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Research Article

Investigating Classroom Teachers' Experiences on the Use of Digital Stories*

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Abstract – This study aimed to investigate classroom teachers' experiences with the use of digital stories in the mathematics teaching process by using the phenomenological research design. Digital stories and lesson plans prepared by the researcher for each primary school grade mathematics course were distributed to the participating teachers during the data collection process. Teachers were asked to teach their lessons with the digital story appropriate for the grade level. The classroom teachers stated that teaching mathematics with digital storytelling provided concretization of abstract concepts, ensured retention, increased attention towards the lesson, and facilitated the transfer of what they learned to real life. The danger of turning the use of technology into a habit, the hardship of preparing digital story materials that could address students' individual differences, insufficient technological equipment in the teaching environment, and problems related to the time-consuming nature of the practice were the main disadvantages of teaching mathematics via digital stories.

Keywords: Digital story, mathematics teaching, classroom teachers.

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Introduction

Since ancient times, traditional storytelling has played an important role in the transfer of knowledge, beliefs, values, history, culture, and traditions to other individuals, communities and future generations (Smeda et al., 2014; Wang & Zhan, 2010). According to Meadows (2003), as a form of import, traditional storytelling is one of the important tools used throughout history in the transfer of knowledge, wisdom and values. Storytelling is a natural way of communication to enable people to better perceive intertwined thoughts, concepts, and information (Chung, 2006; Mello, 2001). As in every literary work, each story carries a certain point of view based on specific feelings and thoughts and shortly expresses the message it wants to convey around various events (Bull & Kajder, 2005). Many researchers agree that storytelling is essential to perceive how people understand and organize information (Si, 2016).

In the present era, stories have been digitized with the development of technology and audio, music, visual, photograph, and video elements are added to the story, so the stories have been transferred to digital media as digital stories (Kurudayıoğlu & Bal, 2014). With the change and development in technology, new tools and concepts emerged such as computers, tablets, smart boards, and internet technologies, therefore teaching needs are differentiated (Alakoç, 2003). Students growing up in the digital environment readily adopt technology as a tool for learning because technological environments appeal to multiple sensory organs (France & Wakefield, 2011). Demir (2019) similarly mentions the importance of using technology in education because digital tools are a part of children's lives, textbooks have turned into interactive books, and communication is provided online. The nature of storytelling has changed and the transfer of storytelling to the digital media environment has begun with the development and increasing use of information technologies and the emergence of different hardware and software (Kaya Erdem & Baydaş Sayılgan, 2011; Van Gils, 2005). Digital stories that emerged with the effect of the development of current technology are among the materials used while integrating information and communication technologies into the learning environment (Pürbudak & Usta, 2019).

Related Studies In The Literature

A digital story is a the combination of a story with multimedia environments such as images, videos, graphics, text, sound, and music to provide information about a subject (Robin, 2006). İnceelli (2005) defines digital storytelling as a process of preparing a short film of 2-6 minutes, in which the story writer usually dubs the story himself/herself and

utilizes multimedia tools such as visual, video, and music. The author emphasizes that a new perspective is given to the digital story method by integrating the traditional storytelling method with technology. Ohler (2008) describes digital storytelling as a unique process created by combining traditional storytelling with media tools such as computers, video cameras, and sound recorders.

It is emphasized that the digital story method can provide education and training opportunities that can meet the needs of the century we live in and improve individuals' skills regarding the analysis of visual and auditory data, meaningful learning, prediction, and liberal thinking skills. In addition, it is believed that the digital story method will cause significant changes in education and is a different, highly functional and unique method for the generation called the digital natives (Bozdoğan, 2012). A digital story is an educational tool recommended for teachers and students at all levels from preschool to higher education in gaining and developing communication, research and cooperative learning skills (Di Blas et al., 2009; LaFrance & Blizzard, 2013).

The digital storytelling method is believed to assist individuals in analyzing, learning, and evaluating current problems and improving their creativity and it is argued that this method is different, original, and functional for the next generations that will shape the future of education (Bozdogan, 2012). In addition, Barrett (2005) emphasized that digital stories facilitate the aggregation of four student-based learning methods, cited as the active participation of the student, reflection for learning, project-based learning, and the active transfer of technology to the learning environment. In addition, integrating digital stories into the learning environment increases students' school achievement, enables them to develop positive behaviors about the course, improves their writing, critical thinking, and problem-solving skills, and provides them with the opportunity to ensure permanence in learning and express themselves (Balaman, 2016a; Foley, 2013; Robin, 2006; Tatlı & Aksoy, 2017; Yoon, 2013).

Kurtoğlu Erden and Uslupehlivan (2016) underlined that digital stories can be used in almost every part and level of education and argued that the process should be well planned for active and efficient use in the teaching environment, which requires mastery of the features of the digital story approach by teachers. Teachers who can benefit from the superior aspects of the digital story method can direct their students to cooperative learning and to interact with people inside and outside the classroom with digital stories (Kocaman Karoğlu, 2015). Teachers who can actively use technology in education are the most important element

of the digital story-creation process which includes certain elements, sequences, and processes (Haliloğlu Tatlı, 2016; Kahraman, 2013; Karakoyun, 2014; İnceelli, 2005).

