Varhaiskasvatuksen Tiedelehti
Journal of Early Childhood Education Research
Volume 9, Issue 1, 2020, 99–123

jecer.

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Digital Stories with Children: Examining Digital Storytelling as a Pedagogical Process in ECEC

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ABSTRACT: Modern digital technologies have become common in educational settings of all levels. This has made the use of digital storytelling (DST) more applicable in early childhood education and care (ECEC). This paper examines the implementation of DST, aiming to answer the following questions: 1) How to support children's active participation throughout the DST process in ECEC, and 2) how do 21st century skills manifest in the DST process? The study was conducted between 2017 and 2018, when two cycles of DST projects were implemented in four Finnish ECEC centres as part of a European project. The data consist of interviews with educators (N=15) and children (N=51), as well as documentation of the DST activities (project sheets, N=37, and yearly summary documents, N=18) produced by the educators. The data were analysed using inductive thematic analysis. Firstly, our results highlight aspects that are important for supporting children's active participation in DST, divided into the following categories: premises on starting DST with children, interpersonal processes during DST activity, affordances of digital tools and the meaning of DST activity and products. Secondly, we present how the 21st century skills such as digital skills, collaboration and problem-solving manifested in the DST process.

Keywords: *digital storytelling, 21st century skills, early childhood education and care, children's participation*

Introduction

In the past two decades, as new digital technologies have emerged and their roles in everyday life have increased, their availability has improved also in educational settings (e.g. Wastiau et al., 2013). One purpose of pedagogically meaningful use of digital technologies is fostering different 21st century skills (e.g. Binkley et al., 2012) that are considered essential in modern society. The advent of mobile devices, such as smartphones and tablets with touch interfaces, has made new technologies appealing to ever younger users (e.g. Couse & Chen, 2010; Kucirkova, 2014; Petersen, 2015; Tootell, Plumb, Hadfield, & Dawson, 2013; Wohlwend, 2015). However, as mobile devices have only recently become a widespread and integral part of daily activities in early childhood education and care (ECEC), research on the topic in this context remains sparse (e.g. Garvis, 2018), especially with respect to specific integrations of these tools into the teaching practice (Herodotou, 2018).

The increasingly diverse role of digital technologies is reflected in the pedagogical aims and working methods outlined in curricula: for example, in the Finnish curricula, digital tools and environments are an essential element in activities starting from ECEC (Finnish National Agency for Education, 2014; 2018). One notable use of digital tools in the ECEC context is digital storytelling (DST) (cf. Kervin & Mantei, 2016; Kocaman-Karoglu, 2015; Wohlwend, 2015; Yuksel-Arslan, Yildirim, & Robin, 2016), which means creating short multimodal stories by using digital tools (Kervin, McMahon, O'Shea, & Harwood, 2014; Fenty & Anderson, 2016).

This paper examines the implementation of DST in four Finnish ECEC centres, aiming to answer the following questions: 1) How to support children's active participation throughout the DST process in ECEC, and 2) how do 21st century skills manifest in the DST process?

Digital storytelling as a pedagogical approach

Traditional storytelling is an integral part of ECEC pedagogy (e.g. Bruner, 1996). It has been shown to enhance children's literacy and communication skills (Campbell & Hlusek, 2015; Isbell, Sobol, Lindauer, & Lowrance, 2004; Peck, 1989), imagination and ability to think creatively (Philips, 2000), and making sense of the world (Ochs & Capps, 2001). The use of digital tablets and apps has also been found to support young children's emergent literacy skills (e.g. Beschorner & Hutchison, 2013; Flewitt, Messer, & Kucirkova, 2015; Kervin, 2016; Neumann, 2018). At the same time, the transformation of the media has changed the concept of literacy: in addition to basic reading and writing skills, the abilities to understand, interpret and produce digital messages and communicate using

multimodal messages have become essential (Kong, 2014; Kotilainen & Tuominen, 2012; Finnish National Agency for Education, 2014; 2018).

DST connects traditional storytelling with modern digital technologies with the aim of producing a multimodal story (Duveskog, 2015; Fenty & Anderson, 2016; Kervin et al., 2014; Kumpulainen, 2011). The process of DST entails different phases and activities: in ECEC, it usually consists of stages such as 1) preparation, 2) creating a script and preparing media material, 3) editing and 4) presenting to an audience (Hytönen, Jokinen, Pitkänen, & Korkeamäki, 2011). However, as the tools for creating digital stories are becoming more versatile and specialised, the phases may become increasingly intertwined.

In addition to suitable tools, successful use of DST and other novel pedagogical approaches is determined by the roles, competences, practices and beliefs of the teachers (e.g. Ertmer et al., 2012; Nousiainen, Kangas, Rikala, & Vesisenaho, 2018). When children are interacting with digital technology, educators play a significant role in ensuring that the activities are pedagogically meaningful and scaffolded in an adequate and relevant way (e.g. Skantz Åberg, Lantz-Andersson, & Pramling, 2015; Stephen & Plowman, 2008).

