The Process Is Not Enough

Children and Teachers Creating Multimodal Digital Stories in Kindergarten

by

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Abstract

This PhD study is a contribution to the contemporary debate on the educational uses of digital technology with young children in early childhood education and care (ECEC) institutions. For young children growing up in the 21st century, digital technology is intertwined in their everyday lives. Nevertheless, children's use of digital technology in ECEC is still limited, especially with regards to creative use of technology. Several researchers call for more empirical studies of young children's creation with digital technology.

In this study, digital technology is emphasised as a tool to create, by which the children and the teachers are the creators of their own products to be shared with others. The purpose is to contribute with research-based knowledge of children's and teachers' collaborative, technology-mediated story creation processes. The overall research question is as follows: *What emerges when kindergarten teachers involve groups of children (age 4-5 years) in technology-mediated story creation processes?* The study has a qualitative multiple-case study approach with two cases, focusing on observable contemporary events. In both cases, six children and one kindergarten teacher have created a multimodal digital story together: an e-book and an animated movie. The empirical material consists of video-recorded field-observations of the process, interviews with the participants and the final products.

The research question is operationalised into three sub-questions that address the overall question from three perspectives: the *participants*, the creation *processes*, and the final *products*. In Article I, the technology-mediated creation process is explored, which can be described as a complex interplay of traditional non-digital activities and new digital activities. For the children, to record sound and to share were found to be the most important. In Article II, the teachers' pedagogical strategies during the creation process with the children is emphasised. The three

most frequently used pedagogical strategies were inviting to dialogue, explaining the practical, and instructing for results. In Article III, the animated movie is explored in-depth through a focus on how different modalities and literacy devices contribute to the development of the story. The importance of including the process, the product, the literacy devices, and all of the modalities in the analysis is highlighted, as well as the importance of being open for the magic during young children's creation processes.

Through the analysis of the three articles, four new themes have arisen: *emerging possibilities due to digital technology*; *creators in a creative process*; *an interplay of multiple knowledge areas*; and *the process is not enough*. In the discussion I argue that a technology-mediated story creation process with a group of kindergarten children and a teacher can be interpreted as a *collaborative creative process*. A synergy of ideas arises through the collaborative co-construction process. Each single part of the creative process may not be viewed as being inherently creative; however, the fusion of these parts into a final multimodal digital story makes it an example of the creative use of digital technology. The children and teachers collaborate and create a product that is new, original and meaningful for them. The process is vital; however, the process itself is not enough—the product also matters—especially for the children.

Teachers' capacity and knowledge of how to integrate technology and pedagogy with other relevant knowledge areas such as creativity and creative processes are crucial when using digital technology with children in ECEC. The final products may seem complicated to create; however, it is easier than it seems. The study contributes with research-based knowledge of creative use of digital technology with groups of young children, important for the ECEC field and kindergarten teacher education.

Sammendrag (in Norwegian)

PhD-studien er et kunnskapsbidrag til samtidens debatt om barns bruk av digital teknologi i barnehagen. For barn som vokser opp i det 21. århundret er teknologi en integrert del av deres hverdagsliv. På tross av dette er barns bruk av digital teknologi i barnehagen begrenset, særlig i forhold til skapende aktiviteter. Flere forskere peker på et behov for flere studier om barnehagebarns kreative og skapende bruk av digital teknologi.

For meg er digital teknologi et kreativt og skapende verktøy som barn og barnehageansatte sammen kan benytte for å skape produkter som kan deles med andre. Formålet med studien er å bidra med kunnskap om ulike sider ved kreativ bruk av teknologi som en gruppeaktivitet med barnehagebarn. Hovedproblemstillingen er: *Hva trer fram når barnehagelærere involverer barnehagebarn (4-5-åringer) i skapende samarbeidsprosesser med digital teknologi?* Studien er en kvalitativ casestudie med to caser som fokuserer på pågående prosesser. I begge casene skaper en gruppe barnehagebarn og en barnehagelærer multimodale digitale fortellinger sammen: en e-bok og en animasjonsfilm. Datamaterialet består av feltobservasjoner av prosessen, intervju med deltakerne og de ferdige produktene.

Hovedproblemstillingen er operasjonalisert i tre forskningsspørsmål som utforsker problemstillingen fra tre ulike perspektiver: *deltakerne*, den skapende *prosessen* og *produktene*. I den første artikkelen utforskes den skapende prosessen, som kan beskrives som en kompleks prosess bestående av tradisjonelle ikke-digitale aktiviteter og nye digitale aktiviteter. For barna var det viktigst å ta opp lyd og å dele den ferdige fortellingen. Den andre artikkelen har fokus på barnehagelærernes pedagogiske strategier i den skapende prosessen. De tre mest brukte strategiene er å invitere til dialog, å forklare det praktiske og å instruere for resultat. I den tredje artikkelen utforskes utviklingen av

animasjonsfilmen. Viktigheten av å inkludere både prosessen, produktet, de litterære virkemidlene og alle modalitetene i analysen trekkes fram som et sentralt funn samt viktigheten av å ha et åpent sinn overfor magien i barns skapende prosesser.

Gjennom analysen av de tre artiklene trer fire nye tema fram: *nye muligheter med digital teknologi*; *skapere i en kreativ prosess*; *interaksjon mellom flere kunnskapsområder*; og *prosessen er ikke nok.* I diskusjonen argumenterer jeg for at en samarbeidsprosess der en gruppe barnehagebarn og en barnehagelærer bruker digital teknologi for å skape kan forstås som en *kreativ samarbeidsprosess*. En synergi av ideer stiger fram gjennom samarbeidet i den skapende prosessen. Hver enkelt del av den kreative prosessen blir kanskje ikke sett på som kreativ, men fusjonen av alle enkelt elementene til en multimodal digital fortelling gjør den til et eksempel på kreativ bruk av digital teknologi. Barna og barnehagelæreren samarbeider og skaper et produkt som er nytt og meningsfullt for dem. Prosessen er viktig, men prosessen i seg selv er ikke nok – produktet er også viktig – særlig for barna.

Barnehagelærernes kunnskap om og evne til å integrere teknologi og pedagogikk med andre relevante kunnskapsområder, for eksempel kreativitet og skapende prosesser, er sentralt ved bruk av digital teknologi sammen med barnehagebarn. Det kan virke komplisert og vanskelig å lage en multimodal digital fortelling, men det er lettere enn det ser ut. Studien bidrar med kunnskap om ulike sider vedrørende kreativ og skapende bruk av teknologi sammen med grupper av barnehagebarn, sentralt for både praksisfeltet og barnehagelærer-utdanningen.

List of publications

Article I:

Undheim, M. (2020). "We need sound too!" Children and teachers creating multimodal digital stories together. *Nordic Journal of Digital Literacy, 15*(3), 165-177. https://doi.org/10.18261/issn.1891-943x-2020-03-03

Article II:

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Article III:

Undheim, M., & Hoel, T. (Accepted with some revisions). An animated story created by a group of young children. *Journal of Early Childhood Literacy.*

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Prologue

> *A group of 5-6-year-olds are composing the narrative for an animation movie. The main characters are a shark and a small fish. "What is the shark going to do?" I ask. "Eat the small fish!" one of the children says. I write the idea on a piece of paper and ask a new question: "What will happen then?" "The shark will start coughing and cough up a skeleton", another child says, and continues, "When my cat eats fish, he always coughs up the skeleton afterwards!"*

I have worked for more than 20 years as a kindergarten teacher and have made many digital animation movies in collaboration with children. Thus, I still remember the above-described event, which was from one of the first animated movies I made with the children, as if it were yesterday. The children had many ideas that they wanted to include in the movie; however, they also expressed that they did not know how to do it. "Do you know what?" I said. "When we make animation movies, everything is possible because we can use something called film tricks".

It is quite magical—for both children and teachers—to watch a clay-shark eat a small clay-fish and then cough up a skeleton or hear a 5-year-old explain to his older brother, "I have made this!" with excitement in his voice. Experiences such as this have motivated me to keep on exploring and learn more about creative use of digital technology and young children's multimodal digital stories. These experiences motivated me to engage in this PhD research and to contribute with research-based knowledge addressing these central aspects of contemporary culture.

1 Introduction

This PhD study is a contribution to the contemporary debate on the educational uses of digital technology with young children in early childhood education and care (ECEC) institutions. On the one hand, children are viewed as consumers and users of digital technology and the technology is considered equivalent to screen-time and entertainment (e.g., Dahle et al., 2020). On the other hand, children are viewed as creators and producers of technology-mediated products that they can share with an audience (e.g., Letnes, 2014; Rowsell & Harwood, 2015; Sakr et al., 2018; Sefton-Green & Reiss, 1999). In this study, I emphasise digital technology as a tool to create, by which the children and the teachers are the creators and producers of their own products to be shared with others. As creators and producers, the children can experience various ways of using digital technology—such that they are not merely consumers of content created by others (Kucirkova, 2017b; Rowsell & Harwood, 2015; Sefton-Green & Reiss, 1999).

However, even though digital technology is a central part of most children's everyday lives, digital technology is "only recently emerging in ECEC" (OECD, 2017, p. 168). Digital technology was first integrated in the Norwegian *Framework Plan for Kindergartens*[1] in 1995 (Barne- og familiedepartementet, 1995). In the current framework plan, teachers' and children's creative exploration and inventive use of digital technology is emphasised (Udir, 2017). Nevertheless, children's use of digital technology in kindergarten is still limited compared to their everyday lives (Chaudron et al., 2018; Medietilsynet, 2018; Yelland, 2017). Further, few teachers involve children in creation activities with digital technology and the most limiting factor for teachers' use of digital technology in Norwegian ECEC is a lack of digital competence (Fjørtoft

[1] Norwegian kindergartens are pedagogical ECEC institutions for children from birth to age five. The *Framework Plan for Kindergartens* is a national regulatory framework for the content and tasks of kindergartens, based on the *Kindergarten Act* (2005).

et al., 2019). Knowledge of technology and pedagogy is considered a prerequisite for making professional judgements and critical reflections regarding the use of digital technology with children in ECEC (e.g., Gibbons, 2010; Jernes, 2013; Jernes et al., 2010; Plowman et al., 2010; Selwyn, 2010; Stephen & Edwards, 2018). To be able to make sound judgements, we need knowledge, which I hope this PhD will contribute with.

1.1 Research questions and contribution

In this PhD study, I explore groups of children (age 4-5 years) and teachers in two Norwegian kindergartens creating multimodal digital stories together. The purpose is to contribute with research-based knowledge of digital technology used in a creation process with young children by focusing on in situ processes and what is actually taking place. More specifically, my aim is to contribute to the knowledge regarding children's and teachers' collaborative, technology-mediated story creation processes in ECEC and the final products.

I am interested in how the multimodal digital stories are created and how the teachers involve groups of children in the creation process—from the first idea to the final product. I consider children's participation in the technology-mediated story creation processes as valuable opportunities for the children to gain first-hand experiences with *creative* and *inventive* uses of technology. The overall research question is as follows:

> *What emerges when kindergarten teachers involve groups of children (age 4-5 years) in technology-mediated story creation processes?*

The research question is operationalised into three sub-questions that address the overall question from the three perspectives of the creation *processes*, the *participants* (teachers and children), and the final *products* (the multimodal digital stories). The three sub-questions are as follows:

1. *What characterises the technology-mediated creation process when groups of young children create multimodal digital stories in collaboration with a teacher?*
2. *What pedagogical strategies are in use by two kindergarten teachers when they create technology-mediated stories with groups of children?*
3. *In what ways do the different modalities and literacy devices contribute to the development of an animated story created by a group of children and a teacher in collaboration?*

An overview of the research design and the three articles is presented in Table 1.

A *technology-mediated story creation process* can be understood as a creative process in which a group of people creates something together, using digital technology as a tool or medium, from the first inspiration to the finished product. In this thesis, the final product is referred to as a *technology-mediated story* or a *multimodal digital story*, a story expressed through several modalities (e.g., pictures, words, sounds) and presented digitally in a medium such as an e-book or an animation movie (e.g., Kucirkova, 2018; Marsh, 2010).

The term *digital technologies* refer to digital tools and devices (e.g., tablets) and digital resources and media (e.g., apps). Other vital concepts in this thesis are collaboration, participation, creativity, literacy, experiences, activities, artefacts, multimodal meaning-making, and pedagogical strategies. They will all be introduced in due time.

Table 1 – Overview of the three articles

Aim	To contribute to the knowledge regarding kindergarten children's and teachers' collaborative, technology-mediated story creation processes in ECEC and the final multimodal digital stories		
Research question	What emerges when kindergarten teachers involve groups of children (age 4-5 years) in technology-mediated story creation processes?		
	Article I	**Article II**	**Article III**
Research questions	What characterises the technology-mediated creation process when groups of young children create multimodal digital stories in collaboration with a teacher?	What pedagogical strategies are in use by two kindergarten teachers when they create technology-mediated stories with groups of children?	In what ways do the different modalities and literary devices contribute to the development of an animated story created by a group of children and a teacher in collaboration?
Theory	Technological pedagogical content knowledge (TPACK), and professional digital competence	Socio-cultural perspectives: guided interaction, sustained shared thinking (SST), and spacious and narrow interactional patterns	Social semiotic multimodal perspectives
Design	Qualitative case study Two cases	Qualitative case study Two cases	Qualitative case study One case
Methods/ empirical material	Video observations of the activities	Video observations of the teachers' actions and interviews with the teachers	Video observations of the process and one final product
Results	Recording sound and sharing, non-digital and digital activities, and professional digital competence	Teachers' pedagogical strategies: Inviting to dialogue, explaining the practical, and instructing for results	Being open for the magic in children's story creation: The process, the product, the literary devices, and all modalities
Summary	Emerging possibilities due to digital technology, creators in a creative process, an interplay of multiple knowledge areas, and the process is not enough		

1.2 Children's participation

Children's active participation in society is a core value in Norwegian ECEC institutions (kindergartens), and it is also deeply rooted in my ontology. Children's right to participate and to express their views on matters that are important for them, as stated in the *United Nations Convention on the Rights of the Child* (UNCRC) (1989, Article 12) is integrated in the Norwegian *Kindergarten Act* (2005, § 3) and the framework plan (Udir, 2017).

Children's participation has been a central aspect during this entire research process and has influenced the choices I have made. In my view, children are active, knowledgeable and competent actors, which is in line with other researchers within early childhood studies (e.g., Danby, 2017; Kjørholt, 2012; Lunn Brownlee et al., 2017; Winger & Eide, 2015). It is important to me as a researcher to value and take into consideration the children's wishes and meanings throughout the process and acknowledge their multiple perspectives and ideas. By involving the children of this study in a technology-mediated story creation process where they create a multimodal digital story in collaboration with a teacher, they are given opportunities to experience that their thoughts and ideas are important (Somers, 1994; UN, 1989).

The collaborations and interactions among the children, teachers and me as a researcher are of great importance in the development and construction of the empirical knowledge of this study. From my perspective, knowledge develops and expands through social construction or an active meaning-making process in collaboration with others, in line with socio-constructivism (e.g., Dysthe, 2001; Selwyn, 2011; Säljö, 2016). However, children's learning is not the focus of this study—instead, I focus on what the children actually do, as creators and meaning-makers, in collaboration with the teacher.

1.3 Thesis structure

The thesis consists of two parts: the "kappe" [the synopsis] (Part 1) and the three articles (Part 2).

In this first chapter, I have presented the study's purpose, research questions, contribution, and central concepts.

In Chapter 2, an overview of the Norwegian kindergarten context is provided first, followed by an elaboration on digital technology, creativity and literacy. This chapter also presents a synthesis of the relevant previous research in the field to situate my thesis nationally and internationally.

In the third chapter, my theoretical foundation based on socio-constructivism is presented and central themes related to the co-construction process are explored.

In the fourth chapter, the methodology and methods are presented and discussed including a description of the cases, the multimodal digital stories that were created, and ethical considerations.

Chapter 5 provides a summary of the main results of the three articles, followed by Chapter 6, in which four central themes that emerged based on the analysis of the results are explored and discussed: *emerging possibilities due to digital technology*; *creators in a creative process*; *an interplay of multiple knowledge areas*; and *the process is not enough*.

Finally, in Chapter 7, I present my reflections on the study's process and limitations, implications for practice and policy, and suggestions for further research.

Part 2 consists of the three articles.

2 Background and relevant research

In this chapter, I will first provide an overview of the Norwegian kindergarten context followed by an elaboration on three core aspects in contemporary cultures, digital technology, creativity and literacy. Then, I will present the relevant previous research on multimodal digital stories in ECEC to situate my thesis within the field, nationally and internationally.

2.1 Norwegian kindergartens

Norwegian kindergartens are pedagogical ECEC institutions for children from birth to age five, based on socio-cultural perspectives and characterised by a child-centred pedagogy (Udir, 2017)[2]. A holistic approach to children's development, the intrinsic value of childhood, children's active participation in society, group activity, and democracy are core values in Norwegian kindergartens (pp. 7-8). In OECD's *Early Childhood Education and Care Policy Review* of Norway "the holistic understanding of education, giving well-being and socio-emotional development a special place" is emphasised (Engel et al., 2015, p. 62).

The Norwegian framework plan emphasises how staff can support and promote children's development and learning through everyday activities and group experiences (Udir, 2017). Learning is understood as something that happens in everyday situations, through communication, interactions, and play. "Care, formative development, play, learning, social skills and communication and language processes shall be seen in context, and together they shall contribute to the children's all-round development", according to the framework plan (p. 19). Children's

[2] In 2019, 92.2% of all children aged 1-5 years attended kindergarten according to Statistics Norway: https://www.ssb.no/en/utdanning/statistikker/barnehager (retrieved 13 March 2020). Kindergartens are considered an important part of the Norwegian educational system (Kunnskapsdepartementet, 2008). Children in Norway start in compulsory school at the age of six.

interests and previous experiences are understood as a foundation for planned activities and new experiences, for example, when integrating children's play and everyday activities with the various learning areas[3] (Udir, 2017). However, according Børhaug et al. (2018, pp. 132-133), there is a lack of research-based knowledge on how teachers and children in Norwegian kindergartens immerse themselves in content where learning areas work together and complement each other. From my perspective, child-centred theme- and project-based activities are methods in which children's participation can be combined and integrated with the learning areas and other themes relevant in today's society (Undheim, 2015b), in line with Dewey (1902, 1963).

2.2 Contemporary cultures

At the beginning of the 21st century, most young children grow up in societies with broad access to various digital technologies in their everyday lives (Chaudron et al., 2018; Medietilsynet, 2018; Yelland, 2017). Norway is, for example, the European country with the highest number of young children with access to the Internet through handheld technology (Letnes et al., 2016, p. 7). In 2018, 77% of children in Norway aged 1-4 years and 92% of children aged 5-8 years had access to tablets at home (Medietilsynet, 2018, p. 15). Consequently, digital technology is neither new nor novel; however, it is embedded in young children's everyday lives (Letnes et al., 2016; Medietilsynet, 2018). As far as these children know, digital technology, such as tablets or smart phones, has always been there; "Technology, as was once said, is not technology if it happened before you were born" (Robinson, 2011, p. 76).

[3] The learning areas are "topics of interest and intrinsic value to children of kindergarten age" (Udir, 2017, p. 47). They are as follows: i) *communication, language and text;* ii) *body, movement, food and health;* iii) *art, culture and creativity;* iv) *nature, environment and technology;* v) *quantities, spaces and shapes;* vi) *ethics, religion and philosophy;* and vii) *local community and society.*

With the increasing use of digital technology in society, it is important to critically examine and reconsider the ways in which we use and engage with technology (Yelland, 2017, p. 57). Young children mostly use tablets as entertainment such as playing games and watching videos and TV[4] (Letnes et al., 2016, p. 4); thus, they are mostly consumers of content created by others. By integrating digital technology in the pedagogical practice in ECEC, the children can experience new ways of using digital technology, for example, as creators and producers of products that they can share with an audience (Fjørtoft et al., 2019; Kucirkova, 2017b; Rowsell & Harwood, 2015; Sefton-Green & Reiss, 1999). Creative use of digital technology is considered a central aspect of 21st century competences (Yelland, 2017).

