

## **The Effect of Digital Storytelling Method in Science Education on Academic Achievement, Attitudes, and Motivations of Secondary School Students**

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### **ABSTRACT**

The purpose of this study was to analyze how the digital storytelling method used in science education affects students' academic success as well as their attitudes, and motivations toward learning science. The study group of the research consisted of a total of 60 6th-grade secondary school students, 30 of whom were in the experiment and 30 of whom were in the control group; all were receiving education at a state secondary school in the Alanya district of the city of Antalya in the 2015-2016 academic year. As the research model, the mixed method was used. The semi-experimental design, in which quantitative data are supported by qualitative data, was used in the study. The quantitative dimension of the study consisted of data obtained from the Academic Test for "Our Earth, the Moon, and Our Source of Life the Sun" unit, the Attitude Scale for Science Lessons, and the Motivation Scale for Learning Science; the qualitative dimension consisted of the semi-structured feedback forms on the use of the digital storytelling method in science lessons. According to the results of the study, it was determined that the digital storytelling method positively affected the academic success and attitudes of the students in the experiment group when compared with the students in the control group in terms of the 6th-grade "Our Earth, the Moon, and Our Source of Life the Sun" unit in their science lesson and no significant difference was found in their motivations. In addition, according to the data obtained from the semi-structured forms, it was concluded that the use of the digital storytelling method in the students' learning process and the use of technology had a great amount of positive effect.

**Keywords:** science education, digital storytelling, academic success, attitude, motivation

### **INTRODUCTION**

In the area of education, storytelling activities support the development of language, which is expressive, social and receptive, and increases the vocabulary of children. These activities give children the opportunity to solve problems, use their imagination, develop their creativity, and reflect their inner Earth. They learn the lesson (information) placed within the study in a more permanent manner (Miller, 2009). This method helps higher cognitive learning such as synthesis and evaluation. Therefore, stories can turn into useful tools not only in the hands of teachers, but also students, and can be used to develop their understanding (Turgut and Kışla, 2015). In the literature, there are definitions of digital stories made by different scientists. In general, these are defined as the

process of digital storytelling narratives and the presentation of narratives in an interactive digital environment based on sound, pictures, graphics, animated graphics, visuals, music and texts (Meadows, 2003). According to Morgan (2014), digital storytelling is a new method that can be used to develop students' skills in line with the age we are living in to encourage them and increase their motivation toward learning. According to Robin (2006), digital stories are an effective teaching tool for teachers and an effective learning tool for students. However, although there are numerous definitions of digital storytelling in the literature, it can be seen that these definitions are generally about integrating multimedia aspects such as pictures, sound, and video with the art of narration. Digital stories affect students' learning not only in the development stage but in numerous stages from planning to usage. For instance, deciding what message these digital stories will contain, which contents will be used to transmit this message, how and through which format this content will be presented in an efficient manner and which visuals, sounds, and music are going to be used; all this requires students to do research, ask questions, analyze information, make decisions and synthesize all these by using their skills of creativity and critical thinking (Ohler, 2008; Sadik, 2008; Ware, 2006).

Digital storytelling is a technological application that can be benefited from to make it possible for students to learn the subjects in a better way and for teachers to use technology in their classes in a more efficient manner (Robin, 2008). Digital narrations help students use their experiences and establish social interactions; they present them with an opportunity to learn in an efficient and realist manner (Smeda, Dakich, and Sharda, 2012). Digital stories make it possible for teachers or students to bring together videos, pictures, music, narrations, and sound effects and narrate their own scenarios using the simple multimedia technologies (Kocaman and Karoğlu, 2015). Digital story narrations present numerous opportunities to teachers and students (Kurudayıoğlu and Bal, 2014). For instance, teachers use digital stories in the introduction part of their lessons to attract the students' attention and to concretize abstract concepts and make it possible for students to develop their skills in different areas (Robin, 2008).

Digital storytelling is an efficient approach that contributes to the learning of information and increases students' interest and motivation (Yang and Wu, 2012). The use of digital narrations within the class environment is an effective teaching method in terms of attracting students' attention and creating a creative and critical thinking environment (Sadik, 2008). Digital storytelling is an innovative approach that presents such opportunities as reflective learning, active learning, and learning by having fun. Therefore, it has been observed that interest in the integration of digital storytelling within teaching environments has been increasing (Wang and Zhan, 2010). There are numerous benefits to be had from including digital storytelling in educational programs. According to Van Gils (2005), the benefits of the use of digital storytelling in education are as follows: (1) presenting more variety compared to traditional methods, (2) the learning experiences being individual, (3) making the learning of subjects more interesting, (4) being formed in a low cost and easy manner, and (5) contributing more to the students' learning process.