Digital story is one of the leading teaching methods of the age in conveying information to digital natives and accommodating to them (Çoruk & Seferoğlu, 2020). Integrating technology into education is often thought to be an important tool to make students active in complicated mathematics learning environments (Zbiek et al., 2007). In addition to the use of digital storytelling in reading, writing, and language education, researchers have emphasized the importance of using digital storytelling in mathematics teaching (Küçükoğlu, 2019). Although educators focus more on developing students' reading, writing and language skills, problem-solving skills should also be developed in this era (İncikabı, 2015). Digital storytelling can enrich teaching by attracting attention in mathematics education (Schiro, 2004). Doing research on the subject with the digital storytelling method improves students' analysis, creation, and critical thinking skills (Hull & Katz, 2006; Ohler, 2008). Researchers examining educational environments that integrate digital stories report active student participation in problem-solving and evaluation processes (Chung, 2007). Basically, the expectations in mathematics education to develop students' analysis, creation and critical thinking skills support this idea as well (Küçükoğlu, 2019). The main purpose of this study is to explore classroom teachers' opinions regarding use of the digital story method in mathematics teaching in elementary classroom settings.

Method

Research Model

This research, which aimed to investigate classroom teachers' experiences of using digital stories after they practiced the method at their own grade level in their classroom, was conducted with phenomenological research design, one of the qualitative research methods. The phenomenological research design aims to describe participants' experiences to reveal similar meanings underlying the stated phenomenon (Onat Kocabıyık, 2015) and to present their perceptions and experiences about a phenomenon and the meanings attributed to the aforementioned elements (Yıldırım & Şimşek, 2018). For this purpose, the digital stories planned by the researcher and the activities related to these digital stories were implemented by the classroom teachers during mathematics lessons and the classroom teachers were provided with opportunities to experience the mathematics teaching process with digital storytelling in their own classrooms before their opinions were collected.

Participants

The sample of the research consisted of 25 voluntary classroom teachers employed in public and private primary schools. Convenience sampling, one of the purposeful sampling methods, was used in this research. Among the participants, 14 were males and 11 were females, all the teachers graduated from Faculty of Education. In addition, 19 of the classroom teachers were working in schools in the city center, while 6 of them were working in the schools that were located in various villages. In order to ensure confidentiality, pseudonyms were used instead of participant names in the research.

Data Collection Tools

During the data collection process, the digital stories and lesson plans prepared by the researcher for all levels of primary school were distributed to the participating teachers to examine their opinions on the use of digital stories, and then, they were asked to teach their lessons with the digital story suitable for their grade level. Afterwards, the interview questions prepared in line with the expert feedback to obtain teacher opinions on the use of the digital story method in primary school mathematics teaching were asked in the form of one-to-one interviews which were audio recorded with the permission of the teachers. The questions used during the data collection process are as follows:

1- What comes to your mind when you think of digital storytelling?
2- What are the positive aspects of using the digital story method in the mathematics teaching process?
3- What are the negative aspects of using the digital story method in the mathematics teaching process?
4- What problems can be encountered with the use of digital stories in the mathematics teaching process?
5- What are the opinions you would like to add about the use of digital storytelling in mathematics teaching?

Educational Implementation Process

Preparation of the Digital Stories

A digital story and a lesson plan were prepared for each primary school grade level in line with the acquisitions specified for mathematics teaching to examine classroom teachers' experiences in using the digital story in mathematics teaching. The elements of the digital

story identified by Robin (2008), Lambert (2010), and Ohler (2013) were examined while preparing the digital stories for the educational implementation process, and the following eight elements were used: point of view, a dramatic question, emotional relationship, the gift of voice, power of the soundtrack, words of the narrator, economy (time and story length) and pacing.

Implementation of the Digital Stories

Figure 1 provides information about the implementation process of digital stories in teaching mathematics. Teaching time was planned as two class periods (40'+40') in the process of preparing the lesson plans. Classroom teachers completed the teaching process 'Addition with Natural Numbers' for the 1st grades and 'Geometric Patterns' for the 2nd grades. Respectively, 3rd and 4th grade teachers completed the teaching process for 'Geometric Objects and Shapes' and 'Data Processing' in two class hours.

The flowchart for the implementation process for using digital stories in mathematics lessons is provided below:

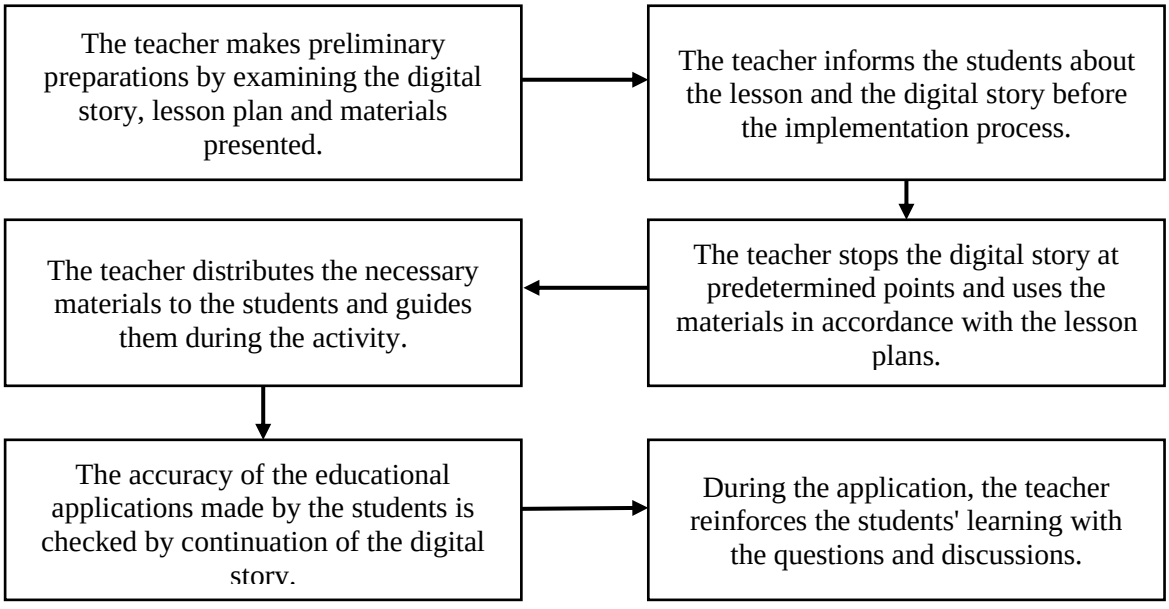

Figure 1 General Flowchart for the Implementation Process

Validity and Reliability

Regarding the validity in qualitative research, Miles and Huberman (1994) suggested taking into account the environment for data collection, using new approaches in the explanation of the obtained data, ensuring the heterogeneity of the sample to allow

generalization, and including possible generalizations for the definitions. During the data collection process, it was ensured that the environment was quiet and the distractions were minimized. In addition, the sample was arranged heterogeneously, by taking at least two teachers from each grade level in the primary school, taking into account their employment in schools located in villages or city center.

In order to increase the validity of the study, the literature was examined while preparing the data collection questions and it was decided to investigate the positive and negative aspects of the use of digital story in mathematics teaching and what are the general needs for its use. With this perspective, the data collection questions were revised twice and then sent to 5 scientists specialized in the fields of Turkish language teaching, mathematics teaching in elementary education, mathematics teaching in secondary education, and computer and instructional technology education. Taking into account expert feedback, the 3rd revision was carried out and data collection questions were finalized.

For the implementation process, Lawshe (1975) technique was used to determine the content validity of the digital stories and lesson plans prepared by the researcher for primary school 1st, 2nd, 3rd and 4th grades. The expert opinion form was prepared by using a three point scale in the Lawshe (1975) technique as “the item measures the targeted structure”, “the item is related to the structure but unnecessary” and “the item does not measure the targeted structure” for the evaluation of each digital story and lesson plan. Expert opinion was received for the digital stories and lesson plans in the research from a total of 5 teachers, including 4 classroom teachers and 1 information technology teacher. The Content Validity Rate was calculated as “1” since all experts marked the option “the item measures the targeted structure” for all items.

To increase reliability, the content analysis method created by Yıldırım and Şimşek (2018) and consisting of four stages “Coding the Data”, “Finding the Themes”, “Organizing and Defining the Data Based on the Codes and Themes” and “Interpreting the Findings” was used during data analysis. Based on these stages, the data were coded, categories and themes were created, the data were organized according to these categories and themes, and the findings were interpreted in a clear and understandable manner.

Data Analysis

The data obtained based on the content analysis is first conceptualized, and then organized realistically for the emerging concepts to determine the themes explaining the data.

In data analysis, themes are created based on the concepts, and together with the themes, the facts can be arranged more clearly to make them more comprehensible. The basic process in content analysis is to gather similar data within the framework of certain concepts and themes and to organize and interpret them in a way that the reader can understand (Yıldırım & Şimşek, 2018). Content analysis was conducted in this study to examine classroom teachers' opinions on the use of digital stories in teaching mathematics. Qualitative research data is analyzed in four stages as "Coding the Data", "Finding the Themes", "Organizing and Defining the Data Based on the Codes and Themes" and "Interpreting the Findings".

While coding the data, the researcher examined and divided the obtained data into meaningful sections and tried to determine the conceptual meaning of each section. The sections that formed a meaningful whole together were named and coded by the researcher. Identification of the descriptive codes of the mentioned sections is essential at this stage. For example, in this research, many teachers mentioned that digital stories help in concretizing abstract concepts regarding the positive aspects of using digital stories in teaching mathematics and hence these opinions were gathered under the code of "Opportunity to Concretize Abstract Concepts". Based on the created codes, themes were determined to gather the codes under a general category and explain them in general. In order to establish themes, the codes were combined, examined, and classified according to similar characteristics. In short, themes were created by categorizing the obtained data on the basis of codes. For instance, the codes of "Opportunity to Learn by Having Fun", "Contributing to Student Development" and "Supporting Multiple Intelligence Types" were gathered under the theme of "Positive Aspects for Students".

