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Influence of the Technology and Project Supported Thinking Journey on 11th Grade High School Students' Academic Self Concept

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Abstract

The purpose of the present study was to examine the influence of the electricity subjects taught with the Technology and Project Supported Thinking Journey on high school students' Academic Self Concept. The study was conducted with a total of 68 11th grade high school students from two different science classes. The control and experimental groups were selected at random. Experimental group were taught using the Technology and Project-Supported Thinking Journey, while in the control group were taught with teacher-centered methods. To collect data, Academic Self Concept scala as pre-test and post-test and a semi-structured interview form were used. The data were analyzed with dependent and independent group's t test. Findings suggest that students who had access to the Technology and Project Supported Thinking Journey scored higher on the post- tests and the experimental group students were satisfied with the applications. However, they reported that the present system of university placement exam made it difficult to apply this learning approach and caused them to become exhausted and miserable.

Keywords: Technology supported learning, Project supported learning, Thinking Journey, Academic self concept, Students' views.

INTRODUCTION

From the perspective of the teacher-centered education system, education deals only with the instructional dimension of the cognitive field. However, the understanding of education that has developed in the last twenty years has expanded its scope in a way to include the individual as a whole. The reason is that the function of education is not only to develop students cognitively and help them become knowledgeable about themselves but also to cause them to be at peace with themselves and with the environment as well as to help train individuals who are skillful, mature and self-confident (Lawrence, 1988). In this respect, today, learners are intended to acquire the thinking skills so that they can synthesize and produce ideas about themselves and about their environment. An individual undergoes the thinking processes that are quite important for everybody while coming to a conclusion. J.Locke, a British thinker, defines thinking as "the ability of conscience to obtain information about its own processes by focusing on itself" (Cited in Kaya, 2012). Especially, in this age, also known as "information society", the thought that individuals are supposed to know and apply such various thinking ways as conducting research, problem solving, creative thinking and critical thinking and to become effective in the learning process results in focusing more on such points as how thinking and learning occur. Knowledge about how individuals think and learn and about what factors influence their thinking and learning is expected to contribute to the process and phases of effective learning and healthy thinking (Güven and Kürüm, 2006). For these reasons, the recently-developed constructive learning approaches and other methods synthesized via these approaches seek to meet such expectations. One of them is the thinking journey technique. The educational environment systematically supported with visual materials is organized in a way to encourage students to think and to begin a journey in their imaginary world. The thinking journey (TJ) depending upon dialogues is based on the constructive learning approach. This approach invites students to learn with new percepevtives of the scientific concepts.

> "*TJ based teaching suggests performing an imaginary journey to a certain environment, which serves a stage for dealing with the goal concept. During the established discussion around certain interesting context, the particular scientific knowledge is mediated by the teacher who detects and reacts to the difficulties of the students as revealed in the discussion. By suggesting several perspectives on the same concept, the created space of variation allows students' construction of the concept, based on the common in its several appearances. This presents the central cognitive tool of the TJ method*" (Schur and Galili, 2007).

TJ method features as below:

1. Dialogue: The teacher asks questions which created curiosity and motivate inquiry with introducing students in a particular environment.
2. Pictures: Pictures are one of important compenent of TJ. They attract interest and become a subject of scrutinized observation. They invite students to discussion and stimulate learning.
3. Observation: Meaningful observation is an introduction to the scientific method. Such observation is selfgenerating, refining itself, producing further questions and in-depth exploration.
4. Comparision: The instruction essentially encourages comparison. Situations, interpretations, ideas and concepts are continuously compared. Frequently changed perspectives during the journey enhance conceptual comparison
5. Returning home: This stage establishes important connection of the learners to their experience.
6. Visualization: TJ instruction manipulates with concrete images and prepares the transition to the abstract.
7. Cognitive facilitation: Cognitive tools and content knowledge are interwoven in the agenda of TJ (Schur and Galili, 2007).

There are other different factors that are influential on learning and as much important as the relationship between a teacher and a student. Mainly, individual differences of learners, their socio-economic life and the demographic information about them are among these factors. When individual differences are examined, it is seen that some individuals are more successful in the visual area, while some are more successful in music or in mathematical fields. Similarly, some students learn faster, while some students learn more easily and more permanently in group works. In addition, students' awareness of such differences and their knowledge of which field they are more successful and interested in is quite important for learning to occur as desired. In this respect, individuals' ideas and thoughts about themselves are important. There are various definitions of how individuals perceive themselves. One of them is self concept. There are a number of sub-dimensions of self concept. These are examined under such headings as social self concept, material self concept, moral self concept, professional self concept, real self concept, ideal self concept and academic self concept (Bacanlı, 1997). In the process of educational guidance, the biggest focus is on Academic Self Concept, which is one of the most important affective entry characteristics. Academic Self Concept defining how individuals perceive themselves academically has quite an important place in their school lives (Senemoğlu, 2007). According to Academic Self Concept, it is necessary to meet students' need for success and to provide them with appropriate educational settings in order to be influenced positively. Academic Self Concept is a sub-dimension of self concept that individuals have. Academic Self Concept is defined as the degree of individuals' belief and confidence in being successful in a job with an academic aspect (Bloom, 1998). Senemoğlu (1989) points out that Academic Self Concept is an important variable influencing students' learning to a great extent and refers to the concept as academic self-confidence. The researcher defines Academic Self Concept as "a way of understanding oneself with respect to whether the student will learn any learning unit based on his or her learning background" (cited in Demir, 2005). According to Corbière and Mbekou (1997), in order to understand a student's academic achievement, it is necessary to understand his or her academic self concept and academic interests in detail. This study focused on how the physics course taught in line with Technology and Project Supported Thinking Journey influenced 11th grade high school students' academic self concept. And in this study it was aimed to evaluate the differences between academic self concept of the students who were taught through Technology-Project Supported Thinking Journey and traditional methods.