The process of creating, designing, writing, and presenting the design of a digital story is effective in terms of the development of students' skills related to doing research, writing, organizing, using technology, presentation, interviewing, communication and cooperation, problem-solving and evaluation (Robin, 2006). Furthermore, since the process of developing a digital story requires the student to make use of technology, it allows students to acquire the skill of making applications using technology and develops technological competence as well (Robin, 2008; Ware, 2006). According to Niemi et al. (2014), digital stories have a great effect on students' knowledge and skills, the cooperation and connections they form and their technological competency. For the students to be able to present their digital stories in a suitable format, they need to decide what technology they will be using, develop their technical skills in the use of this technology, and apply those skills.

In the literature, when the studies on the subject are analyzed, it is noteworthy that digital stories are used in many areas of the learning and teaching process such as Turkish, mathematics, history, and language teaching (Dupain and Maguire, 2005; Robin, 2008; Sadik, 2008). They have begun to be used in an efficient manner in the areas of science education as well (Hung Hwang and Huang, 2012; Kahraman, 2013; Sancar-Tokmak, Sürmeli and Özgelen, 2014; Ulum and Ercan-Yaman, 2018); because when it is considered that there is a need for individuals who have the skill of thinking at a high level rather than individuals who memorize information that is there for them to use, it has become a necessity to educate students who have these skills in the area of science as is the case in many other areas. However, it can be seen that students' success in the area of science in our country is quite low. In Hung, Hwang, and Huang's study (2012), in which they analyzed the effect of digital storytelling activities based on projects in science lessons on their motivations toward learning science, problem-solving skills, and academic success, they showed that the group of students who created stories were more successful when compared with the control group students, who carried out traditional activities based on projects and prepared PowerPoint presentations. In addition, they showed that students in the experimental group were more successful when compared with the control group students, who worked on project-based traditional studies and prepared PowerPoint presentations on the same subject. What is more, they determined that the problem-solving skills of

**Table 1.** Experimental design of research

Group	Pre-test	Application	Post-test
Experiment	-Academic Success Test -Attitude Scale for Science Lessons -Motivation Scale for Learning Science	Digital Story- Based Teaching	-Academic Success Test -Attitude Scale for Science Lessons - Motivation Scale for Learning
Control	-Academic Success Test -Attitude Scale for Science Lessons - Motivation Scale for Learning Science	Traditional Teaching	-Academic Success Test -Attitude Scale for Science Lessons - Motivation Scale for Learning Science

the experiment group students increased. In line with the findings obtained in Titus's (2012) case study in which the researcher aimed to determine whether or not digital stories had an effect on learning such science concepts as the food chain, it was stated that digital texts allowed students to explain science concepts to their classmates. In addition, the researcher expressed that graphics made a positive contribution to students in terms of organizing and structuring their thoughts. In Kahraman's study (2013) on the effect of the use of digital storytelling on the success and motivation of 9th-grade secondary school students in terms of the force and movement subject, it was shown that the use of digital physics stories in the physics lesson increased success and that success was more permanent in favor of the experiment group. In Turpin and Cage's study (2004) on the effect on students' scientific processing skills of a science curriculum based on activities, it was determined that students who received education in line with a science curriculum based on activities were more effective in developing their scientific processing skills when compared with students who received education in line with traditional curriculum. Miller and Redman (2010) compared the exam scores of a group of students who had an online class for their astronomy lesson carried out with videos, and the scores of a group of students who had their lesson face to face with their teacher. As a result of the analysis of the data they obtained, the researchers showed that the students who had their astronomy lesson through watching videos were more successful in the same exam when compared with the students who had their lesson face to face with their teachers. The aim of this was:

- To study the effect of digital storytelling method on secondary school students' academic success, attitudes, and motivations toward the science lesson.
- To determine the students' views on the use of digital stories and the stories in the science lesson.

Within this general framework, the answers to the following questions were sought:

1. Is there a significant difference between the success of students who use the digital storytelling method in science lessons and students who do not use this method?
2. Is there a significant difference between the attitudes of students who use the digital storytelling method in science lessons and students who do not use this method toward their science lessons?
3. Is there a significant difference between the motivations of students who use the digital storytelling method in science lessons and students who do not use this method?
4. What are the views of students who use the digital storytelling method in science lessons about this medium (their positive and negative views and their views on the usability of this medium)?

