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Creating Digital Stories: A Case Study of Turkish Preschool Environmental Education

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Abstract

This study examined an integration of digital stories in teaching environmental concepts to preschool children aged 3-6 in Turkey. The participants were the forth-grade preservice teachers who used a variety of activities to implement environmental education plans. Structured questionnaires were employed as the main data collection tool. The Technological Pedagogical Content Knowledge (TPACK) framework served as a springboard to analyze the data. The findings of this study demonstrate that creating and implementing digital stories in the preschool curriculum can enhance students' learning outcomes. Also the digital stories can be handled as a teaching method in the preschool period. As a result, the integration of technology with pedagogy and content in preschool education has demonstrated the importance of TPACK.

Keywords: Digital stories; environmental education; preschool education; preservice teachers; TPACK.

Introduction

The digital storytelling dates to early 1990s developed by Joe Lambert as the cofounder of the Center for Digital Storytelling (CDS) in Berkeley, California (O'Byrne, Houser, Stone & White, 2018; Robin, 2006). Digital storytelling can be defined as narratives that emerge by combining various multimedia tools such as text, sound, video, visual, animation, and music to present information through reality or fictionalizing for a specific subject (Robin, 2006). Meadows (2003) defines digital storytelling as a means of narration and states it as combining text, pictures, films, animations, and music suitable for the story through different software and re-arranging and presenting them. Kieler (2010) conceives of digital storytelling as enabling emotional interaction with content and sharing content with other people using multimedia tools. As an example, in education, both teachers and students can create 2-6-minute stories with simple multimedia tools, video, painting, art, music, narration, and sound effects that they can use their voice (Kocaman-Karoglu, 2015).

Nowadays, many educators use digital storytelling as a motivational tool to increase students' interest in discovering new ideas by improving their skills such as attracting attention, collecting information, problem-solving, and collaboration in the learning setting (Robin, 2008; Yüksel, 2011). Digital storytelling can be a powerful method in preparing teacher educators. For example, the non-profit "Digital Storytelling Center" founded by Joe Lambert and Dana Atchley in California provides support and training on the relevant subject [Center

for Digital Storytelling, 2016] (Robin, 2008). Including the digital stories developed by the preservice teachers in their future activity plans using technology, pedagogy, and content knowledge will play an important role. Robin (2008) emphasizes the importance of dissemination and development of the digital storytelling identifying the seven basic principles of digital narration as perspective, striking question, emotional content, sound, music, economy, and speed. In addition, digital stories do not take much time and can be created with very basic technology use knowledge and skills. Competencies make it an effective visual communication platform for preschool children (Bedir Erişti, 2017).

While there are numerous studies in recent years on the use of digital storytelling method, especially in elementary school students' learning settings in the process of concept teaching, there are few studies on learning techniques of the children at the early childhood period (Bratitsis, Kotopoulos, & Mandila, 2012; Dinçer & Yılmaz, 2019; Kocaman-Karoglu, 2015; Kurt, 2018; Okumuş, 2020; Onuorah, 2020; Özay Köse & Yıldırım, 2020; Özerbaş & Öztürk, 2017; Smeda, Dakich, & Sharda, 2014; Türe Köse, 2019, Yüksel, 2011).

On the other hand, Forssell (2011) stated that teachers are gatekeepers in most studies of technology use in education who decide what technologies are appropriate to support learning and when students may use them. Teachers decide whether and how to use new technology at risk of failure in the classroom. Their understanding of how those technologies support student learning lays a foundation for their decisions. Therefore, as Schmidt, Baran, Thompson, Mishra, Koehler, and Shin (2009) stated, Technological Pedagogical Content Knowledge (TPACK) provides a valuable framework for teachers to consider what information they need to integrate technology into teaching and improve this knowledge. Using TPACK as a framework for measuring teaching knowledge could potentially impact educational and professional development experiences designed for both pre-service and in-service teachers. Therefore, there is an ongoing need to rethink our practices for teacher education and propose new strategies that will better prepare teachers to integrate technology into their teaching effectively.

The purpose of this study was to examine the digital storytelling activity plans prepared by preservice teachers to teach environmental concepts to children aged 3-6 in Turkey. This study intends to contribute to integrating digital stories into the teaching and learning process at pre-K education.

Review of Literature

Digital storytelling plays an essential role in the integration of technology by our teachers into classroom activities by using technology, pedagogy, and content knowledge in the learning processes (Yılmaz, Üstündağ & Güneş, 2017), and particularly a various level of K–12 education (Rossiter & Garcia, 2010). In other words, digital storytelling is closely related to technological pedagogical content knowledge.

Technological Pedagogical Content Knowledge (TPACK)

Since teachers' subject matter knowledge, general knowledge, and professional knowledge are the essential three variables to train a qualified teacher, it is apparent that undergraduate education has tremendous importance (Özdemir & Çanakçı, 2005). In undergraduate education, preservice teachers need to combine their technology competencies with their pedagogical knowledge. Preservice teachers should have competencies in Pedagogical Content Knowledge (Shulman, 1986) and Technological Pedagogical Content Knowledge

(TPACK) (Mishra & Koehler, 2006). Koehler, Mishra, and Cain (2017) developed the following TPACK framework (Figure 1.).