By providing meaningful experiences (Yuksel-Arslan, et al., 2016), DST activities can influence learners' motivation positively, shown by studies conducted in school (e.g. Duveskog, 2015; Niemi & Multisilta, 2016; Yang & Wu, 2012) and ECEC settings (Kocaman-Karoglu, 2015; Skinner & Hagood, 2008; Yuksel-Arslan et al., 2016). It is also important that, by creating their own stories, children act as active media producers instead of passive users (Ohler, 2006; Leinonen & Sintonen, 2014). This is also visible in the Finnish core curricula for ECEC and pre-primary education (Finnish National Agency for Education, 2014; 2018), where the role of children as active producers has become a notable aspect of fostering children's competences. The playful nature of such activities is highlighted in ECEC (Finnish National Agency for Education, 2018). To this end, DST can provide an open-ended, creative and playful approach that addresses similar narrative and communicative factors as traditional storytelling.

21st century skills in DST and ECEC

The DST process can teach more than the story's content (Frazel 2010, 11). Skills that are considered essential to competence in modern society, and therefore important also in curricula, are often referred to as 21st century skills (e.g. Binkley et al., 2012). Different definitions and frameworks have been created, wherein the main content remains the same (van Laar, van Deursen, van Dijk, & de Haan 2017).

The 21st century skills framework presented by Binkley et al. (2012, 18–55) consists of thinking and working skills, working tools and the skills of an active citizen. In terms of children's thinking skills, creating digital stories can foster creativity, innovative and critical thinking and the ability to evaluate and process information during planning (Dogan, 2011; Hytönen et al., 2011; Ohler, 2006). Working skills such as performing, interviewing, communication and interaction (Hytönen et al., 2011; Robin, 2006) are practiced when stories are made in a group and children must assert their opinions, listen to others and make compromises (Niemi, Harju, Vivitsou, Viitanen, & Multisilta, 2014).

Regarding working tools, DST provides an opportunity to practice technological and digital skills, such as taking videos or pictures (Robin, 2006; Viitanen et al., 2014), and develop information literacy when searching for facts, estimating the reliability of information or realising that there are different kinds of insights (Viitanen et al., 2014). The skills of an active citizen come into play when stories are shared outside of the children's living area, which can expand their insights, improve tolerance (Malita & Martin, 2010) and increase independent working, responsibility and cultural awareness (Viitanen et al., 2014). This occurs when children take responsibility for their own and their group's work during activities. In this paper we examine how DST might facilitate the learning of these skills.

Children's participation and DST

One of this study's aims was to examine children's agency and participation in the DST process. Children's participation is commonly seen as rooted in the UN Convention on the Rights of the Child (1989), focusing on children's rights to freely express their opinions, know about and be heard regarding all matters concerning them (e.g. Lansdown, 2010). The UN Convention has influenced research approaches in childhood studies and the regulations of ECEC services in many countries, including Finland (Act on Early Childhood Education and Care 540/2018; Finnish National Agency for Education, 2018; 2014).

Many researchers assert that participation is grounded in children's ability to initiate activities, actualise their agency, acquire sufficient knowledge of context to participate in decision-making concerning their daily lives and receive support from adults for expressing their thoughts and participating in group negotiations (e.g. Emilson & Folkesson, 2006; Franklin, 2014; Hart, 1992; Lansdown, 2010; Shier, 2001). Digital technologies have expanded children's opportunities to take on different roles and be active participants (e.g. Leinonen & Sintonen, 2014; McPake, Plowman, & Stephen, 2013). The affordances of different tools are important for understanding children's agency in their use of digital devices (Marsh, 2006; Petersen, 2015). For example, the portability of tablet devices and the use of pictorial modes within the applications can increase

children's agency (Flewitt et al., 2015; Petersen, 2015) and children's familiarity with these tools can offer them empowering expert roles (Flewitt et al., 2015). Further, DST can give room to children's own free storytelling that is a way to hear their feelings and thoughts of issues in their interests, and provide them with opportunities to develop imagination, self-expression and co-narration skills (e.g. Engel, 2005; Kervin & Mantei, 2016; Ochs & Capps, 2001) as well as strengthen their positive self-identity and social connectedness (Curenton, 2006).

Methodology

Research context and design

This study was conducted as part of *STORIES,* a European project related to DST in ECEC. There were four partner countries (Finland, Germany, Italy and Turkey) altogether; this paper focuses on data collected from Finnish ECEC centres (N=4). The processes followed the structure of design-based research (Barab & Squire, 2004; Design-Based Research Collective, 2003; Wang & Hannafin, 2005). Design-based research refers to an iterative approach carried out in actual contexts as a collaborative effort between researchers and practitioners (Design-Based Research Collective, 2003; Wang & Hannafin, 2005), aiming to produce new theories, artifacts and practices pertaining to learning and teaching in authentic settings (Barab & Squire, 2004). The process consisted of two cycles where educators, with continuous support from researchers, planned and implemented DST with children (see Figure 1). In this study, 'educator' refers both to ECEC teachers and nurses; in practice, it was mostly the teachers who guided the children.