The idea of *21st century competences* is a central term related to key competences and core aspects in contemporary cultures and international frameworks (Erstad & Voogt, 2018; Voogt & Roblin, 2012; Yelland, 2017). "Collaboration, communication, ICT literacy, and social and/or cultural competencies including citizenship, as well as creativity, critical thinking, and problem-solving" are examples of 21st century competences (Erstad & Voogt, 2018, p. 26). These are also closely related to the core values in Norwegian kindergartens (Udir, 2017). None of the 21st century competences are new; however, due to a rapidly changing society and the technological impact on society, they are regarded as important future competences. In ECEC, a future perspective focusing on school and society is often seen in contrast to a child-centred "here and now" perspective (Berge, 2012). However, these perspectives—the "here and now" and the future—can be combined through the perspective of lifelong learning (Berge, 2012). Further, I consider the 21st century competences to be important "here and now" experiences for children, embedded in their everyday experiences both

[4] YouTube and NRK Super are the most popular websites and apps among children aged 1-8 years (Medietilsynet, 2018, p. 39). NRK Super is NRK's (Norwegian Broadcasting Corporation) offering for children aged 2-12 years with a TV channel, a radio channel, a website (https://nrksuper.no/) and an app with program archives.

at home and in kindergarten—as well as important in the context of a future perspective.

2.3 Digital technology in ECEC

Digital competence is defined as a core 21st century competence—important in itself and as a broader competence to be embedded within the others (e.g., Erstad & Voogt, 2018; Voogt & Roblin, 2012). In the Norwegian framework plan, children's exploration, play, learning, and creation with digital technology are highlighted: "Staff shall explore the creative and inventive use of digital tools together with the children" (Udir, 2017, p. 45). This approach is in line with OECD and UNESCO; OECD focuses on digital technology as "a learning tool to improve learning processes" (OECD, 2017, p. 283), while UNESCO highlights digital technology in relation to creativity, curiosity, exploration, sharing, and problem solving (Kalas, 2010; OECD, 2012, p. 87). This study places a strong emphasis on the pedagogical and creative aspects of the teachers' use of digital technology with the children, in line with the Norwegian framework plan (Udir, 2017).

Knowledge of technology and pedagogy is emphasised as a prerequisite for making professional judgements and critical reflections regarding the use of digital technology with children in ECEC by several researchers within the field (e.g., Gibbons, 2010; Jernes, 2013; Jernes et al., 2010; Plowman et al., 2010; Selwyn, 2010; Stephen & Edwards, 2018). Further, teachers' sound digital judgement and ethical understanding of digital media are also highlighted in the framework plan (Udir, 2017). Similarly, according to Gibbons (2010, p. 5), "How we use them [digital technologies], why we use them, and what happens when we use them" are central aspects to critically consider. This issue can be understood in terms of Selwyn's (2010) "state-of-the-actual". According to Selwyn, it is important to focus on "what is *actually* taking place when a digital technology meets an educational setting" (Selwyn, 2010, p. 70).

The research in ECEC has shown the importance of appropriately embedding technology in pedagogical practice (e.g., Fleer, 2017a; Jernes, 2013; Jernes et al., 2010; Letnes, 2014; Plowman & Stephen, 2007; Undheim & Vangsnes, 2017). According to Jernes et al. (2010), the way in which teachers combine technology and pedagogy is crucial in terms of whether technology should be introduced. To emphasise the professional aspect of teachers' digital competence and digital technology as an integrated part of pedagogical practice in educational contexts, the term *professional digital competence*[5] is taken into account (Alvestad & Jernes, 2014; Børhaug et al., 2018). Professional digital competence is "knowledge about ICT and digital tools related more clearly to children's cultural formation, *bildung*, connected to the content, the strategies (working design) as well as values related to the society of tomorrow" (Alvestad & Jernes, 2014, p. 7). However, in two recent national studies, practitioners in Norwegian kindergartens were asked which factors they regard as most limiting in their use of digital technology when working with children. A lack of competence among practitioners with regard to how to embed digital technology into pedagogical practice is highlighted as the most limiting factor in both reports (Fagerholt et al., 2019, p. 25; Fjørtoft et al., 2019, p. 129). Similar findings are also reported internationally (Blackwell et al., 2014; Marsh et al., 2017). Further, according to Fjørtoft et al. (2019), 60-65%[6] of children in Norwegian kindergartens have never participated in

[5] The Norwegian term is "profesjonsfaglig digital kompetanse".

[6] In Fjørtoft et al. (2019, p. 130), the categories of *Never* and *More seldom than monthly* are combined when presenting children's use of various activities with digital technology. In my opinion, there is a big difference between *More seldom than monthly* and *Never*. I contacted the publisher of the report and asked if they had more details of these percentages. November 6, 2019, Sylvi Thun, one of the authors, e-mailed me a data file with the detailed percentages related to the following question: *How often do children in your group participate in these activities with digital technology? Creating movies/animations*: Weekly 0.2% – Monthly 3.4% – More seldom than monthly 27.3% – Never 64.7% – Not answered 4.3%. *Creating digital stories or digital books*: Weekly 0.9% – Monthly 5.0% – More seldom than monthly 29.4% – Never 59.9% – Not answered 4.8%. *Reading digital books*: Daily 0.9% – Weekly 7.7% – Monthly 13.2% – More seldom than monthly 24.6% – Never 50.3% – Not answered 3.2%.

technology-mediated creation processes, such as creating movies/ animations, digital stories or digital books.

In this study, I explore technology-mediated story creation processes in kindergartens by focusing on in situ processes and what is actually taking place. I consider children's participation in the technology-mediated story creation processes as valuable opportunities for children to gain first-hand experiences with creative and inventive uses of technology.

2.4 Creativity

Creativity is defined as a core concept in contemporary cultures (e.g., Erstad & Voogt, 2018; Voogt & Roblin, 2012; Yelland, 2017), used within a wide variety of domains and contexts. To foster creativity is "fundamentally important because creativity brings with it the ability to question, make connections, innovate, problem solve, communicate, collaborate and to reflect critically", according to Marsh (2010, p. 4). A common definition of creativity emphasises creativity in terms of *originality* and *usefulness* (Robinson, 2011; Sternberg & Lubart, 1999). On the one hand, creativity is understood in terms of the expressions created by extraordinary people, often with a focus on specific domain-related skills. On the other hand, creativity is understood in relation to everyday situations, for example, in terms of problem solving or children's creative production (Kozbelt et al., 2010; Marsh, 2010; Moe, 2018; Nickerson, 1999; Sakr et al., 2018).

In creative processes, the boundaries of what we know are pushed, and new possibilities are explored (Robinson, 2011, p. 152). Creativity is closely connected to imagination, which serves as a source for creativity—to be able to imagine what might be (Kucirkova, 2017a; Robinson, 2011). Craft argues that possibility thinking is "at the heart of creativity" (Craft, 2011, p. 31). In possibility thinking there is a shift from *what is* to *what might be*, from recognition to transformation. "What if" questions can be used to engage children in possibility

thinking (Craft, 2011). With the increasing use of digital technology in society, creators of all ages are provided new ways to promote creativity and share creative practices (Marsh, 2010) including opportunities to generate their own content (Craft, 2011). By engaging in a technology-mediated story creation process, children can create their own stories and become creators (Kucirkova, 2017b; Rowsell & Harwood, 2015; Sefton-Green & Reiss, 1999).

When children create their own stories, the stories are often inspired by popular culture; as such, the stories can be described as a form of re-creation—a remix—of several stories (Hoel, 2013, 2016; Marsh, 2010; Rowsell & Harwood, 2015; Sakr et al., 2018). Further, in the creation process, children may draw on a combination of previous events and experiences or various inspirational sources as inspiration for their creativity; during the creation process, such events or products may be re-created into something new (Moe, 2018; Robinson, 2011). This process can be described as an iterative cycle in which children's ideas generate new creations that again generate new ideas (Resnick, 2006). Collaborative situations such as these, in which "groups of individuals collectively generate a shared creative product" can be explained in terms of *distributed creativity* (Sawyer & DeZutter, 2009, p. 82). In distributed creativity, "one person's idea is often transformed and reinterpreted by the ensuing thought process of the group" (Sawyer, 2010, p. 371); it is thus what individuals create together that matters—the synergy that arises from the collaboration—not each individual's idea. In this process, something new and original can emerge. This process can be explained as collaborative emergence, which is characterised by unpredictable outcomes, moment-to-moment contingency, collaboration, and improvisation (Sawyer & DeZutter, 2009, p. 82).

From my perspective, a technology-mediated story creation process can be understood as an example of an early literacy activity in ECEC.

2.5 Digital literacy in ECEC

In the 21st century, *early literacy* is defined as a key skill and a prerequisite for active participation in society (Snow, 2017). In line with Barton (2007), I understand literacy as embedded in social practices and contexts. In the Norwegian kindergarten context, communication, meaning-making, and language are important aspects of early literacy (Udir, 2017). Children's exploration and development of "their language comprehension, their linguistic competence and a multitude of different forms of communication", as well as being introduced for "a variety of fairy tales, stories, legends and forms of expression" are emphasised in the framework plan (pp. 47-48). However, communication and language are also considered important in itself—as a foundation for children's all-round development. Teachers' ability to facilitate for communication and language development in everyday activities is considered vital to foster children's early literacy development (Udir, 2017).

The increasing use of digital technology in the beginning of the 21st century has reshaped how we read, write and create texts; further, multimodal meaning-making is seen as a core aspect of contemporary literacy activities (Barton, 2007; Sefton-Green et al., 2016). In many countries, various digital texts such as those of digital books and videos/movies are well-known to children from an early age, both at home and in ECEC (Kucirkova, 2017b). However, the situation is different in Norway. On the one hand, watching videos/movies is a common activity also for young children in Norway, at home and in kindergartens (Fjørtoft et al., 2019, p. 130; Medietilsynet, 2018, pp. 34-39). On the other hand, young children's reading experiences and uses of digital books at home are unknown; further, reading activities with digital books in Norwegian kindergartens are not common. Less than 9% of the children in kindergartens have participated in reading activities with digital books daily or weekly, and more than 50% of the children have never participated in such activities (Fjørtoft et al., 2019, p. 130; see footnote 6).

In this study a picture book app is used to inspire the children in the technology-mediated story creation process.

2.6 Multimodal digital stories in ECEC

There has been an increasing number of empirical studies of young children (0-8-year-olds) and digital technology during the last decade. However, several researchers within this field call for more research regarding young children's creation with digital technology (e.g., Burnett, 2010; Burnett & Daniels, 2016; Hsin et al., 2014; Marsh, 2010), children's digital stories (Garvis, 2016) and classroom-based early literacy learning with digital technology (Flewitt et al., 2015).

Drawing on the aim of this study and the call for more research, the thematic focus of this literature review is *young children creating multimodal digital stories with a fiction-based storyline in ECEC.*

2.6.1 Search procedures

This review is a synthesis of the relevant previous research in the field found through a combination of extensive searches in several databases and manually, based on informed filtering of what to include and exclude (see Table 2). I focus on relevance to support my study rather than comprehensiveness (Krumsvik & Røkenes, 2016; Maxwell, 2006). "Digital OR technology OR ICT" and "early childhood education OR preschool OR kindergarten" are terms that were included in all the searches. Other search terms that were used in combination with these were, for example, "story", "animat*", "multimodal", "activity", "narrate*", and "creativity".

Children's participation is essential in my study, and studies of teachers' creating multimodal digital stories without children were therefore excluded. Other studies of various multimodal digital stories were excluded because they are not relevant to my study, e.g., documentation

of play, activities, or surroundings (e.g., Heydon et al., 2017; Kervin & Mantei, 2016; Yamada-Rice, 2014); writing and verbal text production (e.g., Hopperstad & Semundseth, 2012; Ranker, 2014); or teaching about phenomena (e.g., Kocaman-Karoglu, 2015). Studies focusing on special education, language development, learning outcomes, and effect studies were also excluded, as well as articles without a distinct presentation of method(s). Next, the included studies will be presented.

Table 2 – Literature search, adapted by Krumsvik and Røkenes (2016, p. 68).

Theme	Included	Excluded
Database	EBSCOhost (Academic Search Premier, ERIC, and MLA), Scopus, Web of Science, Idunn, and Norart	Other
Type of publications	Peer-reviewed articles, peer-reviewed book chapters, and PhDs	Newspaper articles, books, conference proceedings, BA and MA theses
Time	All until 2019	None
Focus	Empirical studies focusing on young children (age 0-8 years) creating multimodal digital stories with a fiction-based storyline in ECEC	Studies focusing on digital technology used to create without the children, e.g., teacher's creation with digital technology Multimodal digital stories used within special education, with a distinct focus on language development, or learning outcome Documentary stories Activities without digital technology
Languages	English, Norwegian, Danish, and Swedish	Other languages
Methods	All	Articles without a distinct presentation of method(s) used, effect studies

2.6.2 Children's multimodal digital stories

All studies included in this literature review focus on multimodal digital stories with a fiction-based storyline and are created together with young children (age 0-8 years) in ECEC institutions. Further, in all studies the children are involved as active participants in the creation process.

The multimodal digital stories that are described in the included studies can be divided into three types: *digital stories composed of pictures and text*; *stop-motion animation movies*; and *videos of children* (Table 3).

Table 3 – Types of multimodal digital stories

Multimodal digital stories		Study	Inspired by
Digital stories composed of pictures and text	Children's drawings or paintings	(Klerfelt, 2004, 2007) (Letnes, 2014)* (Skantz Åberg, 2017)	Fairy tales
	Ready-made images from software or the Internet	(Bratitsis et al., 2012) (Sakr et al., 2016) (Skantz Åberg et al., 2015) (Wohlwend, 2017)	Fairy tales
	Children's photographs	(Letnes, 2014)* (Hesterman, 2011a)	Visual art Fairy tales
Stop-motion animation movies	Three-dimensional play materials of homemade figures	(Fleer, 2014, 2017b, 2018) (Letnes, 2014)* (Palaiologou & Tsampra, 2018) (Petersen, 2015)	Fairy tales Music
	Two-dimensional drawings	(Leinonen & Sintonen, 2014) (Marsh, 2006)	Media
Videos of children		(Hesterman, 2011b)	Media

Note: * Letnes (2014) is a Doctoral thesis in which groups of children created three different multimodal digital stories.

The use of digital technology is a central aspect in technology-mediated story creation processes. In some of the included studies the researchers focus on certain aspects of the teachers' knowledge when creating multimodal digital stories with children, for example, knowledge of digital stories (Leinonen & Sintonen, 2014; Marsh, 2006), knowledge of digital creation processes (Letnes, 2014), and knowledge of technology (Hesterman, 2011b). Further, in most of the included studies (Table 3), the need for teachers to support, help, inspire, ask questions, and motivate the children during the creation process is highlighted. According to Letnes (2014), the technology itself does not improve the pedagogical situation, but it provides new opportunities. Products created digitally can, for example, easily be modified any time during the process (Fleer, 2018; Hesterman, 2011b). Moreover, the digital story can be watched as many times as the creators want during the process, and when it is finished, it can be easily shared with others (Fleer, 2018; Letnes, 2014). Interestingly, in several of the included studies, the researchers expected the technical part to be the most challenging aspect for the children in creating stop-motion animation movies, for example, to use the software/app; however, it proved to be more difficult for the children to make the animation sequences (Fleer, 2017b; Marsh, 2006).

The literature search revealed some relevant previous research upon which to build. However, this review shows that it is most common for children in ECEC to create digital stories individually or in pairs; as such, groups of children making multimodal digital stories together are less common. Further, only five of the included studies focus on the entire process of creating digital stories, in which both digital and non-digital activities are included (Fleer, 2018; Hesterman, 2011b; Leinonen & Sintonen, 2014; Letnes, 2014; Palaiologou & Tsampra, 2018); the other studies focus on parts of the process, mostly the digital activities. Only one study has included both the process and the product (Skantz Åberg et al., 2015). Moreover, several of the studies included in this literature review used fairy tales to inspire the children (Table 3); however, no

previous studies, to my knowledge, have used picture book apps and shared dialogue-based reading activities as inspiration for a technology-mediated story creation process as I do in this PhD study.

In this study I explore what emerges when teachers involve groups of kindergarten children in a collaborative co-construction process such as the technology-mediated story creation process. The entire process of creating multimodal digital stories—both non-digital and digital activities—are included, as well as the final products.

3 Theoretical foundation

In all science, the researcher's theoretical understanding creates a foundation upon which the research is based. My ontology and epistemology are deeply rooted in how I consider and understand the world (Bartlett & Burton, 2016). My theoretical foundation is based on socio-constructivism, but I also draw on elements from socio-cultural perspectives and social semiotic multimodal perspectives, to be able to explore the findings from different perspectives and to provide a rich picture of the findings and new ways of understanding.

In this chapter, central themes related to a co-construction process will be explored, such as experience and activity, mediating artefacts, communication and interactions, and multimodal meaning-making.

3.1 Co-construction process

Informed by a socio-constructivist view of knowledge, I understand social phenomena such as the technology-mediated story creation process as experiences that are shaped and reshaped through the participants' interactions with each other. I am interested in what is actually taking place in the collaborative co-construction process; how the multimodal digital stories are created and how the teachers involve the children in this process. Children's learning is not the focus of this study; instead, I focus on what the children and teachers are doing—their actions—as creators and meaning-makers.

From my perspective, knowledge develops and expands through a social construction or active meaning-making process in collaboration with others, in line with socio-constructivism (e.g., Dysthe, 2001; Selwyn, 2011; Säljö, 2016). I understand the knowledge development process as an iterative and active collaborative co-construction process in which the participants—the children and teachers—take an active role as active participants in the process, as creators and meaning-makers (e.g., Kress,

2010; Moe, 2008; Selwyn, 2011; Säljö, 2016). The empirical knowledge constructed in this study is co-constructed in collaboration with the participants and myself as a researcher. However, the participants' experiences of the process will be different from mine. Thus, I am interested in the children's and the teachers' thoughts and reflections—their experiences—of what is taking place during the creation process. Drawing on socio-constructivism, an experience is not a reflection of reality, but the reality an individual or a group of people experience because they experience the world as they do (Moe, 2008, p. 85).

3.2 Experience and activity

In an experience there is an interaction—*transaction*—between the individual, other people, and central artefacts, which forms a situation (Dewey, 1963, p. 43). Furthermore, situations are the meeting points between individuals, between individuals and artefacts, and between individuals and society (Vaage, 2001, p. 145). The transaction process can be described as "an active, adaptive, and adjustive process" in which all aspects of the situation influence each other (Biesta & Burbules, 2003, p. 10); the transaction process is not constant but develops over time. The acquisition of knowledge is connected with actions through participation in activities and interactions with other people (Biesta, 2014; Madsen, 2008).

The relationship between our actions and their consequences is central to Dewey's view of knowledge (Biesta & Burbules, 2003). However, activity alone is not enough to explain learning processes: activity has to be followed by reflection, according to Dewey (1963). I understand reflection as the connection between the active and passive parts of an experience. An experience is considered to be both active and passive: "On the active hand, experience is *trying*. (…) On the passive, it is *undergoing*. When we experience something we act upon it, we do

something with it; then we suffer or undergo the consequences" (Dewey, 1916, p. 163).