Figure 1

The TPACK framework (adapted from Koehler, Mishra & Cain, 2017)

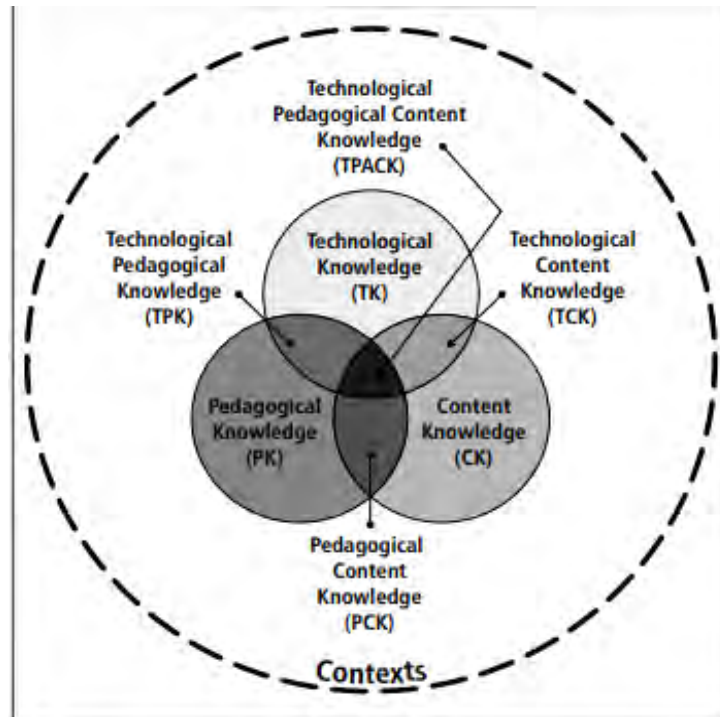


Figure 1 depicts there are three main components: technological knowledge, content knowledge, and pedagogical knowledge. There are the interactions between various types of knowledge, PCK (pedagogical content knowledge), TCK (technological content knowledge), TPK (technological pedagogical knowledge), and TPACK (technology, pedagogy, and content knowledge) (Koehler, Mishra & Cain, 2017). Chai, Koh, Tsai, & Tan (2011) summarize the seven constructs of the TPACK framework below.

- “Technological Knowledge (TK); knowledge of how to operate computers and relevant software.
- Pedagogical Knowledge (PK); knowledge of how to plan instruction, deliver lessons, manage students, and address individual differences.
- Content Knowledge (CK); subject matter knowledge about languages, Mathematics, Sciences, etc.
- Technological Content Knowledge (TCK); knowledge of how technology can research and represent the content like using computer simulation to characterize and study the movement of the earth’s crust.
- Pedagogical Content Knowledge (PCK); knowledge of “the ways of representing and formulating the subject that make it comprehensible to others” (cited in Shulman, 1986, p.9).
- Technological Pedagogical Knowledge (TPK); knowledge of how technology can facilitate pedagogical approaches such as using asynchronous discussion forum to support social construction of knowledge.

- Technological Pedagogical Content Knowledge (TPACK); knowledge of facilitating students’ learning of a specific content through appropriate pedagogy and technology (p. 1185).”

It appears that, in order for preservice teachers to use digital storytelling as a teaching material, they need to have technology knowledge, pedagogical knowledge, and be an expert in the subject matter area to be taught. Education faculties and teacher education programs have a great role in providing preservice teachers with knowledge, skills, and experience about the methods of instruction (Heo, 2011). If one or more of these are absent or insufficient, the teaching materials cannot have a positive effect at the desired level (Yılmaz, Üstündağ & Güneş, 2017).

Therefore, studies such as this are essential in determining whether the preservice teachers have the necessary competencies to create the digital story within the technological pedagogical content knowledge.