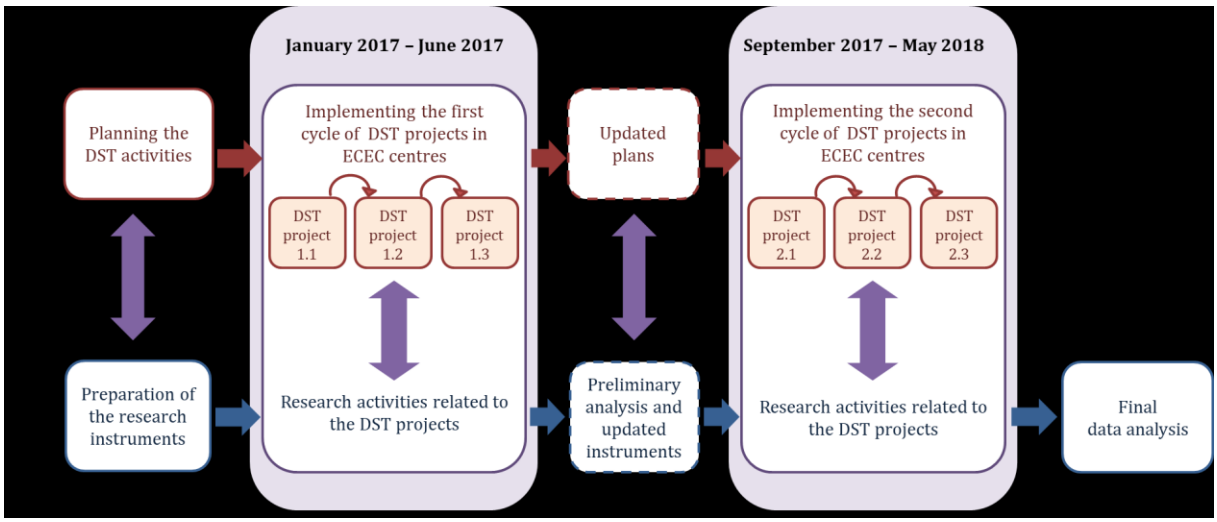

FIGURE 1 The research process and the timeline of the activities

First, the educators designed their DST activities while the researchers supported them and prepared the research instruments. During the first cycle, each educator aimed to implement three DST projects with the children. The research team provided suggested guidelines for the projects, but ultimately, all decisions regarding their implementation (duration, frequency of sessions, digital applications, prompts etc.) were made by the educators. Between the iterations, the researchers examined the data and revised the research instruments. The educators planned their second-year activities based on their reflections and the researchers' preliminary observations of the first cycle. After the second cycle, the researchers analysed the data from both cycles.

The DST activities were primarily implemented with tablet devices, principally iPads, using the specific DST applications Puppet Pals (Polished Play LLC, 2017) or Toontastic 3D (Google LLC, 2017), stop-motion animation and general video editing applications, such as iMotion (Fingerlab, 2017) and iMovie (Apple, 2017), respectively. In addition, a device developed specifically for DST, called i-Theatre (Edutech, 2017), was available to some of the groups. The i-Theatre device includes a built-in touch screen and a scanner, as well as tangible blocks for saving stories and pictures.

Data collection and analysis

This paper focuses on qualitative data collected during the two implementation cycles (January 2017 – May 2018). The data consist of audio- or video-recorded interviews with educators and children, as well as the documentation of the DST activities produced by the educators (see Table 1).

TABLE 1 Description of the data

TYPE OF DATA	*DESCRIPTION & GATHERING TIME*	*PURPOSE*	*N*
Documents	Project sheets: Educators from four Finnish ECEC centres filled in one structured sheet for each DST project they implemented.	Documenting the process and activities of the DST projects.	37 project sheets
	Yearly project summaries: Educators from four Finnish ECEC centres filled in one summary for each of the two project cycles.	Assessing and reflecting on the DST process on a longer term.	18 yearly summaries
Interviews	A total of 12 group interviews with educators from three Finnish ECEC centres. (Spring 2017 first round; spring 2018 second round)	Gaining a deeper understanding of the pedagogical process and the rationale for the activities.	15 educators
	A total of 16 interviews with groups of 2 to 5 children (4 to 6 years of age) from three Finnish ECEC centres by using a film-elicitation method. (December 2017 – February 2018)	Gaining an understanding of the children's agency and learning in the DST process.	51 children (18 boys, 33 girls)

The educators were interviewed in groups or pairs, and the interviews were built around themes such as competences, DST process and pedagogical implications (see the Appendix for themes). The documents (project sheets and yearly summaries) included structured and unstructured items for the educators to describe their DST process and record their observations and reflections. For this paper, the answers to the sheets' open-ended questions were analysed.

A researcher interviewed the children who worked on a joint DST project in groups of two to five. Their teacher was present while refraining from participating in the discussions. Videos of the children's stories were used to prompt discussions in the interviews implemented as thematic discourses. Morgan (2007) uses the term 'video-stimulated recall dialogue' to refer to a method where groups of children watch video clips recorded in their earlier education to discuss their thinking and learning. We use here the term 'film-elicitation' to refer a method that facilitates joint re-creation and co-creation of lived experiences, rather than a simple representation of reality in the studied context (see Skjælaaen, Bygdås & Hagen, 2018). The interview themes are presented in the Appendix.