## METHODOLOGY

### Research Design

In this study, the mixed method was used. The mixed method involves the collection and analysis of both quantitative and qualitative data within the scope of studies carried out in a research program (Creswell and Plano-Clark, 2007). In the study, the embedded design, which is one of the mixed method designs, was used. In embedded mixed designs, the qualitative research methods are made use of to support experimental studies. In the quantitative part of this study, the semi-structured design with pretest-posttest control group was used and structured interviews were carried out to support the obtained data.

All the members of the selected study group for the research were 6th-grade secondary school students who received education in the town of Alanya in the fall semester of the 2015-2016 academic year. The study group for the research consisted of a total of 60 secondary school students (experiment group - N=30 and control group - N=30) who were receiving education at a state secondary school in the Alanya district of the city of Antalya in the fall semester of the 2015-2016 academic year. The placement of the groups in the experiment and control groups was carried out using the random assignment method. The experimental method used for the study is shown in [Table 1](#).

## Data Collection Tools

In this section, information on the characteristics, purpose of use, and state of the data collection tools is given. In the collection of quantitative data in the study, the Academic Test for the “Our Earth, the Moon, and Our Source of Life the Sun” unit, the Attitude Scale for Science Lessons, and the Motivation Scale for Science Lessons were used. In the collection of the qualitative data of the study, the semi-structured feedback form for the feedback received from the students on digital stories created by the experiment group students during the process was used. Detailed information on the data collection tools used in the study is given in this section.

**Academic Success Test:** In the study, a success test was developed by the researcher for the “Our Earth, the Moon, and Our Source of Life the Sun” unit to be used as a data collection tool. Within this context, the development of the success test was carried out using the following steps: In the development of the success test, first, the unit determined as the subject area within the scope of the study and subject content was analyzed and the table of specifications for the gains of the subject was created. In the identification of the gains and subject content, the Science Education program was taken as the basis (MoE, 2013). The classification of the question related to the success test in terms of cognitive area stages was done and question models were created by the researcher. Expert advice was consulted; the views of three expert teachers and one academician on whether the questions were in line with the measurement tool or content were sought, the necessary corrections were made in line with these views, and the test was finalized for the pre-application. The test, consisting of 30 multiple choice questions, was given as a pilot application to 95 7th-grade students in the same school and after this pre-application, five questions were excluded from the test due to the discrimination index of the items and their difficulty, and then the test was applied. Statistical software was used for the statistical evaluation of the reliability of the scale. As a result of the analysis, the KR-20 of the test was calculated as 0.845. The item difficulty index of an item shows the difficulty level of that item. Item difficulty is the ratio of the number of students who give correct answers to the questions to the total number of students who answer the questions. The closer the item difficulty index is to 0, the more difficult that item is for the student group; the closer the item difficulty index is to 1, the easier that item is for the student group. Therefore, it is very suitable when the item difficulty index is generally around .50 (Frankel and Wallen, 2000; Wiersma and Jurs, 2005). The item difficulty index takes on a value ranging between 0 and 1. Therefore, questions with an item difficulty of around 0.50 were preferred. In general, for the validity index of a test item, the item test correlation -- called item discrimination power -- is calculated. This is the correlation between a single item’s score and the total score of the test (Frankel and Wallen, 2000; Wiersma and Jurs, 2005). For the independent groups, it was tested to determine whether or not there were significant differences between the upper and lower 27% slices through the t-test. Questions that did not have a significant difference were excluded from the test based on the views of expert science teachers by taking item difficulty and item discrimination into consideration.

**Attitude Scale for Science Lessons (ASSL):** With the aim of measuring the attitude levels toward science lessons and determining the effect the digital storytelling method has on attitudes toward the lesson, the Attitude Scale for Science Lessons developed by Keçeci and Kırbağ-Zengin (2015) was used. This scale was prepared as a 5 point Likert scale consisting of 31 items, 19 of which are positive and 12 of which are negative. The Likert responses are: I definitely agree; I agree; I have no idea; I do not agree, and I definitely do not agree. As for the structural validity and reliability studies for the scale, it was applied to 272 students receiving education in grades 5-8. The scale developed with the purpose of identifying the attitude of secondary school students toward science lessons was created by taking three theoretical dimensions into consideration. These are: liking science and technology, being curious about science and technology, and associating technology with daily life attitudes (Keçeci and Kırbağ-Zengin, 2015). In the reliability study for the Attitude Scale for Science Lessons, the scale’s Cronbach  $\alpha$  reliability coefficient was calculated as 0.90. According to the obtained data, the developed scale was found to be valid and reliable.