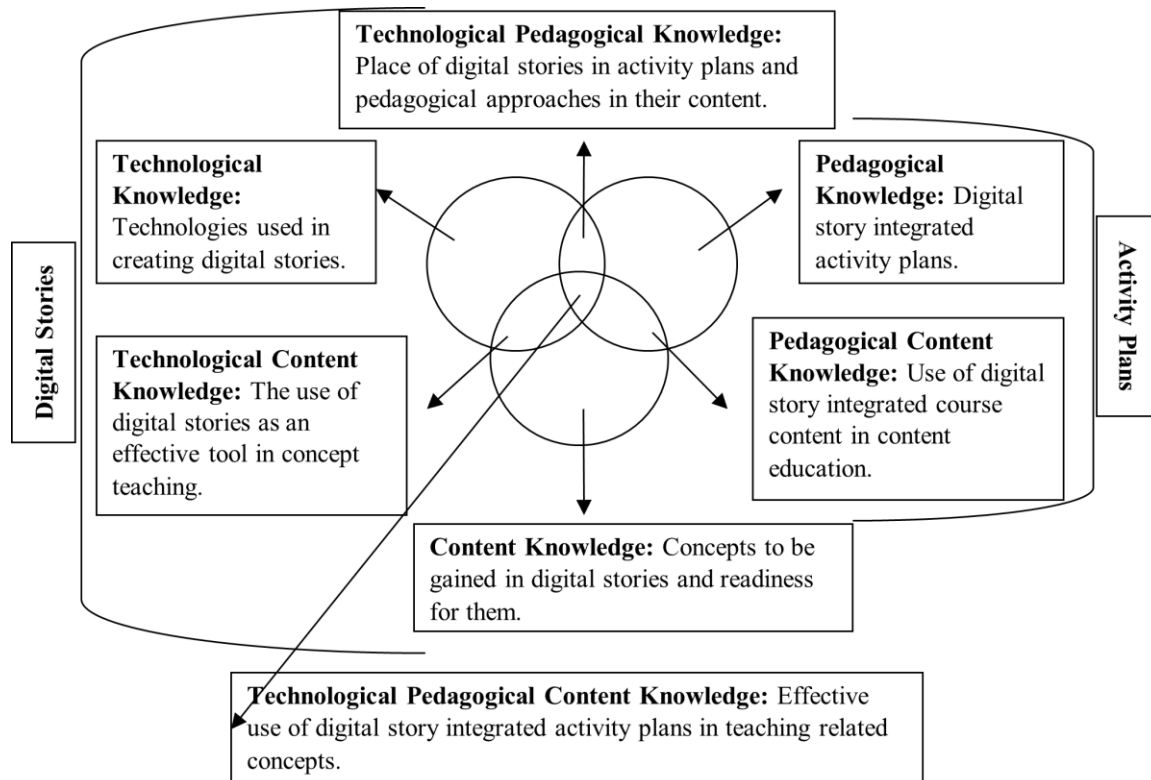
Research Design

For the purposes of this study, we employed as an embedded single-case design (Yin, 2018) to focus on the Technological Pedagogical Content Knowledge components.

Within the context of this study, Technological Pedagogical Content Knowledge components, considered as embedded sub-units, are defined separately within the framework of digital stories and their integration into activity plans. These definitions are presented in Figure 2.

Figure 2

Defining TPACK components in the framework of digital stories and activity plans



Participants

The participants of the study were 24 preservice teachers attending a state university in Turkey in the spring semester of 2019-2020. The criterion sampling method, one of the purposeful sampling types (Patton, 2014), was used to recruit the participants. The criteria for selection included the following:

- preservice teachers who completed the Special Teaching Methods I-II courses and Instructional Technologies and Material Design course - these courses were prerequisites for the situation of having learned to prepare an activity plan example and to create a digital story-,
- preservice teachers who enrolled in and completed Applied Environmental Education Course, a selective 4th grade 2nd semester course.

Data Collection

Several sources of data were considered for this study: Activity plans, digital stories and structured questionnaire. First, the participants were supposed to create an individual “activity plan” based on the requirements of the Ministry of National Education 3-6 Age Preschool Education Program (MoNE, 2013). Further, we asked the participants to use the digital story method to teach 3-6-year-old children the concept they would choose about the environment in the individually prepared activity plans.

Worth noting is that the participants were familiar with digital tools. We asked the participants to take photos, record videos, etc., suitable for their plans. We showcased the software that they can use in their digital stories (e.g., iMovie, Microsoft Photostory 3, Microsoft Movie Maker, Storyjumper, etc.). The participants were free to choose any software to create digital stories (e.g., Bitstrips, GoAnimate, Powtoon, Moovly, Knovio, etc.). Additionally, we used a questionnaire to solicit the participants’ experiences with digital storytelling method. We posed eight open-ended questions in the questionnaire (Appendix A.).

Data Analysis

As previously mentioned, we used TPACK framework to analyze the data. Table 1 demonstrates the themes and supporting content to present the themes that have emerged as a result of data analysis.

Findings

Several themes have emerged as a result of data analysis: (a) Technological Knowledge; (b) Pedagogical Knowledge; (c) Content Knowledge; (d) Technological Pedagogical Knowledge; (e) Pedagogical Content Knowledge; (f) and Technological Content Knowledge.

Table 1*The meaning of the themes*

Themes	Meaning
Technological Knowledge	Technologies (software programs) and contents used by the participants and their experiences in this process are expressed while creating digital stories.
Pedagogical Knowledge	Integration process of the activity plans with the digital stories.
Content Knowledge	Concepts about environmental education wanted to teach by the participants in their activity plans.
Technological Pedagogical Knowledge	Inclusion of digital stories and pedagogical approaches in activity plans.
Pedagogical Content Knowledge	Using the digital story integrated activity plan in content education.
Technological Content Knowledge	How digital stories are used as an effective tool in teaching concepts are expressed.

Technological Knowledge

For this theme, we present categories and codes for the digital stories, and quotations about the experiences of the participants.

Table 2*Categories and codes for the digital stories in the context of technological knowledge*

Category	Code	f
Content need	Unable to find images	8
	Finding examples in the same facial expression constantly	2
	Limited types of character	1
Software features / attributes	Ease of use (not choosing difficult ones)	6
	Premium versions (Cost)	7
	Ease of access	4
	Sound adding problem	2
	Not complex	1
	Visuality	1
Usage experience	Time consuming	1
	Having a good command of the software	8

Table 2 demonstrates that the participants develop technological knowledge in preparing their digital stories and are grouped under three categories. These are content need, software program features / attributes, and usage experience. Under these categories, the most emphasized points are the lack of visuals, ease of use, the need to have experience with the software, the cost problem, and the ease of access. The categories that emerge in technological knowledge and the codes associated with them can be considered preliminary

preparations to be taken into account in the digital story process. In addition, these important points emphasized by the participants are related to the problems experienced in the process. Some quotations that reflect the experiences of all participants presented as follows.