Following the completion of the thematic coding stage, the data obtained were organized according to the codes and themes. The analysis method developed by Lincoln and Guba (1985) for the coding of data in qualitative studies was used in this research. Accordingly, new codes created during the coding process were added to the code booklet in order to assess whether the generated code booklet was satisfactory for the examined data. The themes in the code booklet were checked repeatedly and changes were made where necessary. The relationships recognized between the themes during the data analysis were transferred to the code booklet and the codes which were originally included but were deemed unnecessary during the analysis process were removed (Lincoln & Guba, 1985).

Results

The data obtained from the classroom teachers' experiences of mathematics teaching with digital stories are examined under the titles of "Positive Aspects of Using Digital Stories in Teaching Mathematics " and "Negative Aspects of Using Digital Stories in Teaching Mathematics " in this section.

Positive Aspects of Using Digital Stories in Teaching Mathematics

Table 1 Themes and Categories Regarding Classroom Teachers' Opinions on the Positive Aspects of Using Digital Storytelling in Teaching Mathematics

Theme	Category	Classroom teachers
Positive aspects for learning	Opportunity to concretize abstract concepts Opportunity to learn by doing Facilitator in transferring to daily life Ensuring retention Attracting attention to the lesson Opportunity to ıncrease achievement	Arda, Arzu, Bilge, Elif, Emin, Furkan, İlker, Sude,
Positive aspects for teachers	Time saving Supplementary resource	Demir, Emin, Alper
Positive aspects for students	Opportunity to learn by having fun Contributing to student development Supporting multiple ıntelligence types	Ozan, Elif, Gamze

Positive Aspects for Learning

The classroom teachers stated that students did not have abstract thinking in general due to their developmental stages so many of the mathematics subjects remained nonconcrete for them. They mentioned that the digital stories provided the opportunity to embody the mentioned abstract subjects by appealing to more than one sense. Arda Teacher stated that digital stories ensured concretization of the subjects with the following words:

> *Since the children are not in the abstract thinking stage, they would like everything to be concrete. They need to see (it) with their own eyes. The materials you prepared were very helpful to us in that regard. For example, in recognizing objects. Watching the animation there, seeing it digitally and following the lesson by touching and feeling it, in a way, reinforced the learning of the children. –* ***Arda***

Arzu Teacher emphasized that digital stories provided the opportunity to concretize the math subjects:

> *To be able to present the visual to the student by concretizing the abstract*

information. Mathematics teaching generally remains abstract, but it is important to concretize it. - ***Arzu***

Classroom teachers stated that teaching mathematics with digital stories allowed the learning process to be integrated into daily life. Among her positive views on the learning process, Bilge Teacher mentioned that the use of digital stories facilitated the transfer to daily life in the following manner:

Nice practice. Because, as I said at the beginning, children develop a fear of mathematics. They also have difficulties in applying mathematics to daily life. I find it really helpful to use the digital story for this. - ***Bilge***

Elif Teacher explained the positive effects of using digital stories in teaching mathematics as follows, emphasizing that mathematics is everywhere in life:

It attracts the attention of children more. It's a different material, a different activity. In other words, it is turned into a story and they realize that mathematics is actually in our lives. They realize that we use mathematics in every aspect of our lives. It is like that for us and for the children as well. – ***Elif***

Classroom teachers noted that the use of digital stories in teaching mathematics provided permanence in learning. Emin teacher explained that the mathematics teaching process carried out with digital stories provided higher retention in learning with the following sentences:

It makes the lesson more fun as the subjects are handled with materials and tools. It makes it more permanent. In the images there were models. For example, in our addition activity, since the models there visually attract students' attention, they also increase retention. In the same way, if we consider the use of the senses, for example, hearing, seeing, etc., when these senses are used together, the permanence increases even more. - ***Emin***

Furkan Teacher talked about his experience of using digital stories in teaching mathematics in his own class and stated that using digital stories increased retention since they appealed to more than one sense.

When students have more visual and auditory videos like these, learning becomes more permanent and it is difficult for students to forget. I think it is extremely useful. Because when we tried to explain to the students the subject we covered,

using both the materials and the digital story, the students really learned more and did it more easily. - ***Furkan***

Classroom teachers explained that using digital stories in teaching mathematics was beneficial in increasing the students' interest in the lesson, motivating them, and thus keeping the attention high throughout the lesson. Below, you can find the opinion of İlker Teacher that emphasized how the use of digital stories in teaching mathematics helped to draw attention to the lesson based on his observations:

We have observed that it is very useful in attracting attention, drawing interest, in the implementation stage. In other words, it was very useful in attracting student attention to the lesson. As far as I have observed, we can talk about the positive aspects of motivation, increasing interest in the lesson. – ***İlker***

The opinions of Sude Teacher, emphasizing the involvement of the student in the digital story process in mathematics teaching, are provided below:

First of all, it gives visual information to the children. Both visual and auditory, some applications include the child in the activities we do afterwards. In that sense, the child is involved in the activity. Instead of just watching and listening. I think it's much more insightful and remarkable. I also think that using [digital storytelling] in teaching mathematics strengthens and supports learning. – ***Sude***

Positive Aspects for Teachers

During the course of investigating the positive opinions of classroom teachers towards the implementation of digital stories into the mathematics education process, the categories of time-saving and study aid were developed. The above categories were grouped under the theme of Positive Aspects from the Teacher's Perspective. The lassroom teacher Demir pointed out that the usage of digital stories in teaching mathematics helps the teacher to quickly present the subject matter as follows:

It prevents the teacher from becoming more tired, saves time, and speeds up the achievement of the desired achievement. I interpret it this way. - ***Demir***

Classroom teachers mentioned that using digital stories to teach mathematics might serve as motivating teaching material for teachers themselves. The following are the views of teacher Emin, who emphasized that digital stories are useful as a study aid for teachers:

Looking from the teacher's perspective, firstly, it provides a variety of options as

> *a study aid and the teacher as a supportive learning aid. Compared to presenting the lesson on your own, using the video as a learning aid, motivates students and helps you as a teacher.* ***– Emin***

While teacher Alper acknowledged that digital stories were beneficial as a study aid, he emphasized that they helped him keep the classroom in control:

> *Honestly, I've never used a digital story before. Then I observed that the students are much better prepared for the class and significantly more engaged. And I observed that digital storytelling offered better classroom management when I was unable to control it. It seems like an aid that I will use from now on. So, digital storytelling has become a teaching material for me as well. I can use it as a supportive element.* ***- Alper***

Positive Aspects for Students

Concerning the positive opinions of classroom teachers regarding the use of digital stories in mathematics teaching, the categories of opportunity to learn by having fun, contribution to student development, and support for multiple intelligence types were created. The grouping of the aforementioned categories under the theme of "Positive Aspects from the Student's Perspective" was considered appropriate. According to a classroom teacher, unlike traditional teaching methods, the use of digital stories in mathematics teaching enables students to learn while having fun. Teacher Ozan used the following statements to describe how students were affected by the usage of digital stories in mathematics teaching in terms of learning by having fun:

> *Its benefits include preventing the child from being bored and making learning more enjoyable via the use of stories. Those are the positive aspects. It's more fun, they do it with a lot of fun, which we observed in class. They do it easily. They didn't have that much fun when we were discussing the subject of the pattern. Because our methods and the methods in the book are fairly traditional, this way makes the process more enjoyable.* ***- Ozan***

A classroom school teacher indicated that the use of digital stories in mathematics teaching promotes the psychomotor development of students. The development of the student is fostered by the student's participation in the teaching process using digital story, as mentioned by the teacher Elif with the following words:

> *It was a unique activity that grabbed the children's attention. Through cutting*

and gluing, children have also reinforced their hand muscles. And that was a different and nice thing. In fact, it can be used at any stage. In other words, it may be applied once per week or once every 10 days in a math class. So that, we can incorporate it with other lessons. I believe that is a good and applicable method. - ***Elif***

As a result of the fact that digital stories differentiate the process of teaching mathematics, they accommodate different types of intelligence, hence reducing individual differences in learning. With the following explanations, teacher Gamze stated that digital stories are intended to appeal to different types of intelligence:

I think it comes with several positive aspects. The story targets both visual memory and auditory intelligence as it is delivered as a video. You know that intelligence types are quite crucial for students at that age. Thus, I think it can be more effective when the subject is explained in a differentiated way. Therefore, I support using digital stories. ***-Gamze***

Negative Aspects of Using Digital Stories in Teaching Mathematics

Table 2 Themes and Categories Regarding Classroom Teachers' Opinions on the Negative Aspects of Using Digital Story in Teaching Mathematics

Theme	Category	Classroom teachers
Negative aspects for students	Turning into a habit Individual differences Technology saturation Readiness	Arda, Sude, Elif, Cem, Alper, Zehra, Demir
Negative aspects regarding the teaching environment	Lack of technological Infrastructure	Ezgi, Oğuz, Didem
Negative aspects for teachers	Time constraints Crowded classrooms	Figen, Ozan, Eylül, Hakan, Ezgi, Zehra

Negative Aspects for Students

Classroom teachers stated that the use of digital stories in teaching mathematics and the continuous use of digital stories in teaching will cause negative results if this method turns into a habit over time. Arda Teacher highlighted the negative aspects of using the digital story continuously in teaching mathematics with the following sentences:

It has to be used in moderation. It may be good for the teacher to use it as an introduction to some subjects in the introduction, as you mentioned, and to do the rest with other methods. However, it is seen that the children constantly need it after a certain point, when the lesson is carried out with it[digital story] or the

subjects are taught with it. It can also cause problems in the future. – ***Arda***

Similarly, the opinions of Sude Teacher which explained that the continuous use of digital stories in teaching mathematics would easily turn into a habit, considering the technology competencies of today's students are given below:

> *Let me see, as I said, children are very prone to this[digital technology] and they can solve how to use everything digital in two minutes. However, the harmful aspects of this are, of course, that the child does these in the virtual world. Doing virtual activities, not touching anything in reality. It directs the child more towards the digital. The child does not want to write or draw later. He wants to place the shape there because it is easier. You say, for example, let's draw a square, draw a cylinder. The child does not have the skill to draw cylinders. Does not use pen and notebook correctly. -* ***Sude***

Classroom teachers mentioned that having some students with attention problems or with different languages made it difficult for students to adapt to the learning process when digital stories were used in teaching mathematics. With the following statement, Elif Teacher explained that not every child was able to listen to a digital story in the teaching process carried out with digital stories:

