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The Effect of Digital Stories on 3rd Graders' Achievement, Attitudes and Motivation in Science Lesson

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This research aimed to determine the effect of digital stories on 3rd grade students' achievement, attitudes, and motivation in science lesson. For this purpose, explanatory sequential design, one of the mixed methods, was used in the research. The study group, composed of primary school 3rd grade students, was identified via convenience sampling method. The students in the experimental group watched the digital stories prepared by the researcher in the experimental process of the research. 10 cognitive learning outcomes related to the units "Our five senses", "Let's recognize the force" and "Let's know the matter" included the Primary School Third Grade Science Curriculum of Turkey were taken as the basis during the preparation of the digital stories used within the scope of the research. As a result of the quantitative data obtained from the research, it was concluded that experimental group students' achievement, attitudes, and motivation were higher in the science lesson compared to control group students' achievement, attitudes, and motivation. Based on the results of the qualitative data obtained from the research, it was determined that the students found digital stories entertaining, interesting and intriguing. In addition, it was concluded that digital stories facilitate students' learning process and provide them with the opportunity to associate what is learned in the lesson with daily life. It is recommended to integrate digital stories into the current Science Curriculum in line with the results obtained from the research.

Introduction

Stories, regarded as one of the most ancient methods of conveying information, have been used in educational settings for centuries (Carvalho & Cibrao, 2018; Yoon, 2013). That is to say, teachers have benefited from stories in the teaching-learning process from past to present (Foelske, 2014). Therefore, it can be argued that using stories is one of the oldest education methods frequently preferred in many fields of education. Stories, first painted on the cave walls and later published in books, are now transferred to digital media with the development of technology (Turgut & Kışla, 2015). Thus, digital stories emerged as a new version of conventional stories (Anılan, Berber & Anılan, 2018; Sandaran & Kia, 2013).

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In reality, the digital story method is not a new method. Digital stories emerged in the late 1980s with the contributions of Joe Lambert and Dana Atchley, who were also the founders of the Center for Digital Storytelling (CDS). Founded in 1998, CDS (2005) is also known as the organization that develops and disseminates the seven core elements that guide the individuals who want to construct digital stories (Lambert, 2013; Robin, 2008). Robin (2008) explains the seven core elements that should be present in a digital story as follows:

- Point of view: the author's point of view to the main point of the story
- A dramatic question: a question that is asked to grab the viewer's attention.
- Emotional content: the selection of important topics that connect the audience to the story.
- The gift of your voice: effective use of sound/audio to help the audience understand the content.
- The power of the soundtrack: the addition of music or sounds that add color to the story.
- Economy: the arrangement of the content in a manner that does not bore the viewer.
- Pacing: the arrangement of the rhythm in pacing the story.

The point that distinguishes digital stories, which are also accepted as electronic presentations of stories, from traditional stories is that the stories are shared using multimedia elements such as images, audio and video (Kobayashi, 2012; Malita & Martin, 2010; Rossiter & Garcia, 2010). Therefore, these stories that are presented digitally rather than orally or in print include many components such as images, written text, recorded voice narration, music, video clips, animation, motion pictures and graphics (Sandaran & Kia, 2013; Yoon, 2013).

Use of digital stories in education

Digital stories are widely used in educational settings since they can be easily used in many different disciplines such as mathematics, science, foreign language, social studies, art, etc. (Foelske, 2014; Robin, 2008; Sarıtepeci, 2021). Another reason why digital stories are highly preferred in education is related to the fact that they offer multimedia that appeal to many senses of the learner (Özkaya, 2020). These multimedia environments make it easy for students to understand difficult and complex information that they have difficulty in understanding otherwise. In other words, digital stories help students concretize abstract concepts (Amayrah & Al-Husaini, 2021; Kogila, Ibrahim & Zulkifli, 2020; Lunce, 2011; Robin, 2008; Shemy, 2020; Turan & Sezginsoy Şeker, 2018).