By taking part in the technology-mediated story creation process in this study, the participants interact and experience the process; thus, what they experience may vary from person to person, depending on their previous experiences. The quality of an experience "here and now" is important; however, at the same time, an experience is considered important for subsequent experiences (Dewey, 1963). A person's world expands or contracts by participating in society, that is, by taking part in or being involved in various situations. What a person has learned and experienced in "one situation becomes an instrument of understanding and dealing effectively with the situations which follow", according to Dewey (1963, p. 44). All experiences will, in one way or another, change a person and influence the quality of that person's following experiences. The source and power of an experience lies within the specific situation and its interaction (Dewey, 1963). This is central in Dewey's concept of experience, in which interactions and continuity are central concepts (Madsen, 2008; Vaage, 2001). When experiences are built upon and connected to previous experiences, continuity is created (Dewey, 1963; Moe, 2008).

In the Norwegian kindergarten context, children's interests and previous experiences are emphasised as a foundation for new experiences. Learning and development through play, experiences, and active participation in everyday activities—in collaboration with others—is highly valued (Børhaug et al., 2018; Udir, 2017). The framework plan does not have specific learning goals for the children and does not use the words "teach" or "educate". Instead, it focuses on how practitioners can stimulate and support children's development and promote learning through everyday activities, both individually and in groups (Udir, 2017). Hence, it is important for teachers to facilitate activities based on children's interests and knowledge. In doing so, teachers maintain continuity and provide activities that are relevant and useful for the

children (Dewey, 1902, 1963). Learning is described "as taking place best when it is problem-based and built upon the learner's previous experience and knowledge" (Selwyn, 2011, p. 73), such as, for example, in inquiry-based learning.

Inquiry-based learning can be seen as a spiral process that begins with the children's interests and their curiosity, followed by various ways of exploring, experimenting, experiencing, problem-solving, analysing a topic in collaboration, and reflecting (Dewey, 2009). Reflection is a central aspect of this process, according to Dewey. At certain times during this process, a new understanding may be achieved; at other times, new thoughts and new conditions may occur, which may lead to new problems or topics to be explored, after which the cycle starts again (Dewey, 2009; Harwood, 2017). A learning process such as this involves construction and reconstruction (Moe, 2008, p. 91). A technology-mediated story creation process, such as that of my study, may draw on elements from inquiry-based learning. Winters and Memme (2017) highlight the use of portable digital technologies by children, for example, tablets; these technologies provide possibilities for children to be involved in the process and participate as co-creators in projects in which the teachers and children explore and experience something together.

For children's learning and development, it is important that they experience activities that support previous learning and encourage new learning at a slightly higher level, which Vygotsky (1986) defined as the *zone of proximal development* (ZPD). A central aspect of the ZPD is that of the *more competent other* as a partner in the individual development process, which includes teachers, adults and/or peers, depending on the situation. In my study, both the children and teachers may serve as the more competent other, with the one who takes this role potentially varying from activity to activity. The more competent other might play a role in scaffolding the process (Wood et al., 1976).

My understanding of knowledge as being socially constructed through experience and collaboration with other people—through construction and reconstruction—is understood in terms of socio-constructivism. However, socially constructed knowledge can also be understood in terms of socio-cultural perspectives, in which distributed knowledge and mediating artefacts are central aspects.

3.3 Mediating artefacts

In socio-cultural perspectives, knowledge is understood as being distributed among people and the mediating artefacts of a community; not as being "located" within a single person (e.g., Dewey, 1916; Dysthe, 2001; Säljö, 2016). In my study, knowledge in the technology-mediated story creation process can be understood as being distributed among the children, the teachers and the available artefacts, in the specific context. Drawing on Säljö (2019), I consider the digital technologies that were used during the technology-mediated story creation process in this study, the tablets and the apps, as important tools and resources in the creation process. Thus, the other artefacts that were used, for example, clay, Duplo blocks, paper, and crayons, are equally important. Artefacts are intentionally produced and available resources that serve "memory and other social functions of significance to a community", for example, rock carvings, books, and digital technology such as tablets (Säljö, 2019, p. 24). *Artefacts* are the physical and intellectual resources created by humans based on ideas and practices. By using artefacts—digital and non-digital—an individual's knowledge and ability to manage complex tasks expands. Further, new potentials may develop and emerge from the communication and interactions among the participants and the artefacts during the process. These new and emerging ideas and products that are created can be understood as new artefacts; consequently, the artefacts change because of how we use them (Säljö, 2017, 2019).

3.4 Communication and interactions

Language is the most important "cultural tool" or mediating artefact for people—the "tool of tools"—according to Vygotsky (see Säljö, 2016, p. 111). Communication and interactions are central aspects in socio-constructivism and socio-cultural perspectives (e.g., Dewey, 1916, 1963; Dysthe, 2001; Säljö, 2016; Vygotsky, 1986). Interactions among the children and the teachers is a core value in Norwegian kindergartens; this includes teachers' interactions with the children as well as interactions among the children (peer-interactions) (Udir, 2017). Bae (2009, 2012) describes interactions among teachers and children in terms of *narrow and spacious interactional patterns*. According to Bae (2012), for children's experience, right to participate, and opportunities to express thoughts and feelings, a spacious interactional pattern will give the best support. A spacious interactional pattern can be observed when the teacher is attentive and present, focusing on the children's attention, open for meta-communicative signals, responsive, and tolerant (Bae, 2012). From my perspective, a spacious interactional pattern can be seen in relation to *sustained shared thinking* (SST). SST is the deepening of the means by which to effectively support children's learning and development in which the interactions among the individuals are central (Siraj-Blatchford & Sylva, 2004; Sylva et al., 2004). An interaction in SST is described as:

> an episode in which, two or more individuals "work together" in an intellectual way to solve a problem, clarify a concept, evaluate activities, extend a narrative etc. Both parties must contribute to the thinking and it must develop and extend thinking. (Sylva et al., 2004, p. 36)

The interactions between participants are central in SST and are understood as essential for quality learning and children's development in ECEC (Siraj-Blatchford & Sylva, 2004; Sylva et al., 2004). From my perspective, an interaction in SST can be understood in line with Dewey's (1963, p. 43) concept of transaction. Listening to the children,

respecting their decisions and choices, observing body-language, showing genuine interest, inviting children to elaborate, clarifying ideas, suggesting, reminding, encouraging, and asking open questions are central aspects within SST (Brodie, 2014, p. 65). From my perspective, SST may be supported through active participation in a creation process in which the children are given an opportunity to experience that their thoughts and initiative are important. However, the way in which the teachers engage the children in the process is crucial in considering whether the interaction can be interpreted as an example of SST.

Another way to understand how teachers can actively support children during the technology-mediated story creation process is by drawing on the *distal and proximal guided interaction* of Plowman and Stephen (2007). Teachers can support children's use of digital technology indirectly through distal guided interaction, for example, in the planning, facilitating, and providing of resources, or directly through proximal guided interaction by supporting and helping children through face-to-face interactions (Plowman & Stephen, 2007, pp. 18-19). I understand guided interactions to be closely connected to SST (Siraj-Blatchford & Sylva, 2004; Sylva et al., 2004) and scaffolding (Wood et al., 1976).

Further, to facilitate activities that support children's learning and development in various ways, in situ interpretation and guidance by teachers are required (Dewey, 1902, p. 13), as has been demonstrated by several researchers (e.g., Bae, 2012; Plowman & Stephen, 2007; Siraj-Blatchford & Sylva, 2004; Sylva et al., 2004; Vygotsky, 1986; Wood et al., 1976). Teachers' interpretation and guidance are vital for my study regarding how the teachers involve and support the children in the technology-mediated story creation process, in which communication and interaction are central aspects.

In terms of communication and language, Dewey (1916) includes everything that has or adds *meaning* in a social context, including products of art and technology, not merely verbal communication. This

approach can be understood in terms of an expanded understanding of digital literacy (e.g., Barton, 2007; Sefton-Green et al., 2016) and social semiotics (Kress, 2010), in which multimodal meaning-making and communication through various expressions are core aspects.

3.5 Multimodal meaning-making

From my perspective, the participants in my study are meaning-makers and creators of multimodal digital products (Selwyn, 2011; Säljö, 2016). The ways in which individuals in a social context use signs, symbols, and various modes to create meaning and communicate—through several modalities based on their own interests—are central aspects of social semiotic multimodal perspectives (Kress, 2010; Kress & Jewitt, 2003; Kress & van Leeuwen, 2001). Signs and symbols are socially produced cultural resources created with a purpose that contain the creators' meaning of the work. I understand cultural and semiotic resources as cultural tools or artefacts (Säljö, 2017, 2019). By being meaningful, these cultural resources are regarded *semiotic resources*: "It is 'the social' which generates 'the cultural' and, in that, 'the semiotic'", according to Kress (2010, p. 14). Cultural or semiotic resources are never fixed and may have different meanings in different contexts; their meanings are situated, depending on the social context (Kress, 2010). Hence, what counts as a mode in one context or community may be very different in another context or community.

Meaning can be created through a combination of various modes, including linguistic and non-linguistic communication systems (Kress, 2010). During the creation process, such as the technology-mediated story creation process, there are many choices to make for the participants to create meaning and communicate a message, e.g., choice of modes and choice of artefacts (Kress, 2010; Kress & Jewitt, 2003; Kress & van Leeuwen, 2001). Different people will make different choices, which will influence both the process and the communicated message. These choices may be based on previous experiences and/or

practicalities, e.g., related to the artefacts and resources that are available in the specific context. Drawing on the idea of distributed creativity, I consider the synergy that arises from each individual's contribution during the collaborative process to be important (Sawyer, 2010). The personal interests of the creators and the creators' choices during the process are foregrounded in social semiotic multimodal perspectives (Kress, 2010; Kress & Jewitt, 2003).

In addition to the creator's choices, the affordances of the modes and artefacts may also influence the process and the communication. Various modes and artefacts have specific affordances, i.e., invariant combinations of variables and properties (Gibson, 2015, p. 126); these variables and properties may offer potentials or limitations, or a combination of both, depending on the situation and how they are used. Images can provide an overview, written words can highlight action while music can create a mood. Sometimes modes can complement and highlight each other, for example, written text and illustrations in a picture book, a narrator voice and images in a picture book app, and music and photographs in a digital story; other times, modalities can overlap and communicate the same message (Kress, 2010). However, it is the creators' choices that influence how the message is communicated and expressed (Kress & van Leeuwen, 2001).

3.6 Summary

Drawing on a theoretical foundation based on socio-constructivism, this chapter focused on central themes related to a co-construction process, such as experience and activity, mediating artefacts, communication and interactions, and multimodal meaning-making. These themes will be included in the discussion in Chapter 6 to provide a foundation for my interpretation and understanding of the empirical material in this study.

4 Methodology and research design

In this chapter, I present and discuss the methodology and methods used in this study including ethical considerations.

4.1 Applied educational science

In this PhD study, I explore what emerges when kindergarten teachers involve groups of children in technology-mediated story creation processes in ECEC. I am interested in what is actually taking place in the technology-mediated story creation process, how the multimodal digital stories are created and how the teachers involve the children in this process. This is related to my epistemological, ontological and methodological position (Bartlett & Burton, 2016; Creswell, 2013). In line with philosophy of social science and the research within the social sciences, I am concerned with questions and reflections regarding social phenomena (Cartwright & Montuschi, 2014; Morgan, 2014). My aim is to describe, explain and contribute to understanding and knowledge of a specific phenomenon. Both the teachers' and the children's points of view, subjective meanings and reflections during the technology-mediated story creation process are essential; these are the central aspects of qualitative research (Bryman, 1984; Creswell, 2013; Silverman, 2011).

My understanding of "emerging" implies "emerging from acting together". The focus is on that which emerges from the collaboration and active co-construction among the participants—the actors. With an ontology and epistemology grounded in socio-constructivism, I value the empirical knowledge co-constructed in collaboration with the participants and myself as a researcher; this can be understood as a concrete and practical context-dependent knowledge (Alvesson & Sköldberg, 2018; Creswell, 2013). I have therefore chosen a qualitative multiple-case study design with two cases with a focus on observable

contemporary in situ events holistically and in-depth (Creswell, 2013; Yin, 2014).

4.2 Hermeneutical interpretation process

Inspired by hermeneutics, I consider the interpretative perspective to be a valuable methodological approach. All interpretations are based on a researcher's preunderstanding and subjective experiences of past events, according to Alvesson and Sköldberg (2018) and Gadamer (2013). My preunderstanding is informed by my previous experience as a kindergarten teacher, previous experience using digital technology with children, and previous experience creating multimodal digital stories. By drawing on my preunderstanding, a new understanding—a new horizon—and ensuing interpretations have emerged through active and iterative dialogue with the participants, the empirical material, the previous research, theory, and discussions with colleagues and other researchers. This iterative and active co-construction process can be described as a hermeneutical interpretation process inspired by Gadamer's (2013) hermeneutical circle.

The readers of this thesis will continue this process, in which their preunderstanding will influence their understanding and interpretations of this text (Alvesson & Sköldberg, 2018; Gadamer, 2013).

4.3 Research design

4.3.1 Defining the cases

Two cases are included[7], each consisting of one kindergarten teacher and six children (aged 4-5 years), who together have created a multimodal digital story. The two cases focus on a particular process, the creation process, within a particular context, two Norwegian kindergartens. The

[7] The initial plan was to include three cases, see Section 4.3.2.

same research protocol[8] was followed in both cases, to maintain the same chain of evidence across the cases (Yin, 2014). Three stages are included in the cases: 1) preparation, 2) the creation process, and 3) after-work (Figure 1).

The creation process has a predefined start and end. In both cases, the creation process began with a shared dialogue-based reading activity where the teacher invited the children into a dialogue around a picture book app to inspire the children (see Tønnessen & Hoel, 2019). At the end of the creation process, the teacher and children watched the products they had made. In both cases, the teacher and children spent nine days on the creation process, from the first shared dialogue-based reading activity to the completion of the project (Appendix 2). All activities took place in separate rooms, with only the teacher, the six children and me present. The kindergarten teachers were responsible for the activities while I participated as an observer, video-recording all the activities.

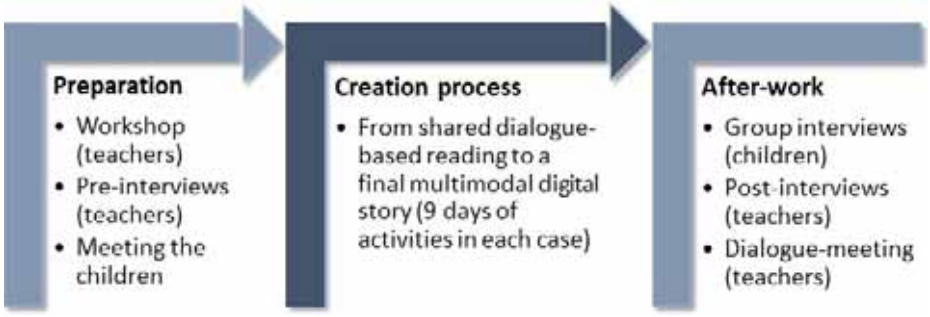

Figure 1 – The stages of the research process

[8] The research protocol consists of an overview of the study (Table 1, Section 1.1); data construction procedures (Sections 4.3 and 4.4); and interview questions (Appendix 1).

The empirical knowledge constructed during the research is context-specific. The participating teachers were asked to create a multimodal digital story with a group of children; thus, this study can be described as an external initiated case study. The empirical knowledge would not have been constructed without the research, which is dependent upon me and the participants and the interactions between us, in line with a socio-constructivist understanding of the construction of knowledge (Alvesson & Sköldberg, 2018; Creswell, 2013). Thus, this research has relevance for other similar cases, for example, within other ECEC institutions and teacher education.

4.3.2 The participants – the teachers and the children

The teachers participating in the research were recruited among the participants in VEBB (Mangen et al., 2019)[9]. I wanted to collaborate with kindergarten teachers who had some prior knowledge of tablets, digital picture book apps, and shared dialogue-based reading with children in kindergarten. The first contact was made orally at a workshop for VEBB-participants in April 2017. Two months later, written information about the project was sent to all participants in VEBB (13 teachers), which was approved by the municipality. In the information letter, the following four criteria for participating were listed:

- Participating in VEBB;
- Interested in using digital technology to create a multimodal digital story with children;
- Possess some digital competence and knowledge of some possibilities of digital technology use; and
- Able to spend two-three weeks on the project between January and March 2018.

[9] VEBB ("Vurderingsverktøy for e-bøker for barn") is an intervention study in which researchers studied the use of picture book apps and print picture books in shared dialogue-based reading activities in Norwegian kindergartens: https://lesesenteret.uis.no/vebb/ (retrieved 20 May 2020).

Initially I aimed towards three teachers to participate, to provide a context-based in-depth exploration and analysis of the particular process (Creswell, 2013). By the end of September 2017, three teachers had volunteered to participate. However, in January 2018, one of them notified me that she had to withdraw from the study. At this time, the creation process in case 1 was already finished. Drawing on the intrinsically bounded nature of the cases (Merriam & Tisdell, 2016) and the empirical data from the first case, I considered two cases to be sufficient to provide the exploration and analysis that I was interested in. EU's *General Data Protection Regulation* (GDPR) and the principle of data minimisation (Datatilsynet, 2018) were also taken into consideration in my decision.

Both teachers are female, aged 44 and 47, with 15-20 years of experience as kindergarten teachers. They represent two different kindergartens. Both teachers considered participation in the study to be a good opportunity to learn more about creatively using digital technology with the children. The teacher in case 1 had made a few multimodal digital stories previously; however, the teacher in case 2 was doing it for the first time.

The participating children were invited by the teachers; they were asked to organise a group of six children who would enjoy participating in the technology-mediated story creation process. Case 1 includes six children (two boys and four girls) between 5.2 and 5.9 years (M = 5.6 years). Case 2 includes six children (four boys and two girls) between 4.3 and 5.6 years (M = 5.1 years).

4.4 The empirical material – data construction

A wide variety of methods was used during the data construction, and multiple sources of empirical material were constructed during the three stages (Creswell, 2013; Yin, 2014), as shown in Table 4.

Table 4 – An overview of the empirical material

Stages	Events	No.	Method	Duration	Text*
1) Preparation	Workshop	1	Written summary	180 min	2 pages
	Pre-interviews with the teachers	2	Sound-recordings	74 min	17 pages
2) Creation process	Field observations	18	Video-recordings of the activities	796 min	247 pages
	Field notes and daily reflections	30	Written summary		50 pages
	Products	2	Multimodal digital stories	14 min	3 pages
3) After-work	Group interviews with the children	2	Video-recordings	56 min	23 pages
	Post-interviews with the teachers	3	Sound-recordings	182 min	50 pages
			Total	1302 min	392 pages

Note: * All transcripts are written in Times New Roman, 12 pt, single line spacing.

I spent 34 hours in the field, spread over 26 days (January and February 2018), including a visit to the kindergartens as a part of the preparations to talk with the children and present the research.

4.4.1 Preparation

To provide the teachers some technical assistance to get started, they were given the opportunity to attend a workshop focusing on how to create multimodal digital stories on tablets. Four creative free apps were presented: Book Creator (Red Jumper Limited, 2018), Stop Motion Studio (Cateater LLC, 2017), iMovie (Apple, 2018), and Garage Band (Apple, 2017). All three teachers participated in this workshop. A written

summary of the dialogue during the workshop is included in the empirical material. As participants in VEBB (Mangen et al., 2019), the teachers had also been trained in shared, dialogue-based reading activities with picture book apps.

Semi-structured in-depth interviews (Kvale & Brinkmann, 2009) with the teachers were conducted prior to the creation process with the children, with a focus on the teachers' didactical reflections on the creation process (Appendix 1.1).

4.4.2 Creation process

All activities during the creation process in both cases took place in separate rooms, with only the six participating children, the teacher and I present. The teachers were responsible for the activities, while I participated as an observer, video-recording all the activities. I consider video observation in combination with participating observation to be useful and important when seeking "naturally occurring situated interaction in contexts" (Cowan, 2014, p. 6). Video-recording is considered by several researchers to be a valuable method to capture verbal and non-verbal interactions between teachers and children in situ by providing a rich source of information with temporal and sequential records of communication and interactions (e.g., Björklund, 2010; Cowan, 2014; Flewitt, 2006; Haggerty, 2011; Heikkilä & Sahlström, 2003; Luff & Heath, 2012; Nicholas, 2018). Most of the children were used to the camera from their participation in VEBB (Mangen et al., 2019); none of them seemed to worry about the camera. One of the teachers expressed that she did think about the camera and my being present the first two days; however, she then "forgot" that I was there.