> *I mean, not every child can listen to the story. The disadvantage may not apply to the whole class. when it is digital, Sometimes, children cannot be guided to it, they do not listen much. They can get distracted after a while. Therefore, not every child can adapt. –* ***Elif***

In the following sentences, Cem Teacher expressed the problems experienced by the students who used different languages in the mathematics lesson taught with a digital story:

> *As I said, children did not understand some of the things due to language. The students in our region are very problematic in terms of language. Some of them are Syrian, some come from Urfa, and they speak Arabic all the time at home. Most of the Turkish words are a little troublesome for younger students. So we experienced some problems with the language. –* ***Cem***

The opinions of Alper Teacher, who experienced a similar problem caused by students' individual differences in the use of digital stories are given below:

> *At my school, the digital story may not work for some children because children*

may have language problems, because they are of Syrian or Arab origin. Some things are left unfinished because all of them cannot speak Turkish. Things cannot be transferred to other students fully. Another disadvantage is that some children may have conditions such as heavy hearing issues because of ear problems. When it comes to severe hearing conditions, children also cannot hear or perceive what they hear. There are such problems. – ***Alper***

Classroom teachers stated that the digital story may not attract students' attention while teaching mathematics simply because students generally have easy access to technological tools and equipment and due to being so intertwined with technology in this age we live in. Elif Teacher stated that digital stories do not attract the attention of students addicted to technology with the following words:

Addicted children cannot turn to digital stories either. They can't concentrate, because it's an environment they're used to anyway, so it doesn't seem different to them. For example, it is the case for our students. In other words, doing something digital with them did not attract their attention so far. It becomes very ordinary.

– ***Elif***

In the following sentences, Zehra Teacher explained students' technology saturation and the problems it causes:

Some children have trouble concentrating. We're having a hard time attracting these kids. Now children have had enough of the digital environment. They expect different things from you. It is a little more difficult to influence them– ***Zehra***

Negative Aspects regarding the Teaching Environment

Classroom teachers mentioned that the lack of computers, internet and smart boards can cause problems in using digital stories in teaching mathematics. The opinions of Ezgi Teacher on the lack of technological infrastructure as the first problem to mind about the digital story method are given below:

Here, if there is no problem with the internet network, the video lecture is efficient in terms of teaching children the lesson. So I just thought of standard problems like internet, computers… Other than that, I don't see a problem, frankly. - ***Ezgi***

The explanations of Oğuz Teacher about what kind of problems can be encountered in

the use of digital stories in teaching mathematics are given below:

> Since it is carried out in a technological environment, problems with electricity and internet can sometimes be experienced. Infrastructure problems may occur. There may be situations where children have limited access to technology. – ***Oğuz***

Didem Teacher talked about the effects of technological infrastructure problems on digital stories used in teaching with the following sentences:

> *Disadvantages may occur due to technological problems. As a disadvantage, maybe not for digital stories, but in some schools, digital stories may not be used efficiently in cases where there is no smart board or internet cannot be provided, there can be blackouts. –* ***Didem***

Negative Aspects for Teachers

Classroom teachers stated that the use of digital stories in teaching mathematics has negative consequences for teachers due to the slow progress in the process and the one-to-one activities. The opinions of Figen Teacher regarding the time constraints related to the digital story process in teaching are given below:

> *More time is consumed. It's going slower. Time loss may be extreme. I would say it takes too much time. Also, since there are individual differences in children, it may be slower for some to learn. It can cause problems in terms of individual differences. It also makes us to use more time. It is not time efficient for us. –* ***Figen***

Ozan Teacher explained that the topics took a longer time when digital stories were used in teaching mathematics:

> *We may experience a lot of problems with the curriculum due to time. When we process it as a story, it provides permanence for children, but it can cause a loss of time because the topics in the normal curriculum are too long. Of course, it takes a lot of time, at least 1-2 hours, to tell each story, to have students watch it and then to turn it into an activity. –* ***Ozan***

Similarly, Eylül Teacher explained as follows with examples from her own class that the students had a hard time adapting to the process when the digital story was used for the first time in the classroom:

> *The time given to us was very short. For example, in forty minutes, we started the*

> *story; especially the column chart and the scoreboard table are done one after another since they are like the parts of a whole, so we had some time problems. We had to continue in the second class hour. It is necessary to plan the time well. When planning such trainings, it is necessary to allocate time not only to animation, but also to the activity within the lesson. The digital story was already short. But you have to close it because the student will watch, collect the data himself, of course, it is a bit of a problem for the child who lags behind* – ***Eylül***

Classroom teachers expressed their opinions about the problems in maintaining classroom control due to the large number of students while using digital stories in teaching mathematics. For example, Hakan Teacher expressed his concern about the use of digital stories in teaching mathematics in crowded classrooms with the following words: *"It is a difficult method in crowded classrooms. I think children should be accustomed to group work to use this method*." Ezgi Teacher explained that she did not use digital stories in teaching mathematics because her class was crowded and the topics were lengthy:

> *It's a bit of a waste of time for us, I think, since our classes are crowded, children can spend more time on examples after video lectures in less crowded classes. But since the class is crowded and there are too many students, I can't use it in math class, frankly.* – ***Ezgi***