The transcribed data were analysed using inductive thematic analysis (Braun & Clarke, 2006; Guest, MacQueen, & Namey, 2011). The research questions of the study served as the starting point for the analysis. The content was coded in a data-driven way: the text was reduced by selecting text units containing a specific meaning, selections were clustered thematically and abstractions were made towards more theoretical and general

concepts. Each researcher focused first on a specific subset of the data, after which the researchers presented, compared and discussed the findings together for developing and conceptualising the themes that emerged in relation to each research question. The relevant quotations were then categorised according to these themes.

Considerations on ethics

The ECEC centres and educators participated in the study voluntarily. Permission was requested at the administrative level, after which educators in specific ECEC centres expressed their interest to participate. The educators were informed about the goals and details of the study at the beginning and throughout the design-based research process both in person and via printed and digital information material. The educators could shape the intensity of their participation according to their own schedules as part of their normal pedagogical activities.

We strived to follow the good practices of research with children (see Alderson & Morrow, 2011; Harcourt & Conroy, 2005) by building confidentiality, reciprocity and balanced power relations between the children and the researchers, respecting the children's will to participate in and leave interviews. Informed consent of their child's participation in the research project (see Fargas-Malet et al., 2010) was requested from parents. The researchers prepared information letters and consent forms for the families and guided the ECEC personnel to provide the parents with necessary information and collect the consent forms. The children, informed by their parents and teachers, made the final decision regarding their participation in the interviews. The researcher actively sought an informed assent of the children (see Harcourt & Conroy, 2005) when meeting them by being sensitive to their willingness to be involved in the interviews. The researcher also gave information of the study if the children still seemed to be unaware of the researcher's purpose.

Results

DST as a participation fostering process in ECEC pedagogy

Four main themes with two to four sub-themes emerged related to the first research question, loosely following the chronological process of DST (see Figure 2). The first theme consists of topics that are relevant for the general *planning and preparation* of DST activities with children. The next two themes comprise issues related to participants' *interaction* during concrete DST activities: interpersonal, social processes and interaction

with and through digital technology. The final main theme is related to overall *meaningfulness* of DST activities for children and educators.

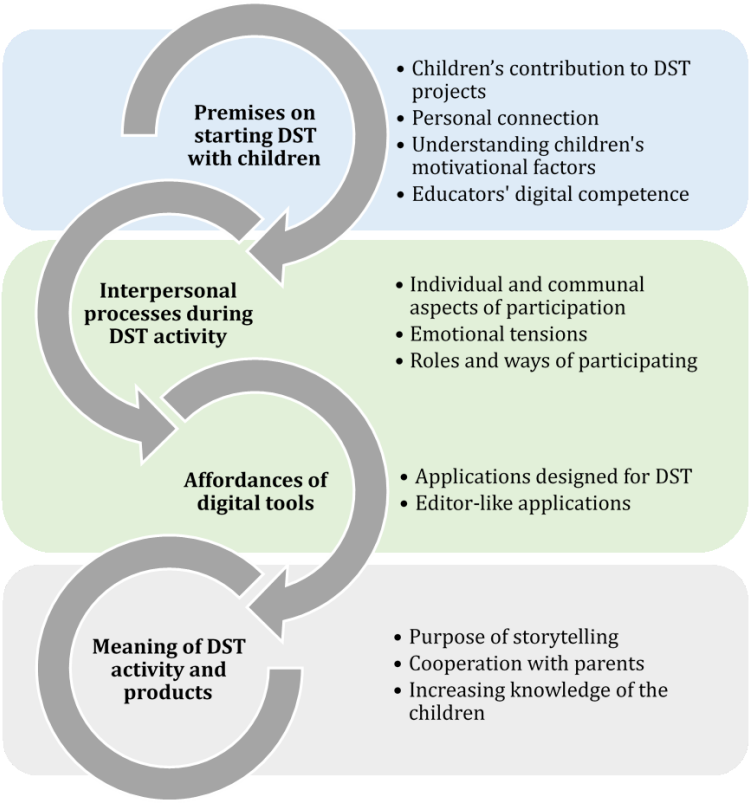

FIGURE 2 DST as a participation fostering process in ECEC pedagogy

Premises on starting DST with children

Children's agency and participation was a prominent theme in the interviews with educators and their project documentation. During the first cycle, there was some variation in ***the degree of children's contribution to the DST projects***. In the interviews conducted thereafter, educators mentioned that teacher-driven projects, planned from the start by the educators, did not arouse interest among the children and the story processes dried up. However, projects that were planned together with the children or had a topic that was especially meaningful to them were mostly motivating and successful.

The children described three main ways to contribute to story content. First, they chose a fairy tale pre-selected by the educators and changed it into a digital form. In the second approach, the educators provided the theme but the children had the freedom to alter the characters, plot and more. In the third way, while the general idea of DST came from the educators, the story itself was ideated by a child or a team of children. In these cases, children also highlighted adults' support in content solutions and technical

implementation: "*It was ours, the children's idea. We had pondered it with P [the teacher]"* (Child 28).

It appeared to be important for individual children to ***build a personal connection*** to the story. They often mentioned how they had prepared their own character or brought personal belongings to the joint storytelling: "*It was nice - - because you can bring your own toys there"* (Child 35). They also identified strongly with the characters they had created: "*And I lived there… on the beach"* (Child 5). "*And then I really started to cry --- waaah! - when we [fairies] were trapped in the jail … do we have to leave the story already now!"* (Child 13).