**Motivation Scale for Learning Science:** With the aim of identifying students’ motivations toward learning science, the Motivation Scale for Learning Science developed by Dede and Yaman (2008) was used. The scale consists of five sub-dimensions: motivation toward doing research, motivation toward performance, motivation toward communication, motivation toward working cooperatively, and motivation toward participation. There are 23 questions in total in the scale. The validity and reliability study of the scale was carried out by Dede and Yaman (2008) and the reliability of the scale was determined as 0.80. In the study, the scale’s reliability value was determined and its reliability coefficient was determined as 0.71.

**The Feedback Questions on Science Education through Digital Stories:** After the study was completed, the interview method, which is a frequently used data collection tool in qualitative studies, was used for the students in the experiment group. The semi-structured interview, which is one of the interview types defined as structured, semi-structured, or unstructured, is a qualitative data collection tool that allows the rearrangement and use of open-ended questions that are prepared and put in order beforehand (Güler, Halıcıoğlu, and Taşgın, 2013; Karasar, 2011). With the purpose of obtaining more detailed and in-depth data on the study process, the semi-structured

**Table 2.** Subject and Study Group Pairings on the “Our Earth, the Moon, and Our Source of Life the Sun” Unit of the Science Lesson

Group	The subject to be dealt with through the digital storytelling method
1st Group	Comparison of the shape and size of the earth, the sun, and the moon.
2nd Group	The layer model that represents the structure of the earth.
3rd Group	The general characteristics of the layers of the earth.
4th Group	What happens when the moon revolves around the earth while simultaneously revolving around its own axis?
5th Group	The movements of the earth’s satellite the moon.
6th Group	What are the phases of the moon?
7th Group	How are the phases of the moon formed?

feedback form and digital storytelling evaluation form prepared by the researcher were given to the students. The data obtained from the interviews carried out with the experiment group students and the forms containing the views of the experiment group students on the applications were evaluated using content analysis.

### Application

The study began with the pretest application for the experiment and control group students, then the digital storytelling method was introduced to the experiment group and the application stages of the method were explained. The introduction brochure and the instructions for teamwork on the digital story creation activity were distributed to the students and the stages to be followed were indicated. The pretests were applied to the experiment and control groups in the same week and each test was given at a different class hour. At the beginning of the preparation of digital stories, the experiment group students were separated into seven groups to work on the digital stories they were going to create. In the identification of the groups, the students’ success levels in the science lessons from the previous semester were taken into consideration. In this activity, the stages of “Writing the Story Text,” “Creation of the Story Flow Chart and Story Board,” and “Doing Research on the Visuals” were carried out in line with the stages determined by Robin and McNeil (2012) and the students were allowed to use pictures they found on the Internet or from other sources besides their own drawings as visuals in the different digital stories. During the process of preparing the digital stories, the groups were given time to plan their activity and were allowed to do research on the subjects they were going to deal with in their digital stories. In the stages of “Dubbing the Story” and “Creation of the Digital Story,” the students dubbed the digital stories they created in a quiet environment with a hand camera placed in a fixed point simultaneously with their visuals and recorded the digital stories using their visuals as videos. In the digital storytelling method, music, which is an important aspect in transmitting those emotions and thoughts that cannot be told in the text, was recorded while the digital stories were being created. No studies were found in which these steps of the digital storytelling method were used in the manner they were in this study. During the seven weeks in which the application was carried out, the progress of the student groups was observed and they were given the chance during this process to repeat their recording numerous times. According to the subject order, the digital stories of the 4th and 2nd groups were watched in the first week, digital stories of the 1st and 6th groups were watched in the second week, the digital stories of the 5th and 7th groups were watched in the third week, and the digital story of the 3rd group was watched in the fourth week. After each digital story watched, Feedback Questions 1 and 2 on Science Education through Digital Stories were applied and the story groups did not evaluate their own stories. In the preparation process prior to the experimental application, the subjects related to the “Our Earth, the Moon, and Our Source of Life the Sun” unit indicated in the science lesson education program for the 6th-graders’ annual science lesson plan were determined and groups were formed among the experiment group students to create digital stories in which one gain from the gains related to the unit was to be dealt with. These groups were allowed to identify the gain they were going to deal with in their digital stories. The subject and group pairings are shown in [Table 2](#).