Thanks to the elements such as audio, video, and images that capture students' attention, integrating digital stories in education is highly beneficial for educational environments (Dewi, Savitri, Taufiq, Khusniati, 2018; Robin, 2008). Because in this digital age, it is not easy to direct the attention of today's digital generation to the lessons. Therefore, technology integration should definitely be used in educational environments to ensure the willing and active participation of the digital generation. Using digital stories is one of the ways teachers can benefit from technology integration. Teachers can increase students' interest, attention and motivation towards lessons through digital stories they construct (Bayrakdar & Şahinkayası, 2021; Kubravi, Shah & Jan, 2018; Turan & Sezginsoy Şeker, 2018).

With the widespread use of digital stories in educational environments, studies on this subject are increasingly carried out in the literature as well. Relevant literature shows that studies are done on the effectiveness of digital stories in several disciplines such as social studies

(Karataş, 2019; Pala, 2021; Turan & Sezginsoy Şeker, 2018; Ünlü, 2018), science (Karataş, 2020; Pekmezci, 2014), mathematics (Çakıcı, 2018; Karaoğlan Yılmaz, Gökkurt Özdemir & Yaşar, 2018; Yılmaz & Dinçer, 2019), teaching English (Çokyaman & Çelebi, 2021; Aljaraideh, 2020) and teaching Turkish (Özerbaş & Öztürk, 2017; Yılmaz, Üstündağ, Güneş & Çalışkan, 2017).

Use of digital stories in science education

In terms of content, science lesson includes abstract and complex subjects and concepts (Akçay, Aydoğdu, Yıldırım & Şensoy, 2005; Kahyaoğlu, 2011). For this reason, digital stories can be used to embody and concretize abstract science concepts in science education (Bilen, Hoştut & Büyükcengiz, 2019). Thus, students can assimilate the subjects and concepts in science more easily through digital stories (Anılan et al., 2018). Therefore, digital stories can be widely used in science education as in other disciplines of education. However, in their content analysis study where they examined the studies on the use of digital stories in science education, Çakı, Yıldırım, and Çam (2021) concluded that there are very few studies on the use of digital stories in science education. According to Anılan et al. (2018), more studies are needed on the use of digital stories in science education. In this direction, it can be argued that more studies are needed in the literature to present the effectiveness of using digital stories in science education. Therefore, this study is expected to contribute to the literature by investigating the effect of using digital stories in primary school 3rd grade science lesson.

Students experience difficulties in science lessons due to abstract and complex nature of science topics which negatively affects students' attitudes towards the lesson. However, students' attitudes towards the lesson can be changed with digital stories which contribute to the concretization of the abstract science lesson content (Sarıtepeci, 2021). This study explored the use of digital stories not only in relation to student achievement in the science lesson but also in relation to student attitudes towards the lesson and student motivation. The study is believed to be valuable for the literature with this aspect as well.

Purpose of this research

This research aimed to determine the effect of digital stories on primary school 3rd grade students' achievement, attitudes, and motivation in the science lesson. For this purpose, the study sought answers to the following questions:

(1) Is there a significant difference between the experimental group's pretest and posttest scores in terms of achievement, attitude, and motivation?
(2) Is there a significant difference between the control group's pretest and posttest scores in terms of achievement, attitude, and motivation?
(3) Is there a significant difference between the posttest scores of the experimental and control groups in terms of achievement, attitude, and motivation?
(4) How are the experimental group students' opinions about digital stories?

Method

Research model

The present research utilized the explanatory sequential design, which is one of the mixed methods. The explanatory sequential design is a preferred research method when

quantitative data are at the forefront and qualitative data are used to support the quantitative data. In this method, data is collected in two separate phases. In this direction, first quantitative data and then qualitative data are obtained in the research (Creswell, 2009). In this study, quantitative data were obtained by using a quasi-experimental design with pretest-posttest control group. In the second phase of the research, qualitative data were obtained by using the case study design. The research case is that primary school 3rd grade students watch digital stories in science lesson. Within the scope of the research, it was studied to determine the opinions of the students about this case.

