretim öğrencilerinin fen ve teknoloji dersine yönelik motivasyon düzeylerini anlamlı olarak yordadığı tespit edilmiştir. Proje tabanlı öğrenme yaklaşımının uygulandığı deney grubu öğrencilerinin uygulama öncesi "Öğrenmeye ilişkin Motivasyonel Stratejiler Ölçeği"nden aldıkları puanların yükseldiği görülmüştür. Geleneksel öğrenme yaklaşımının uygulandığı kontrol grubu öğrencilerinin uygulama öncesi ölçme aracından aldıkları puanların ortalamasının düştüğü görülmüştür. Grupların ortalama puanları incelendiğinde, deney grubu lehine anlamlı farklılık gözlenmiştir.

Araştırma sonunda proje tabanlı öğrenme yaklaşımının fen ve teknoloji dersinde öğrencilerin derse yönelik motivasyonunu geliştirmede etkili olduğu söylenebilir. Proje tabanlı öğrenme yaklaşımının uygulandığı sınıftaki öğrenciler ile geleneksel öğrenme yaklaşımının uygulandığı sınıftaki öğrencilerin uygulama sonrası, "Öğrenmeye İlişkin Motivasyonel Stratejiler Ölçeği" nin öz-düzenleme, bilişsel strateji kullanımı, öz-yeterlik, içsel değer ve sınav kaygısı alt boyutlarının her birinden aldıkları ortalama puanlar arasında farklılığın anlamlılığına bakılmıştır. Araştırma sonunda deney grubunda yer alan öğrencilerin öz-düzenleme, bilişsel strateji kullanımı, öz-yeterlik, içsel değer alt boyutlarından aldıkların ortalama puanların daha yüksek olduğu belirlenmiştir. Sınav kaygısı alt boyutundan alınan puanın ise deney grubu öğrencilerinde daha düşük olduğu belirlenmiştir. Bu bakımdan proje tabanlı öğrenme yaklaşımının motivasyonun öz-düzenleme, bilişsel strateji kullanımı, öz-yeterlik, içsel değer boyutları açısından doğrusal, sınav kaygısı açısından ise ters yönde anlamlı olarak yordadığı görülmüştür.

Bu araştırma ile proje tabanlı öğrenme yaklaşımını temele alan bir fen eğitiminin ilköğretim öğrencilerinin derse yönelik motivasyonlarının gelişiminde olumlu etkisi olduğu söylenebilir. Bu bağlamda fen ve teknoloji dersinde proje tabanlı öğrenme yaklaşımının uygulanmasının öğrencilerinin motivasyonları üzerinde etkili olacağı düşünülmektedir.

Fen ve Teknoloji Dersi Öğretim Programı'nda (MEB,2005) eğitim sürecinin öğrencilerin öz güvenlerini ve motivasyonlarını artırıcı nitelikte olması gerektiği vurgulanmıştır. Bu bağlamda öğretmenlerin, öğrencilerin öz-düzenleme ve öz-yeterliklerini geliştirecek, işlenen derse yönelik içsel değerlerini artıracak ve bilişsel strateji kullanma becerilerini ilerletecek etkinliklere göre derslerini planlamaya dikkat etmesi gerektiği düşünülmektedir.

Proje tabanlı öğrenme yaklaşımının etkililiğinde öğretmenlere önemli sorumluluklar düşmektedir. Öğretmenler bu süreçte, projelerin öğrencilerin yaratıcılıklarını, buluşçu ruhlarını harekete geçirecek, çok yönlü bakış açıları, üst düzey düşünme becerileri kazandıracak nitelikte olmasına özen göstermeleri gerekmektedir. Ayrıca öğretmenlerin proje ile ortaya çıkan buluşun veya ürünün öğrencilerin kendilerine ait özgün fikirler olmasına özen göstermeli ve bunu ayırt edebilmelidir.

Öğrencilerin fen ve teknoloji dersine yönelik motivasyon düzeylerini engelleyen faktörleri belirlemeye yönelik çalışmalar düzenlenebilir, bulunan sonuçlarla öğretim ortamı yeniden düzenlenebilir. Öğretmenlerin öğrencilerin motivasyonlarını artırmak için bireysel farklılıkları ön plana çıkararak sınıf içi ve sınıf dışı uygulamaların düzenlenmesinin daha fazla önem kazanması gerektiği düşünülmektedir.

Citation Information

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