### Analysis of the Data

The data obtained within the scope of the study were analyzed with the statistical software and tested at the  $p = 0.05$  significance level. Since the data obtained from the study met the assumptions of the parametric test ( $N=60$ ), and the data displayed normal distribution, parametric tests were made use of in the analysis of the data. In this context, the tests used for each sub-purpose are explained below. The demographic data of the participants were explained using frequencies, which is one of the descriptive statistical methods. With the purpose of identifying the differences in the results of the data collection tool of the study group, ANCOVA and t-test were used for related and unrelated samples. In the qualitative analysis of the study, content analysis was done. In content analysis, first the answers the students gave were coded one by one and then these codes were grouped under certain themes in consultation with an expert to ensure that they are plausible and approvable. The themes

**Table 3.** The normalcy distribution results

Test	Groups	Kolmogorov-Smirnov	Skew	Kurtosis
Pre- Success Test (ST)	Experiment	0.104	-0.368	-0.961
	Control	0.095	0.121	-0.905
Post- Success Test (ST)	Experiment	0.173	-0.720	-0.084
	Control	0.244	-0.293	-1.175

**Table 4.** ANCOVA results of post-test means corrected according to achievement pre-test for experimental and control groups

Source of Variance	Sum of squares	df	Mean	Sum of squares	df
Pre-test	2122.537	1	2122.537	209.553	0.000
Group	484.176	1	484.176	47.801	0.000
Error	577.347	57	10.129		
Total	19337	60			

**Table 5.** Descriptive statistics of the groups' post-test scores

Group	N	Mean	Std. Deviation	Adjusted Means
Experiment	30	81.33	3.495	20.293 <sup>α</sup>
Control	30	72.26	2.786	14.607 <sup>α</sup>

**Table 6.** The paired comparison results of the success test

Groups	Mean Difference	Std. Error	Sig. <sup>α</sup>
Experiment x Control	5.686 <sup>α</sup>	0.822	0.000

determined in the study were directly quoted in a manner the reader can understand without adding any interpretations, and were reported. While the quotations were presented, the students were named as S1, S2... S30 to ensure the privacy of the students.

In the study, in the solution of the problem case in which the effect of digital storytelling method on the academic success of the students in science lessons was determined. The normalcy distribution results for the data obtained from the Success Test (ST) given to the experiment and control groups are given in **Table 3**.

## FINDINGS

In this section, the analysis results and interpretations related to the data obtained from the academic success test, attitude scale, and motivation scale used in the study are reviewed.

### Findings on Academic Success

With the purpose of determining whether or not there is a significant difference between the experiment group students, who used the digital storytelling method, and the control group students, who did not use this method, the pretest and posttest scores of the groups were compared. The comparisons of the pretest and posttest results made after the application with the purpose of determining the academic success state of the experiment and control group students are given in **Tables 4, 5** and **6**.

Prior to the application, the experiment group's average of the pretest results for the "Our Earth, the Moon, and Our Source of Life the Sun" unit was  $X_{exp.} = 53.73$  and  $X_{cont.} = 49.93$  for the control group. This shows that the pre-knowledge levels of the experiment and control group students were close. After the application, the average for the experiment group was  $X_{exp.} = 81.33$  and  $X_{cont.} = 72.26$  for the control group.

When the findings in **Table 4** are analyzed, it can be seen that when the pretest scores of the groups are checked, the posttest scores display differences between the groups based on the p value. Since  $p < .05$ , it can be stated that the difference between the two groups' scores is significant.

When **Table 5** is analyzed, it can be seen that the experiment group students' average scores in the success test are higher than the control group students' average scores in the success test. However, whether this difference is significant or not was determined with the p value of the paired comparisons given in **Table 6**.

When the paired comparison results presented in **Table 6** are analyzed, it can be seen that there is a significant difference between the averages of the experiment and control groups (since  $p < .05$ ).