Study group

In the research, the study group, consisting of primary school 3rd grade students, was identified by convenience sampling method. The primary school selected for this study had total two 3rd grade classrooms. One of these classrooms was identified as the experimental group while the other was assigned as the control group. The assignment to experimental and control groups was random. At pretest was applied to both groups to determine student achievement, attitude, and motivation in the experimental and control groups in the science lesson before the experimental procedure. Table 1 presents the results of the independent groups t-test for the experimental and control groups' pretest scores:

Table 1. Independent groups t-test results

	Group	**N**	$\overline{X}$	**sd**	**df**	**t**	**p**
Achievement	Experimental	17	8.52	1.46	34	.861	.395
	Control	19	8.15	1.11			
Attitude	Experimental	17	44.05	1.88	34	.466	.644
	Control	19	43.78	1.58			
Motivation	Experimental	17	45.76	2.68	34	-.349	.729
	Control	19	46.10	3.12			

Table 1 shows that there was no significant difference between the experimental and control group students' achievement, attitudes, and motivations before the experimental procedure.

Data collection tools

Four data collection tools were used within the scope of the research.

"Science lesson achievement test"

The "*Science Lesson Achievement Test*" was developed by the researcher to determine student achievement in the science lesson. The developed achievement test was prepared for the 3rd grade level. In this study, the reason for choosing the 3rd grade level is that the children encounter the science lesson for the first time in Turkey at the 3rd grade level. Within the scope of the study, one each unit was determined for each field of science education, that is to say, 'physics', 'chemistry' and 'biology' fields. Accordingly, the "Let's recognize the force" unit for the physics field, the "Let's know the matter" unit for the chemistry field, and the "Our five senses" unit for the biology field were included in the scope of the research. In this context, first, three items were written for each of the 10 cognitive learning outcomes for the "Our five senses", "Let's recognize the force" and "Let's know the matter" units included the Primary School Third Grade Science Curriculum. These items were prepared with three options, considering the level of the students. Expert opinions were sought to ensure the suitability of the prepared achievement test for the unit achievements, that is, to determine the content validity of the achievement test. In this direction, a classroom teacher, a science

education specialist and a curriculum development specialist provided input. In addition, the questions were also examined by a Turkish education expert in terms of compliance with the language rules. Necessary adjustments were made in the achievement test in line with the opinions of the experts. Finally, to determine the clarity of the questions in the achievement test, three 3rd grade students were asked to read the questions aloud and indicate the parts that they had difficulty in understanding. All three students stated that the questions were understandable.

A pilot application was carried out with 102 students to determine the reliability of the 30-item achievement test. Item difficulty and discrimination indexes were calculated for each item after the pilot application. The items in the achievement test were determined by taking these values into consideration. Care was taken to ensure that the item discrimination indexes of the selected question items were above 0.30 and the item difficulty indexes were moderate. The finalized achievement test includes two items for each cognitive learning outcome. The KR-20 reliability coefficient of the achievement test consisting of 20 questions is .83.

"Science lesson attitude scale"

The "*Science Lesson Attitude Scale"* developed by Uyanık (2014) was used in this study to determine the students' attitudes towards the science lesson. This scale was selected to be used in this study because its 3-point Likert type ("*Never*", "*Sometimes*" and "*Always*") structure is suitable for student levels. The 18-item scale consists of four sub-dimensions: "*Attitudes towards the general science lesson", "Attitudes towards the effect of science lesson on daily life", "Affective dimension towards the science lesson"* and "*Positive attitudes towards the science lesson*". While the minimum score that can be obtained from the scale is 18, the maximum score is 54. The reliability coefficient of the scale is .86. In order to use the scale in this study, necessary permission was obtained from the researcher who developed the scale via e-mail.

"Motivation scale for learning science"

The *"Motivation Scale for Learning Science"* developed by Uyanık (2014) was used in this study to determine students' motivation towards learning science. This scale was selected to be used in this study because its 3-point Likert type ("*Never*", "*Sometimes*" and "*Always*") structure is suitable for student levels. The 19-item scale consists of three sub-dimensions: *"Sense of achievement in the science lesson", "willingness towards learning science"* and "*willingness towards doing science lesson activities"*. The minimum score that can be taken from the scale is 19, while the maximum score is 57. The reliability coefficient of the scale is .87. In order to use the scale in this study, necessary permission was obtained from the researcher who developed the scale via e-mail.