“I had a hard time finding pictures. I could not find pictures that I wanted.”

“I had trouble finding the images. I had a little difficulty in harmonizing the story and the visuals.”

“While creating the digital story, I was a little nervous as I had a hard time finding software.”

“Since I did it in the trial version, it said during the story you prepared this video with a trial version”

“This image bothered me a lot.”

“I think it helps me get experienced. When I completed the story, I thought how I could diversify the event.”

“While preparing a digital story, I wanted to choose the easiest software because some software is complicated.”

“I had to make changes because I had difficulty finding pictures suitable for the stories I wrote. I had problems with the software I used in some parts, and it distracted me a lot.”

“I think I will use it if there is a technology possible according to the situation of the place where I will work.”

“I think it takes a lot of time to prepare and it's difficult to find a suitable image.”

Pedagogical Knowledge

It was interesting to find out that all participants stated that they had difficulties in integrating pedagogical knowledge in the creation of digital stories. Some of the quotations that reflect the experiences of all participants are presented as follows.

“At first I could not find what kind of plan to write. I had a little difficulty in the process.”

“I prepared the activity plan after my digital story, so I had trouble connecting it at first.”

Additionally, some participants demonstrated different pedagogical approaches using interactive concrete materials (puppets, etc.) and method-techniques (concept map, etc.) in the sections where they integrated digital stories into their activity plans. Some quotations in this regard are as follows. For example, one of them wanted to draw attention by showing the character in the story as a puppet before moving on to the digital story in the activity plan:

“... The teacher asks the children's predictions about who their guests might be. By showing children the stick puppet of Cloud Pento that she had prepared before. She introduces the puppet to the children. The teacher tells the children that the puppet Cloud Pento has many digital stories and has brought one for you...”

Similarly, another participant took a unique approach with stick puppets before the digital story. S/he demonstrated this by expressing it in a section of the activity plan prepared as follows.

Stick puppet says, “kids, you have to listen to my friends very carefully to get to know them better. Now I will open the presentation my friends have prepared for you.”

Another participant’s activity plan can be another example. S/he demonstrated their approach to this issue by expressing it in a part of the activity plan prepared as follows.

“The teacher tells the children that they have a guest and shows Waterdrop puppet. Waterdrop introduces itself to children, says that today it brings a story for children, asks children to listen and think about it very well. After the water drop's speech, the teacher tells the children to listen to the story very carefully and chat after the story is over.”

Another important finding is what the participants reported after the digital story's implementation:

“After the story is over, children answered some questions about the story. Where was our story set? What exactly was the problem of living creatures in the sea? We chatted about the story by asking such questions.”

“After watching the digital story, we talk about how the trees grow, why their leaves fall and the benefits of the trees.”

“Together we listen to the digital story. Then, we prepared for the activity at the end of the digital story.”

Yet another finding of this study is that technology affects the pedagogical approach and is often more critical than pedagogy. The following statements demonstrate this finding:

“After I found the right site, I started designing my story, but the variety of characters that could be used for the story was minimal. This restricted the creativity in the story.”

“I prepared the event plan after my digital story. That's why I had trouble connecting at first.”

“First I wrote the story and then I thought about the design.”

“Since I couldn't find the images I wanted, I made the story using the images I saw appropriate, and I had a hard time writing the appropriate story.”

Content Knowledge

In the activity plans prepared by the participants in environmental education, we obtained essential findings regarding the relevant environmental concept they wanted to teach through digital stories. The concepts that the participants dealt with in their activity plans are in Table 3.

Table 3 demonstrates that the participants mostly prepare activity plans and digital stories in the concept of “dirty-clean,” which is also included in the Ministry of National Education [MoNE] Preschool Education Program for 3-6 Age Children. Clearly, the concept of water (contaminated-clean, its importance, rain, desert) is more prominent when evaluated holistically. Therefore, the content of the applied environmental education course, which is elective, affects the inclusion of the concept of water in more activity plans in digital stories.

Table 3

Concepts that participants deal with in their activity plans.

Relevant Concept(s) about Environment	f
Contaminated – Clean (Water)	5
Polluted - Clean (Environment)	4
Nature (Animals, Plants, Sky, etc.)	2
Water and its importance	2
Recycling	2
Trees and forests (Tree growing, its importance, etc.)	2
Weather events (rain, wind, etc.)	2
Animals (Bees, their habitats)	2
Live- lifeless	1
Soil	1
Desert	1

The participants of this study stated that they needed to do it again in the relevant content. Their awareness of the environment increased, and they also emphasized real-life experiences. The following quotes support this statement:

“I understood the value of the environment one more time while I was preparing it. I think this activity in my own social life helped me even think of a product that I would buy and throw away after consuming it.”

“I researched various topics and concepts before writing my plan.”

“I paid attention to using events, objects that we could link to the real-life experiences of the children”.

Technological Pedagogical Knowledge

The participants of this study adopted different pedagogical approaches in content and integration in creating their digital stories. The first is that the participants integrated digital stories into other activity plans, using various methods, as shown in Table 4.

Table 4 shows that the participants used digital stories at the same rate in the introduction/warm-up, expansion/practice and conclusion/evaluation parts of the activity plans. However, it is noteworthy that they mostly preferred direct instruction and question-answer methods in their practices.