All activities were video-recorded with a small hand-held digital camera[10] with integrated microphone to capture sound. During the

[10] Zoom Q4n handy video recorder: https://www.zoom-na.com/ (retrieved 20 May 2020).

activities in both cases, I sat close enough to capture all six children and the teacher as well as the conversations, body movements, and artefacts. The verbal communication is of good quality in all the video-recordings. I mostly used a stable mid-shot wide angle camera position, placed either on a tripod on the table or a chair, or holding it, as suggested by Luff and Heath (2012). I was interested in the interactions among the participants, the listeners as much as the speakers (Heikkilä & Sahlström, 2003). Sometimes I zoomed in to capture what the participants were doing on the tablet. Some days, I was able to capture their mimicking behaviours and facial expressions but not always, depending on the activity and the camera's angle. However, the group activity was the main focus, not a detailed analysis of how they interacted. This approach influenced the choices I made during the data construction.

I obtained 14 hours of video from the different activities during the creation process. These included creating a narrative, drawing, painting, creating props, building with Duplo blocks, photographing, animating, recording sound, editing, and producing a multimodal digital story. Some of the activities lasted for approximately 30 minutes while others lasted for approximately 75 minutes. These activities were quite different in the two cases (Appendix 2).

Field notes were written every day during the data construction: short descriptions of what the children were doing when I arrived, of the different activities, what time the activities started and when they ended, who of the children participated, and my observations and comments (Clandinin & Connelly, 2000). The field notes support the video-recordings by providing additional information about the context. Written notes from daily reflections with the teachers after the activities are also included; their spontaneous thoughts and reflections about the specific activity that day and plans for the following day. Both teachers were very eager to talk about the activities afterwards, especially in the beginning, and these daily reflections took approximately 5-to-10 minutes (Appendix 1.2).

The empirical material also consists of the children's drawings, paintings, and props made during the process, and the two final multimodal digital stories, *The Wedding* and *Rapunzel*.

The Wedding is an e-book with 24 pages, which lasts for 12 minutes (Figure 2). It consists of pictures of children's drawings and paintings, photos from the Internet, text written by hand on an iPad and by using the keyboard, sound-recordings of the children narrating the story and singing, and music. The book was created on an iPad in the Book Creator app (Red Jumper Limited, 2018). The book is about a rooster who gets married to a dream princess and their large wedding with more than 12 thousand guests.

Figure 2 – Illustration from the e-book *The Wedding*, with the written text, "The church was full, because there were so many guests".

Rapunzel is a stop-motion animated movie with Duplo and clay figures, which lasts for 2 minutes (Figure 3). The movie consists of five scenes and approximately 250 still pictures (frames), which are edited together into one movie by the children and the teacher on an iPad in the Stop Motion Studio app (Cateater LLC, 2017). Included in the movie is also text written by hand on an iPad and by using the keyboard, sound-recordings of the children narrating the story, and music; these elements were edited in the iMovie app (Apple, 2018). The story has clear references to the familiar narrative of Rapunzel who is trapped in a tower by her stepmother but is rescued by a prince. Several other creatures are also included in the new story: a troll, a monster, a lion, and a leopard, all of whom fell on a small rock in the woods.

Figure 3 – Still image from the animated movie *Rapunzel*

4.4.3 After-work

When the creation process was finished, a semi-structured in-depth group interview with the children was conducted in both cases, focusing on the children's thoughts and reflections about the process and the product (Alvestad et al., 2017; Jug & Vilar, 2015) (Appendix 1.3). In both cases, the children, the teacher and I sat around a rectangular table, facing towards each other during the interview. In case 1, the children were engaged in playing with clay during the interview, and in case 2 and the pilot study, the children were engaged in drawing inspired by Einarsdóttir (2007). The interview in the pilot study was a positive experience, and so was the interview in case 2. However, in case 1, it was very difficult to engage the children in the conversation. The children mostly talked about the clay, and they did so with the teacher. This interview took place in the same room and around the same table as the other activities where I had been a silent observer. Now I was leading the conversation, and the questions were about the process, which I had observed. Perhaps the children did not answer because they thought I already knew the answer. Perhaps I was not clear enough in communicating that I was interested in their thoughts and meanings. Perhaps they simply felt they had finished the process after they had showed it to their peers. I believe the answer is a combination of these factors. Based on these reflections, I was very clear in case 2 that the interview had to be in a new room, and the children were allowed to engage only in drawing as an activity.

After the group interviews with the children, semi-structured in-depth interviews were performed individually with both teachers, focusing on their thoughts and reflections of the process and the product (Kvale & Brinkmann, 2009) (Appendix 1.4). During these interviews, they were asked to elaborate on various issues that they had raised during their previous reflections. Some months later, the teachers were invited to participate in a dialogue-meeting to discuss some of the preliminary

findings (see Jernes & Alvestad, 2017). It was important for me to involve the participants as co-researchers in the process.

4.5 Analysis

The aim of this study is to contribute to the knowledge regarding children's and teachers' collaborative, technology-mediated story creation processes in ECEC and the final multimodal digital stories. The multiple sources of empirical material (presented in Section 4.4) are used to provide multiple views of the creation processes through the analysis, and a rich description of the two cases (Creswell, 2013; Yin, 2014).

4.5.1 Transcriptions

I consider the transcription activity as an important and valuable part of the research process. All sound and video data have been transcribed by me (Table 4, Section 4.4), in Hyper Transcribe (Researchware, 2013), based on Jefferson (2004). I find it easier to access the data when it is transformed into written text and anonymised. In the transcriptions, I have focused on the content within the conversation and included verbal and non-verbal communication about and related to the activities during the creation process (Kvale & Brinkmann, 2009). How the teacher and the children used the different apps on the tablet, their finger movements, and the sounds from the tablet are also included. However, as with all transcriptions, they are a re-presentation of the situation (Cowan, 2014). Communication about whose turn to click on the tablet and communication about matters that I interpreted as not relevant for the creation process have been excluded. The transcriptions are written in dialect, the way in which the participants spoke; however, they do not focus specifically on how the words are spoken. Some words and pauses indicating active listening have been included when it was interpreted as important for the content (Kvale & Brinkmann, 2009). Extracts from the transcriptions were later translated into standardised English.

4.5.2 Coding

I have taken an open inductive approach to the analysis, inspired by grounded theory (Glaser & Strauss, 1967). I am interested in what is actually taking place. The analysis was rigorously performed based on the written transcriptions in NVivo (QSR International Pty Ltd., 2018) and by watching the videos. To classify the empirical material, each incident was compared with the previous incidents, applying them to a previous code or a new one, in line with constant comparison analysis (Glaser & Strauss, 1967; Leech & Onwuegbuzie, 2008). Descriptions of all codes were added to codebooks to ensure consistent coding. These codes were refined and adjusted several times during the analysis, and some were grouped together into broader categories. Several of the incidents were coded as two or more codes indicating interconnections among the codes. In this way, all the multiple layers and the richness from the video observations were integrated through this process (Ritchie et al., 2003). I found it very helpful to be able to view and review the video-recordings as many times as needed during the analysis to explore the different layers of information that occurred simultaneously.

I began by coding what the teachers and children were doing during the creation process, named as *activities* (Appendices 3 and 4). A combination of frequency and duration codes are used to determine how much time the teachers and children spent on the different activities during the creation process (Article I). Then, I coded the incidents where the teachers involved the children in the process, verbally and non-verbally, named as *pedagogical strategies* (Appendix 5). Children communicating with each other, and dialogue about themes beyond the narrative or the activity, were not included. This was as a useful way to reduce the empirical material (Ritchie et al., 2003) and provided a frame within which to analyse the teachers' pedagogical strategies further (Article II). The codes of activities and pedagogical strategies were also cross-tabulated to develop a further understanding of how the teachers involved the children within the different activities. Further, the narrative

activity from the *Rapunzel* case provided a frame within which to analyse how the animated story evolved through the creation process (Article III). The children's ideas related to the narrative and the animated story were coded focusing on who, what the characters were doing and where, literary devices, and other elements mentioned by the children. To explore the final product, a social semiotic multimodal analysis of the stop-motion animated story was carried out (Article III) (Appendix 6).

During the analysis, I have searched for internally and externally consistent coherent connections between the parts and the whole from the perspective that the *parts* of the empirical material and the *whole* are equally important (Alvesson & Sköldberg, 2018; Gadamer, 2013; Gander, 2015; Gómez, 2015). I began with the empirical material, added theory and returned to the empirical material, this time supported by the theory and continuously shifting between the whole and the parts.

4.6 Researcher role

Prior to conducting this PhD study, I had worked as a kindergarten teacher for 22 years; hence, I know the field very well. During those years, I created many multimodal digital stories with kindergarten children. That experience can be an advantage because I know the kindergarten field and I am used to working with children in this age group (NESH, 2016). However, it can also be a disadvantage because I might take certain aspects for granted and/or judge the teachers' choices and/or decisions compared with how I would approach this type of project. It has therefore been important for me to remain conscious of my role as a researcher, be sensitive and flexible and show the participants respect, by being a reflexive researcher, as noted by Guillemin and Gillam (2004). This is one reason why I chose to be an observer and use video observations instead of, for example, engaging in action-based research, where I would be more active and involved during the activities. These choices are based on my reflections connected to my

epistemological, ontological and methodological position (Alvesson & Sköldberg, 2018; Creswell, 2013), see Section 4.1.

During the data construction, the teachers and the children created multimodal digital stories while I was present in the same room and observing the activities. However, even though I was an observer and not an active participant during the creation processes, the children clearly saw me as a participant, according to one of the teachers in an interview after the creation process (Extract 1):

Extract 1: Interview with a kindergarten teacher

> *What I think is fascinating is that—even though you have only been sitting on a chair in the room and video-recording the activity—for the children, you are included just as much as everybody else. According to the children, you have participated in the making of this digital book just as much as I have. The children told me, "Marianne has also participated". "Well, she sat on her chair and video-recorded everything. She didn't do much on the book, or has she?" I asked them. "No, but she was there all the time", the children answered.*

Extract 1 is an example of how I as a researcher influence the situation and indirectly play an important part in the process. During the whole project, which lasted for 2 ½ weeks, I sat on a chair in the same room as the children and teacher, video-recording the activities. However, the group only "worked" on the project when I was present; thus, I believe that is the main reason why the children so strongly perceived me as a participant: the creation process occurred because of the research project. Some days I spent nearly 2 hours in the kindergarten; other days I spent only 45 minutes, depending on the activity and the participants as well as the kindergarten's other plans and activities.

The empirical knowledge constructed through the research is closely connected with the context and the specific group whereby I as a

researcher also influence the situation, which is in line with Alvesson and Sköldberg (2018). By being present during the creation process, I have experienced proximity to the researched activity and even experienced the activity that I am researching. To provide a distance to the activity, I have written field notes of what I saw and experienced and reflected on the content and of myself as a researcher, as suggested by Clandinin and Connelly (2000). This interplay among proximity and distance to the researched activity proved to be valuable during the data construction and the analysis. In line with being a reflexive researcher, I have reflected upon and taken my preunderstanding and subjective experiences into account throughout the entire research process to make the research transparent, which includes the clarification of values and attitudes (Alvesson & Sköldberg, 2018; Guillemin & Gillam, 2004; NESH, 2016). According to Flyvbjerg (2007), some researchers question the idea of researcher bias when conducting a qualitative case study by indicating the tendency to confirm the researcher's preconceived notions. These are central philosophical questions upon which I have reflected and taken into account when analysing the empirical material. To clarify which is based on my own experience, my interpretation, and the participants' statements, I have described the theoretical lenses I have used in the analysis (Alvesson & Sköldberg, 2018; Creswell, 2013; NESH, 2016).

When conducting research, there is always a possibility that the participants will feel criticised, misunderstood, misrepresented, exposed or stigmatised (Alver & Øyen, 2007). There is also, according to Allmark et al. (2009), a risk of focusing on the most sensational elements among the findings when disseminating the research afterwards. Such effects of participating in research can be counterproductive. To validate the preliminary findings, the teachers were invited to participate in a dialogue-meeting where some preliminary thoughts and reflections of the analysis were discussed: the creation process, the teachers' verbal and non-verbal communication and their different ways of involving the

children during the process (see Jernes & Alvestad, 2017). The preliminary analysis was confirmed by the teachers.

In line with other researchers in early childhood studies, I consider children to be competent and important actors (e.g., Danby, 2017; Kjørholt, 2012; Lunn Brownlee et al., 2017; Winger & Eide, 2015). I value the children's participation and contribution, in line with the Norwegian Kindergarten Act (2005, § 3) and UNCRC (1989). I consider storytelling and the process of creating multimodal digital stories to be reliable methods when children are included as participants in the research. However, the method itself does not give the children the possibility of contribute and participate; what is important is how the researcher uses the method and involves the children (Ennew et al., 2009). I hope the children felt that their thoughts and meanings were appreciated and valued by the teachers and by me during the data construction and afterwards. In this PhD study, the participating teachers were asked to create a multimodal digital story with the participating children. Consequently, the teachers had a large impact on the children's participation in the process.

4.7 Ethical considerations

The study was approved by the Norwegian Centre for Research Data (NSD) (Appendix 7), the kindergarten principals and the municipality. Ethical guidelines, as stated by NESH (2016), have been taken into account and followed during the entire research process. The participants' confidentiality is ensured by anonymising their names and other identifiers.

4.7.1 Freely and informed consent

It has been important for me to ensure that the participants understand why I wanted them to participate and what I wanted them to do, especially because I deal with personal information such as video-

recordings of children and teachers. Trust, loyalty and confidentiality have been essential in the interactions between me as the researcher and the participants during the entire research project. All the participants were informed about the research, the intended use of the research, and possible consequences, in line with NESH (2016) (Appendix 8); this includes the children's parents.

I spoke with the teachers several times before and during the process, answering questions about different aspects regarding the research. They were informed about what I wanted them to do, the type of data that I was collecting, and their right to say "no".

To ensure that the children understood the purpose of the study, I visited both groups prior to the research process and spoke with the children about the research. It was important for me to let the children know that they had a voice and say regarding their participation. I let them know why I wanted them to participate, what I wanted them to do and that they had a right to say "no", at any time. Then, I showed them a consent form (inspired by Danby & Farrell, 2005), explained what it meant, and talked about it with them (Appendix 8.3). Afterwards, I asked the children to repeat what we had talked about to determine what they could remember as suggested by Alderson (2005). The children's explanations gave me an opportunity to see and hear what they had understood about the project. They talked mostly about the video-recordings, which they were used to from VEBB (Mangen et al., 2019), that we should not include their names and that they could say "no" to participating at any time. Then, they signed the consent form. At the end, we spoke about the next day, when I would come back and the research project would begin.

During the research process, the children's consents were re-affirmed, which is described as continuous consent by Danby and Farrell (2004). I found this approach to be a good way to ensure the children's protection and active participation on their own terms. Each day, I clearly expressed when I began the video-recorder, which gave the children an opportunity

to leave if they wanted to. Several times during the research process, I heard the children say, "I don't have to participate if I don't want to". Before the research project began, I was slightly worried that too much focus on the consent could take the children's focus away from the actual activity; however, this did not happen. Some days, some of the children chose not to participate, mostly because they were engaged in play with other children and wanted to continue with that. The teacher and kindergarten staff knew that this was ok; they knew that I did not want them to pursue the children to join the activity without their wanting to.

4.7.2 Video observations

The use of video observation in research with children raises some ethical considerations of which researchers should be especially aware. Children are understood as vulnerable and "particularly entitled to protection" (NESH, 2016, p. 20), and "the best interests of the child shall be a primary consideration" in all research (UN, 1989, Article 3). These are important principles for researchers, and it is my responsibility as a researcher to protect and safeguard the children's interests throughout the entire research process. The video-recordings contain private information about the teachers and the children. Although all participants gave their consent, it is my responsibility to show an ethical consciousness during the process. There is always a possibility that events might occur while recording that could jeopardise the children's or teachers' privacy, integrity or confidentiality. Guillemin and Gillam describe such events as "ethically important moments" when the researcher must decide what to do in the situation (2004, pp. 264-265). One solution might be to turn off the recorder or to delete the clip afterwards, which is about respecting human dignity and maintaining the participants' privacy (NESH, 2016). In case 1, I had to edit some of the recordings because children playing outside were captured through the window. Throughout the entire research process, the empirical material has been treated with confidentiality and stored safely to protect the

participants' privacy, which is especially important because children are involved (NESH, 2016; Personopplysningsloven, 2018).

4.8 Validity and reliability

The study is an in-depth exploration of how two teachers involve groups of children in technology-mediated story creation processes in ECEC. It is a multiple case study with a replication design (Yin, 2014). The same research protocol was followed throughout both cases including a pilot study. This pilot study was conducted prior to the main data construction to ensure the quality of the study and strengthen the study's validity and reliability (Yin, 2014).

The pilot study consisted of one teacher and six children (age 4-5 years) and took place in a third kindergarten. The overall experience with the research design and the research protocol in the pilot study was good; however, some changes were made. 1) In the pilot study, the teacher asked many technical questions about the applications; hence, to provide the teachers in the main study with some technical help, I invited them to a workshop during the preparation stage, described in Section 4.4.1. 2) Based on experiences from the pilot study, I decided to video-record all activities during the creation process to capture the multimodal complexity and all the layers of information being generated simultaneously as well as the interactions and communication among the participants. 3) Some of the questions in the semi-structured interview-guides were changed slightly. Some questions were too specific, e.g., about technological competence, and they were grouped into broader themes, e.g., competence. Some questions were added, e.g., "What is a story?", because the teachers continued to use this concept during the process without explaining it. 4) During the pilot study, the teacher and I spent 5-10 minutes together after the activities with the children. This was a valuable time for reflection, questions and sharing information, which I included in the main study. Overall, the pilot study provided important experiences for the main study.

The participating teachers were recruited among participants in VEBB (Mangen et al., 2019) and had some prior knowledge of tablets, digital picture book apps, and shared dialogue-based reading. One of them had made a few multimodal digital stories with kindergarten children previously; however, the other was doing it for the first time. In line with the findings from a recent national survey (Fjørtoft et al., 2019) in which 60-65% of kindergarten staff had never created movies/animations, digital stories or digital books with the children (see Section 2.3), the participating teachers can be described as quite "typical" Norwegian kindergarten teachers.

To strengthen the study's validity and reliability, I have provided details of the choices I have made throughout the process. Based on experiences from the pilot study, I chose to use only one camera when video-recording (see Section 4.4.2). In the pilot study, I observed that there was a large possibility that the activities would take place in different places within the room, and it would be difficult to find a good location for a second camera. I also thought of capturing the activity on the tablet through screen recording, which would have been interesting; however, because that was not a distinct focus of this study, I chose not to pursue it. These choices of what to include and how to frame the focus of the video-recordings have influenced the analytical possibilities of this study (Heikkilä & Sahlström, 2003; Luff & Heath, 2012). However, aspects from the field observations and my reflections as a present observer have also informed the analysis.