"Semi-structured interview form"

An interview form was developed by the researcher to determine experimental group students' opinions about the use of digital stories in the science lesson. Expert opinion was sought for the interview form from a classroom teacher and a science education expert. The interview form consists of four questions. A preliminary application was carried out with 2 students to determine the clarity of the questions in the interview form. The main application was carried out individually with 8 separate students from the experimental group.

Data analysis

First of all, Shapiro Wilk test was conducted to determine whether the data obtained in the study showed a normal distribution. Since it was found that the data showed normal distribution, parametric tests were used in the analysis of sub-problems. In this context, dependent groups t-test was used in the analysis of the first and second sub-problems, and independent groups t-test was used in the analysis of the third sub-problem. Descriptive analysis technique was used for the last and fourth sub-problem of the research.

Experimental process

The experimental process of the research was carried out in the fall semester of the 2021-2022 academic year. Before starting the experimental process in the research, a pretest was given to the experimental and control group students. Then, a 10-week experimental process was carried out in which the students in the experimental group watched the digital stories prepared by the researcher. After the experimental process, a posttest was given to the students in the experimental and control groups. In addition, post-experiment interviews were conducted with the students in the experimental group. Table 2 presents the design process of the research:

Table 2. The design process of the research

Group	**Pre-experimental process**	**Experimental process**	**Post-experimental process**
Experimental	• "Science lesson achievement test" • "Science lesson attitude scale" • "Motivation scale for learning science"	The current curriculum was implemented with the support of digital stories	• "Science lesson achievement test" • "Science lesson attitude scale" • "Motivation scale for learning science" • Interview
Control	• "Science lesson achievement test" • "Science lesson attitude scale" • "Motivation scale for learning science"	The current curriculum was implemented as is	• "Science lesson achievement test" • "Science lesson attitude scale" • "Motivation scale for learning science"

Preparation of the digital stories

The digital stories prepared within the scope of the research were based on the 10 cognitive learning outcomes in "Our five senses", "Let's recognize the force" and "Let's know the matter" units included in the Primary School 3rd Grade Science Curriculum. One digital story was prepared for each cognitive learning outcome.

The digital stories used in the study were created using the Powtoon program. The following steps suggested by Cennamo, Ross and Ertmer (2010) were followed while the digital stories were constructed:

(1) Script writing: At this step, a story topic was identified for each cognitive learning outcome and a scenario was prepared for the topic.
(2) Creating a storyboard: At this step, storyboards were developed for the scenes in the prepared story scenario.
(3) Locating/Placing the images: At this step, images, and videos suitable for the story scenario were integrated in the story.

(4) Creating the digital story: At this step, the story scenario was voiced by the researcher in accordance with the level of the students and the background music was added to the story.
(5) Sharing the story: At this step, the prepared digital stories were shared in the classroom via the smart board.

Expert opinion was sought to determine the suitability of the digital stories to the cognitive learning outcomes in the curriculum and the level of the students. In this direction, opinions were taken from the classroom teacher, a science education specialist and a curriculum development specialist. In addition, the prepared digital stories were also examined by an instructional technology expert and evaluated in terms of the elements that should be included in a digital story. A Turkish education expert was consulted to determine the intelligibility of the texts in the digital stories and whether they complied with the language rules. A 2-week pilot application was carried out in order to identify the problems that may arise during the implementation of digital stories. As a result of expert opinions and pilot application, necessary changes were made, and the digital stories were finalized.