The educators highlighted children's active participation as one of the main starting points of the activities. Their ***understanding of the children's motivational factors*** in DST improved during the process, as they were able to observe and reflect on what variables influenced the children's motivation. One educator discussed the impact of involving all the children in the same, large project on their individual experience of participation: "*Because I wanted everyone to be involved, many [of the children] felt like they didn't get to decide for themselves. Our project lasted for a long period of time, which led to them forgetting what we had decided together [earlier] and thought it was the adults who decided"* (Educator 3). During the DST activities, the educators realised how important it was to give the children time to explore and experiment technically with these new apps, which made the activities playful. Playfulness was also present in the storytelling: "*I played that, and H played that. K played the bear"* (Child 15) "- - *they were hiding, and that monkey was seeking, so that was exciting"* (Child 34). The children also reported appreciation that, afterwards, they could continue to play freely with the storytelling materials.

As to the ***digital competence required from educators*** to be able to work with the children on DST, the interviewed educators had varying conceptions of their own capability. They felt that it was necessary to have an understanding of the applications' basic functions and were somewhat doubtful of their own skills. The anxiety stemmed from the fear of lacking time or support for acquiring competence: "*I see it [DST] positively, and as a way to keep up to date and to get familiar with novel tools. But training and guidance is important, and that there would be someone competent acting as a mentor."* (Educator 5.)

Interpersonal processes during DST activity

When children were motivated to participate actively, story creation became a collaborative process focusing on interpersonal interaction and negotiations. The

children brought up both ***individual and communal aspects of their participation*** in DST. During the video-elicited interviews, the children paid positive attention to both their personal contribution and their partners' role and input in the storytelling: "*There are the cakes that I have done"* (Child 2). "*Then K was there, saying 'Stop in the name of law'. K was so good there!"* (Child 28).

While the DST process was generally regarded as positive and motivating, also ***emotional tensions*** appeared. Some children were somewhat nervous about storytelling and role-taking within their team: "*-- a bit scary because all the others were looking"* (Child 24). "*- - a little bit similar as with singing, when you were speaking and the others could hear it, it made me a bit nervous*" (Child 31). Some self-restraint was also needed: "*K was just laughing there when those [characters] snored"* (Child 30, reproachfully). "*Yes, I was like this* (covering his mouth with his hand) *when they were snoring, so that I don't start to laugh"* (Child 28).

One of the main strengths of DST was that it provided ***various roles and ways of participating*** to the children. Besides performing in front of others, the children could participate, for example, in preparing the material (both digital and non-digital), creating the script or moving the characters. The wide variety of tasks supported the participation of children with different interests, skills and personalities: "*I find it's a very good way of getting those quieter ones participating too. They might not be the ones who produce the dialogue for a recording, but they see that they are participating and an important part of the process even though their voice might not be heard in the final product*" (Educator 2). "*I'm not good with scenes - - I draw the figures"* (Child 46). Moreover, the different roles made it possible for children of different ages to participate in ways suitable for their developmental level. "*The younger ones have been participating according to their skill level, so they haven't produced an actual story, but they have been choosing the characters and playing around with them"* (Educator 1).

Affordances of digital tools

Different apps used in the DST projects provided different affordances for the children's technological agency. Some of the ***applications that were designed for DST***, such as Puppet Pals or Toontastic, resembled games in their visual appearance and character-based interaction, which made them intuitive to the children. These tools were chosen especially for when a child told a story by themselves. Although they may increase children's own agency, they also have pre-designed features, such as options for characters and scenes, that determine the plot to a certain extent. "*There is such a theatre thing in the iPad, where those [characters] are at the ready, and then you can choose the scenes and the [characters]. - - It is easy"* (Child 36).

Similarly, the i-Theatre device, designed especially for young children's DST, allowed the children to independently craft their stories alone, with a friend or a team. The children mentioned drawing or finding suitable pictures, scanning them, cutting figures, moving and resizing them and using the recording, saving and bin functions. Experimenting with character sizes was amusing for the children: "*I accidentally made my bunny very big, big and little, it was fun!*" (Child 17). However, even though the educators had prepared the children with technical guidance, the children struggled to find the final products among the saved items during the interviews.

Telling stories with stop-motion animation apps allowed the children to participate in photography: "*We have taken a photo and then moved [the figure] a little and then [taken] a photo and moved a little"* (Child 22). "*And so, it becomes a video"* (Child 19). Recording voice was considered easy: "*You just speak to this iPad"* (Child 23).

Some more complex, ***editor-like applications*** such as iMovie were frequently used in the DST projects, yet they were hardly mentioned by the children during the interviews. This may be because the adults were the principal users of these applications. The educators also felt that the simpler applications, such as Puppet Pals, offered better opportunities for children's agency than the more complex ones: "*When - - I had to edit [a story] with iMovie, the children's role was basically to watch as I did it. I might say 'press here', but the whole process was too hard to let the children do it independently. - - it would require so much more practicing from the children"* (Educator 2).