METHOD

The present study was conducted with a total of 68 11th grade students from two different science classes (each including 34 students) in a regular high school in Diyarbakır in the Spring Term of the academic year of 2009-2010. Among the experimental group students, 52,2% of them were female and 42,2% of them were male students, while there were equal number of male and female students in the control group.

Data Collection Tools: In the present study, as the data collection tools, the four-point Likert-type Academic Self Concept Scale made up of 45 items was used to determine the students' potential of academic self concept; in addition, for the purpose of revealing the students' views about the process, a semi-structured interview form was used. The Academic Self Concept Scale used as one of the data collection tools in the study was developed by Brookover, Erikson and Joiner (1967) and adapted to Turkish by Senemoğlu (1989). After the Academic Self Concept Scale including 16 sub-dimensions and 170 items was adapted to Science, such sub-dimensions among all as

Mathematical skills, interest in Science, interest in Mechanics and Shape-space skill were used in this study. The 45-item Academic Self Concept Scale was applied to 327 participants and the reliability coefficient was calculated as 0.92 as a result of the analysis conducted. In the Academic Self Concept Scale, A refers to “Never”, B to “Sometimes”, C to “Frequently” and D to “Always”. While encoding the data for analysis, the arrangement of A=1 B=2 C=3 D=4 was done. Table 1 presents the reliability coefficients of the sub-dimensions of the Academic Self Concept Scale. In addition, a semi-structured interview form was used for determining the students’ views about the application process and the applicability of the study. The interviews were done by a recorder.

Table 1. *Reliability Coefficients of the Academic Self Concept Scale and Its Sub-Dimensions*

Variable	Reliability Coefficient
Total	.92
Mathematical Skill	.77
Interest in Science	.72
Interest in Mechanics	.84
Shape-Space Skill	.87

Data Analysis: In this study, quantitative and qualitative analysis methods were used. In the quantitative part, the pre-test and post-test research design was used for both groups. The difference between the Academic self concept pre-test and post-test mean scores was statistically examined. For this purpose, the *t*-test for dependent and independent groups was used. In the qualitative part, to obtain views of the 34 students of the experimental group about the process, method, utility and reflections of this method, semi-structured interviews were done by the researchers. The data were obtained from the interviews. And content analysis method was used to examine words and phrases in the interviews of the students.

Application Process: The experimental group students were determined on random basis. The works started with 36 students at the beginning were completed with 34 fully-attending students. The study lasted eight weeks in three course-hours a week. This duration did not include the course-hours during which the students were informed about the Thinking Journey Technique, about the “Project” and about the animation-simulation program or the course-hours during which the Academic self concept pre-test and post-test were applied. The study group students were divided into a total of nine groups, each including three or four students. The groups were formed based on the students’ choices. The electric-related subjects that the study group students wanted to study were determined with the students. Regarding the studies to be carried out with the study group in the course of physics, the course teacher was provided with a work-file covering the 4^{th} and 5^{th} chapters as well as the subjects related to electric circuits presented in the 3^{rd} chapter; in addition, the teacher was informed about the application process. The activities to be carried out each week were prepared by the researchers and presented to the course teacher. The applications were carried out in the three course-hours of the physics course in line with the Thinking Journey, one course-hour being supported with the Project and the other supported with simulations and animations in the classroom (Table 2). On the other hand, the same subjects were taught to the control group students on teacher-centered basis in the same duration of time. In teacher centered learning methods the students are passive and they are not the focus. The teacher is the focus (Catalano and Catalano, 1999) and teacher use traditional methods for teaching the students.