Through a rigorous analysis of various perspectives of the two cases—the creation processes, the participants, and the products—a concrete, context-dependent body of knowledge of the rich descriptions of these two creation processes has been constructed in collaboration with the participants (Alvesson & Sköldberg, 2018; Creswell, 2013). This closeness to real-life contexts is understood as an advantage of case study research (Flyvbjerg, 2007; Morgan, 2014). To explore and understand what happens during a complex process and to be able to grasp all the

layers of information happening at the same time, it is a major advantage to be present and observe the process and pedagogical practice as they unfold (Flyvbjerg, 2007). However, the creation process would not have happened without me; hence, my presence influences the process. Thus, I have sought to provide a detailed picture of how I analysed the material including my reflections, preunderstanding, and interpretations. My interpretations are based on my preunderstanding, subjective experience and past events (Alvesson & Sköldberg, 2018). Therefore, I have reflected upon, demonstrated that I am aware of, and clarified my preunderstanding throughout the research process and the writing of this thesis (the articles and the synopsis) to make the research as transparent as possible (see Sections 4.2 and 4.6). To validate the preliminary findings, these have been discussed with the teachers who confirmed the analysis of the activities and the creation process (see Jernes & Alvestad, 2017). The participants were also given opportunity to read the articles prior submission.

This research contributes new perspectives on an aspect that is not very common in Norwegian kindergartens: the involvement of groups of young children in creation processes with digital technology (Fjørtoft et al., 2019). Thus, this research can be understood as "inspirational practice" for teachers and practitioners in ECEC and early childhood teacher education and will hopefully motivate others to include groups of children in similar technology-mediated story creation processes.

In the next chapter, a summary of the main results of the three articles is presented.

5 Results

The overall research question in this PhD study is operationalised into three sub-questions that address the overall question from three perspectives: the creation process, the participants, and the final products. These perspectives are explored in the three articles and a summary of the main results is presented here.

The three sub-questions are as follows:

> Article I: *What characterises the technology-mediated creation process when groups of young children create multimodal digital stories in collaboration with a teacher?*
>
> Article II: *What pedagogical strategies are in use by two kindergarten teachers when they create technology-mediated stories with groups of children?*
>
> Article III: *In what ways do the different modalities and literacy devices contribute to the development of an animated story created by a group of children and a teacher in collaboration?*

5.1 Article I

In the first article (Undheim, 2020), I explore the technology-mediated creation process when groups of six children and a teacher co-create a multimodal digital story. This article contributes to the current debate concerning digital technology in ECEC by focusing on children's and teachers' collaborative use of digital technology in a creation process. TPACK (Mishra & Koehler, 2006) and professional digital competence (Alvestad & Jernes, 2014) are used as theoretical frameworks. Most of the previous research on young children (age 0-8 years) creating multimodal digital stories with teachers/researchers have focused on stories made individually or in pairs, not in groups.

The video observations of the technology-mediated creation process were analysed inductively through constant comparison analysis (Glaser & Strauss, 1967; Leech & Onwuegbuzie, 2008), with a focus on the activities of the teachers and children. Two main analytical categories were identified: *non-digital activities* and *digital activities* (Appendices 3 and 4). Non-digital activities are activities where digital technology is not used (narrative, props, and planning), whereas digital activities are activities where the use of digital technology plays an important role (animation, pictures, product, editing, sound, and play).

The analysis of the total amount of time spent on the different activities shows that in both cases, approximately half of the total time was used on activities without digital technology (44% in the case of *Rapunzel*, and 58% in the case of *The Wedding*; an illustration of these activities in one of the cases is included in Appendix 9). This finding highlights the importance of seeing traditional non-digital activities and digital activities as complementary activities when creating multimodal digital stories, as emphasised by Burnett and Daniels (2016) and Kucirkova (2014). The digital technology was used as a tool to create and played an important part of the process by providing the creation process with new possibilities, e.g., photographing drawings, animating, recording sound, and editing. Recording sound and sharing were found to be the most important for the children.

The findings in this article show that the technology-mediated creation process is characterised as a complex interplay of digital and non-digital activities. The teachers' knowledge of technology, pedagogy and content and how to combine them in situ is central. Both teachers adjusted the use of technology to the children and the activities, in a critical and reflexive way. The findings highlight the importance of having enough knowledge about digital technology to be able to reflect and make critical choices not only of how to include digital technology in pedagogical practice but also of when to use technology in activities with children (e.g., Jernes et al., 2010; Stephen & Edwards, 2018). However, as also

shown in the article, creating a multimodal digital story can be achieved without much previous experience in using digital technology with children, as demonstrated by the fact that one of the participating teachers was doing so for the first time. Further, the findings indicate that teachers' professional digital competence is an important factor in the creation process, which includes teachers' knowledge of how to integrate the use of technology during the process with pedagogical and content-based judgement and experience (Alvestad & Jernes, 2014; Børhaug et al., 2018; Dardanou & Kofoed, 2019). Drawing on the results from this article, there is a need for more focus on teachers' professional digital competence in ECEC and teacher education.

5.2 Article II

In the second article (Undheim & Jernes, 2020), we explore and describe how two teachers involved groups of six kindergarten children (age 4-5 years) in collaborative, technology-mediated, story creation processes by emphasising the teachers' pedagogical strategies. This article contributes to the contemporary research on the use of digital technology with children in ECEC. The theoretical framework is set forth within social cultural perspectives using concepts such as guided interaction (Plowman & Stephen, 2007), sustained shared thinking (SST) (Siraj-Blatchford & Sylva, 2004; Sylva et al., 2004), and spacious and narrow interactional patterns (Bae, 2012). The article relates to the previous research in which teachers and young children create digital stories together; however, most of these studies emphasise the children or the activities, to a lesser extent the teachers.

Through an inductive approach to the analysis of the video observations of the creation process, several pedagogical strategies used by the teachers to involve the children in the process were identified (Appendix 5). The three most frequently used strategies were as follows: *inviting to dialogue*; *explaining the practical*; and *instructing for results.*

The analysis shows that the teachers invited the children to engage in a rich dialogue during all activities, both the non-digital and the digital activities. The teachers showed genuine interest, encouraged the children to participate actively and respected the children's ideas and opinions, in line with SST (Sylva et al., 2004) and spacious interactional patterns (Bae, 2012). The teachers explained the practical aspects by supporting and scaffolding the children during the process (Wood et al., 1976) and by observing the children and regulating when explanation was needed (Dewey, 1902). Explaining was often used along with inviting by combining spacious and narrow interactional patterns (Bae, 2012). Sometimes the teachers provided instructions for obtaining results by giving short instructions (Wood et al., 1976) that appeared necessary to finalise the products (Bae, 2012; Jernes, 2013; Klerfelt, 2007).

Moreover, an encouraging tone characterised both teachers' communication during the entire process. Both teachers mostly worked directly with the children as in proximal guided interaction (Plowman & Stephen, 2007), which can be understood in relation to the concept of children's participation (Udir, 2017; UN, 1989) and interpretation and guidance (Dewey, 1902). However, the teachers' overall knowledge of the situation is equally important (Dewey, 1902; Letnes, 2014; Plowman & Stephen, 2007). This combination—of children's participation on the one hand, and the teachers' overall knowledge on the other hand—was taken care of in both cases by how the teachers involved the children in the different activities during the process. These findings highlight the pedagogy in creation processes with digital technology, as emphasised in digital pedagogy (Fleer, 2017a).

In conclusion, the findings show that when creating technology-mediated stories with young children, teachers' various pedagogical strategies are equally important for the process and product: inviting to dialogue, explaining the practical, and instructing for results. Further, the teachers' use of instruction seems to be necessary when using digital technology, to achieve the goal of creating a digital story, as emphasised

in other studies within ECEC (Jernes, 2013; Klerfelt, 2007). The findings contribute to the knowledge of how teachers involve groups of children in technology-mediated story creation processes by highlighting the teachers' pedagogical strategies. Implications for policy and practice might be to reflect and take into account new knowledge of children's participation in a technology-mediated creation process, in which a combination of narrow and spacious interactional patterns is essential (Bae, 2012)—especially in a world where digital technology has become a central part of many young children's lives.

5.3 Article III

In the third article (Undheim & Hoel, Accepted with some revisions) we explore and describe how different modalities and literary devices contribute to the development of an animated story created by a group of children and a teacher. This article focuses on the creation process and the final product in the *Rapunzel* case. It contributes to the contemporary focus on digital stories and literacy in ECEC. The animated story is understood in light of social semiotic multimodal perspectives (Kress, 2010; Kress & Jewitt, 2003; Kress & van Leeuwen, 2001) in which communication is considered to be a combination of several modes. When a group of young children and a teacher create an animated story together, they might collaborate with each other. Nevertheless, we know little of how an animated story evolves through such a creation process and how various modalities and literary devices contribute to the story.

During the analysis, an in-depth exploration of the creation process and the final product were provided. Three analytical strands were identified: *the verbal narrative in the final product*; *the multimodal narrative in the final product*; and *the literary devices applied during the process*.

By drawing on the transcription of the verbal narrative in the final product, the verbal narrative seems fragmented (Nicolopoulou, 2011). However, the analysis of the multimodal narrative in the final product

demonstrates that the children do not verbally elaborate the narrative, they simply say what is needed to complement the moving images by drawing on each modality's affordances (Kress, 2010; Tønnessen, 2012). The analysis of the final product shows that all of the modalities play important roles and contribute to the story (Kress, 2010): verbal narrative (narrator voice), moving images, music, and written text. The combination of these modes creates the animation—the kineikonic mode—in which the interrelations among the modes are emphasised (Burn & Parker, 2003; Mills, 2011) (Appendix 6). In this article, we argue that the verbal narrative in the animated story is an important part of the whole—in which all modalities play an important part. This is understood in line with an elaborated understanding of literacy and narrative as "multiliteracy" (Barton, 2007; New London Group, 1996; Sefton-Green et al., 2016). The animated story—with all its modalities—is seen as a way to communicate.

Nevertheless, to fully understand the final product, it is important to include the process in the analysis. The analysis shows how the story evolves during the process through the participants' collaboration with each other. Further, the literary devices of humour and tension played an important role for the children. The children participated with enthusiasm in the creation of the animated story. The analysis of the process and the final product show that the final animated story is strongly influenced by the children's personal interests (Kress, 2010).

The findings in this article highlight the importance of keeping one's eyes and ears open for the magic in young children's creation processes. Further, we argue that it is important to include and consider the process, the product, the literary devices, and all of the modalities in the analysis. The findings show how various modalities contribute to the animated story and play important roles in the final product; the kineikonic mode is of particular importance in an animated story.

5.4 Summary

In each of the three articles the technology-mediated story creation process is explored from multiple perspectives to provide a nuanced and comprehensive picture of the process, the participants and the products (Table 1, Section 1.1). The overall research question driving this study is as follows: *What emerges when kindergarten teachers involve groups of children (age 4-5 years) in technology-mediated story creation processes?*

The technology-mediated story creation process is described as a complex interplay of digital and non-digital activities, in which new possibilities emerge from the children's and the teachers' collaborative use of digital technology. For the children, recording sound and sharing the final products are found to be the most important. I will suggest that the technology-mediated story creation process may be interpreted as a creative process. During the creation process, the teachers used various pedagogical strategies to involve the children; these strategies are equally important for the process and the product. In addition to the teachers' pedagogical knowledge, their professional digital competence and their knowledge of modes and multimodality are found to be important factors. One may wonder which areas of knowledge are the most important in a technology-mediated story creation process with a group of young children. Finally, the findings highlight the importance of including both the process and the products in the analysis, which raises the question of the process vs the product.

Based on the overall research question and the summary of the results from the articles, new themes have arisen that in various ways are related to the process, the participants and the products. Next, these themes will be discussed further.

6 Discussion

The aim of this study is to contribute to the knowledge of kindergarten children's and teachers' collaborative, technology-mediated story creation processes in ECEC. Drawing on a theoretical foundation based on socio-constructivism, I will explore the findings from different perspectives to provide a rich picture and new ways of understanding the creation process and the final products.

Four central themes that have emerged based on the analysis of the results from the three articles will be discussed in this chapter: *emerging possibilities due to digital technology*; *creators in a creative process*; *an interplay of multiple knowledge areas*; and *the process is not enough*.

6.1 Emerging possibilities due to digital technology

The technology-mediated story creation process in this PhD study can be described as a complex interplay of traditional and well-known activities combined with new and less common activities (Article I) (Appendices 2 and 9). All activities during the creation process are organised and facilitated by the teachers. Some of these activities are described as non-digital, i.e., activities where digital technology is not used, whereas others are described as digital, i.e., activities where the use of digital technology plays an important role (Article I). The non-digital activities can be described as common and traditional activities in Norwegian kindergartens, for example, constructing narratives, creating clay-figures, building with Duplo blocks, and drawing (Børhaug et al., 2018). In contrast, most of the digital activities that took place during the creation process, such as animating, recording sound, editing, and creating digital stories, are less common (Fjørtoft et al., 2019, p. 130). Photography is the only digital activity in my study that can be described as a common digital activity in Norwegian kindergartens (Fjørtoft et al.,

2019, p. 130). Furthermore, during the creation process, traditional activities are combined with new and less common activities, thereby creating continuity among previous and new experiences (Dewey, 1963). In my opinion, the interplay of non-digital and digital activities and artefacts is important in the technology-mediated story creation process, in contrast to the previous research on children creating digital stories, which mostly focused on digital activities (Section 2.6.2).

Through the participants' exploration of new and emerging possibilities when digital technologies are integrated as tools in the creation process, traditional activities are transformed into something new (Articles I and III). Children's drawings are used with a specific purpose in mind—as props—arising as images in the e-book illustrating the narrative in combination with a recorded narrator voice (Figure 2, Section 4.4.2). Further, a house built of Duplo blocks by one of the children during free play is used in the animated movie where it serves a new purpose as a central prop (Figure 3, Section 4.4.2). Through active participation in a creation process in which non-digital and digital artefacts and resources are understood as complementary, the children experience how various activities and artefacts can be combined and used with a new purpose. In this process, new potentials may emerge for the users (Dewey, 1916; Säljö, 2016). The boundaries between *what is* and *what might be* are pushed (Craft, 2011), making room for creative exploration and inventive activities with digital technology (Kalas, 2010; OECD, 2017; Selwyn, 2011; Udir, 2017). In my research, the technology, such as the tablet, is used as a creative tool and important artefact in the technology-mediated story creation process. The digital technology provides a new layer to the process, and the possibilities of combining various activities and artefacts are expanded (Säljö, 2017, 2019), for example, in modifying a project, recording or adding sound, or watching and re-watching the final products (Article I), as has been demonstrated by several researchers (e.g., Fleer, 2018; Hesterman, 2011b; Letnes, 2014).

In both cases, various modes of sound are added to the final products, strongly influenced by the children (Articles I and III). When watching a scene from the animated movie, one of the children expresses, "They don't talk! We need sound too!" This utterance may, on the one hand, be understood as a wish to record dialogues; on the other hand, the utterance may indicate a wish to add a narrator voice. Dialogues and narrator voices are commonly used modes of sound in children's movies, while narrator voices are mostly used in picture book apps. According to two national surveys (Fjørtoft et al., 2019, p. 130; Medietilsynet, 2018, pp. 34-39), watching videos/movies is a common activity for young children in Norway; I assume this to also be the case for the children in my study. Furthermore, in both kindergartens, the children had multiple experiences with various picture book apps prior to this research, through their participation in VEBB (Mangen et al., 2019). Consequently, the children had multiple experiences with sound created by others prior to participating in this study, but none of them had recorded sound to use in a multimodal digital story before. The video observations show that the children participated with joy and excitement when they recorded the sound.

There are many choices to make for the creators in a creation process, which will influence the final product and the communicated message, for example, which artefacts and modalities to use (Kress, 2010; Kress & Jewitt, 2003; Kress & van Leeuwen, 2001). Various modes of sound and artefacts all have specific affordances that may provide possibilities or limitations to the creation process and the final products (Gibson, 2015; Kress, 2010). In an e-book, a sound-recording can last as long as the creators want, with no limitations in terms of duration. In an animated movie, however, the duration of the animated scenes might place a time limitation on the recordings (Article III). In some apps, the creators can choose among available ready-to-use soundtracks, e.g., the iMovie app (Apple, 2018); whereas other apps offer creators various beats to choose that they can use as a basis for their own songs, e.g., the Auto Rap app

(Smule, 2017). These various possibilities may make the creation process easier for the creators; however, they can also be perceived as a limitation to creativity and as leading the work along a specific path. Thus, in a complex creation process such as creating a multimodal digital story with kindergarten children, I consider the app's suitability—how easy the app is to use—to be the most important feature, though this may limit creativity to some degree.

The analysis of the creation process and the final products show that the children are inspired by multiple modes and cultural resources (Articles I and III). In the *Rapunzel* case, for example, the final animated story has clear references to the narrative of Rapunzel. Early in the process, when constructing the narrative, the children expressed that they wanted to create a scary movie (Article III). On the one hand, the term "scary" might be inspired by a picture book app that they had just read, which was described as "scary" by some of the children. On the other hand, the analysis of the animated movie indicates that the children were inspired by the Rapunzel movie called *To på rømmen* [Tangled] (Walt Disney Animation Studios, 2011), in which some of the scenes can be described as scary. Drawing on the analysis of the animated movie in Article III, the final stories can be understood as a remix of several cultural resources (Hoel, 2013, 2016; Rowsell & Harwood, 2015; Sakr et al., 2018). During the creation process, the participants combined multiple ideas and created something that was new and meaningful to them (Kress, 2010; Rowsell & Harwood, 2015; Sakr et al., 2018). By drawing on inspiration from several sources and the emerging possibilities due to digital technology, the participants remixed and created a new cultural resource (Säljö, 2017, 2019): *The Wedding* in case 1 and *Rapunzel* in case 2.

Prior to conducting this research project, I thought there would be a greater similarity and resemblance between the picture book app used as inspiration and the final products created by the participants. That assumption was based on an understanding that children's creative processes are inspired by art and cultural experiences (Letnes, 2014, p.

154; Udir, 2017, p. 50). In several of the included previous studies of multimodal digital stories created in ECEC, fairy tales, visual art, music, or media are used to inspire children in their creation process (Bratitsis et al., 2012; Fleer, 2014, 2017b, 2018; Hesterman, 2011a, 2011b; Leinonen & Sintonen, 2014; Letnes, 2014). However, these previous studies merely focus on the process and not the final product. It is therefore unknown how the final products will be influenced by, for example, the fairy tales or media in these studies. To my knowledge, no previous study has used picture book apps and shared dialogue-based reading activities as inspiration for a technology-mediated story creation process. A fairy tale presented orally or from a picture book may be a better source of inspiration in a story creation process if the aim is to create a multimodal digital story with a narrative similar to the inspirational source. However, based on my analysis, a picture book app may inspire the children in other ways, such as the "sound" mode, which was very important for the children in my study. However, other factors may also play an important part here, such as, for example, the teacher's focus during the process (Skantz Åberg et al., 2015).

6.2 Creators in a creative process

From my perspective, the collaborative technology-mediated story creation process can be understood as a social and active meaning-making process, in which the interactions among the participants are central (Articles II and III). A meaning-making process such as this, might provide the children with good opportunities for active participation, and they might experience that their initiatives, thoughts and ideas are important and influence the final products (Garvis, 2016, 2018; Udir, 2017). Both teachers in this study emphasise children's active participation and the process as the most important, focusing on the quality of the "here and now" experience and the specific context (e.g., Dewey, 1916; Kress, 2010). However, as demonstrated in Articles II and III, the quality in situ depends on the teachers, specifically, how

they facilitate the children's active meaning-making and provide time and space for the children to contribute in this co-construction process. The quality of the transactions between the participants and the artefacts during the process are vital (Vaage, 2001).