Overall, the regular DST activities helped establish the role of digital tools as an integral and meaningful element in the ECEC centre. Many educators reported that after the DST projects the children were able to use certain applications to create stories independently: "*Today we still [after the project] did some digital stories with Puppet Pals. The children wanted to create stories and as I watched them, I saw that now they know how to do it by themselves."* (Educator 1.) This indicates moving towards establishing DST as a part of daily pedagogical activity. As reported in the yearly summary of the educators, "*the threshold to use technology became lower not only in DST but also in other daily activities as the new-found routine made it much easier to bring out the projector and to use pictures as a support also in other contexts"* (Educators 3, 7).

Meaning of DST activity and products

We found that the ***purpose of storytelling*** – making stories for later use – remained unclear for many of the children. Despite the educators wanting to give children time to explore the apps, a couple of children (34, 35) warned that "*you are not allowed to make trivial stories*." However, they did not clarify what criteria determine triviality. Some of

the children had clear expectations for story use: "*I wonder if that story is going to be saved on such a disk so that we can watch it also at home"* (Child 13). Others, instead, were unsure of the story usage: "*I was thinking that we make some video and then it will be shown in some party here"* (Child 16*). "Is that being planned?"* (Interviewer). "*No. - - We don't know for what purpose this video is made"* (Child 15).

From the educators' perspective, DST was beneficial for ***cooperation with parents***. Digital stories were easy to present to parents, providing them with the opportunity to share in those moments their children experienced: "*It helps us visualise for the parents those moments during the day where they are not present. You [parents] can also go through lived moments with the children and they are eager to do so"* (Educator 5). Furthermore, the digital stories were seen as the children's creations, through which they could illustrate what was meaningful to them: "*Children's own creations are very important to them, so - - it would be important to make sure that parents have access to them too and children can show their own creations to them so that parents can participate too"* (Educator 8).

The educators also highlighted that, through DST projects that were open to children's ideas and voices, they can ***become more familiar with the children*** in several ways. "Y*ou get to know the children in a whole different way through this kind of [activity], and their mind-set in a sense that what they are interested in, skilled in and what they like to do"* (Educator 1). According to the educators, in some cases the process also exposed issues such as problems with language development or past traumatic experiences.

21st century skills

Our second research question concerned those skills included in the framework of 21st century skills that could be fostered by DST activities.

The educators regarded DST activities as important for developing the children's ***digital skills*** and increasing their awareness that they can be active producers. They considered it important because through DST projects*, "instead of only using [something produced by others], they understand that they can influence the content"* (Educators 3, 7). According to the educators, many children already had the basic digital skills needed for using tablet devices, such as the different gestures used for navigating between and within applications. Some children mentioned their earlier experiences with DST, and several discussed other digital applications they had used. However, as the children's previous experiences were mainly from playing games on the tablet, adopting a more purpose-oriented approach to using these devices required some adjustment, especially in groups with very young children: "*They manage to 'play' with the apps [applications] but they still*

lack understanding about creating coherence and need a lot of help from the adults in that regard" (Educator 6).

Both children's and educators' interview data revealed that DST activity entailed various ***social, collaboration and problem-solving skills***. Joint participation, togetherness and collaboration were expressed both implicitly in the children's 'we-talk' and explicitly in their descriptions of negotiating and dividing tasks amongst their team: "*We decided by ourselves what we'd do. We invented everything, I mean, that we shall make a forest"* (Child 19). "*And we pondered together on the script. - - So that everybody… one of us suggests, and then, what is fine with everyone [is accepted]"* (Child 21). Some of the children also described how they encountered and solved problems and disagreements. "- - *we had many quarrels over which one of us does [something] now - - And then we decided that we both can do it"* (Child 13). Turn-taking was also practiced: *"The first one makes their own scene and then the other"* (Child 21). Children brought up also the need to be quiet and listen when the partner's performance was being recorded, as well as waiting during turn-taking.

The educators pointed out how working towards a shared goal in small groups put the children in situations where they had to make decisions together: "*There were different views and opinions [of the story among the children] so we practiced negotiation and making compromises"* (Educator 4). "*Collaboration, turn-taking, listening to each other, letting others speak and come up with ideas"* (Educator 6) were observed as aspects that developed during the projects. The educators felt that the DST projects motivated the children to such an extent that they put aside their differences: "*It was nice to see children working together and how they bonded through the process. All the arguing and fighting disappeared while they concentrated on creating the story"* (Educator 1).

The teachers brought up in the interviews how they felt the DST processes supported development of children's ***language and discussion skills*** as children had to practice using language in a different context than they would use it in normal interaction. In DST processes children had to narrate the stories and take up various roles: *"It is a different way of using language. If you are the narrator, you don't talk from the first person but the third"* (Educator 1).

In the interviews, the children used many specific terms such as 'script', 'figure', 'scene', 'cutting', 'saving' and 'deleting', which indirectly indicates their growing DST-related vocabulary. Additionally, the following interview episode – an example of the importance of reflective discussions – shows how the participants can affect each other's language usage and build reciprocity while watching a recorded i-Theatre story.

Child 11: *There they [figures] fly all around.*
Child 12: *They drift.*
Child 11: *Now they went … they got a big ship.*
Interviewer: *Okay, they travel on the ship.*
Child 11: *Yes, and …*
Child 12: *Yes, on that they go all around.*
(Participants wonder what is happening next.)
Child 9: *They drift.*

In this excerpt, the participants provided new concepts together while accepting the presented ones for use in the proper context.