The digital stories prepared by the researcher were used with the experimental group for ten weeks. Therefore, each week, the students watched a digital story aimed at a cognitive learning outcome via the smart board. While the digital stories were shown to the students in the experimental group, the teacher stopped the story in certain sections and asked the students questions about the story. Thus, a discussion environment was created in the classroom about the story topic. The lessons in the experimental group were carried out based on the existing Primary School 3rd Grade Science Curriculum. Therefore, the order of the digital stories per week was identified according to the order of the cognitive learning outcomes in the current curriculum. Table 3 lists the cognitive learning outcomes and the names of the digital stories prepared for these cognitive learning outcomes in the research:

Table 3. Weekly implementation plan for the digital stories

Week	Learning outcome	Digital Story
1.	"Recognizes the importance of sense organs"	What if we didn't have the sense organs?
2.	"Explains the basic functions of the sense organs"	Each sense organ has a task
3.	"Explains what needs to be done to protect the health of the sense organs"	The health of our sense organs is in our hands.
4.	"Observes the moving beings and expresses their motion characteristics"	They act differently from each other
5.	"Discovers by experience that push and pull are forces"	We apply force both when pushing and pulling.
6.	"Defines force by observing the effects of push and pull forces on moving and stationary objects"	I can either stop it or move it by pushing and pulling
7.	"Discusses the dangers of moving objects in daily life"	Where there is movement, there can also be dangerous situations
8.	"Explains the basic features that characterize the matter by using the five sense organs"	I can find the properties of a matter with my sense organs
9.	"Discusses that touching, looking, tasting and smelling certain matters can harm the living body"	Some of the matters can harm us
10.	"Classifies the surrounding matters according to their states"	Which of the three states are you in?

In the study, the lessons in the control group were taught based by following the current Primary School 3rd Grade Science Curriculum. Unlike the experimental group, digital stories were not used when teaching the control group students.

Results

Results related to the first sub-problem

Table 4 presents the results of the dependent groups t-test conducted to determine whether there was a significant difference between the experimental group students' pretest and posttest scores in terms of achievement, attitude and motivation:

Table 4. Dependent groups t-test results

	Group	N	$\overline{X}$	sd	df	t	p
Achievement	Pretest	17	8.52	1.46	16	-22.337	.000
	Posttest	17	18.11	1.49			
Attitude	Pretest	17	44.05	1.88	16	-12.645	.000
	Posttest	17	51.29	1.64			
Motivation	Pretest	17	45.76	2.68	16	-8.788	.000
	Posttest	17	54.29	1.89			

Table 4 points to that experimental group students' posttest scores related to the variables of achievement, attitude and motivation showed a significant increase compared to their pretest scores.

Results related to the second sub-problem

Table 5 presents the results of the dependent groups t-test conducted to determine whether there was a significant difference between the pretest and posttest scores of the students in the control group regarding achievement, attitude, and motivation:

Table 5. Dependent groups t-test results

	Group	N	$\overline{X}$	sd	df	t	p
Achievement	Pretest	19	8.15	1.11	18	-11.635	.000
	Posttest	19	13.73	1.79			
Attitude	Pretest	19	43.78	1.58	18	-4.480	.000
	Posttest	19	46.31	2.42			
Motivation	Pretest	19	46.10	3.12	18	-4.068	.001
	Posttest	19	49.10	1.82			

Table 5 demonstrates that the control group students' posttest scores regarding achievement, attitude and motivation showed a significant increase compared to their pretest scores.

Results related to the third sub-problem

Table 6 presents the results of the independent groups t-test conducted to determine whether there was a significant difference between the posttest scores of the students in the experimental and control groups regarding achievement, attitude, and motivation:

Table 6. Independent groups t-test results

	Group	N	$\overline{X}$	sd	df	t	p
Achievement	Experimental	17	18.11	1.49	34	7.915	.000
	Control	19	13.73	1.79			
Attitude	Experimental	17	51.29	1.64	34	7.108	.000
	Control	19	46.31	2.42			
Motivation	Experimental	17	54.29	1.89	34	8.367	.000
	Control	19	49.10	1.82			

Table 6 demonstrates that the experimental group students' posttest scores regarding achievement, attitude and motivation were significantly higher than the control group students' posttest scores.

Results related to the fourth sub-problem

Figure 1 demonstrates the categories created in line with the experimental group students' opinions regarding the use of digital stories in the science lesson.