Table 4*Inclusion of digital stories in activity plans*

Parts of the activity plans	Objectives	Practice Method and Technique	f
Introduction/ Warm-up	Teaching the subject	Direct instruction	4
	Attract attention	Question-answer and direct instruction	2
	Teaching the subject and attract attention	Question-answer and direct instruction	1
	Attract attention	Direct instruction	1
Total			8
Expansion/ Practice	Exemplification and reinforcer	Direct instruction	5
	Preparing for the activity and attract attention	Direct instruction	2
	Teaching the subject (instruction)	Question-answer	1
Total			8
Conclusion/ Evaluation	Reinforcer, Repetition of the subject	Direct instruction	6
		Question-answer	2
Total			8

Another important finding is that the answers to the questions in digital stories where the question-answer method was not included in the relevant digital stories. Some quotations of the participants' experiences on this issue are as follows.

"I thought there must have been places where I needed to attract their attention. I supported it with question sentences. At the end of the story, I asked the children about the information box and the story."

"The person who prepares a digital story should pay close attention to children's readiness and similar situations."

"My story can be used as a reinforcement for related concept teaching or as an introduction to related concept teaching."

Another finding obtained in the context of another technological pedagogical knowledge is that the participants took different pedagogical approaches into account in terms of the content of the digital stories they prepared, as can be seen in Table 5.

Table 5*Pedagogical approaches included in the digital story contents*

Pedagogical approach taken into account	f
Not preferring music in the background	17
Establishing cause and effect relationship	10
Playback the digital story	6
Giving a problem but not answering	6
Choosing a nickname	3
Reading the digital story aloud	3
Preferring music in the background	3

Table 5 demonstrates that, while most of the participants did not prefer background music in their digital stories, very few preferred. In addition, some of the participants tried to establish a cause-effect relationship, while some chose to present the problem but not to answer. Similarly, the participants preferred their digital stories to be played back and to be read out aloud in the presentation. The difference may stem from the software, as participants' experiences indicate. If the program provides convenience in audio recording, the participants indicated that they preferred to record and playback their voices. Although it is not included in the purpose of the study another critical finding draws attention. Some of the participants have different comparisons on whether the stories are in print or digital. Some quotations that may reflect the experiences of all participants on this issue are as follows.

“When a storybook about the concept is not available, we can easily create our own story thanks to the digital story.”

“Stories presented to children should not always be given from the book. Teachers should use different techniques. We need to use the technology in every field in our age in storytelling.”

“If a story is to be read to children, if children should see, touch and feel that story, I think the digital story is lacking in this aspect.”

“I do not find it right to constantly use digital stories in activity plans. I find it more correct for children to touch the book and feel the pages.”

Pedagogical Content Knowledge

The participants of this study clearly state that digital stories will be an effective method for using the content of the digital story integrated activity plan in the content instruction. Some quotations that will reflect the experiences of all participants on this issue can be presented as follows.

“There are not many different activities that we can use in concept teaching. There are plans in the same style for a concept, so by designing such different activities, we both attract the attention of children and ensure that children acquire new and different information in different ways.”

“I can implement my plan and make adjustments based on the feedback I receive from the children, in line with the children's interest and attention. It makes me happy to present something I have prepared myself to children instead of ready-made activities and I can improve myself with the feedback I receive from them.”

“I can easily use new digital stories in teaching different concepts.”

“I can make arrangements in my school or classroom according to the appropriate environmental conditions.”

Technological Content Knowledge

The participants of this study stated that digital stories are more remarkable in teaching concepts. Some of the participants' experiences on this are as follows.

“The digital story made it easier to teach many concepts and also made my activity more enjoyable and easier while teaching the related concept.”

“Children often complain that they cannot see when reading a storybook. But since digital stories are not such a problem, children can pay more attention to the story.”

“I can improve myself and write stories about different concepts for children thanks to the program.”

The findings of this study underscore two important points. First, it is essential for preschool teachers to have the necessary TPACK knowledge and skills in developing digital stories. Secondly, the following distinct components should be taken into consideration in the process of implementation of digital stories: the affective outcomes such as the increase in motivation of the participants, being happy, having fun, and being proud. Some quotations that reflect the experiences of all participants on this issue can be presented as follows.

“An activity that requires comprehensive thinking and planning, it was a bit tiring and stressful process as thinking every step requires mastering every field.”

“I had difficulties, I was a little tired, but when I looked at the activity and digital story I created, I was happy”

“But after figuring out the software I used a little more, it was fun to create my own story.”

“While preparing the digital story, I had difficulty in preparing the story content, but preparing the digital story was an enjoyable process.”

“At first, I was very worried... The construction phase was a lot of fun for me. During the recording, I had even more fun. In places I could not do, I laughed at myself, saying, ‘Come on, we are starting again.’ ”

“But when I finished all the preparations and finally watched my story, I was happy telling myself I did this.”

“I was excited while preparing the activity plan and also wondered.”

“At first, I was excited to think about and find the story I was going to write for my concept and to be able to reflect it because it would be my story even in the digital environment, and it was exciting and happy to think about it.”

“While I was preparing my activity plan, I realized that I had been away from the beauty of nature for a long time.”

“It was a challenging and thinking process. But in every sense, it was a developing and instructive process.”