**Table 7.** ANCOVA of posttest attitude scores by treatment

Source of Variance	Sum of squares	df	Mean	Sum of squares	df
Pre-test	3.449	1	3.449	32.202	0.000
Group	0.233	1	0.233	2.173	0.046
Error	6.106	57	0.107		
Total	426.835	60			

**Table 8.** The average scores of the science attitudes scale

Group	N	Mean	Std. Deviation	Adjusted Means
Experiment	30	2.7086	.299	2.710 <sup>α</sup>
Control	30	2.5860	0.348	2.584 <sup>α</sup>

**Table 9.** The paired comparison results of the attitude scale

Groups	Mean Difference	Std. Error	Sig. <sup>α</sup>
Experiment x Control	-0.126	0.085	0.046

**Table 10.** The post-test results of the motivation scale for science learning

	Groups	N	Mean	S	df	t	p
Post-Test	Experiment	30	73.28	13.46	37	0.117	0.43
	Control	30	73.16	14.70			

\*p&lt;0.05

### Findings Related to Attitudes toward Science Lessons

With the purpose of determining whether or not there is a significant difference between the attitudes toward science lessons of the experiment group students, who used the digital storytelling method, and the control group students, who did not use this method, the pretest and posttest success scores of the experiment and control group students were compared. After the application, the comparisons of the results of the pretest and posttests carried out with the purpose of determining the attitudes of the experiment and control group students toward science lessons are given in **Tables 7, 8, and 9**.

The ANCOVA data obtained when the groups' pretest scores were checked are given in **Table 7**.

When **Table 7** is analyzed, it can be stated that there is a significant difference between the attitude scores of the groups (since  $p < .05$ ). All the attitude scores of the groups are given in **Table 8**.

When **Table 8** is analyzed, it can be seen that the experiment group's average attitude scores are higher than the control group's average scores. The attitude scores of the paired comparisons done in order to determine in which group's favor this difference is are given in **Table 9**.

When the results of the paired comparisons given in **Table 9** are analyzed, it can be seen that there is a significant difference between the averages of the experiment and control groups (since  $p < .05$ ). When the averages given in **Table 9** are taken into consideration, it can be stated that the applied method created a significant difference in favor of the experiment group. With this finding, it can be stated that the digital storytelling activities carried out with the experiment group students are effective in terms of developing positive attitudes toward science lessons in students.

### Findings Related to the Motivation Scale for Learning Science

With the purpose of determining whether or not there is a significant difference between the motivations toward learning science of the experiment group students, who used the digital storytelling method, and the control group students, who did not use this method, the pretest and posttest success scores of the experiment and control group students were compared. After the application, the comparisons of the results of the pretest and posttests carried out with the purpose of determining the motivation states of the experiment and control group students toward learning science lessons are given in **Table 10**.

When **Table 10** is analyzed, it can be seen that there is no significant difference between the motivation toward learning science scores of the posttests given to the experiment and control groups after the application [ $t(37) = 0.11$ ,  $p > .05$ ]. In the posttests, the test average of the experiment group was calculated as  $X = 73.28$ , and as  $X = 73.16$  for the control group. This result shows that the application did not create a significant difference in favor of the experiment group.

**Table 11.** Groups of experiment group students and the digital story names

Groups	Digital Story Names
Group 4	The Earth, the Sun and the Moon are Friends
Group 2	The Layers of the Earth
Group 1	The Characteristics of the Layers of the Earth
Group 6	Where is the Moon?
Group 5	Movements of the Moon
Group 7	Cem's Telescope
Group 3	Baby Moon

\*Appendix

### Findings Related to the Qualitative Part of the Study

During the seven weeks in which the application was carried out, the progress of the student groups was observed and the digital stories of the 4th and 2nd groups were watched in the first week, digital stories of the 1st and 6th groups were watched in the second week, the digital stories of the 5th and 7th groups were watched in the third week, and the digital story of the 3rd group was watched in the fourth week. The student groups and the names of the digital stories that were prepared are given in [Table 11](#).

The data obtained from the Science Education through Digital Stories Feedback Questions form given to the experiment group students of the study also support the findings obtained from the analysis of quantitative data. The following answers the students gave to the question on what they think about digital storytelling activities and science support these findings;

*S1: Our normal science lessons were boring. The lessons were very difficult. They were not fun. I was having difficulty understanding the lessons. But now our lessons in which we record films in teams and create digital stories are more enjoyable.*

*S2: Digital storytelling activities are more fun and we do not get bored. We first discuss the subject with our team and film the digital story of the subject. Then, we watch the digital stories. These are better than normal science lessons.*

*S3: I really love this idea. And I'm very happy about it.*

*S4: Story writing is fun. Drawing is fun. The dubbing part is funny.*

The question, "What are the positive aspects of science lessons in which digital stories are used?" was asked to the experiment group students in the study and the following answers were received as a result of the analysis of the answers:

*S1: I spent a lot of time with my friends while creating the digital story and I had fun. It was very nice that our science lessons were given in a different manner. I learned new things and I was not dependent on books. I understood the subject better.*

*S2: I learned more things with digital stories. We did research. We did planning while creating the story.*

*S3: At first, I had negative thoughts and did not believe that we were going to be successful. But as we started filming the stories, the activity became fun. We gradually got better at it. We repeated the filming process 17 times.*

*S4: This method allows us to learn more things. We need to do research. It is fun getting prepared.*

In addition to the positive views of the experiment group students on the digital storytelling activities, some students gave the following answers to the question on what the negative aspects of this activity are:

*S1: Working in teams in this activity. Some team members not helping while the rest of us prepared the stories.*

*S2: The digital story activities can cause us to be unsuccessful because test questions are asked in exams.*

*S3: Some stories can be unrelated to be subject.*

*S4: The preparation takes time.*

Five of the 30 experiment group students who participated in the study were interviewed with the semi-structured interview questions and the obtained data were analyzed through descriptive analysis and summarized below. The experiment group students were asked how science lessons in which digital storytelling activities were carried out differed from normal science lessons. The data were analyzed taking the common expressions in the students' answers as the starting point. According to the obtained data, the students stated that they found the digital story activities fun, felt like scientists due to the research they did during the story creation process, felt excited during the creation of the stories, and better understood the subject. Some of the students' statements that support these inferences are as follows:

*S1: First, it was an exciting experience, because we wrote our own story and filmed it. I love watching films. The subject became more memorable with this method.*

*S2: There are differences between normal science lessons and science lessons in which digital stories are used. I felt happy and as if I'm dealing with scientific activities. I will be telling other people about these in the future because I believe that in the future I will benefit from the things I have learned. I get happy and I have fun while learning. Normally, I would get bored in science lessons sometimes but the digital stories were not boring at all.*

**Table 12.** The students' views on the digital storytelling method

Positive Aspects	f	Negative Aspects	f
Being fun and enjoyable	20	Taking too much time	11
Facilitating learning	14	Assuming duties in teamwork	5
Increasing motivation	13	Difficulties in using technology	4
Making learning permanent	11	Putting too much pressure on the student	3
Giving the opportunity to make repetitions	10	Problems related to searching for information	3
Making the lesson more interesting	9	Accessing computers and the internet	2
Working in a cooperative manner	8		

*S3: Since science lessons in which digital stories are used are more fun, I believe that the subjects will be easier to remember and that I will be successful in the exams. I wish digital stories were made use of in other subjects and lessons as well.*

*S4: I both learn and have fun with my friends while watching the story in the digital stories. I found science lessons in which digital stories are used more fun and enjoyable. I liked all the stages of creating a story.*

*S5: I understood the subject better. And I learned while having fun.*

With the purpose of determining the students' views on science education through the digital storytelling method, the experiment group students were first asked, "What are your positive/negative views on the process and medium of creating digital stories in science lessons?" The experiment group students expressed the positive and negative aspects in the semi-structured form as follows in **Table 12**.

When **Table 12** is analyzed, it can be seen that the students had both positive and negative views on the learning process and the use of technology during the digital storytelling activity. In terms of the contribution of digital stories on their learning process, the students stated the most that this method was fun and enjoyable (N=20), facilitated learning (N=14), and increased motivation (N=13). On the other hand, it can be seen that the story preparation process taking too much time appears as a negative view regarding this method.

## DISCUSSION AND CONCLUSION

In this study, the effect of the digital storytelling method used in the "Our Earth, the Moon and our Source of Life the Sun" unit of the 6th-grade science lessons on students' academic success, attitudes, and motivations toward learning science was analyzed. Accordingly, the answer to whether or not there is a statistically significant difference between the pretest and posttest scores of the students' academic success test and the attitudes and motivations of the experiment group in which the digital storytelling method was used and the control group in which this method was not used was sought. After the application, the posttest results of the success test on the "Our Earth, the Moon, and our Source of Life the Sun" unit showed that the digital storytelling method significantly increased the academic success levels of the students in science lessons. This result overlaps with the results of similar studies in the literature. When the literature is reviewed, it can be seen that many studies support the idea that digital stories enrich the learning environment, increase students' academic success, motivation, interest, and attitudes toward the lesson, support learning in a cooperative manner, develop their questioning skills, and make permanent learning possible (Clarke and Adam, 2011; Hung et al., 2012; Lowenthal and Dunlap, 2010; Robin, 2008; Sadik, 2008; Xu, Park and Baek, 2011; Yang and Wu, 2012). For instance, Lowenthal and Dunlap (2010) stated in their study that in particular the cooperative learning environment created by the digital stories develops the structuring of knowledge and is effective in developing problem-solving skills in the learning environment and increasing learning success. Similarly, Hughes (2005) and Yang and Wu (2012) have also shown that digital studies increases students' academic success and develops their skills of critical reflection and questioning. The positive effects of digital stories on students' success and higher thinking skills show that digital stories can be used in many different areas and to support students' learning in this process.