Discussion

Conclusions

The first research question was related to DST as a pedagogical approach to support children's active participation. The first theme within this question highlighted aspects of which educators should be aware when *planning DST activities*. In line with the findings of Leinonen and Sintonen (2014), children's motivation and commitment were enhanced when they had many opportunities for participatory actions right from the start. Therefore, educators' understanding of children's motivational factors seems to be important when planning DST activities.

In this study, educators implemented a series of DST projects, and as they observed and interacted with the children, they were able to modify and improve the activities along the process. Especially playfulness and ability to experiment and explore were important (cf. Dunn, Gray, Moffett, & Mitchell, 2018; Kervin, 2016). Previous research shows that playfulness is related to achieving creative results, facilitating collaborative learning and enhancing motivation and satisfaction (Amabile, 1983; Kangas, 2010; Randolph et al., 2016; Resnick, 2006).

Supporting children's opportunities to engage in playful and open-ended DST activities requires from the educators a creative and playful mind-set that is not restricted by fear of failure (cf. Nousiainen et al., 2018; McPake et al., 2013). It is common for teachers to feel insecure about their skills with digital tools, and teacher training is an integral part of successful integration of digital technology in ECEC settings (Blackwell et al., 2014; Ihmeideh, 2018; Park & Hargis, 2018). In the constantly changing technological landscape, the focus is not on any specific tool but on competences like the willingness to

share and collaborate, courage to experiment and improvise and knowing where to find resources for overcoming technology-related obstacles (Nousiainen et al., 2018). As suggested also by our findings, regular and meaningful use of digital tools can be seen as a key to enhancing educators' competence and confidence related to both DST and digital pedagogy in general (e.g. Flewitt et al., 2015).

The next two themes pertained to how *interpersonal processes* and the *affordances of digital tools*, respectively, manifested during the DST activity. We found that the children acknowledged each other's contributions positively. Some emotional tensions appeared but were alleviated by the opportunity to assume different roles according to personal interests and skills. Previous research shows that educators need to scaffold children's interactions in a responsive and child-driven way in digital learning activities (e.g. Stephen & Plowman, 2008; Wohlwend, 2015). Observing how children make use of the affordances of the tools, simultaneously supporting them to find suitable ways to contribute, is one way of ensuring such responsiveness.

Visual appearance and character-based interaction made specific DST applications (such as Puppet Pals) intuitive and playful, allowing for children's independent use (cf. Dunn et al., 2018; Kervin, 2016; Wohlwend, 2015). On the other hand, the visuals may end up guiding the content too much, and in that sense, more traditional video editors like iMovie might provide more room for creativity and make the DST process more versatile. However, it was principally the educators who used these applications when compiling the final stories, which meant that children's agency was indirect in this phase. In line with Petersen (2015), our results suggest that tools that are easy for children to use increase their agency (see also Garvis, 2018), while complicated tools limit it. By carefully considering these aspects, the educator can take advantage of the affordances of different DST applications for children's agency.

Overall, DST activities opened up opportunities for children to assume expert roles and show new aspects of their personalities or skills (cf. Flewitt et al., 2015). Pride in their own contribution combined with feelings of togetherness and admiration for each other's input was noticeable. All these aspects of participation refer to such fundamental human needs as experiencing decision-making autonomy, connecting with others, and feeling competent due to other people's admiration and acceptance, all of which positively affect intrinsic motivation (Deci & Ryan, 1985; 2000) and awaken feelings of empowerment (Hart, 1992; Shier, 2001).

The final theme focused on the *meaning of the DST activity and products*. In order for DST to become a part of daily pedagogical activity, its purpose and value need to be clear both to educators and children. One important aspect of children's participation is their access

to knowledge that, in general, determines their opportunities to take meaningful action, develop relevant ideas and initiate activities (e.g. Hart, 1992). The results indicated that informing children of DST's purpose and the usage and possible audience of the stories had remained insufficient. In addition to encouraging children to freely and playfully explore new devices and apps, they should know the wider impacts of DST. Children's consideration of the present and future audiences of their stories (cf. Searle, 1969; Engel, 2005) help them plan their messages, develop their understanding of media and communication, reflect on their choices and gain ownership of their DST activity (e.g. Kervin & Mantei, 2016; Yuksel-Arslan et al., 2016).

Garvis (2018) points out how digital narratives allow children an interactional forum for ordering, communicating and explaining their everyday experiences, understanding and views of the world. Accordingly, examining children's stories with them supports their self-expression and learning, indicates appreciation for their stories and serves as an important means for educators and parents to increase their knowledge of the children. Indeed, the educators in our study felt that they learned to know children's interests, skills and personalities better through the DST activities. As Kervin and Mantei (2016) point out, such observations can be important for planning future pedagogical activity and integrating novel approaches into the daily ECEC practice. Simultaneously, as noted also in the studies of Leinonen and Sintonen (2014) and Yuksel-Arslan et al. (2016), digital stories can support cooperation with parents, offering a method of documenting daily activities from the children's perspective.