Below, the explanations of Zehra Teacher are given who emphasized that using digital stories in mathematics lessons in crowded classrooms make it difficult for the teacher to control the class:

> *Number of students. I think it would be more appropriate and healthier if the activity was done in a group of twenty people. It is a little more problematic in crowded settings. There are issues with time. It takes longer. Control is more difficult. As I said, if we are to take our life as a model, we always try to be practical because we always work in crowded settings. We are trying to save time. We are trying to speed up the activity by checking the children one by one visually by glancing at them haphazardly.* **– *Zehra***

Conclusions and Discussion

This study aimed to examine classroom teachers' experiences in teaching mathematics with digital stories. For this purpose, teachers' opinions on the positive and negative effects of digital storytelling and mathematics teaching were discussed, and suggestions were given for

the implementation process of digital storytelling, taking classroom teachers' opinions into account. According to the research results, teachers often cited the positive effects of using digital stories on the mathematics teaching process. Teachers mentioned that students had difficulty understanding abstract subjects due to their developmental level and that the mathematics teaching process conducted with digital stories enabled them to visualize the subject more easily by narrating the subject with visuals. Kahraman (2013) similarly argued that the use of digital stories in physics lessons helped to embody educational knowledge and supported effective learning. Kocaman Karoğlu (2016) emphasized that digital stories provided the opportunity to concretize abstract concepts and stated that students had the opportunity to experience concrete learning thanks to digital stories. From this point of view, it is recommended to support the preparation of digital stories for use in teaching by taking into account the students' developmental levels with understandable visuals and content that carry examples from daily life and provide concrete experiences.

Classroom teachers stated that the use of digital stories in teaching mathematics allowed students to learn by doing by appealing to more than one sensory organ and by ensuring their active participation in the process. Similarly, Göçen (2014) found that using the digital story in the lesson ensured students' active participation in the process and provided the opportunity to learn by doing; in addition, the presence of elements supporting more than one sensory organ enabled students to realize meaningful learning. Polater (2019) emphasized the importance of conducting values education with digital stories, as digital stories provide an opportunity to learn by doing and facilitate the transfer of learning to daily life. In this respect, the opinions presented in the studies in the literature support the opinions of the teachers who took part in this research since it is cited time and again that using the digital story in teaching activates many sensory organs and increases active participation by ensuring learning by doing. Based on the suggestions of the aforementioned researchers and the findings of this study, it is recommended that digital stories are not only used as a material to present information on the subject, but rather to be supported with activities and materials that will attract students' attention, enable them to learn while having fun, and actively gain concrete experiences in the process.

In this study, teachers mentioned that digital stories facilitated the transfer of the information obtained within the scope of the learning process to daily life, as they carried examples from students' real lives. Kayalı (2019) reported in his research that the digital story method contributed to the development of design-oriented thinking skills in secondary school

students by allowing them to produce solutions to the problems they experienced in daily life with. Kahraman (2013) cited in his research that digital stories facilitated learning physics and allowed retention because they contained visual elements and could be associated with daily life. It was found in this study that the teachers believed that the digital stories containing examples from life and enabling students to transfer their knowledge to daily life would enable the students to make sense of the subject more easily, make their learning permanent, and provide them with concrete experiences. Designing digital stories around students' interests and lives will help students to reflect the knowledge they have acquired within the scope of the course to their daily lives.

Dinçer and Yılmaz (2019) reported that using digital storytelling in a mathematics course increased students' mathematics achievement. Similarly, Torun (2016) and Pala (2021) concluded in their research that the teaching process carried out with digital stories increased students' academic achievement. Similarly, in this study, teachers emphasized the importance of integrating technology into the teaching process to keep up with the current era, and mentioned that the use of digital stories in mathematics can increase mathematics achievement. It was identified in the study that the teachers believed that teaching mathematics with digital stories had a positive effect on students' academic achievement which was supported by the findings in the literature. Based on this point of view, it can be argued that planning the teaching process with a digital story will have efficient results in increasing student achievement in the course.

Classroom teachers stated that using digital stories in teaching mathematics would be beneficial in drawing attention to the lesson during the learning process because it would motivate students for active participation, support them with materials, present interesting content, appeal to more than one sensory organ, and include examples from real life. Sarıtepeci (2016) and Özüdoğru (2021) identified that when the social studies course was taught with digital stories, digital stories motivated the students, allowed active and willing participation in the process and attracted their attention. Similarly, Hung et al. (2012) and Yang and Wu (2012) reported that the use of digital stories in Science and English teaching, respectively, positively affects students' motivation towards the class. Balaman (2016b) reported that digital stories enabled students to be active during the teaching process. In line with the findings of this research and the emphasized opinions, it is believed that using digital stories during the teaching process will let students listen to the lesson more carefully since the method will increase their active participation, interest and motivation in the lesson.