Table 2. *Process Steps in Technology and Project Supported Thinking Journey Applications*

Process Steps	**Duration**
Giving information about the applications and forming the team for the project	2 course hours (in class)
Teacher-student dialogue via simulation-animation presentation	2 course hours (in class)
Collecting information for the projects	6 days (out of school)
Teacher-student dialogue via simulation-animation presentation	2 course hours (in class)
Evaluation of the information gathered for the projects	6 course hours (electric laboratory)
Doing preparations for the reports and presentations	2 days (out of school)
Teacher-student dialogue via simulation-animation presentation	2 course hours (in class)
Discussion on project subjects with other teams	2 course hours (in class)
Teacher-student dialogue via simulation-animation presentation	2 course hours (in class)
Transferring project works into the electronic environment	1 course hour
Teacher-student dialogue via simulation-animation presentation	2 course hours (in class)
Presentation	2 course hours (in class)
Teacher-student dialogue via simulation-animation presentation	4 course hours (in class)

Experimental Process Steps of Thinking Journey Based on Teacher and Student Dialogue in Classroom Environment

1. Goals were set: The student's behavioral changes expected to occur at the end of the process were determined.
2. Pictures, videos, simulations or animations related to the subject were presented via the projector.
3. A question like "What do you see here?" was directed. A dialogue was started between the teacher and the students.
4. Sequential presentations in relation to the subject were made. The students were then asked to state what they had seen and thought.
5. Questions regarding the similarities and differences between the visuals were directed by the teacher. The questions directed and the visuals presented were organized in a way to have the students make related comparisons.
6. Questions were directed regarding how the students reflected on the visuals in the presentation taking their own lives into consideration.

7. The students were asked to put themselves into the place of some of the visual objects in the presentation. The question of "How would it be?" was directed.
8. Following this dialogue, the focus was on the object again. The teacher gave examples from real life experiences to help make permanent students' learning.
9. In the last phase, research on the related subject was carried out by using simulation and animation programs.

Experimental Process Steps of Project-Based Learning Applications

1. The target behavior that the students were expected to have by the end of the applications were determined.
2. The outline of the subjects to be focused on or the work to be handled was determined. Using the list, the students chose the subjects they would study.
3. The students chose their friends to work with and were divided into groups of three or four.
4. The students were informed about how the reports to be prepared would be and about which subjects the reports would cover. As for the way of presentation, CD and PowerPoint were selected.
5. The students were given the sample work schedule and were asked to plan their work time. In this way, the time planned for the applications was used effectively.
6. The students were regularly controlled. They were asked to list the studies they conducted for the projects they would carry out and to list the materials they would use in these projects.
7. The evaluation phase was devised at the beginning of the application as process and product evaluation. The "Individual Activities Evaluation Form (Student Autonomy)" and the "Group Activities Evaluation Form" were used as process and product evaluation.
8. The students obtained information from various sources. Especially the Internet and the library acted as a source for the project research.
9. All the data gathered were reorganized, and the data considered necessary were put into report form. In this phase, the students discussed the projects together with their friends from the other group.
10. Finally, the projects prepared were transferred into CDs and presented by the students to the class.

Groups and Project Subjects:

The distribution of the subjects with respect to the groups formed was as follows;

Group 1: Serial and parallel connection of resistors, factors influencing the resistance of a conductor, calculation of the resistance of water, reading the value of a resistor via color codes.

Group 2: Various methods of producing electric currency, forming an electric field.

Group 3: Wheatstone bridge, short circuit.
Group 4: Electrical work and heat.

Group 5: Producing a generator, connection of generators, fields of their use.
Group 6: Producing a fuse, producing an engine, fields of use of fuses and engines.
Group 7: Producing a condenser, serial and parallel connection of condensers, fields of their use.
Group 8: Electric circuits, producing a mini lamp, connection of a voltmeter to the circuit, connection of an ammeter to the circuit, ohm's law, measurement of resistance, fields of their use.
Group 9: Serial and parallel connection of lamps, duration of their consumption, conductors and non-conductors, fields of their use.