In regard to the second research question, the results indicate that DST is a viable tool for ECEC settings to support the development of various 21st century skills. This research supports previous findings (Preradovic, Lesin, & Boras, 2016; Robin, 2006) that DST can enhance the development of children's digital skills. Besides the skills needed to operate different digital devices and software, the results show that through DST, children learn also about producing their own media content. In line with Yuksel et al. (2016) findings, the educators reported feeling more confident using digital tools in the classroom after the DST projects. As digital competence and the ability to produce multimodal content to various media platforms play a key role in being a competent citizen in the 21st century (Binkley et al., 2012), it is evident that digital storytelling is a viable pedagogical approach in supporting the development of these skills in ECEC.

Our findings are in line with Niemi et al. (2014) in that DST can foster the development of both social and collaboration skills as well as problem-solving skills. As the negotiation and decision-making processes can cause emotional tension among the children, it is essential for the teacher to support and guide children throughout the process. There has been public debate around digital devices' impact on children's social interaction and

skills. According to the results, DST seems to be a suitable approach to support both the social interaction and the use of digital technology.

Our results align with previous studies (Garvis, 2018; Gregory et al., 2009; Maureen, van Der Meij, & de Jong, 2018; Niemi et al., 2014; Yang & Wu, 2012) in seeing DST as an approach to enhance children's communication and language skills. In accordance with Morgan's (2007) results, emotional aspects, such as enjoyment, humour and shyness, proved to be easier for children to memorise than aspects of learning although they proved to learn multiple things and concepts regarding the DST process and technology. Altogether, positive outcomes require educators' actions towards guaranteeing every child an equal chance to participate in a trusting atmosphere (c.f. Emilson & Folkesson, 2006; Franklin, 2014) and providing guidance in learning to negotiate as well as reflect and conceptualise DST processes.

To summarise, the present study revealed that DST processes can motivate and empower children and enhance their learning and development in areas that are in line with the objectives of the ECEC curricula and 21st century skills. The children's participation was facilitated in the planning and implementation of DST, whereas participation in the assessment and knowledge of its purposes was emphasised less, emerging as areas for further development.

Trustworthiness, limitations and further research needs

The credibility, dependability, confirmability and transferability of the results (cf. Lincoln & Cuba, 1985) bases strongly on the four researchers' fieldwork and interpretations of the gathered data as well as the way the whole process is opened to readers. As the interviews were conducted as discussions around the key topics, and especially the children were allowed to tell everything that came to mind while watching their DST products and stop if they felt so, the data content is diverse. Three of the researchers had ECE teacher background and hence were familiar with the ECEC context and language used by the informants.

Multiple conditions may affect reaching children's voices in research (Spyrou, 2011). As Komulainen (2007) has stated, several factors can shape and constrain the outcome in a co-constructed interview situation, including the language used, the researchers' assumptions about children, and the overall conversational climate. In this study, presence of the group's teacher soothed possible tension caused by the interviews but may have affected the opinions expressed by the children. Watching their own story videos together also seemed to inspire the children's discussions and facilitate mutual support.

Trustworthiness was also strengthened by triangulation of data sources and types (educators, children; documents and interviews of educators twice) as well as researchers; two of the researchers analysed children's data separately, and all interpretations were discussed and checked together in the research group. Member-checking of our preliminary interpretations was possible during the second-round interviews with the educators. Continuous meetings with the educators during the project increased our understanding of the implemented DST processes in practice. Within the limited space of the article we have also provided quotations from the participants to confirm our interpretations.

Transferability of the results is dependent on the contexts. DST processes quite similar to processes in this research are impossible to reconstruct. Even the participating centres varied in their starting points and ways to implement DST. We have, however, strived to present the results on such a general conceptual level that they are applicable in planning future DST activities for young children.

Garvis (2018) states that a future mission is to build ECEC teachers' knowledge and understanding of digital technology to allow children to become active creators of digital narratives. In our study, different digital tools and applications provided various affordances for children's participation and learning. However, ECEC educators' own opportunities and motivation to experiment with and take possession of various methods of DST determine children's experiences. This study was conducted as part of a broader project wherein the implementation of DST was facilitated by the researchers, and the centres announced their willingness to participate with a positive perspective on learning to use new technologies as a part of their daily pedagogy. Further investigation should focus on exploring DST becoming a sustainable pedagogical practice in ECEC and widen research to organisations with diverse support resources and varying attitudes of educators towards the use of digital technology.

Acknowledgement

The work reported in this paper has been carried out as part of the *STORIES (Fostering Early Childhood Media Literacy Competencies)* project with the support of the Erasmus+ programme of the European Union (2015-1-IT02-KA201-015118). In Finland, the project was implemented at the Finnish Institute for Educational Research where the first and second author were employed at the time of the project. We would like to thank all the children and educators who took part in the study as well as all the STORIES project partners.

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Appendix

Topics of interviews

Interviews with educators

DST in ECEC pedagogical use (strengths, challenges, prerequisites, expectations, benefits)

Educator's own competence (new learning, challenges, expectations)

Children's learning

DST in the future ECEC

Interviews with children

Interests towards and experiences of digital tools used in DST

Own agency, tasks and roles during DST projects

Educators' role during DST projects

Digital and storytelling skills, and other skills (e.g. cooperation) used, needed and learned in the project