Through the digital storytelling method, students gain more in-depth knowledge about the subject and test their current knowledge, in addition to being able to do research and use the information they obtain by filtering this knowledge. Furthermore, there are studies showing that digital storytelling activities give students the opportunity to associate their previous experiments with lesson subjects (Dupain and Maguire, 2005; Hung, Hwang and Huang, 2012; Kahraman, 2013; Wang and Zhan, 2010; Yang and Wu, 2012).

According to the averages of the pretest and posttest scores between the groups, a significant increase did not take place in students' attitudes toward science lessons. However, a statistically significant difference was observed between the experiment group, in which digital stories were used, and the control group, in which these stories were not used ( $p=.046$ ;  $p<.05$ ). In the literature, there are studies in which the effect of digital stories on the students' attitudes toward the lesson was analyzed and which showed that these stories positively affected their attitudes toward the lesson (Hung, Hwang and Huang, 2012; Yang and Wu, 2012; Yoon, 2013). In this study, the

conclusion that the digital storytelling method has a positive effect on the students' attitudes toward science lessons overlaps with the conclusions of studies in the literature. It can be stated that a digital storytelling activity in which students manage all the stages on their own during the lessons creates a continuous curiosity in students and is a source of motivation in terms of creating a better digital story each time and that this is effective in forming a positive attitude toward the lessons.

According to the students, digital science stories made "boring" science lessons "fun and enjoyable," attracted their interest and curiosity, and increased their participation in the lesson. According to the interview form data, digital science stories turned science lessons, which seemed boring and difficult before, into fun and enjoyable lessons and thus increased interest, eagerness, and motivation and also participation in the lessons. However, in this application, it was concluded that the use of digital stories in science lessons did not have a more positive effect when compared with the control group in terms of the students' motivation and the permanence of this motivation. In the related literature, Hung et al. (2012) stated that the use of computer technology is effective in increasing students' interest and motivation and Doğan (2012) stated that the opportunity to use computers is effective in terms of students' motivation. Furthermore, Van Gils (2005) stated that digital story writing is a more enjoyable means of learning as a tool of "edutainment," which is a combination of the words education and entertainment, whereas Robin (2007) stated that digital stories are a strong tool for learning and teaching allowing for participation in all areas. Hathorn (2005) and Yoon (2013) stated that digital storytelling makes active participation possible.

In the studies in the related literature, it is expressed that digital storytelling activities have a positive effect on students' motivation (Dupain and Maguire, 2005; Robin and McNeil, 2012; Yang and Wu, 2012), increases students' motivation (Barrett, 2005; Doğan, 2012; Robin, 2008), makes the lessons fun and enjoyable (Doğan, 2012; Hung et al., 2012; Tsou et al., 2006), increases curiosity and interest (Tsou et al., 2006; Yoon, 2013), and increases participation (Doğan, 2012; Robin, 2008; Robin and McNeil, 2012; Sadik, 2008; Smeda et al, 2012; Van Gils, 2005).

As a result of this study, our conclusions are as follows:

- The digital storytelling method can be used as a suitable teaching method for science subjects allowing them to be taught within a plot with the accompaniment of a story and the method can be used as a successful means of concretizing and exemplifying abstract science concepts.
- Prior to the application, giving information to the students on how to use digital video cameras will help them to create their digital story videos during the filming of the digital stories more easily.
- Prior to the application, in addition to teaching the lesson subjects through the digital storytelling method, it should be emphasized that the students can write stories about anything including their own life stories and can enrich these stories with visuals, sounds, and music.
- In addition to preparing the digital stories to be used in the lessons by students, teachers can create their own digital stories about the lesson content and use these as effective teaching materials.
- Although digital storytelling activities require more time, this can be compensated for by good planning.

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