Samples of Simulations and Pictures Used in the Applications

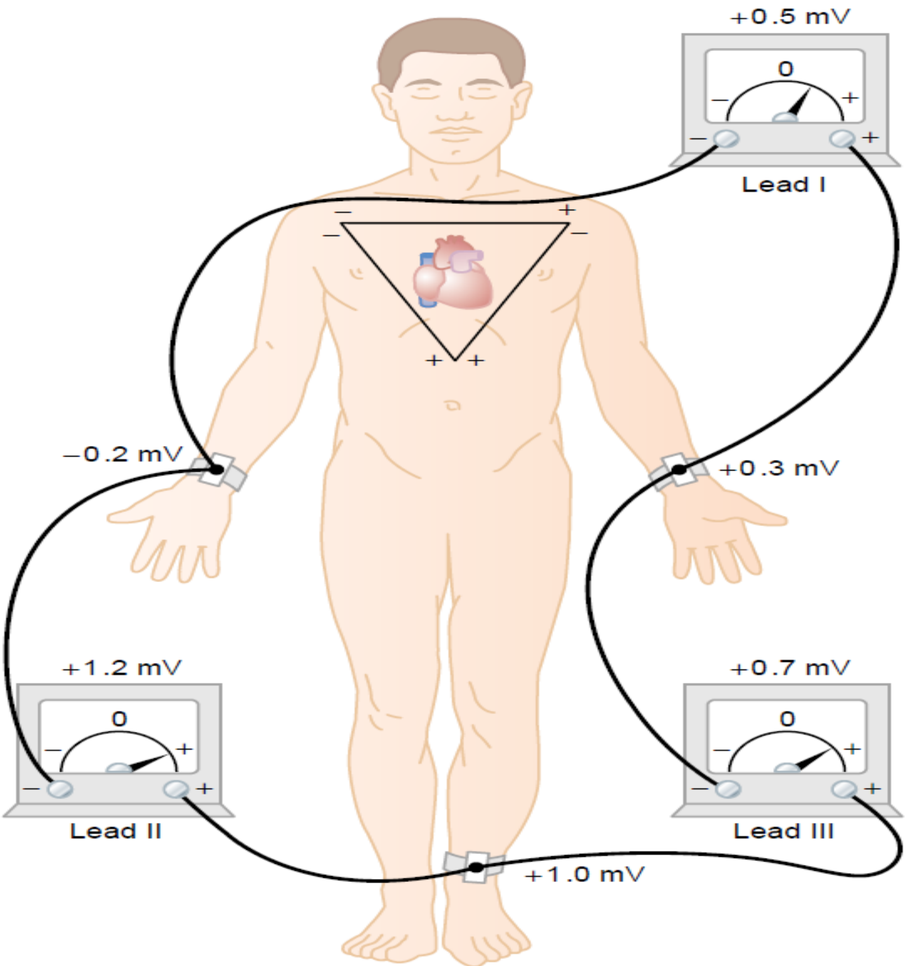
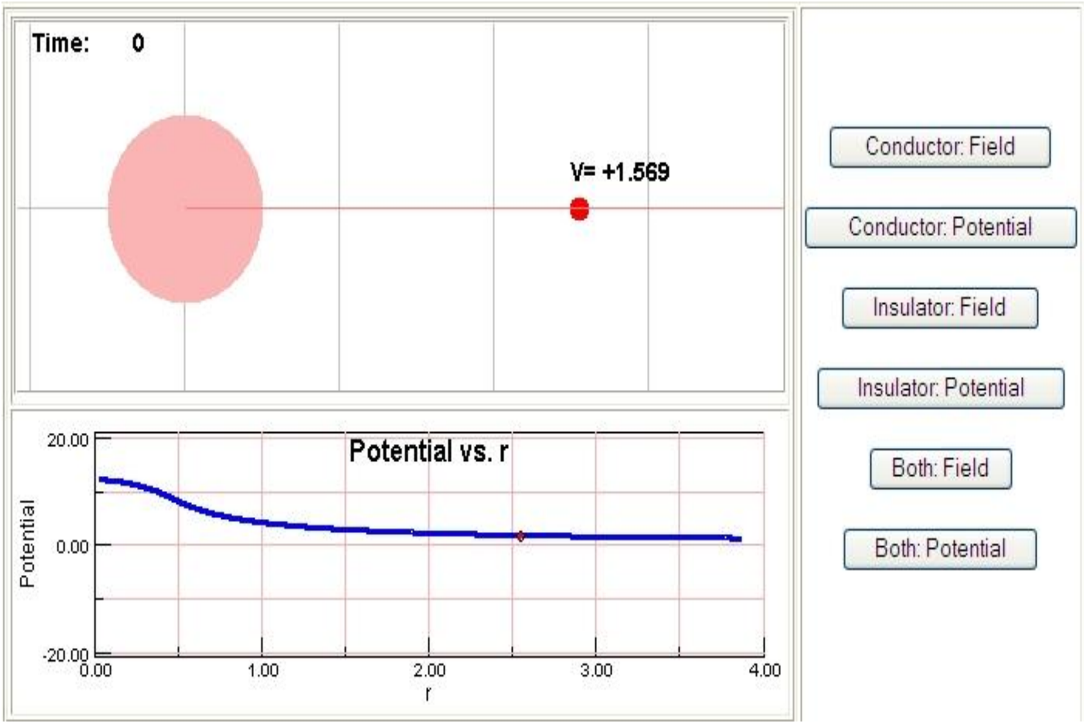
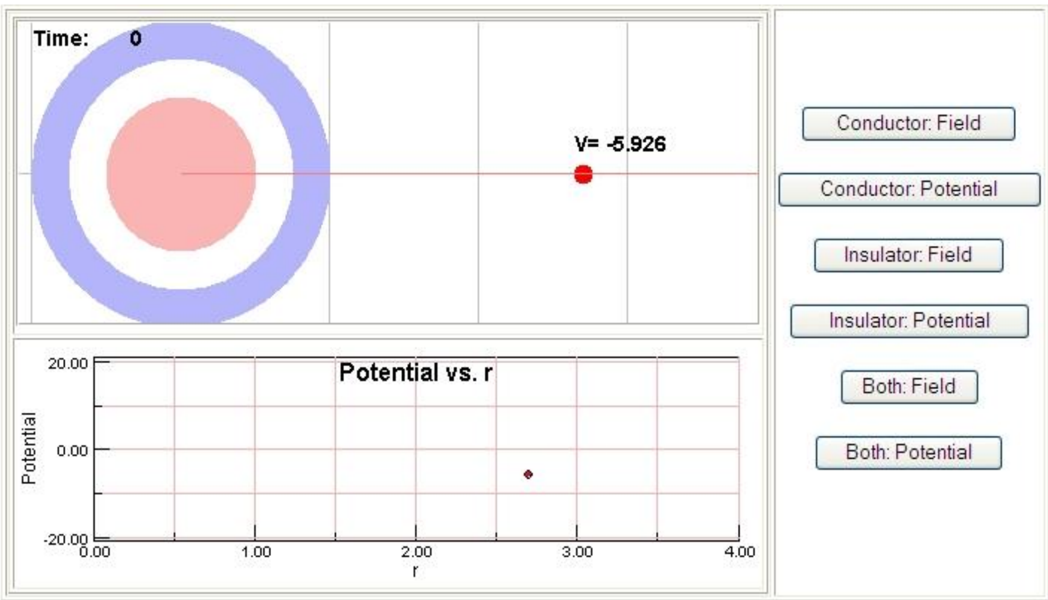