By involving the children in a creation process with digital technology, such as creating a multimodal digital story, the children are provided new experiences with digital technology—as creators and producers of their own entertainment (Rowsell & Harwood, 2015). Opportunities for children to become creators and producers of products that they can share with an audience have increased due to digital technology (Kucirkova, 2017b; Sefton-Green & Reiss, 1999). From my perspective, it is equally important for children to create their own stories, including digitally, as it is for them to be presented stories created by others. As active participants in a creation process, the children and teachers construct and develop their own knowledge and understanding of the process (Selwyn, 2011; Säljö, 2016). Viewing children as creators and producers is in contrast to the dominating view of young children as consumers and users of digital technology (Dahle et al., 2020; Fjørtoft et al., 2019; Letnes et al., 2016; Medietilsynet, 2018), as also noted by several Norwegian ECEC teachers and researchers (e.g., Bølgan, 2018; Letnes & Jæger, 2008; Undheim, 2015a; Waterhouse, 2019). From my perspective, both of these contrasting views are represented in the Norwegian framework plan. On the one hand, the children are positioned as creators and producers through the focus on exploring and creating (Udir, 2017, p. 45). On the other hand, they are positioned as vulnerable users and consumers through the focus on using digital technology with care, together with the teachers, and not letting the use "become a dominant practice" (p. 44). Thus, I argue for a stronger focus on technology-mediated story creation processes with children in ECEC—creation processes in which multiple activities and artefacts are involved, both non-digital and digital. I consider non-digital and digital resources as complementary resources and meaning-making as an entwined

activity that includes both on-screen and off-screen activities, as emphasised by Burnett and Daniels (2016) and Kucirkova (2014).

For most young children at the beginning of the 21st century, technology is not something special; as far as they know, it has always been there (Gilutz, 2020; Kleeman, 2020; Plowman et al., 2010; Robinson, 2011; Stephen & Edwards, 2018). However, to create multimodal digital stories is an uncommon activity in Norwegian kindergartens (Fjørtoft et al., 2019, p. 130). Digital technology is "now so much a feature of everyday life that education—willingly or unwillingly—has to consider how to adapt" (Säljö, 2017, p. 9). During the group interviews, when I asked the children how the various elements were integrated and added to the multimodal digital stories, they answered, "We just did it!" and "We photographed them [the drawings]. Just as we normally do". Even though the children participated in a technology-mediated story creation process for the first time, the analysis suggests that the children do not view the technology as something special. Nevertheless, in the contemporary public debate about digital technology and young children, digital technology is often perceived as equivalent to screens and entertainment, and the children are viewed as consumers and users, for example, in relation to "screen time" (Dahle et al., 2020; Kleeman, 2020). When a tablet is used in the current study, it is used with a group of several children and a teacher. It is therefore neither possible—nor relevant—to consider such activities in terms of "screen time". The tablet is used as a tool to create.

During the creation process, creativity is distributed among the participants, the activities and the artefacts through collaboration and communication (Articles I and III). In one of the dialogues, one of the children expresses an idea, "a scary story", which is followed by another child adding something new, "I want to make a funny story". Then, a third child continues by introducing a character, which is also connected to the first child's utterance: "I will make a monster, a scary". This example demonstrates how the narrative develops and something new

emerges by building on the previous comments and by adding new elements. Each individual's contribution is recognised as important, not in and of itself as a single contribution but in combination with everyone's contribution—as a whole. This is explained as collaborative distributed creativity (Sawyer, 2010; Sawyer & DeZutter, 2009). Drawing on Resnick (2006), I understand collaborative distributed creativity to be an iterative cycle, in which the participants, the activities and the artefacts are considered important. This is observed when the participants are discussing the narratives while drawing props, where the children's drawings inspire and generate new ideas to be discussed, which again generate and inspire new ideas regarding what to draw. Similarly, when the children are creating the clay figures and constructing the scenery for the animated movie, the children start to play with the Duplo and clay figures, generating new ideas to be included in the narrative (Article III).

With a distributed perspective on creativity based on socio-constructivism (Selwyn, 2011; Säljö, 2016), I argue that the technology-mediated story creation process in this study is an example of a collaborative creative process. A synergy of ideas arises from the participants' dialogue, the artefacts and the various activities during the process (Sawyer, 2010; Sawyer & DeZutter, 2009). Each single part of this creation process may not be viewed as inherently creative; however, the interplay among the individual participants' contributions, the activities, and the artefacts can, from my perspective, be interpreted as creative. I consider, the fusion of these multiple parts into a final multimodal digital story as an example of creative use of digital technology.

During the creative process, the participants are the creators and producers of an original and meaningful product that can be shared with others. By drawing on a common definition of creativity, in which originality and usefulness are two central criteria when valuing creativity (Robinson, 2011; Sternberg & Lubart, 1999), I acknowledge that other

people may not value the final products in this study as original or useful. However, for the creators—the children and the teachers—the multimodal digital stories are new and meaningful. Consequently, it is important to take the creators' perspectives into account when valuing the originality and meaningfulness of a creative process and the created products.

6.3 An interplay of multiple knowledge areas

When teachers involve children in a creative process in which the children's participation is foregrounded, their ability to "plan for the unknown" is an important part of teachers' knowledge. Drawing on the analysis of this study, I interpret the teachers' role during the process as improvisational (Sawyer, 2010; Sawyer & DeZutter, 2009); nobody knows in which direction they will move or how the process will end. During interactions with the children, the teachers leave the definite reality surrounding them, the known and familiar, "in favour of a state of wondering about how things could be" (Sakr et al., 2018, p. 26). Imagination, wonder and magic are central aspects of the creation process (Articles II and III), in line with the framework plan (Udir, 2017), in which concepts such as wonder, imagination, creativity, curiosity, and exploration are recognised as important. Through dialogues and activities, the participants engage in possibility thinking and explore new possibilities together (Craft, 2011). Further, by having an open, wondering approach, giving the children time and space to contribute, the teachers can provide time for creativity to emerge (Sakr et al., 2018). Prior to the creation process, the teachers made preliminary plans for how they wanted to facilitate and organise the process. During the process, changes were made to the plans based on the teachers' interactions and collaboration with the children (Article II). Children's participation and agency is highlighted by several researchers as a premise for motivating and involving children in creation processes with digital technology (e.g., Leinonen & Sintonen, 2014; Letnes, 2014;

Merjovaaraa et al., 2020), as emphasised by Dewey (1902, 1916) and UNCRC (1989). Children's participation is important; however, I also consider it important that teachers keep an overview of the entire process to be able to reach the goal of making and finalising a multimodal digital story together (Dewey, 1902; Vygotsky, 1986; Wood et al., 1976).

I consider teachers' pedagogical knowledge to be vital when involving young children in a creation process—with or without digital technology; this is, for example, related to their pedagogical strategies in situ with the children. During the creation process, both teachers are attentive to the present "here and now" with the children, which can be understood in line with SST (Siraj-Blatchford & Sylva, 2004; Sylva et al., 2004), spacious interactional pattern (Bae, 2012) and proximal guided interaction (Plowman & Stephen, 2007). The teachers' interactions with the children in this study can be described as proximal; they used several pedagogical strategies to involve the children, such as inviting to dialogue, explaining the practical, and instructing for results (Article II). Moreover, their communication with the children during the process is characterised by an encouraging tone. The teachers participated with the children in the activities by inspiring, motivating and providing help and support when needed, which can be described in terms of the more competent other (Vygotsky, 1986) and scaffolding (Wood et al., 1976). The communication and interactions among the participants during the creation process are central, as also noted by other researchers (e.g., Fleer, 2017b, 2018; Klerfelt, 2007; Letnes, 2014, 2019; Skantz Åberg, 2018). Consequently, pedagogy is essential when involving children in a technology-mediated creation process. From my perspective, teachers' knowledge of how to combine technology and pedagogy in situ is a prerequisite to be able to make critical judgements and reflections regarding the use of digital technology in ECEC (Gibbons, 2010; Plowman et al., 2010; Selwyn, 2010; Stephen & Edwards, 2018).

However, teachers' technological or digital competence is often highlighted in research and textbooks that focus on the use of digital technology in ECEC (e.g., Bølgan, 2018; Jernes et al., 2010; Undheim, 2015a; Undheim & Vangsnes, 2017). In TPACK, for example, the integration of technology, pedagogy and content during interactions with children in digital activities is emphasised (Dardanou & Kofoed, 2019; Mishra & Koehler, 2006) (Article I). Further, embedding technology and pedagogy with content, methods and modern society are considered to be central aspects of professional digital competence (Alvestad & Jernes, 2014; Børhaug et al., 2018). However, from my perspective, by drawing on the analysis of the technology-mediated story creation process, the term "content" exists on another level than "technology" and "pedagogy". Teachers' knowledge of digital stories (Leinonen & Sintonen, 2014; Marsh, 2006; Undheim & Vangsnes, 2017) and digital creation processes (Letnes, 2014) are important aspects of technology-mediated story creation processes; but in my opinion, the term "content" does not fully capture these aspects.

Drawing on the findings in this study, teachers' capacity and knowledge of how to integrate technology and pedagogy with other relevant knowledge areas are crucial. When involving groups of children in a technology-mediated story creation process, a complex focus on multiple knowledge areas is essential, which includes, for example, professional digital competence (Article I), pedagogical strategies (Article II), and the knowledge of modes and multimodality (Article III). In contrast to this complex focus on multiple knowledge areas, there seems to be a one-sided focus on teachers' lack of digital competence in Norwegian kindergartens (Fagerholt et al., 2019, p. 25; Fjørtoft et al., 2019, p. 129). Consequently, many kindergarten teachers consider themselves as not digitally competent, including the teachers participating in my study who expressed an uncertainty and lack of confidence in using digital technology with the children prior to this research project. When I asked them how they assessed their competence after they had created the

multimodal digital stories with the children, they both said, "Now I know how to do it!" Their knowledge and competence appear to develop during the process, including how they assess themselves. By drawing on their pedagogical experience as kindergarten teachers and being active and exploring various possibilities with the children, they became more confident.

Considering this, I argue for a focus on the interplay of multiple aspects concerning teachers' competence and knowledge when using digital technology with children in ECEC, depending on the specific context. Teachers' knowledge of how to appropriately embed and integrate technology and other relevant knowledge areas into pedagogical practice is crucial (e.g., Fleer, 2017a; Jernes, 2013; Jernes et al., 2010; Letnes, 2014; Plowman & Stephen, 2007; Stephen & Edwards, 2018; Undheim & Vangsnes, 2017). With the increasing use of digital technology in society, it is important to critically examine and reconsider the ways in which we use and engage with technology (Yelland, 2017, p. 57). Digital competence is defined as a core 21st century competence. On the one hand, it is considered an important competence in itself; on the other hand, it is understood as a broader competence to be embedded within the other 21st century competences, such as, for example, creativity and/or literacy (Erstad & Voogt, 2018; Voogt & Roblin, 2012). In a creative process, such as in this study, I emphasise teachers' knowledge of creativity and creative processes, as well as their knowledge of technology and pedagogy. This includes teachers' ability to make professional judgements and critical reflections in situ (Gibbons, 2010; Jernes, 2013; Jernes et al., 2010; Selwyn, 2010; Stephen & Edwards, 2018), as well as teachers' ability to develop their knowledge when needed, depending on the context (Undheim & Vangsnes, 2017). Furthermore, I consider interpretation and guidance (Dewey, 1902) and improvisation (e.g., Sawyer & DeZutter, 2009) to be important aspects of teachers' knowledge when involving young children in a creative process with digital technology.

6.4 The process is not enough

Prior to the creation process, both teachers expressed that they considered the process to be most important. They said that they wanted the activities to be joyful and good experiences for the children (Article II). This is in line with the Norwegian framework plan, in which processes, experiences and children's active participation "here and now" are highly valued (Børhaug et al., 2018; Udir, 2017). Creativity and creative processes in ECEC are commonly understood in terms of playfulness, in which "an attitude of uncertainty" is highlighted as a strategy for teachers to support children's creative experiences by "bringing themselves into the present moment and staying there" (Sakr et al., 2018, pp. 156-157). However, the importance of displaying children's artwork is also emphasised by Sakr et al., who claim that "the tendency to prioritize process over product in young children's creativity means that display is often overlooked as an important part of the creative process" (Sakr et al., 2018, p. 91). On the one hand, I consider the process—the "here and now" experience—as central to creative activities with children in ECEC; on the other hand, I consider the product—the result or outcome of the creative process—as equally important. In my opinion, the product can be seen as a fulfilment of the creative process, which I consider to be especially important when groups of children create something together.

During this research project, there is a shift in how the teachers emphasise the process and the product, from a clear focus on the process in the beginning to a more mixed focus on the process and the product towards the end. The creation process had a clearly defined goal—to create a technology-mediated story (Article II), which may have contributed to a greater focus on the products than usually occurs in kindergartens. In the post-interviews, both teachers highlighted the importance of the final products—especially for the children. Throughout the process the children express, verbally and bodily, a clear ownership and agency of the products—it is "their" story. Drawing on

the analysis, I interpret the experience of creating their own story, which they can then share with their peers afterwards, to be a valuable experience for the children.

On the one hand, digital products are easy to share with others, both online and in situ (e.g., Kucirkova, 2017b; Letnes, 2014; Sakr et al., 2018). On the other hand, digital products may also be perceived as less accessible. In some ECEC settings, the children have easy access to tablets and are able to share their products themselves whenever they want to (Garvis, 2018); whereas in other settings, the children's access to tablets is more limited. In contrast, traditional art and craft products created in Norwegian kindergartens are usually shared by being displayed on shelves or the wall for anyone to see whenever they want to (Undheim, 2015b). According to a national survey, it is quite common for children to use digital cameras and take photos in Norwegian kindergartens; however, the decision regarding whether to use and display the photographs afterwards—and how to do this—is mostly made by the teachers without involvement of the children (Jacobsen et al., 2013, pp. 56-57). When provided with an opportunity to display the product that they have created, the children "engage in meaningful dialogues about the creative process" with their peers and parents (Sakr et al., 2018)—and they do so with excitement in their voices (Articles I, II, and III). However, as shown in Article I, the findings in this study suggest that it is also important for the children to share their perspectives of the products with each other during the process. Displaying their products adds an important new layer to the creation process (Letnes, 2014; Sakr et al., 2018).

The analysis in Article III demonstrates how the story evolves during the process and emphasises the importance of including both the process and the final product in the analysis. The final product can be understood as an extract or a snapshot of the children's concerns at the end of the creation process. By analysing only one part—either the process or the product—only a fragment of the communicated message is analysed

(Article III). Thus, both the process and the product need to be included in the analysis to provide a full picture of the technology-mediated story creation process.

By drawing on the findings in this study, I argue that neither the process nor the product is sufficient—the process is important, but so is the product. Hence, I suggest a broader focus in research focusing on the creative use of digital technology in ECEC by emphasising the importance of including both the process and the product.

6.5 Conclusions

In this chapter, I have discussed the issue of *what emerges when kindergarten teachers involve groups of children (age 4-5 years) in technology-mediated story creation processes.* Three consistent perspectives—process, participants, and products—are explored and discussed in relation to the four central themes that emerged from the analysis.

Drawing on the discussion in this chapter, a technology-mediated story creation process with groups of kindergarten children can be interpreted as a *collaborative creative process*. The children and teachers collaborate and create a product that is new, original and meaningful for them, which they share with others. During the creative process, creativity is distributed among the participants, the activities, and the artefacts; new experiences emerge through the collaborative co-construction process, and a synergy of ideas arises. In this process, there is an interplay of traditional non-digital activities and new digital activities, creating a continuity among previous and new experiences. Digital technology adds a new layer to the creative process in which sound and sharing are the most important aspects. Each single part of the creative process may not be viewed as being inherently creative; however, from my perspective, the fusion of these parts into a final multimodal digital story is an example of the creative use of digital technology.

In this creative process, teachers' professional judgements and critical reflections are essential, as well as their ability to "plan for the unknown". When involving young children in creation processes—with or without digital technology—teachers' pedagogical knowledge is vital. However, I argue for a focus on the interplay of multiple aspects concerning teachers' competence and knowledge. I consider teachers' capacity and knowledge of how to integrate technology and pedagogy with other relevant knowledge areas to be crucial when using digital technology with children in ECEC, depending on the specific context. In a technology-mediated story creation process, this includes teachers' knowledge of creativity and creative processes.

In my opinion, the final product can be understood as an extract or a snapshot of the children's concerns at the end of the creation process. By analysing only one part—either the process or the product—only a fragment of the communicated message is analysed. Thus, I suggest that both the process and the product need to be included in the analysis to provide a full picture of the technology-mediated story creation process.

7 Reflections and implications

At the end of a long and interesting research project, it is time to reflect on my process and share some final thoughts about how my research can contribute to further studies related to digital technology and ECEC by providing some suggestions for further research and implications for practice and policy.

7.1 Positive surprises

I am truly touched by the children's and teachers' engagement and commitment to this research project. Each day that I arrived in the kindergartens, I was meet by a group of enthusiastic children. The teachers told me that several times during the process, the children asked, "When is Marianne coming back? When will we continue with the research project?" The research project lasted for nine days in both cases with the same group who were able to immerse themselves in the various activities during the course of the project. It was interesting to observe how the children included elements of importance to them in the multimodal digital stories.

In the group interviews, when I asked the children how they made the products, their answers indicated that they do not consider digital technology to be something special, even though the whole process was a new activity for them. I did anticipate, prior to the research, that recording sound and sharing with peers and parents would be important factors for the children; however, I did not anticipate **how** important they would be. The children spoke about sound and sharing throughout the whole process. It was impressive to observe how concentrated—and joyful—the children were when they recorded sound.

7.2 Reflections and limitations

This study is a small qualitative example of how two teachers used digital technology creatively. It adopts a multiple-case study approach. The findings draw on observable data analysed and explored in depth, supported by interview data. The teachers volunteered to participate in this research project, which was initiated by me and in which I asked the teachers to involve a group of six children in a technology-mediated story creation process and to create a multimodal digital story of their choice. The empirical knowledge constructed through the research is closely connected to the context and the specific group where I as a researcher also influence the situation, which is in line with Alvesson and Sköldberg (2018).

If I were to conduct the same research over again, I would have asked both cases to create the same type of multimodal digital story, instead of one e-book and one animated movie. This would have made it easier to compare and discuss them, for example, by creating a cross-case synthesis among the two cases, and it would have increased the validity of the study. I have focused on three consistent perspectives in this study, namely, the process, the products, and the participants—with an emphasis on the teachers. Another interesting research approach would have been to conduct an action-based research study in which I could have discussed the findings more thoroughly with the teachers, for example, in terms of how they describe or interpret their pedagogical strategies. It would also be interesting to more deeply consider the interactions among the teachers and the children during the process. Another approach that would be interesting would be to analyse the empirical material from the children's perspectives, for example, peer-interactions. The children participated in the process with joy and humour; hence, it would be interesting to go deeper into the humour and the playfulness. Another interesting focus would be to analyse the empirical material in light of Craft's "four Ps" of changing childhood and youth (Craft, 2011, p. 33): *plurality of identities, possibility-*

awareness, playfulness of engagement, and *participation.* Some of the empirical material could, for example, be analysed based on the concept of possibility-thinking, as suggested by Sakr et al. (2018, p. 26).

Prior to the research project, I thought there would be a greater similarity and resemblance between the picture book app used as inspiration and the final multimodal digital stories created by the children and teachers; however, this preconceived notion proved to be wrong. Some researchers question the researcher's bias in conducting a qualitative case study by indicating a tendency to confirm the researcher's preconceived notions, as noted by Flyvbjerg (2007). He emphasises the possibilities for deep exploration of situations and phenomena in situ as they unfold in practice as an advantage of a case study (Flyvbjerg, 2007, p. 398). If, however, my preconceived notions had not been proved wrong during the research, this could have been understood as a bias towards verification of the results.

Drawing on the analysis, one could say that a fairy tale presented orally or from a picture book may be a better source of inspiration in a story creation process if the aim is to create a multimodal digital story with a narrative similar to the inspirational source. However, based on my analysis, a picture book app may inspire the children in other ways, such as the "sound" mode, which was very important for the children in my study. No previous study, to my knowledge, has used picture book apps and shared dialogue-based reading activities as inspiration for a technology-mediated story creation process. Thus, more research is needed, perhaps in comparison with paper books.