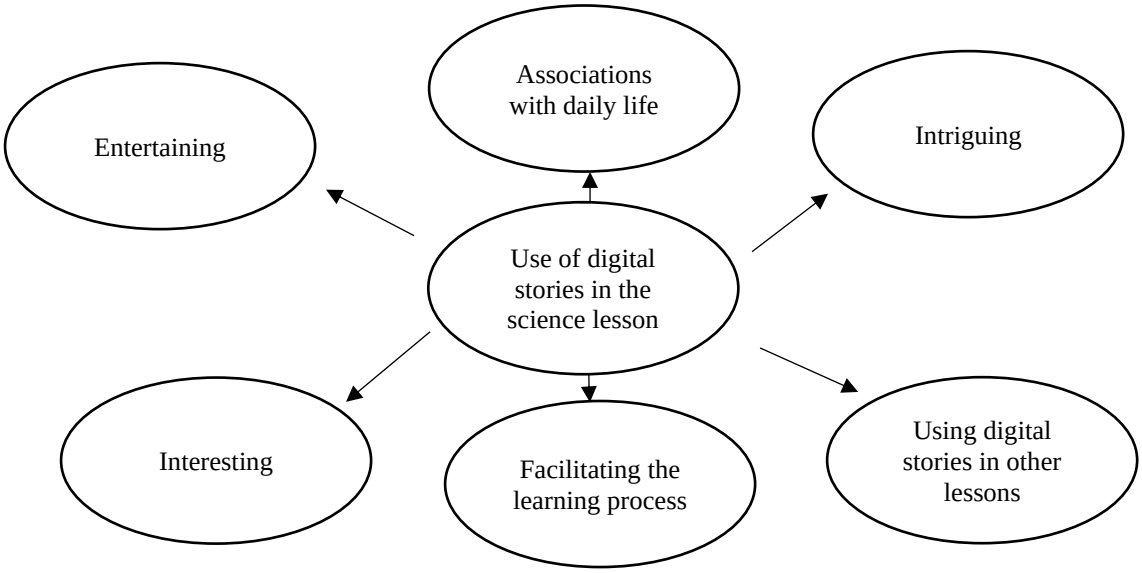

Figure 1. Categories based on student opinions

Figure 1 shows that students found digital stories entertaining in science education. Regarding this situation, a student (S5-Student 5) stated that *"the lessons went very well, we had a lot of fun"* and another student (S7) said *"I was very happy watching the stories during lesson; I had a lot of fun"*. Based on student opinions, it can be concluded that digital stories were well liked by the students.

Examination of students' opinions demonstrated that students associated the stories they watched in the lesson with their daily lives. Regarding this, S2 stated the following: *"The story I watched in the lesson had happened to me too";* while S4 declared that *"After watching the stories, I realized that most of the things around us are related to science"*. Based on student opinions, it can be argued that digital stories allowed students to associate the information they learned in the lesson with daily life.

Examination of students' opinions showed that digital stories activated the sense of curiosity in students. Regarding this, S3 stated the following *"The stories we watched were very good, I was wondering what would happen at the end of the story";* while S6 said *"I always*

wondered which story we would watch the following week". Based on student opinions, it can be argued that digital stories aroused students' sense of curiosity and increased their attention towards the science lesson.

Based on student opinions, it was concluded that the students liked the multimedia elements of the digital stories very much. Regarding this, S2 reported the following *"I loved the pictures and videos in the stories, I liked them very much";* while S8 said that *"the music used in the stories was very nice".* Based on student opinions, it can be argued that multimedia elements such as images, music and videos in the digital stories attracted student attention.

Based on student opinions, it was concluded that the students thought that digital stories facilitated their learning. Regarding this, S1 stated that *"I learned a lot of new information from the stories, and I had no difficulties"* while S5 reported the following: *"I understood many words we learned in the lesson better when I watched the stories".* Based on student opinions, it can be concluded that digital stories supported students' learning processes positively.

Examination of students' opinions showed that that the students wanted to watch the digital stories in other lessons as well. Regarding this, S3 reported the following: *"I would like to watch digital stories in other lessons, because it would be fun like it was in the science lesson".* S6 said, *"I get bored in math lessons, I think it would be nice to watch a story in math lesson as well".* Based on students' opinions, it can be said that digital stories can be used in lessons other than science.