Figure 1. *Electrical events occurring within the human body as an example for the potential difference*



Simulation 1. *Examples for the potential and electrical field inside and outside a conductive and nonconductive full sphere* (webphysics.davidson.edu/.../index.html)[1]



Simulation 2. *Examples for the potential and electric field inside and outside conductive nonconductive, interpenetrating and empty and full spheres* (webphysics.davidson.edu/.../index.html)[2]

[1-2] The simulations, animations and pictures used in the study were retrieved from web sites of Physics by research group

Photo 1. *Experimental group students' presentation regarding lamps at the end of the project works*

RESULTS

This part presents the qualitative and quantitative data obtained via the Technology and Project Supported Thinking Journey applications and focuses on the findings in tables obtained as a result of statistical analysis.

The experimental and control group students' Academic Self Concept mean scores prior to the experimental processes were compared. The results obtained are presented in Table 3.

Table 3. *Independent Groups t Test Results Regarding the Comparison of the Experimental and Control Group Students' Academic Self Concept Pre-Test Mean Scores (N=34)*

Source of Variance	Group	$\overline{X}$	Df	T	p
Mathematical Skill	Control	25.85	3.978	-.314	.755
	Experimental	26.18	4,502		
Interest in Science	Control	26.56	5.775	-1.612	.112
	Experimental	28.71	5.196		
Interest in Mechanics	Control	32.76	7.050	-.456	.650
	Experimental	33.59	7.836		
Shape-Space Skill	Control	45.68	7,502	-.266	.791
	Experimental	46.18	7.990		
Total	Control	127.74	16.937	-.811	.420
	Experimental	131.29	19.189		

P*<0.05 meaningfull level

When Table 3 is examined, it is seen that there was no significant difference between the experimental and control group students' Academic Self Concept mean scores prior to the experimental processes. The fact that no significant difference was found between the students' Academic Self Concept levels demonstrated that the students had similar affective characteristics.

Following the experimental processes, in order to determine how the control group students' Academic Self Concept mean scores changed, the research data were analyzed. The results obtained are presented in Table 4.

Table 4. *Dependent Groups t Test Results of the Comparison of the Control Group Students' Academic Self Concept Pre-Test and Post-Test Mean Scores (N=34)*

Source of Variance	$\bar{X}$ - $\bar{X}'$	**Df**	**T**	**p**
Mathematical Skill Pre-Test Mathematical Skill Post-Test	-.676	4.340	-.909	.370
Interest in Science Pre-Test Interest in Science Post-Test	-.353	7.631	-.270	.789
Interest in Mechanics Pre-Test Interest in Mechanics Post-Test	2.588	8.832	1.709	.097
Shape-Space Skill Pre-Test Shape-Space Skill Post-Test	-.029	8.558	-.020	.984
Total Pre-Test Total Post-Test	-1.588	21.353	-.434	.667

P*<0.05 meaningfull level

When Table 4 is examined, it is seen that there was no significant difference between the control group students' Academic Self Concept pre-test and post-test mean scores following the experimental processes.

Following the experimental processes, in order to determine how the experimental group students' Academic Self Concept mean scores changed, the research data were analyzed. The results obtained are presented in Table 5.

Table 5. *Dependent Groups t Test Results of the Comparison of the Experimental Group Students' Academic Self Concept Pre-Test and Post-Test Mean Scores (N=34)*

Source of Variance	$\bar{X}$ - $\bar{X}'$	**Df**	**T**	**p**
Mathematical Skill Pre-Test Mathematical Skill Post-Test	-2.118	6.163	-2.003	.053
Interest in Science Pre-Test Interest in Science Post-Test	-4.941	5.794	-4.973	.000*
Interest in Mechanics Pre-Test Interest in Mechanics Post-Test	.912	9.995	.532	.598
Shape-Space Skill Pre-Test Shape-Space Skill Post-Test	-1.324	9.908	-.779	.442
Total Pre-Test Total Post-Test	-10.824	23.553	-2,680	.011*

P*<0.05 meaningfull level

When Table 5 is examined, it is seen that following the experimental processes, there was a significant difference between the experimental group students' Academic Self Concept pre-test and post-test mean scores with respect to the total mean scores and to the sub-dimension of "interest in science" in favor of the post-test

At the end of the experimental process, the experimental and control group students' mean scores regarding the sub-dimensions of the Academic Self Concept Scale as well as their total mean scores were compared and analyzed. The results obtained are presented in Table 6.