Classroom teachers stated that individual differences such as attention deficit, having diverse native languages, hearing problems and the presence of individuals in need of special education in the classroom would cause problems in using digital stories in mathematics teaching. Classroom teachers emphasized that some students may have concentration problems during mathematics teaching conducted with digital stories and that they may get bored when the same method is used all the time. Demirer (2013) found that the implementation of educational processes with the digital story increased the motivation and participation of shy students in the lesson. Considering this opinion and the opinion of the teachers participating in this research, it can be argued that the negative aspects caused by individual differences can also be eliminated with digital stories. Karakoyun (2014) mentioned that negative results may occur based on individual differences in the digital story teaching process if individuals progress at different speeds during the application. Preparing the digital stories by taking these factors into account and planning the activities and materials by considering the students' situations will provide an opportunity for students with individual differences to benefit from the educational process more effectively.

Classroom teachers regarded the lack of technological infrastructure as the disadvantage of teaching mathematics with digital stories. Yürük (2015) reported that although the digital story has more than one positive feature, there is no infrastructure that can disseminate and popularize the digital story as a teaching material. Sarıtepeci (2016) argued that students generally experienced problems with the technological infrastructure in the process of creating digital stories. Teachers in this study mentioned that the absence of tools such as the internet, computer and smart board in schools or the emergence of infrastructure problems such as power cuts during implementation would negatively affect the mathematics teaching process conducted with digital stories. Thus the sufficiency of digital requirements such as smart boards, computers, projections, sound systems, and the internet in classes where teaching will be carried out with digital stories should be regularly checked to minimize the negative situations that may be encountered during teaching.

According to classroom teachers, the use of digital stories in mathematics teaching would lead to a loss of time for teachers by prolonging the teaching process due to the intensity of the curriculum, the active roles of the students in the process and the learning differences. Van Gills (2005) reported that the use of digital stories in teaching has successful results, but the educational process takes more time than traditional approaches. Teachers reported the large number of students in the classrooms, the inability to reproduce the

examples, the loss of time and the lack of classroom control as problems that would undermine the efficiency of using digital stories in teaching mathematics. When teachers' opinions in this regard and the primary school mathematics curriculum are examined, it can be argued that the curriculum is rather dense. In addition, classroom teachers also mentioned situations where teaching needed to be repeated from the beginning due to students' individual and learning differences. In this context, to reduce the disruptions in the curriculum, it can be suggested to practice digital storytelling in mathematics teaching in specific subjects to increase student participation rather than implementing the method in every mathematics lesson. In addition, expanding the class hours for the mathematical concepts in the curriculum and providing in-service training to support these changes will help reduce classroom teachers' concerns regarding time limitations and motivate them to prefer student-centered teaching approaches such as digital storytelling.

Recommendations

The classroom teachers emphasized that group work was not suitable for all student levels in the teaching process planned with digital stories. For this reason, it is suggested that attention should be paid to the language characteristics, readiness, class level and individual and learning differences of the student while making decisions about organizing the activities as group work or individual study.

The classroom teachers reported experiencing difficulties in using digital stories in teaching mathematics due to crowded classrooms. In this respect, it is thought that the size and the physical characteristics of the class should be taken into account when creating a digital story.

The classroom teachers thought that teaching with digital stories would make teachers lose time since they believed density of the mathematics curriculum. Therefore, the time required to use alternative teaching methods in the classroom should be taken into account while preparing the next mathematics curriculum to reduce concerns about curriculum density.

The classroom teachers mentioned that the inability to support digital stories with materials in mathematics teaching will negatively affect students' active participation in the process. For this reason, it would be appropriate to create and distribute lesson plans and inexpensive and easy-to-prepare materials related to digital mathematics stories by experts in the Ministry of National Education.

Compliance with Ethical Standards

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Research involving Human Participants and/or Animals

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Sınıf Öğretmenlerinin Dijital Öykü Kullanımına Yönelik Deneyimlerinin İncelenmesi

Özet:

Bu çalışmada sınıf öğretmenlerinin matematik öğretim sürecinde dijital öykü kullanılmasına yönelik deneyimlerinin incelenmesi amaçlanmış ve bu doğrultuda nitel araştırma yöntemlerinden olgubilim araştırması deseni kullanılmıştır. Veri toplama sürecinde, matematik dersi kapsamında araştırmacı tarafından ilkokulun her kademesi için hazırlanan dijital öyküler ve ders planları katılımcı öğretmenlere dağıtılmıştır. Öğretmenlerden öğretim yaptıkları sınıf seviyesine uygun olan dijital öyküyle birlikte derslerini işlemeleri istenmiştir. Bulgular doğrultusunda öğretmenlerin matematik öğretiminin dijital öyküyle yürütülmesinin soyut kavramları somutlaştırma, akılda kalıcılığı sağlama, dikkati derse çekme, yaşama transferi kolaylaştırmayı sağladığı yönünde olumlu görüş bildirdikleri tespit edilmiştir. Öğretmenlerin matematik öğretiminde dijital öykünün kullanılmasının dezavantajları kapsamındaysa teknoloji kullanımının alışkanlığa dönüşmesi, öğrencilerin bireysel farklılıkları, öğretim ortamındaki teknolojik donanımın yetersiz olması, zaman alması şeklinde olumsuzlukların ortaya çıkabileceğinden bahsettikleri görülmektedir.

Anahtar kelimeler: Dijital öykü, matematik öğretimi, sınıf öğretmeni.

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