Discussion

This study set out to determine the effect of digital stories on primary school 3rd grade students' achievement, attitudes, and motivations in science lesson. The findings obtained within the scope of the research showed that digital stories positively affected student achievement in science lesson. This finding can be interpreted with the fact that digital stories positively affect the quality of science education trained, and this reflects positively on students' success. Similar findings were obtained in the studies conducted by Karataş (2020) and Pekmezci (2014) and both studies concluded that digital stories affected student achievement in science lesson positively. Findings obtained from studies on different disciplines in the literature also overlap with the findings obtained from this study. The digital stories used in studies on different disciplines such as social studies (Karataş, 2019; Pala, 2021; Ünlü, 2018), teaching English (Çokyaman & Çelebi, 2021; Aljaraideh, 2020), teaching Turkish (Özerbaş & Öztürk, 2017) were also found to have a positive effect on student achievement. In addition, meta-analysis studies in the literature which investigated the studies on the use of digital stories also support the findings obtained from this study. The meta-analysis study conducted by Akgün and Akgün (2020) concluded that digital stories had a strong effect on increasing achievement and this effect was mostly observed in science lessons. Also, the meta-analysis study conducted by Şahin and Çoban (2020) determined that digital stories affected students' academic success at a high level.

The fact that the students in the experimental group in this study were more successful in the science lesson compared to the students in the control group can be interpreted with the facilitative effect of digital stories during the learning process. As a matter of fact, the qualitative findings obtained from this study also confirm this view. Interviews conducted with the students within the scope of this research showed that digital stories helped students assimilate science lesson content more easily. According to Sandaran and Kia (2013), digital

stories have a facilitating role in the teaching-learning process. In addition, the qualitative findings obtained from this research also showed that digital stories allowed students to associate the information they learned in the lesson with daily life. This finding can be interpreted with the fact that digital stories contributed to students' concretization and easier understanding of abstract science concepts. Studies in the literature also support this view. Shemy (2020) determined that digital stories positively affected the teaching of scientific concepts. In the study conducted by Santos (2009), it was found that animations positively supported primary school students' learning of science concepts. Also, the study conducted by Dalacosta, Kamariotaki-Paparrigopoulou, Palyvos and Spyrellis (2009) concluded that animated cartoons facilitated the learning of difficult and complex science concepts.

The findings from the present study demonstrated that digital stories positively affected student attitudes towards the science lesson as well. A similar finding was obtained in the study conducted by Pekmezci (2014) in which it was identified that digital stories positively affected student attitudes towards science. Again, the findings obtained in the studies conducted on the use of digital stories in the mathematics lesson by Çakıcı (2018) and in the social studies lesson by Karataş (2019) overlap with the findings obtained from this study. In both studies, it was concluded that digital stories affected student attitudes positively. The fact that the students in the experimental group had higher attitudes towards the science lesson than the control group in this study can also be interpreted with the fact that the students liked the digital stories used in the lessons. As a matter of fact, the qualitative findings obtained from this study also support the quantitative findings here. The result of the interviews with the students within the scope of the research showed that the students found the digital stories entertaining and reported that they wanted to watch the digital stories in other lessons as well.

The qualitative findings obtained from the research showed that digital stories positively supported students' learning processes. In other words, it can be said that digital stories contributed to students' understanding of the content in the science lesson more easily. Various studies in the literature also show that digital stories positively affect students' listening comprehension skills (Ciğerci, 2015; Demirbaş, 2019; Sandaran & Kia, 2013). It is believed that increased level of student understanding in regards to science lesson content which was facilitated with digital stories may have played a decisive role in their attitudes towards the lesson because students usually have a negative attitude towards the lessons that they have difficulty in understanding. Therefore, it can be argued that digital stories, which enable students to understand abstract science concepts and content more easily, contribute positively to their attitudes towards the lesson.