Both teachers described themselves as unexperienced users of digital technology with the children in kindergarten. They both had limited experience and knowledge of multimodal digital stories prior to this research project. This can be perceived as a limitation of this study. However, they were both experienced kindergarten teachers, which, from my perspective, is an advantage and an important factor in this

study. Despite their limited previous experience with technology-mediated story creation processes, they both involved a group of six children and created a multimodal digital story with the children. In light of the recent national survey (Fjørtoft et al., 2019), in which 60-65% of kindergarten staff have never created movies/animations, digital stories or digital books with the children (see Section 2.3), the participating teachers in my study can be described as quite "typical" Norwegian kindergarten teachers. This may be taken as an inspiration for other teachers.

7.3 Implications for practice and further research

Most young children at the beginning of the 21st century grow up in a society with broad access to digital technology (Chaudron et al., 2018; Medietilsynet, 2018; Yelland, 2017). "Our children don't even consider these devices as technology. They are as natural to them as the air they breathe. Technology, as was once said, is not technology if it happened before you were born" (Robinson, 2011, p. 76). Young children do not view digital technology as something special because it is intertwined in their everyday lives. In contrast, many practitioners and researchers within ECEC consider digital and non-digital artefacts and resources as contrasting resources and not as complementary resources (Kucirkova, 2014). Instead of focusing on "screen time" and entertainment—in which children are viewed as consumers and users—I want to emphasise the importance of focusing on children's creative use of digital technology in collaboration with peers and practitioners in ECEC. Through the creative use of digital technology, such as a collaborative, technology-mediated story creation process, children can be engaged as creators and producers of their own entertainment (Rowsell & Harwood, 2015). Further, to provide a full picture of the technology-mediated story creation process, both the process and the product need to be included. The process is not enough—the product matters—especially for the children.

Both teachers in my study expressed that it was unusual to work on a project with a small group of children for several days. Unfortunately, this observation is supported by Børhaug et al. (2018, pp. 132-133) who found a lack of research-based knowledge of how practitioners and children in Norwegian kindergartens immerse themselves in themes based on children's interests where several learning areas are combined. From my perspective, project-based theme periods inspired by Dewey's (1902, 1963) inquiry-based learning, would be one way to meet this research gap. From my own experience as a kindergarten teacher, I am used to focusing on a few large projects each year, which gives us time to become immersed deeply in themes, in which creative processes could develop over time (Undheim, 2015b). Drawing on Børhaug et al. (2018), there is a need for more research on collaborative creation projects in general in Norwegian kindergartens, with and without digital technology.

My research contributes to the new perspectives on creativity and creative processes with young children in ECEC. During the creative process, creativity is distributed among the participants, the activities, and the artefacts; new experiences emerge through the collaborative co-construction process, in which digital technology adds a new layer to the creative process. The children and teachers collaborate and create a product that is new, original and meaningful for them, which they share with others.

Drawing on my findings, I argue for a focus on the interplay of multiple aspects concerning teachers' competence and knowledge when using digital technology with children in ECEC, depending on the specific context. In a collaborative, technology-mediated story creation process with children, I consider teachers' capacity and knowledge of how to integrate technology and pedagogy with knowledge of creativity and creative processes to be crucial. This includes critical reflections (Alvestad & Jernes, 2014; Jernes et al., 2010; Stephen & Edwards, 2018), interpretation and guidance (Dewey, 1902), and improvisation (e.g.,

Sawyer & DeZutter, 2009). However, there is a need for more research on the creative use of digital technology in ECEC to be able to understand all aspects of this complex interplay.

Further, I suggest a more explicit focus on digital technology embedded into the pedagogical practice in the Norwegian framework plan for kindergartens (Udir, 2017) as well as in the *National guidelines for kindergarten teacher education* (UHR-Lærerutdanning, 2018), in which digital and non-digital artefacts and resources should be considered as complementary resources. On the one hand, digital technologies are tools, artefacts, resources and methods; on the other hand, digital technology is a way of thinking. For young children today, digital technology is not considered something special, but intertwined in their everyday lives.

This study aims to contribute with research-based knowledge of digital technology used in a creation process with young children, an aspect that is not very common in Norwegian kindergartens (Fjørtoft et al., 2019). Both teachers had minor prior experience of creating multimodal digital stories with groups of children; however, they nevertheless created the stories. Thus, this research can be understood as "inspirational practice" for teachers and practitioners in ECEC and early childhood teacher education and will hopefully motivate others to include groups of children in similar technology-mediated story creation processes. Teachers' technological knowledge and experience is only one factor of the process.

The final products may seem complicated to create. However, it is easier than it seems. As one of the teachers said: "If I can do it, then everyone can do it!"

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Appendices

Appendix 1 – Interview guides

Appendix 1.1 – Interview guide teachers (pre-interview)

Intervjuguide – barnehagelærerne før prosessen

Kort innledning om formålet med studien og intervjuet.

Formålet med studien er å få mer kunnskap om: 1) Deres kompetanse når dere involverer barna i digitale produksjonsaktiviteter og 2) Barnehagebarns multimodale fortellinger.

Jeg er interessert i hvordan dere, sammen med seks barn, lager en multimodal fortelling. Hele prosessen fra start til ferdig produkt er relevant.

Fokus i dette intervjuet er deres tanker rundt aktivitetene dere skal gjennomføre – med utgangspunkt i din didaktiske refleksjon for hele prosessen, som en forberedelse.

Da starter jeg filmopptaket.

Innledende spørsmål (maks 10 min)

1. ***Er dere kjent med begrepet multimodale fortellinger? Hva legger dere i det?***
   - Hvis behov: Multimodale fortellinger er fortellinger som formidles gjennom f.eks. bilder, lyd og/eller ord, som bildebøker, bildefortellinger (f.eks. som dokumentasjon fra en tur), digitale fortellinger (basert på f.eks. ei bok) og animasjonsfilmer.

Spørsmål knyttet til den multimodale fortellingen som skal lages

2. ***Didaktisk refleksjon for hele prosessen***
   - Hvilken type multimodal fortelling tenker du/dere å legge til rette for?
   - Hva vil du/dere legge vekt på i prosessen fra start til slutt?
   - Hvordan vil du/dere organisere dette?
   - Hvorfor?

3. ***Barnas involvering***
   - Hvordan vil du/dere involvere barna i de ulike delene av prosessen?
     - Hva vil du/dere legge vekt på? Har du snakket med barna om dette allerede?
     - Hvordan vil du/dere organisere dette?
     - Hvorfor?
   - Hvordan vil du/dere åpne opp for barnas ideer om det ferdige produktet?

4. ***Bokas tema***

- Hvordan tenker du/dere å løfte fram bokas tema?
- Hvordan vil du/dere åpne opp for at din lesing av boka kan være annerledes enn barnas?

5. ***Din kompetanse og rolle***

- Hvilken kompetanse (kunnskap og ferdigheter) regner du/dere med å ta i bruk i prosessen?
- Hvordan ser du/dere for deg din egen rolle i prosessen (innenfor de ulike delaktivitetene)?
- Tror du at du/dere vil møte på noen utfordringer underveis? Hvis ja, hvilke og hvordan tenker du å løse disse?
- Annet?
    - Evt: Hvilket utstyr/verktøy (digitalt/ikke-digitalt tenker du/dere å bruke?

Avslutning

6. ***Hva motiverte dere til å bli med i dette forskningsprosjektet?***

7. ***Har dere noe annet dere vil tilføre?***

Debrifing og avrunding av intervjuet.

Be om å få en kopi av den didaktiske refleksjonen.

Tusen takk for at dere stilte opp på dette intervjuet.

Appendix 1.2 – Daily reflections with the teachers

Refleksjonsguide

Dato: _____

1. ***Hvordan synes du det gikk i dag?***

2. ***Hva gikk bra? Hvorfor?***

3. ***Er det noe du kunne tenkt deg og gjort annerledes? Hvordan ville du gjort det?***

4. ***Hva vil du legge vekt på mht gjennomføringen i morgen?***

Appendix 1.3 – Interview guide children

Intervjuguide – Gruppeintervju med barna

Hei. I dag skal vi gjøre noe helt annet. Dette er også forskning, så derfor har jeg tatt med videoopptakeren, og den starter jeg nå. Ok?[1]

Dere har nettopp laget boka/filmen. Denne samtalen, som vi også kan kalle et intervju, er om denne boka/filmen.

1. ***Vet dere hva et intervju er?***
   - Samtale om et tema, der jeg har forberedt noen spørsmål.
   - Det finnes ingen rette svar, jeg ønsker å få vite hva dere tenker og mener om det jeg spør om. Dersom dere synes at noe er vanskelig å svare på, trenger dere ikke å si svare.

Om boka/filmen

2. ***Hvem er med i boka/filmen?***
   - Hjelpespørsmål knyttet til figurene i boka/filmen
3. ***Hva skjer i boka/filmen?***
   - Hjelpespørsmål knyttet til handlingen i boka/filmen
4. ***Hvor foregår handlingen?***
   - Hjelpespørsmål knyttet til handlingen i boka/filmen

Filmtricks og ulike effekter

5. ***Hvordan har dere fått disse figurene inn i boka/filmen?***
   - Hvordan gjorde dere dette?
   - Hvordan fikk dere de til å bevege seg?
6. ***Jeg kan høre stemmer/musikk i boka/filmen.***
   - Hvordan har dere laget dette?
   - Hjelpespørsmål knyttet til lyden i boka/filmen

[1] Dette er den siste aktiviteten sammen med barna, så samtykke og nærmere informasjon om opptakene er allerede gitt og snakket med barna om.

7. ***Dere har også skrevet bokstaver noen steder i boka/filmen.***
   - Hvem bestemte hva dere skulle skrive?
   - Hvordan fikk dere bokstavene inn i boka/filmen?

Produktet

8. ***Er dere fornøyde med boka/filmen?***

9. ***Hva liker dere ekstra godt med boka/filmen?***

10. ***Er det noe dere ikke er fornøyde? Noe dere ville gjort annerledes?***

Relatert til e-boka om Luna

11. ***Minner boka/filmen dere har laget om noe dere har lest eller sett før?***

12. ***I e-boka skjer... jeg ser at noe lignende skjer i boka/filmen.***
    - Hvorfor har dere valgt å ha med dette?
    - Hvis aktuelt: spørsmål knyttet til likheter og ulikheter med e-boka.
    - Noen hvorfor-spørsmål, basert på det barna har fortalt tidligere.

Avslutning

13. ***Likte dere å lese e-boka «En fisk til Luna»?***

14. ***Likte dere å lage boka/filmen ... «tittel»?***

15. ***Har dere lyst til å lage en annen bok/film en annen gang?***

16. ***Har dere noe mer dere vil fortelle?***

Debrifing og avrunding av intervjuet.

Tusen takk for at dere var med på dette intervjuet.

Appendix 1.4 – Interview guide teachers (post-interview)

Intervjuguide – barnehagelærerne etter prosessen

I dette intervjuet er jeg interessert i dine tanker om hele prosessen og produktet, knyttet til den multimodale fortellingen du har laget sammen med barna.

Prosessen

1. ***Kan du beskrive prosessen fra start til slutt?***

2. ***Hva gikk bra?***
   - Hvorfor?

3. ***Var det noe som gikk mindre bra?***
   - Hvordan kunne du gjort dette annerledes?

4. ***Hva var viktigst for deg i prosessen, fra e-boka til en ny multimodal fortelling?***
   - Hva legger du i begrepet historie/fortelling? Hva er en historie/fortelling for deg?
   - Pleier dere å lage andre typer historier i barnehagen? På hvilken måte er prosessen knyttet til disse lik/ulik det du har gjort nå?
   - Trekk fram element fra intervjuet og refleksjonene.

5. ***Hvordan vil du beskrive din rolle i prosessen?***
   - Relater til det hun allerede har sagt i sp 1 og 4
   - I det forrige intervjuet la du vekt på…
   - I refleksjonen etter en av aktivitetene…

6. ***Var det noe du opplevde som utfordrende underveis?***
   - Hvis ja, hva og hvordan ble dette løst?

Barnas involvering

7. ***Hvordan tror du barna har opplevd å bli involvert i prosessen (de ulike delene)?***

8. ***Hva tror du barna har lært av å delta?***

Kompetanse

9. ***Kan du beskrive hvilke kompetanser (kunnskaper og ferdigheter) du tok i bruk i løpet av prosessen?***
   - Relater til det hun allerede har sagt i sp 1 og 4
   - I det forrige intervjuet snakket du om…

10. ***På hvilken måte ble disse kompetansene knyttet sammen?***

11. ***Har du lært noe underveis i prosessen?***
    - Hvis ja, hva da?

12. ***Synes du at du har nok kompetanse (kunnskaper og ferdigheter) til å lage digitale fortellinger sammen med barna?***
    - Hvis ja, på hvilken måte?
    - Hvis nei, hva ønsker du mer kompetanse i/kunnskap om?

Produktet

13. ***Er du fornøyd med det ferdige produktet?***
    - Hvis ja, hvorfor? Hva liker du spesielt godt?
    - Hvis nei, hvorfor ikke. Hva ville du gjort annerledes?

Avslutning

14. ***Hva synes du har vært kjekkest i denne prosessen?***

15. ***Har det gitt mersmak?***
    - Kunne du tenke deg å lage flere multimodale fortellinger sammen med barna?

16. ***Har du noe annet du vil tilføre?***
    - I refleksjonen etter en av aktivitetene gav du uttrykk for at…

Debrifing og avrunding av intervjuet.

Tusen takk for at du stilte opp på dette intervjuet.

Appendix 2 – The technology-mediated story creation processes

	Case 1 – *The Wedding*	Case 2 – *Rapunzel*
Day 1	Shared dialogue-based reading, creating the narrative and talking about the product	Shared dialogue-based reading and creating props
Day 2	Creating the narrative and creating props	Creating the narrative and creating props
Day 3	Creating the narrative and creating props	Creating the narrative, creating props, and preparing
Day 4	Creating the narrative, creating props, taking pictures, talking about the product, and recording sound	Animating and preparing
Day 5	Creating props and recording sound	Animating, creating the narrative, and editing
Day 6	Creating the narrative, taking pictures, recording sound, editing, and talking about the product	Editing and animating
Day 7	Editing, recording sound, and talking about the product	Animating, editing, and talking about the product
Day 8	Talking about the product, recording sound, and creating the narrative	Talking about the product and recording sound
Day 9	Talking about the product and displaying the final multimodal digital story	Recording sound and displaying the final multimodal digital story

Appendix 3 – Non-digital activities

Categories and Codes	Description of the code
Narrative	Activities and conversations concerning the different aspects related to the development of the narrative
Composing	Conversations about which characters to include in the narrative and what the characters would do
Repeating	Repeating what they had agreed on, specifying some elements or extending the narrative
Re-telling	Activities when they were retelling the narrative, e.g., recording the narrator voice
Discussing	Conversations about adjustments during the process from oral to multimodal digital story
Props	Activities and conversations concerning the props
Making	When they were making props, e.g., clay-figures
Drawing/Painting	When they were drawing or painting, including conversations about what they were drawing or painting
Discussing	Conversations about what to use as props and how to make them, and what else they needed
Planning	Conversations about what they were going to do and when, including questions about who would prefer to do what

Source: Undheim (2020, p. 168)

Appendix 4 – Digital activities

Categories and codes	Description of the code
Animation	Activities and conversations concerning the different aspects related to making the animations
Preparing	Preparations with the props and tablet when getting ready to animate the scenes
Animating	Moving the characters, one step at a time while taking the pictures and creating the animations
Discussing	Conversations concerning how to animate
Editing	Activities and conversations concerning aspects related to editing the e-book or movie
Cropping	Cropping and editing the pictures in the e-book
Changing tempo	Changing the movie's tempo, in the app iMovie
Copying	Copying pictures, in the Stop Motion Studio app
Deleting	Deleting pictures, in the Stop Motion Studio app
Title and text	Writing and adding text to the e-book and movie
Discussing	Conversations concerning editing
Product	Conversations and utterances concerning the products they were making, e.g., when watching the animated scenes, reading the e-book, or listening to the sound-recordings
Pictures	Activities and conversations concerning the pictures
Photographing	Photographing drawings and text posters
Searching	Searching for pictures on the Internet and conversations about them
Discussing	Conversations concerning the pictures, e.g., how to take pictures
Sound	Conversations concerning sound-recordings
Recording	Recording children's voice and creating a narrator voice for the e-book and movie
Creating	Creating their own music, in the Auto Rap app
Searching	Searching for music on the Internet
Adding	Adding voice recordings and music to the e-book or movie
Discussing	Conversations concerning the recordings, e.g., when listening to the narrator voice
Play	Events when the children spontaneously engaged in play
Technology	Activities and conversations concerning the use of technology
Shared dialogue-based reading	Transcriptions of the shared dialogue-based reading activity

Source: Undheim (2020, p. 169)

Appendix 5 – Teachers' pedagogical strategies

Categories	Codes	Description of the code
Describing	Describe	The teacher describes how something looks, what happens (in the e-book and the animated movie), what the children are doing, etc.
Explaining	Explain	The teacher explains what they are going to do and why, answers questions and explains what something means
Instructing	Instruct	The teacher instructs the children by telling them what to do (without any explanation, short messages)
Inviting	Ask about facts	The teacher asks questions about facts related to the process and product
	Ask about opinion	The teacher asks questions about opinions, e.g., about who would like to do what
	Clarify ideas	The teacher clarifies ideas and gives the children a chance to confirm and explain more thoroughly
	Give choices	The teacher gives the children choices among different alternatives
	Inspire	The teacher inspires the children by presenting alternative viewpoints, new ideas, or suggestions
	Invite	The teacher invites the children to dialogue about the e-book, the drawings, or the narrative, and encourages the children to elaborate their thoughts and say more
	Repeat	The teacher repeats what the children have said, often in an asking tone, to encourage them to say more
	Wonder	The teacher encourages the children to wonder about things happening to the product or during the process, e.g., by asking open questions
Motivating	Motivate	The teacher motivates the children to start or continue, e.g., the conversation or an activity, verbally or non-verbally
	Encourage	The teacher encourages the children to look at something special, indirectly and directly
Organising	Organise	The teacher organises the activities and the children by telling them who is doing what and where
Providing feedback	Provide feedback	The teacher gives the children encouragements for efforts, verbally and non-verbally
Supporting	Support	The teacher supports the children's utterances and/or confirms that something is «correct»

Source: Undheim and Jernes (2020, p. 260)

Appendix 6 – Multimodal analysis of the final product

			THE KINEIKONIC MODE				
				Moving image			
Scene	Time	Framing	Verbal narrative (narrator voice)	Mentioned by the narrator	Not mentioned by the narrator	Music	Written text
Written text	0.00	Data text on a still picture from the movie				"News-inspired" background music	Two running away [To på rømmen]
	0.01		Once upon a time (·) step-mother was going for a walk (0.01)				
Scene 1	0.04	Long shot: the house, the woods with a small rock		The step-mother is standing by the open door.	Rapunzel is standing by the window inside the house.	"News-inspired" background music	
	0.07		she walked and walked (0.01) and walked (0.08)	The step-mother walks out from the house. She falls but gets up again. Then she walks towards and into the woods.			
	0.18		and then she fell on a rock and didn't see anything (0.02)	The step-mother falls on a rock but gets up again			
	0.23		and then she went home again (·) she took a shortcut (0.02) up (·)	The step-mother walks back towards the house. She jumps around the corner of the house and falls.			
	0.31		and then she fell down (·) and		Rapunzel is standing by the window inside the house. The step-mother gets up and walks towards the door and into the house.		

Source: Undheim and Hoel (Accepted with some revisions), adapted from Burn (2016, p. 321).