Discussion and Conclusions

Considering the findings of preservice teachers' views, there are similarities with the literature (Bedir Erişti, 2017; Turgut & Kışla, 2015). That is to say, the preservice teachers stated in their views that the digital story creation and implementation process is effective for preschool children and that there are advantages for effective learning with such practices. In this study, the result of technological pedagogical knowledge also is similar with some basic principles (perspective, striking question, emotional content, sound, music) stated by Robin (2008).

Preparing digital stories and activity plans individually is a useful method to motivate preservice teachers and stimulate learning (Yang & Wu, 2012). As a result of this study, the preservice teachers stated that the digital story is more remarkable in teaching concepts that match up with the literature in this dimension. In this study, the practices and views of the preservice teachers clearly show that the digital story creation and application process on different concepts in the preschool period can be handled as a teaching material and method

(Yılmaz, Üstündağ, & Güneş, 2017). Similar to this, another research showed that preservice teachers' opinions pointed out some difficulties in the digital story creation process and emphasized the positive contribution of digital storytelling in educational settings (Çetin, 2021).

Another result emerging from this study is that preservice teachers emphasized the lack of visuals, ease of use, the need to have experience with the software, the cost problem, and the ease of access. Similarly, Özüdoğru and Çakır (2020) pointed out that the preservice teachers had difficulty in using the software.

The preservice teachers stated that they would use the activity plans they prepared in this study when they start teaching. This can only be supported by the preservice teachers' qualifications by experiencing a pedagogical change in their field experiences Daniels (2013) stated. Çetin (2021) also concluded that digital storytelling could improve preservice teachers' teaching skills.

In this study, preservice teachers stated that however exhausting and intense a process, at the end of this feeling happy, having fun and being proud were observed. These findings are similar to the results of other studies about this content. Yigit (2020) also concluded that positive effects of digital storytelling process on their motivation. Karataş, Bozkurt and Hava (2016) found the same results; the participants stated that digital storytelling had positive effects in increasing their motivation.

As Tuithof, Van Drie, Bronkhorst, Dorsman and Van Tartwijk (2021) pointed out, to develop and carry out teaching strategies, Pedagogical Content Knowledge is seen as the transformation of content and pedagogical knowledge into a different type of knowledge. Furthermore, with this study, the integration of technology with pedagogy and content in preschool education has once again demonstrated the importance of Technological Pedagogical Content Knowledge that Mishra and Koehler (2006) put forward. In this context, we can say that Technological Pedagogical Content Knowledge should have a place in undergraduate education, considering that undergraduate education has great importance in training qualified teachers, as stated by Özdemir and Çanakçı (2005).

One of the points emphasized by the preservice teachers in the context of technological knowledge is the fact that it is time-consuming regarding the software feature, and time constraints can be mentioned in parallel with the study conducted in digital storytelling activities (Gakhar & Thomson, 2007; Karakoyun, 2014; Kocaman-Karoğlu, 2016; Robin, 2006). Gürsoy (2021) stated that pre-service teachers considered digital storytelling had disadvantages since it was time-consuming and required technological knowledge. Also Tatlı and Bayramoğlu (2015) stated that the content knowledge of the preservice computer education and instructional technology teachers was sufficient in their digital story application processes and concluded that digital stories offer a flexible learning environment and are an entertaining application. In the context of technological knowledge, the need for content emphasized by the preservice teachers, program features / qualifications and usage experience / experience can be considered as preliminary preparations to be taken into account in the digital story process.

In this study, it is possible to see the following results in the light of activity plans and digital stories examined in the context of Technological Pedagogical Content Knowledge components. First, technical competence and equipment significantly affect the process while

preparing digital stories. It is noteworthy that the choices regarding the pedagogical approach find direction/change considerably depending on the content and usage of the software. We can say that technological knowledge guides pedagogy in creating digital stories and activity plans in the light of the results of preservice teachers' desired concepts in digital stories and their readiness for them. In addition, affective factors emerge depending on this competence and equipment. When the preservice teachers are technically insufficient, this situation weakens them affectively (motivation, happiness, self-confidence, etc.). Secondly, when digital stories are implemented within an activity plan, they can be supported by additional pedagogical approaches (applications such as puppets, trip organization, and concept maps). Thus, preservice teachers emphasize that it can be more effective. For example, a preservice teacher stresses that this approach can be practical, stating that "I aimed to support children's learning by doing and experiencing and reinforce the concept I want to teach by organizing a trip after the digital story in my activity plan." Third, with this kind of study, preservice teachers can pass themselves through a self-assessment of both content and pedagogy. This can indicate that it is an opportunity to improve and keep the learners up to date with the digital story creation process. Fourth, the preservice teachers were quite insufficient to include pedagogical approaches in the content of digital stories. As can be seen in the findings, they applied very few methods and techniques (direct instruction and question-answer, etc.) and implementations (causation, page-text consistency, etc.). This result clearly shows the necessity of developing pedagogical approaches in digital story contents. Finally, digital stories are noteworthy for children and thus can be an effective method for teaching related concepts or concept teaching. In addition, it can be considered as a significant result that such an application offers alternative ways to the users in introducing new concepts. In light of all these results, considering the components of the Technological Pedagogical Content Knowledge, teachers should prepare a digital story and integrate it into the learning process with a holistic approach. Additional studies in this area may focus on longitudinal studies, which ascertain if the teachers consider the components of the Technological Pedagogical Content Knowledge and digital story as a means for concept learning within their classrooms.