Table 6. *Independent Groups t Test Results of the Comparison of the Experimental and Control Group Students' Academic Self Concept Post-Test Mean Scores (N=34)*

Source of Variance	Group	$\overline{X}$	Df	T	p
Mathematical Skill	Control	26.53	4.129	-1.791	.078
	Experimental	28.29	3.996		
Interest in Science	Control	26,91	6.067	-5.487	.000*
	Experimental	33.65	3.797		
Interest in Mechanics	Control	30.18	6.713	-1.625	.109
	Experimental	32.68	5.948		
	Control	45.71	6.380	-1.168	
Shape-Space Skill	Experimental	47.50	6.282		.247
Total	Control	129.32	18.481	-3.123	
	Experimental	142.12	15.129		.003*

P*<0.05 meaningfull level

When Table 6 is examined, it is seen that there were significant differences between the experimental and control group students' mean scores regarding some of the sub-dimensions of Academic Self Concept following the experimental processes. The differences were found to exist with respect to the Academic Self Concept total mean scores and with respect to the mean scores regarding the sub-dimensions of "interest in Science" in favor of the experimental group students.

In addition, in the present study, the content of the data collected via the interviews held with the students following the applications of the "Technology and Project Supported Thinking Journey" was analyzed. During this process content analysis method was used. After the subject headings reflecting the students' views were examined, the themes, the basic points the students focused most on, were determined. Below are these themes and the related views of the students:

Exam anxiety: Some of the students stated that they would take the university placement exam the following year; that they were studying and memorizing the subjects considering the question types in the exam; and that the old method based on answering multiple-choice questions was more beneficial than this new method. Regarding this subject, one of the students reported:

"Now, we'll graduate a year later. We have learnt with the old method for 11 years. Of course, we'll take the exam next year. In the exam, they ask questions in line with the other method. For example, they ask formula-based questions"(Student F).

Concretizing: The students reported that supporting the electric subjects visually with the new method was beneficial because it was based upon the thinking journey technique. Regarding this subject, one of the students reported:

"Well, it is beautiful and sounds better and more reasonable. We believe it is beneficial. We reinforce the subjects by conducting experiments. For example, we see the sources. We learnt how to use a voltmeter and ammeter by seeing and touching" (Student C).

Visuality: A majority of the students stated that they were influenced by the visual presentations and that they thus found this new method beneficial. They also pointed out that seeing certain activities and presentation types both in the computer environment and in the laboratory environment was more effective on them. Regarding this subject, one of the students reported:

"Well, it was useful for me. I liked it because if it is based more on formulas, we get bored more easily of that course. Now, because the subject was taught visually, we entertained more. I can remember more things about the subject but because we are generally accustomed to formulas, well, actually, we can only deal with questions" (Student G).

Dialogue: Some of the students pointed out that they had the chance to speak in class and enjoyed stating their views in the class. Regarding this subject, one of the students reported:

"Sir, speaking in class and discussing with friends were very beautiful" (Student J).

Science courses: The students stated that this new method was applicable for the courses of physics and chemistry and especially appropriate to biology. Regarding this subject, one of the students stated:

"Especially for biology, yes; also, for biology, chemistry and physics. For example, in biology, you understand better when you do experiments. Also, this is true in chemistry. When we see a reaction and witness it, we understand better. It becomes more permanent" (Student M).

Tinkering with an electronic appliance at home: After learning the relationship between electric circuits and a simple electronic appliance – which they had never touched before the students stated that they began to wonder more about such appliances and wanted to tinker with them. Regarding this subject, one of the students reported:

"I can see the difference in-between. For example, when there is short-circuit, I at least say that short-circuit occurred because electric preferred the shortest way instead of the resistant way. Well, the things we did were useful. I now try to fix an appliance when it breaks down. I try to use electric, and it's the most important thing in our lives" (Student F).

Affective contribution: The students stated that they developed their self-confidence more thanks to the new method and that the new method helped them talk about electric-related subjects in the community and feel themselves important. The students reported their views about the question of whether the new method applied contributed to them cognitively:

"Of course, it did. Well, when I think of mathematical courses, I thought the most difficult physics subject was electric and optics. That's, they ask questions related to these subjects in the university placement exam. And these are among the subjects that students have most difficulty in learning. It was also difficult for me. I have never been so much involved in electric in my life. Well, I'm dealing with electric circuits, and I can accomplish them" (Student L).