The findings obtained from this study showed that digital stories positively affected students' motivation towards learning science as well. The study carried out by Shemy (2020) with kindergarten students obtained a similar finding and it was determined that the use of digital stories in the teaching of scientific concepts had a positive effect on student motivation. Also, the studies conducted on the use of digital stories, by Özerbaş and Öztürk (2017) in teaching Turkish, by Aljaraideh (2020) in teaching English, and by Turan and Sezginsoy Şeker (2018) in social studies, concluded that digital stories positively affected student motivation. In addition, a compilation study in which the studies on the use of digital stories were investigated, Foelske (2014) concluded that digital stories increased the motivation of students.

The finding that the motivation of the students in the experimental group for learning science was higher than that of the control group in this study can also be interpreted with the fact that

the digital stories used in the lesson attracted the attention of the students and aroused a sense of curiosity. As a matter of fact, the qualitative findings obtained from this study also confirm this view. Interviews conducted with students within the scope of the research showed that multimedia elements used in the digital stories such as images, music, videos, and animations attracted the attention of students. In addition, the students' self-efficacy perceptions about the lesson may have also played a role in the higher motivation of the students in the experimental group compared to the students in the control group because students with high self-efficacy perceptions for science make more effort to learn science content. In other words, students who believe that they will be successful in science lessons will be more motivated towards learning science. The study by Pekmezci (2014) which concluded that digital stories positively affected students' self-efficacy perceptions about science also supports this view.

Conclusion and Recommendations

This study investigated the usability of digital stories in science education. In line with the findings obtained from this research, it can be argued that digital stories are an effective teaching method that contributes positively to science education. The study concluded that digital stories positively affected student achievement in the science lesson. This result is very valuable especially in relation to how primary school 3rd grade students who are in the concrete operational stage understand abstract science concepts. In addition, the findings obtained from the research showed that digital stories also positively affected student attitudes and motivation towards science lessons. These results obtained from the research are significant considering that the students in Turkey first encounter the science lesson in the 3rd grade of primary school. Student attitudes towards the lesson and science will be formed in the science lesson which they have encountered for the first time will also determine their attitudes towards science education and science in the future. In this respect, it is thought that digital stories that make students enjoy science lessons will contribute positively to their interest in science and science education throughout their lives.

Based on the results of the research, it can be argued that digital stories contribute to the effective implementation of the current Primary School 3rd Grade Science Curriculum. When the current curriculum is supported with digital stories, students will attain the expected cognitive learning outcomes more easily. In this context, it is recommended to integrate digital stories into the current Science Curriculum. Ohler (2006) is also of the opinion that digital stories, which present multimedia to students, must be integrated into the curriculum. In addition, the current Science Curriculum asks teachers to create discussion environments where students can freely express their thoughts (MNE, 2018). Teachers can easily create these discussion environments in their classrooms with the digital stories they will prepare (Lunce, 2011; Robin, 2008). Therefore, when digital stories are integrated into the current Science Curriculum, this aspect will contribute to the effective implementation of the curriculum.

The integration of technology into curricula is very valuable, but it is not enough on its own because the effectiveness of technology integration in learning environments depends on teachers' proficiency in technology (Sadik, 2008). In other words, using digital stories in science lessons depends on teachers' competencies in this subject. This competence can be provided during the pre-service training process. Anılan et al. (2018) reported that pre-service teachers should definitely acquire the ability to prepare digital stories during pre-service training. Özüdoğru and Çakır (2020) also emphasized the importance of providing pre-service

teachers with experiences in preparing digital stories during their pre-service training. Therefore, it is suggested that teacher training programs should be organized in a way that allows pre-service teachers to acquire digital story preparation skills and experience.

This study was carried out at the 3rd grade level of a primary school. Future studies can investigate the effectiveness of digital stories in science lessons at different grade levels and with different units. In addition, this study examined the effectiveness of digital stories in terms of achievement, attitude, and motivation. The current Science Curriculum emphasizes many other skills such as scientific process skills and analytical thinking skills. In this context, the effects of using digital stories can be investigated in further studies in relation to different variables such as scientific process skills and analytical thinking skills.

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