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References

- Bedir Erişti, S. D. (2016). Katılımcı tasarım temelli dijital öyküleme sürecinde ilköğretim öğrencilerinin yaratıcılık göstergeleri [Participatory Design Based Digital Storytelling and Creativity Indicators in Elementary School]. *Turkish Online Journal of Qualitative Inquiry*, 7(4), 462-492.
- Bratitsis, T., Kotopoulos, T., & Mandila, K. (2012). Kindergarten children's motivation and collaboration being triggered via computers while creating digital stories: A case

- study. *International Journal of Knowledge and Learning*, 8, 239–258.10.1504/IJKL.2012.051677
- Chai, C. S., Koh, J. H. L., Tsai, C-C. & Tan, L. L. W. (2011). Modeling primary school pre-service teachers' Technological Pedagogical Content Knowledge (TPACK) for meaningful learning with information and communication technology (ICT). *Computers & Education*, 57, 1184–1193.
- Çetin, E. (2021). Digital storytelling in teacher education and its effect on the digital literacy of pre-service teachers. *Thinking Skills and Creativity*, 39, 100760.
- Daniels, K. (2013). Exploring the impact of critical reflection through the use of service-learning and digital storytelling. *i-manager's Journal on School Educational Technology*, 9(1), 11.
- Dinçer, B., & Yılmaz, S. (2019). Matematik dersinde dijital hikaye anlatımının açıklık kavramı öğretimine etkisinin incelenmesine yönelik deneysel bir çalışma [An experimental study on the investigation of the effect of digital storytelling on teaching of the concept of range]. *International Journal of New Trends in Arts, Sports & Science Education (IJTASE)*, 8(2).
- Forsell, K. S. (2011). *Technological pedagogical content knowledge: relationships to learning ecologies and social learning networks*. [Unpublished doctoral dissertation]. Stanford University.
- Gakhar, S. & Thompson, A. (2007). Digital storytelling: Engaging, communicating, and collaborating. In R. Carlsen et al. (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2007* (pp. 607-612). Chesapeake, VA: AACE.
- Gürsoy, G. (2021). Digital Storytelling: Developing 21st Century Skills in Science Education. *European Journal of Educational Research*, 10(1), 97-113.
- Heo, M. (2011). Improving technology competency and disposition of beginning pre-service teachers with digital storytelling. *Journal of Educational Multimedia and Hypermedia*, 20(1), 61-81.
- Karakoyun, F. (2014). *Çevrimiçi ortamda oluşturulan dijital öyküleme etkinliklerine ilişkin öğretmen adayları ve ilköğretim öğrencilerinin görüşlerinin incelenmesi [Examining the views of elementary school students and preservice teachers about digital storytelling activities in online environment]* [Unpublished Doctoral dissertation]. Anadolu University.
- Karataş, S., Bozkurt, Ş. B., & Hava, K. (2016). The perspective of history pre-service teachers" towards the use of digital storytelling in educational environments. *Journal of Human Sciences*, 13(1), 500-509.
- Kieler, L. (2010). A reflection: Trials in using digital storytelling effectively with the gifted. *Gifted Child Today*, 33(3), 48-52.

- Kocaman-Karoglu, A. (2015). Telling stories digitally: An experiment with preschool children. *Educational Media International*, 1-13. DOI: 10.1080/09523987.2015.1100391
- Kocaman-Karoğlu, A. (2016). Personal voices in higher education: A digital storytelling experience for pre-service teachers. *Education and Information Technologies*, 21(5), 1153-1168.
- Koehler, M. J., Mishra, P., & Cain, W. (2017). What is Technological Pedagogical Content Knowledge (TPACK)? *Journal of Education*, 193(3), 13–19. <https://doi.org/10.1177/002205741319300303>
- Kurt, E. (2018). *Altıncı sınıf Türkçe dersi kavram öğretiminde animasyon ve hikâye kullanımının başarıya etkisi [The effect of using animation and story in concept teaching for sixth-grade Turkish courses on achievement]* Unpublished Doctoral dissertation, Karadeniz Technical University
- Meadows, D. (2003). Digital storytelling: Research-based practice in new media. *Visual Communication*, 2(2), 189–193
- Ministry of National Education [MoNE] (2013). *Okul öncesi eğitim programı [Preschool education programme]*. Ankara
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teacher knowledge. *Teachers College Record*, 108, 1017-1054.
- O'Byrne, W. I., Houser, K., Stone, R., & White, M. (2018). Digital Storytelling in Early Childhood: Student Illustrations Shaping Social Interactions. *Frontiers In Psychology*, 9, 1800. DOI: [10.3389/fpsyg.2018.01800](https://doi.org/10.3389/fpsyg.2018.01800)
- Okumuş, A. (2020). The perceptions and preferences of 8th grade students in digital storytelling in English. *International Online Journal of Education and Teaching*, 7(2), 585-604.
- Onuorah, A. R. (2020). Efficacy of digital storytelling intervention on social skills acquisition among primary school children. *Journal of Engineering and Applied Sciences*, 15(12), 2562-2567.
- Özay Köse, E., & Yıldırım, T. (2020). Dolaşım sistemi öğretiminde hikâye destekli etkinliklerin ilköğretim öğrencilerinin akademik başarı, tutum ve kalıcılığına etkisi [The effect of story supported activities on academic achievement and retention of primary school students in circulatory system teaching]. *International journal of humanities and education (IJHE)* 6(13), 68-84.
- Özerbaş, M. A., & Öztürk, Y. (2017). Türkçe dersinde dijital hikâye kullanımının akademik başarı, motivasyon ve kalıcılık üzerinde etkisi [The effect of digital story usage on academic success, motivation and permanentity in Turkish course]. *Journal of TUBAV Science*, 10(2), 102-110.