Technological contribution: The students stated that they learnt how to use technological tools and how to develop computer use as well as how to use computers in scientific activities. At the end of the applications, the students were directed the question of "Do you think you have learnt new things in terms of technology?" Regarding this subject, one of the students reported:

"Of course , sir. We learnt a lot about slides. I learnt how to prepare slides or videos or how to download files via the Internet. I learnt how I can download them into flash memories. Although it may not be beneficial for us now, I know it will be useful for us at university. To me, it was quite beneficial" (Student F).

Interest in the course of physics: At the end of the experimental process, the students stated their interest in the course of physics increased. Regarding this subject, one of the students reported:

"Sir, in the past, to tell the truth, I was never interested in physics. Yes, only the formulas. Well, we used to answer the same questions with a single formula. It was quite difficult. When we use only one single formula, well, it really becomes difficult. Thus, we at least saw in this way (Student E).

DISCUSSION AND CONCLUSION

In the study, it was found out that there was no significant difference between the experimental and control group students' Academic Self Concept pre-test mean scores prior to the experimental process. Depending on this result, it could be stated that the experimental and control group students had similar affective perceptions with respect to Academic self Concept before the applications started. In this respect, according to other related studies conducted, it is important for participants to have similar levels in affective fields prior to experimental processes (Katırcı & Satıcı, 2010). At the end of the study, it was also found out that there was no significant difference between the control group students' Academic Self Concept pre-test and post-test mean scores. Based on this finding, it could be stated that the teacher-centered instruction did not play an important positive role in the control group students' Academic Self Concept post-test mean scores. However, when the experimental group students' Academic Self Concept pre-test and post-test mean scores were taken into consideration, it was seen that there were significant differences with respect to the sub-dimension of "interest in Science" and with respect to the Academic Self Concept total mean scores in favor of the post-test. Similarly, the comparisons of the groups revealed a significant difference with respect to the sub-dimension of "interest in Science" and to the total mean scores in favor of the experimental group. These results demonstrated that the applications of the student-centered Technology and Project Supported Thinking Journey were influential on the experimental group students' mean scores regarding the sub-dimension of "interest in Science" and regarding the Academic Self Concept total mean scores. Physics subjects are already included in science. So, it could be said that students had learned a part of science via doing experiments, thinking about scientific stuations through visual materials of the applications. With this method they had started to touch science with their hands in laboratory and explain scientific events with their words via simulations, animations and pictures. It could be stated that this method affected the students' interests in science positively and the experimental group students who had the chance not only to express themselves by taking part in the thinking journey during the lessons but also to learn by doing and experimenting developed their self-confidence. While "Thinking Journey activities computerized provided to students perspectives they never experienced" (Galili & Schur, 2007) projects provided to practice scientific concepts. In this study it could be concluded that both these components of the method can develope students' academic self concepts. When literature was reviewed it was seen that there were some studies related to Thinking Journey (Schur, 1999; Schur & Galili, 2006; Schur et al., 2002a; Schur et al., 2002b). But these studies are generally about cognitive concepts of physics teaching. In addition, there are many studies conducted related to the other components (computer and project) of the method. For example, Başbay and Senemoğlu (2009) conducted a study investigating the influence of the project-based learning approach on students' Academic Self Concept. As a result of the applications carried out with experimental and control groups in 12 weeks, the researchers found out that the project activities had positive influence on Academic Self Concept in favor of the experimental group. Shearer and Quinn (1996), in their study, revealed that projects help students to conduct research in line with their interests; to find an opportunity to apply their problem-solving skills into real-life problems; to recognize the importance of cooperation; and to increase their self-confidence. Katırcı and Satıcı (2010), in their study titled "Influence of simulations and portfolio applications on academic self and creativity in physics programs", found out that use of materials within an electronic portfolio were more influential on the development of students' levels of academic self concept than use of materials in a traditional portfolio. In addition, Korkmaz and Kaptan (2002), in their study carried out with elementary school 7th grade students, demonstrated that instruction based on the project-based learning approach contributed positively to students' academic self concept. Tarım et. al. (2006), as a result of project works, reported that the students had increased self-confidence and felt themselves more proficient and expert in the field. Studies demonstrated that modern learning methods such as project and group works more positively influence academic self concept when compared to traditional instructional methods (Açıkgöz, 2006; Korkmaz & Kaptan, 2002; Özkal, 2000).

In this study, when the interviews held were examined, it was seen that the experimental group students found the applications of the learning envoriment usefull, enjoyable and interesting. It was seen that the students wanted this method to be applied in other courses. From these results it could be said that technology and project supported thinking journey had positive effects on the students' emotional feelings. In a study titled "Influence of Computer-Supported Instruction in Line with the Constructive Theory on 9th Grade Students' Achievement and Attitudes in the Course of Geography", Teyfur (2010) reported that the visual activities increased the students' interests in the course of Geography and had positive effects on their learning. Atıcı and Polat (2010) examined the influence of the project-based learning method on students' views. It is thus believed that as a result of the method applied in the course of Web Design, the project-based learning approach had positive effects on skill development in general. In their study, the students stated that thanks to the project-based learning approach, they discovered the fields they were interested and skillful in; that their research skills developed; and that they learnt how to choose the information necessary for a research subject.

SUGGESTIONS

In line with the findings of the present study, the following suggestions could be put forward:

- In high school physics courses, it could be beneficial not only to apply the thinking journey technique believed to have affectively positive influence on students but also to carry out technology-supported applications together with students from time to time.
- While doing educational planning for physics courses, it is necessary to consider students' cognitive development as well as their development in such affective fields as academic self concept.
- In physics course applications in the classroom and in other environments, teachers should give importance to students' individual differences.
- The learning environment in physics courses should be arranged in a way for the teacher to encourage students to ask questions and in a way to help them express their views freely and develop self-confidence.
- Computer and physics laboratories in secondary school institutions should be organized in line with the contemporary learning approaches. For this

purpose, equipping physics laboratories with the necessary tools and increasing the number of computer classrooms for students' use could be beneficial especially with respect to the modern educational programs of the Technology and Project- supported Thinking Journey.

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Teknoloji ve Proje Destekli Düşünme Yolculuğu Metodunun Lise 11. Sınıf Öğrencilerinin Akademik Benlik Tasarımına Etkisi

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Genişletilmiş Özet

Problem: Bu çalışmanın amacı, Teknoloji ve Proje Destekli Düşünme Yolculuğu metoduna göre işlenen fizik dersinin Lise 11. sınıf öğrencilerinin Akademik Benlik Tasarımına etkisini değerlendirmektir. Bu yöntemle, lise 11. sınıf öğrencileri sekiz hafta boyunca çeşitli bilgisayar programları ile görsel etkilerin yaratıldığı ve kendi seçtikleri problem cümlesiyle ilgili olarak projeler geliştirerek düşünsel bir yolculuğa çekilmiştir.

Yöntem: Araştırma Lise 11. fen sınıfının 34'er kişilik iki şubesinde eğitim görmekte olan toplamda 68 öğrenciden oluşturmaktadır. Şubelerden biri deney öteki ise kontrol grubu olarak belirlenmiştir. Bu araştırmada veri toplama aracı olarak öğrencilerin akademik benlik tasarım gücünü belirlemek amacıyla 45 maddeden oluşan likert tipi Akademik Benlik Tasarımı Ölçeği ön test ve son test olarak ve öğrencilerin sürece yönelik düşüncelerini almak amacıyla bir yarı yapılandırılmış mülakat formu kullanılmıştır. Uygulamalar sekiz hafta sürmüştür. Deney grubunda elektrik Konuları Teknoloji ve Proje Destekli Düşünme Yolculuğu metoduna göre işlenirken, kontrol grubunda ise bu konular öğretmen merkezli öğretim yöntem ve tekniklerine göre işlenmiştir. Araştırmadan elde edilen veriler bağımlı ve bağımsız gruplar t testi kullanılarak analiz edilmiştir. Bunun için SPSS 15.0 paket programı kullanılmıştır. Bu araştırmaya katılan deney ve kontrol grubu öğrencilerinin deneysel işlemler öncesi Akademik Benlik Tasarımı ön test puan ortalamaları arasında anlamlı bir farkın olmadığı bulunmuştur ($P>0.05$).

Bulgular: Araştırma sonunda kontrol grubu öğrencilerinin Akademik Benlik Tasarımı ön test ve son test puan ortalamaları arasında anlamlı bir farkın olmadığı tespit edilmiştir ($P>0.05$). Fakat, deney grubu öğrencilerinin Akademik Benlik Tasarımı ön test ve son test puan ortalamalarında bakıldığında ise "fen bilimlerine ilgi" alt boyutu ile toplam puan ortalamalarında son test lehine anlamlı farklılıklar olduğu saptanmıştır ($P<0.05$). Benzer şekilde, deney ve kontrol gruplarının Akademik Benlik Tasarımı son test puan ortalamaları karşılaştırıldığında, fen bilimlerine ilgi ve akademik benlik toplam son test puan ortalamalarında deney grubu lehine anlamlı farklılıkların olduğu görülmüştür ($P<0.05$). Yapılan mülakatların analizinde ise deney grubu öğrencilerinin uygulanan "Teknoloji ve Proje Destekli Düşünme Yolculuğu Metodundan" memnun olduklarını belirtmişlerdir. Fakat var olan merkezi üniversiteye giriş sınav sisteminin bu

öğrenme yaklaşımının uygulanmasını zorlaştırdığını ve kendilerini yıprattığını görüşünü açıklamışlardır.

Sonuç ve Öneriler: Araştırmanın sonunda elde edilen bulgular ışığında öğrencilerin akademik benlik ve diğer duyuşsal özelliklerinin önemsenmesi, öğretim ortamlarının çağın gereklerine uygun olacak şekilde öğrenci merkezli öğretim yöntem ve tekniklerinin kullanılması gerektiği düşünülmektedir. Ayrıca, öğretim ortamlarının öğrencilerin bilişsel boyutlarının olduğu kadar duyuşsal boyutlarının da gözönüne alınarak düzenlenmesi önerilmektedir.

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