- Özdemir, A. Ş., & Çanakçı, O. (2005). Okul deneyimi I dersinin öğretmen adaylarının öğretim-öğrenme kavramlarına ve öğretmen-öğrenci rollerine bakış açıları üzerindeki etkileri [The effect of “school experience I” course on Turkish pre-service elementary mathematics teachers’ understandings about the concepts of teaching- learning and student and teacher roles]. *Elementary Education Online*, 4(1).
- Özüdoğru, G. & Çakır, H. (2020). An investigation into the opinions of pre-service teachers toward uses of digital storytelling in literacy education. *Participatory Educational Research*, 7 (1) , 242-256. DOI: 10.17275/per.20.14.7.1
- Patton, M. Q. (2014). *Qualitative research & evaluation methods: Integrating theory and practice*. Sage Publications.
- Robin, B. (2006). The educational uses of digital storytelling. In C. Crawford et al. (Eds.), *Proceedings of Society for Information Technology and Teacher Education International Conference 2006* (pp. 709-716). Chesapeake, VA: AACE.
- Robin, B. R. (2008). Digital storytelling: A powerful technology tool for the 21st century classroom. *Theory Into Practice*, 47, 220-228.
- Rossiter, M., & Garcia, P. A. (2010). Digital storytelling: A new player on the narrative field. *New Directions for Adult and Continuing Education*, 126, 37-48.
- Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J. & Shin, T. S. (2009) Technological Pedagogical Content Knowledge (TPACK). *Journal of Research on Technology in Education*, 42(2), 123-149. [https://doi.org/ HYPERLINK](https://doi.org/HYPERLINK) [“https://doi.org/10.1080/15391523.2009.10782544”10.1080/15391523.2009.10782544](https://doi.org/10.1080/15391523.2009.10782544)
- Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15, 4-14.
- Smeda, N., Dakich, E., & Sharda, N. (2014). The effectiveness of digital storytelling in the classrooms: a comprehensive study. *Smart Learning Environments*, 1(1), 6.
- Tatlı, Z , & Bayramoğlu, A . (2015). Öğretmenlik uygulaması sürecinin dijital öyküler ile yansıtılması [The process of teaching practice reflected by digital stories]. *Journal of Instructional Technologies and Teacher Education*, 4(2)
- Tuithof, H., Van Drie, J., Bronkhorst, L., Dorsman, L., & Van Tartwijk, J. (2021). Teachers’ pedagogical content knowledge of two specific historical contexts captured and compared. *Educational Studies*, 1-26.
- Turgut, G., & Kışla, T. (2015). Bilgisayar destekli hikaye anlatımı yöntemi: alanyazın araştırması [The use of computer-aided story in education: literature review]. *Turkish Online Journal of Qualitative Inquiry*, 6(2), 97-121.
- Türe Köse, H. B. (2019). *Okul öncesi dönem çocuklarında dijital hikaye anlatımının dinleme becerilerine etkisi [The Effect of Digital Storytelling on Listening Skills in Preschool Children]* [Unpublished Master Thesis]. Dumlupınar University

- Yang, Y. T. C., & Wu, W. C. I. (2012). Digital storytelling for enhancing student academic achievement, critical thinking, and learning motivation: a year-long experimental study. *Computers & Education*, 59, 339-352. <http://dx.doi.org/10.1016/j.compedu.2011.12.012>
- Yılmaz, Y., Üstündağ, M. T., & Güneş, E. (2017). Öğretim materyali olarak dijital hikâye geliştirme aşamalarının ve araçlarının incelenmesi. [Investigation of digital story development stages and tools as teaching materials]. *Bolu Abant İzzet Baysal University Journal of Faculty of Education*, 17(3), 1621-1640.
- Yigit, E. O. (2020). Digital storytelling experiences of social studies pre-service teachers. *International Journal of Technology in Education (IJTE)*, 3(2), 70-81.
- Yin, R. K. (2018). *Case study research and applications: Design and methods*. Sage publications.
- Yüksel, P. (2011). *Using digital storytelling in early childhood education a phenomenological study of teachers' experiences* [Unpublished Doctoral dissertation]. Middle East Technical University.

Appendix A

Structured Questionnaire Form

After you have prepared the digital story and activity plan, you need to answer the following questions. You are supposed to submit your activity plan and digital story together with the Word file containing the answers to these questions.

- What did you pay attention to while preparing the activity plan? For which age group did you create your plan? Why?
 - Why did you choose the relevant concept in the activity plan?
 - Explain why you used the relevant software in the digital story you prepared for your event plan.
 - Explain and describe the digital story-making process in the activity plan.
 - What would you change in your activity plan if you wanted? Why?
 - While preparing your activity plan, explain what you think about using the digital story in concept teaching.
 - What did you feel while preparing the activity plan (thinking about each phase)?
 - When you become a teacher, will you use the activity plan and the digital story you have prepared to teach the relevant concept? Why? Explain.
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