			THE KINEIKONIC MODE				
Scene	**Time**	**Framing**	**Verbal narrative (narrator voice)**	**Moving image**		**Music**	**Written text**
				Mentioned by the narrator	**Not mentioned by the narrator**		
Scene 2	0.35	Long shot: the house, the woods with a small rock	Ehm (·) once upon a time a >monster was walking in< (·) the woods (·) and then it (·) and then (0.01)	The monster walks into the woods.	The prince is hiding around the corner of the house as a spy. The step-mother is inside the house by the door.	"News-inspired" background music	
	0.44		it fell on a rock and hit its head and <got> up again (0.02)	The monster falls behind a tree [partly on the rock]. It gets up again			
	0.51		and then it walked towards the woods (0.01) and then (·) and then and then	The monster walks out from the woods [away from the house].	Movement in the trees and a flower.		
	0.56		[laughter]		The prince moves forward as the troll is walking out of the movie.		
Scene 3	1.00	Long shot: the house, the woods with a small rock	Once upon a time a troll was walking in the woods (·)	The troll walks through the woods. Several of the trees are moving.		"News-inspired" background music	
	1.05		he walked and walked and it was very windy (·) and then (0.01) we- (0.01)				
	1.13		and then he became invihhsible and fell (0.01)	The troll falls [next to the rock].			

			THE KINEIKONIC MODE				
Scene	**Time**	**Framing**	**Verbal narrative (narrator voice)**	**Moving image**		**Music**	**Written text**
				Mentioned by the narrator	**Not mentioned by the narrator**		
Scene 5	1.38	Long shot: the house, the woods with a small rock	Once upon a time the prince rescued the princess	The prince comes riding on a horse through the woods, towards the house.	Rapunzel is standing by the window inside the house. The step-mother is standing on the house terrace.	"News-inspired" background music	
	1.43		and he went into the house and the step-mother didn't see	The prince walks into the house.	Rapunzel opens the window. The step-mother jumps down from the terrace. The horse is standing by the door.		
	1.46		but then they went ·hhh and they fought (·)	The step-mother walks into the house.	Rapunzel is standing by the open window, inside the house.		
	1.49		and then she was rescued and they went into the woods and disappeared	Rapunzel and the prince come out from the house and ride together on the horse through the woods.			
Written text	1.53	Hand written text on paper	Living happily ever after			"News-inspired" background music	Living happily ever after [Lever så lykkelig alle sine dager]
	1.56		The end				The end
	2.02						[Slutt]

Appendix 7 – Approval from NSD

NSD

Marianne Undheim

4036 STAVANGER

Vår dato: 01.11.2017 Vår ref: 56264 / 3 / LAR Deres dato: Deres ref:

Vurdering fra NSD Personvernombudet for forskning § 31

Personvernombudet for forskning viser til meldeskjema mottatt 29.09.2017 for prosjektet:

56264	*Med blikk på teknologi, pedagogikk og fag som integrerte enheter i barnehagen*
Behandlingsansvarlig	*Universitetet i Stavanger, ved institusjonens øverste leder*
Daglig ansvarlig	*Marianne Undheim*

Vurdering

Etter gjennomgang av opplysningene i meldeskjemaet og øvrig dokumentasjon finner vi at prosjektet er meldepliktig og at personopplysningene som blir samlet inn i dette prosjektet er regulert av personopplysningsloven § 31. På den neste siden er vår vurdering av prosjektopplegget slik det er meldt til oss. Du kan nå gå i gang med å behandle personopplysninger.

Vilkår for vår anbefaling

Vår anbefaling forutsetter at du gjennomfører prosjektet i tråd med:

- opplysningene gitt i meldeskjemaet og øvrig dokumentasjon
- vår prosjektvurdering, se side 2
- eventuell korrespondanse med oss

Vi forutsetter at du ikke innhenter sensitive personopplysninger.

Meld fra hvis du gjør vesentlige endringer i prosjektet

Dersom prosjektet endrer seg, kan det være nødvendig å sende inn endringsmelding. På våre nettsider finner du svar på hvilke endringer du må melde, samt endringsskjema.

Opplysninger om prosjektet blir lagt ut på våre nettsider og i Meldingsarkivet

Vi har lagt ut opplysninger om prosjektet på nettsidene våre. Alle våre institusjoner har også tilgang til egne prosjekter i Meldingsarkivet.

Vi tar kontakt om status for behandling av personopplysninger ved prosjektslutt

Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.

NSD – Norsk senter for forskningsdata AS Harald Hårfagres gate 29 Tel: +47-55 58 21 17 nsd@nsd.no Org.nr. 985 321 884
NSD – Norwegian Centre for Research Data NO-5007 Bergen, NORWAY Faks: +47-55 58 96 50 www.nsd.no

Ved prosjektslutt 31.12.2022 vil vi ta kontakt for å avklare status for behandlingen av personopplysninger.

Se våre nettsider eller ta kontakt dersom du har spørsmål. Vi ønsker lykke til med prosjektet!

Marianne Høgetveit Myhren

Lasse André Raa

Kontaktperson: Lasse André Raa tlf: 55 58 20 59 / Lasse.Raa@nsd.no

Vedlegg: Prosjektvurdering

Personvernombudet for forskning

Prosjektvurdering - Kommentar

Prosjektnr: 56264

TILKNYTNING TIL VEBB-PROSJEKTET

Prosjektet er en oppfølgingsstudie tilknyttet prosjektet "Bøker og apper: Utvikling av vurderingsverktøy for e-bøker for barn (VEBB)", som tidligere er vurdert av personvernombudet, vår ref. 55150.

UTVALG OG DATAINNSAMLING

Utvalget vil overlappe med utvalget i tilknyttet prosjekt. Det kan også bli aktuelt å rekruttere nye deltakere. Det vil innhentes samtykke fra både nye deltakere og deltakere hentet fra VEBB.

INFORMASJON OG SAMTYKKE

Utvalget informeres skriftlig og muntlig om prosjektet og samtykker til deltakelse. Informasjonsskrivet er hovedsakelig godt utformet. I den grad det innhentes personopplysninger fra tilknyttet prosjekt, slik som opplysninger om lesevaner, forutsetter vi imidlertid at det innhentes samtykke også til dette fra barnas foreldre.

Personvernombudet legger ellers til grunn at det innhentes samtykke fra alle som kan fanges opp på opptak.

BARN I FORSKNING

Merk at når barn skal delta aktivt, er deltakelsen alltid frivillig for barna, selv om de foresatte samtykker. Barna bør få alderstilpasset informasjon om prosjektet, og det må sørges for at de forstår at deltakelse er frivillig og at de når som helst kan trekke seg dersom de ønsker det.

TREDJEPERSONOPPLYSNINGER

Det oppgis at det vil registreres enkelte opplysninger om tredjeperson ved at det innhentes opplysninger om lesevanene til barnas foreldre. Foreldrene vil bli informert skriftlig om dette. Personvernombudet forutsetter som nevnt ovenfor at denne informasjonen implementeres i informasjonsskrivet til foreldrene, og at det således innhentes samtykke til innhentingen av opplysninger fra tilknyttet prosjekt.

DATASIKKERHET

Personvernombudet legger til grunn at forsker etterfølger Universitetet i Stavanger sine interne rutiner for datasikkerhet. Dersom personopplysninger skal lagres på mobile enheter, bør opplysningene krypteres tilstrekkelig.

PROSJEKTSLUTT

Forventet prosjektslutt er 31.12.2022. Ifølge prosjektmeldingen skal innsamlede opplysninger da oppbevares med personidentifikasjon til 31.12.2027 for oppfølgingsstudier/videre forskning samt for undervisningsformål eller andre formål.

Personvernombudet minner om at dersom personopplysninger skal benyttes til andre formål enn angitt, vil dette etter dagens lovverk som hovedregel kreve at det innhentes nytt samtykke samt at dette meldes til personvernombudet eller Datatilsynet.

ANONYMISERING

Dataene vil anonymiseres innen 31.12.2027. Anonymisering innebærer å bearbeide datamaterialet slik at ingen enkeltpersoner kan gjenkjennes. Det gjøres ved å:

- slette direkte personopplysninger (som navn/koblingsnøkkel)
- slette/omskrive indirekte personopplysninger (identifiserende sammenstilling av bakgrunnsopplysninger som f.eks. bosted/arbeidssted, alder og kjønn)
- slette digitale lyd-/bilde- og videoopptak

Appendix 8 – Information letters and consent forms

Appendix 8.1 – Consent form teachers

University of Stavanger

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Til barnehagelærere som deltar i VEBB

Samtykke til deltakelse i forskningsprosjektet

«Med blikk på teknologi, pedagogikk og fag som integrerte enheter i barnehagen»

Bakgrunn og formål
Jeg er PhD-stipendiat ved Institutt for barnehagelærerutdanning, UiS, og tilknyttet forsknings- og innovasjonsprosjektet VEBB. Jeg ønsker å følge opp arbeidet i VEBB ved å se på hvordan e-bøker inspirerer barn til å skape sine egne multimodale fortellinger. Overordnet problemstilling er: *«Hva trer fram når barnehagelærere involverer barnehagebarn i digitale produksjonsaktiviteter etter samtalebasert lesing?»*

Formålet med studien er å få mer kunnskap om: 1) *Barnehagelæreres kompetanse når de involverer barnehagebarn i digitale produksjonsaktiviteter*, dvs. skapende og kreative aktiviteter ved hjelp av digital teknologi og 2) *Barnehagebarns multimodale fortellinger*, dvs. fortellinger som formidles gjennom f.eks. bilder, lyd og/eller ord, som bildebøker, bildefortellinger og animasjonsfilmer.

Jeg er interessert i hvordan du, sammen med seks barn (fortrinnsvis de samme som deltar i de filmede leseøktene i VEBB), lager en multimodal fortelling med inspirasjon fra ei e-bok. Hele prosessen fra start til ferdig produkt er relevant.

Kriterier for deltakelse i studien
Kriterier for å delta er at du deltar i utviklingsfasen i VEBB og at du er interessert i å bruke digital teknologi for å lage en multimodal fortelling sammen barna. Du bør også ha noe digital kompetanse og kjenne til noen av mulighetene knyttet til digital teknologi.

Gjennomføringen (datainnsamlingen) vil foregå over en 2-ukers periode i løpet av januar-mars 2018. I denne perioden må du sette av tid og lage en multimodal fortelling sammen med seks barn. Den multimodale fortellingen dere lager skal ikke inneholde bilder av barn, barnas navn eller barnehagens navn. Den kan inneholde lydopptak av barnas stemme. Underveis i prosessen kan barna tegne tegninger, lage figurer/kulisser el.l. Barnehagen og barna beholder en kopi av den multimodale fortellingen.

Jeg ønsker også å hente inn bakgrunnsinformasjon om deg fra VEBB-prosjektet (alder, kjønn, utdanning, erfaring og lesevaner) til studien.

Jeg vil tilby workshop i praktisk bruk av appene iMovie, StopMotionStudio, GarageBand og BookCreator, men andre apper kan også brukes. Du kan låne iPad fra UiS, men må holde appene selv (alle kan lastes ned gratis).

Hva innebærer deltakelse i studien?

1. Gruppeintervju i forkant av gjennomføring, om dine tanker rundt aktivitetene du skal gjennomføre. Jeg ønsker å ta lyd-/videoopptak av dette intervjuet.
2. Videoobservasjoner av gjennomføringen av hele prosessen med å lage en multimodal fortelling. Siden jeg bl.a. ønsker å se på hvordan e-bøker inspirerer barna til å skape sine egne multimodale fortellinger, må gjennomføringsprosessen starte med en samtalebasert leseøkt. Jeg skal ikke delta aktivt i disse aktivitetene, kun være tilstede som en observatør.
3. Gruppeintervju med barna i etterkant av gjennomføringen, for å få tak i deres tanker og meninger om prosessen og det ferdige produktet. Jeg ønsker at du deltar i dette intervjuet, som en trygghet og støtte for barna. Dette ønsker jeg ta videoopptak av.
4. Intervju med deg i etterkant, om dine tanker om hele prosessen. Dette ønsker jeg å ta lydopptak av.

Hva skjer med informasjonen om deg, barna og barnehagen?

Alle opplysninger om barn, personal og barnehage vil bli behandlet konfidensielt. Det er kun jeg og prosjektgruppen i VEBB som vil ha tilgang til disse. Lyd- og videoopptak lagres i tråd med gjeldende retningslinjer for sikker datalagring i forskningsprosjekt, i samarbeid med VEBB. Resultater fra prosjektet vil bli publisert som gruppedata, uten at den enkelte deltaker kan gjenkjennes. Jeg vil sørge for at alle aktører blir framstilt på en tilbørlig måte. Prosjektet vil være avsluttet innen 2022, mens datamaterialet vil være lagret i TSD (Tjeneste for sikker datalagring) til 2027. Da vil alt materialet bli anonymisert. Dersom det skulle bli aktuelt å benytte datamaterialet i nye prosjekter, eller bli delt med andre forskere, vil jeg be om ny samtykkeerklæring fra deg. Studien er meldt til Personvernombudet for forskning, NSD (Norsk senter for forskningsdata).

Frivillig deltakelse

Det er frivillig å delta i studien og du kan når som helst trekke ditt samtykke uten å oppgi noen grunn.

Hva får du igjen for å delta?

Du vil få økt digital kompetanse knyttet til digitale produksjonsaktiviteter sammen med barna og få anledning til å reflektere rundt bruken av digitale verktøy. Jeg vil også dele funn og erfaringer fra gjennomføringen med deg i etterkant.

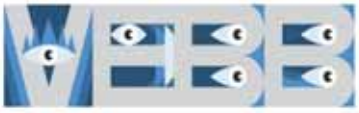
Ta gjerne kontakt dersom du har spørsmål.

Med vennlig hilsen

Marianne Undheim
PhD-stipendiat
Mob: 97012231, marianne.undheim@uis.no

Margrethe Jernes (hovedveileder)
Mob: 90012073, margrethe.jernes@uis.no

Trude Hoel (biveileder)
Mob: 99382061, trude.hoel@uis.no



University of Stavanger

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Samtykke til deltakelse i forskningsprosjektet

«Med blikk på teknologi, pedagogikk og fag som integrerte enheter i barnehagen»

☐ Jeg har mottatt informasjon om studien og ønsker å delta.

☐ Jeg godtar at det tas lyd-/videoopptak av gruppeintervju og enkeltintervju med meg, av gruppeintervju med barna (der jeg er tilstede) og av aktivitetene som gjennomføres.

☐ Jeg godtar at den multimodale fortellingen som lages kan brukes i forskning og undervisning.

☐ Jeg godtar at bilder av barnas tegninger/figurer/kulisser el.l. kan brukes i forskning og undervisning.

☐ Jeg godtar at det hentes inn bakgrunnsinformasjon om meg fra VEBB-prosjektet (alder, kjønn, utdanning, erfaring og lesevaner).

_____
(barnehagelærerens navn)

_____
(sted og dato)

Appendix 8.2 – Consent form parents

University of Stavanger

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Til foreldre/foresatte i barnehager som deltar i VEBB

Samtykke til deltakelse i forskningsprosjektet

«Med blikk på teknologi, pedagogikk og fag som integrerte enheter i barnehagen»

Bakgrunn og formål
Jeg er PhD-stipendiat ved Institutt for barnehagelærerutdanning, UiS, og tilknyttet forsknings- og innovasjonsprosjektet VEBB. Jeg ønsker å følge opp arbeidet i VEBB ved å se på hvordan e-bøker inspirerer barn til å skape sine egne multimodale fortellinger. Overordnet problemstilling er: *«Hva trer fram når barnehagelærere involverer barnehagebarn i digitale produksjonsaktiviteter etter samtalebasert lesing?»*

Formålet med studien er å få mer kunnskap om: 1) *Barnehagelæreres kompetanse når de involverer barnehagebarn i digitale produksjonsaktiviteter*, dvs. skapende og kreative aktiviteter ved hjelp av digital teknologi og 2) *Barnehagebarns multimodale fortellinger*, dvs. fortellinger som formidles gjennom f.eks. bilder, lyd og/eller ord, som bildebøker, bildefortellinger og animasjonsfilmer.

Jeg er interessert i hvordan en barnehagelærer, sammen med seks barn, lager en multimodal fortelling. Hele prosessen fra start til ferdig produkt er relevant.

Hva innebærer deltakelse i studien for barna?
Gjennomføringen (datainnsamlingen) vil foregå i løpet av januar-mars 2018. I denne perioden lager barnehagelæreren og seks barn sammen en multimodal fortelling med inspirasjon fra ei e-bok. Den multimodale fortellingen skal ikke inneholde bilder av barn, barnas navn eller barnehagens navn. Den kan inneholde lydopptak av barnas stemme. Underveis i prosessen kan barna tegne tegninger, lage figurer/kulisser el.l. Barnehagen og barna beholder en kopi av den multimodale fortellingen.

Det er barnehagelæreren som foretar utvalg av de seks barna som deltar, i samråd med dere foreldre/foresatte.

Barna deltar i aktiviteter knyttet til prosessen med å lage en multimodal fortelling, sammen med barnehagelæreren. Jeg som forsker er tilstede som en observator. Noen av aktivitetene blir videofilmet.

Barna deltar også i et gruppeintervju i etterkant av gjennomføringen, i barnehagen. Barnehagelæreren deltar i intervjuet, som en trygghet og støtte for barna. Jeg er interessert i barnas tanker og meninger om prosessen og det ferdige produktet (dere kan få se intervjuguiden dersom dere ønsker). Dette ønsker jeg å videofilme.

Jeg ønsker også å hente inn bakgrunnsinformasjon om barnet og foreldre fra VEBB-prosjektet (alder, kjønn, morsmål, foreldres utdanning og lesevaner) til studien.

Hva skjer med informasjonen om barna og barnehagen?
Alle opplysninger om barn, personal og barnehage vil bli behandlet konfidensielt. Det er kun jeg og prosjektgruppen i VEBB som vil ha tilgang til disse. Lyd- og videoopptak lagres i tråd med gjeldende retningslinjer for sikker datalagring i forskningsprosjekt, i samarbeid med VEBB. Resultater fra prosjektet vil bli publisert som gruppedata, uten at den enkelte deltaker kan gjenkjennes. Jeg vil sørge for at alle aktører blir framstilt på en tilbørlig måte. Prosjektet vil være avsluttet innen 2022, mens datamaterialet vil være lagret i TSD (Tjeneste for sikker datalagring) til 2027. Da vil alt materialet bli anonymisert. Dersom det skulle bli aktuelt å benytte datamaterialet i nye prosjekter, eller bli delt med andre forskere, vil jeg be om ny samtykkeerklæring fra dere. Studien er meldt til Personvernombudet for forskning, NSD (Norsk senter for forskningsdata).

Frivillig deltakelse
Det er frivillig å delta i studien og dere kan når som helst trekke deres samtykke uten å oppgi noen grunn.

Ta gjerne kontakt dersom dere har spørsmål.

Med vennlig hilsen

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Samtykke til deltakelse i forskningsprosjektet

«Med blikk på teknologi, pedagogikk og fag som integrerte enheter i barnehagen»

☐ Vi/jeg har mottatt informasjon om studien og godtar at barnet deltar.

☐ Vi/jeg godtar at det tas lyd-/videoopptak av aktiviteter og gruppeintervju som barnet deltar i.

☐ Vi/jeg godtar at den multimodale fortellingen som barnet er med og lager kan brukes i forskning og undervisning.

☐ Vi/jeg godtar at bilder av barnets tegninger/figurer/kulisser el.l. kan brukes i forskning og undervisning.

☐ Vi/jeg godtar at det hentes inn bakgrunnsinformasjon om barnet og foreldre fra VEBB-prosjektet (alder, kjønn, morsmål, foreldres utdanning og lesevaner).

_____
(barnets fornavn og etternavn med store bokstaver)

_____
(foresattes underskrift)

_____
(sted og dato)

Appendix 8.3 – Consent form children

University of Stavanger

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Tillatelse

«Med blikk på teknologi, pedagogikk og fag som integrerte enheter i barnehagen»

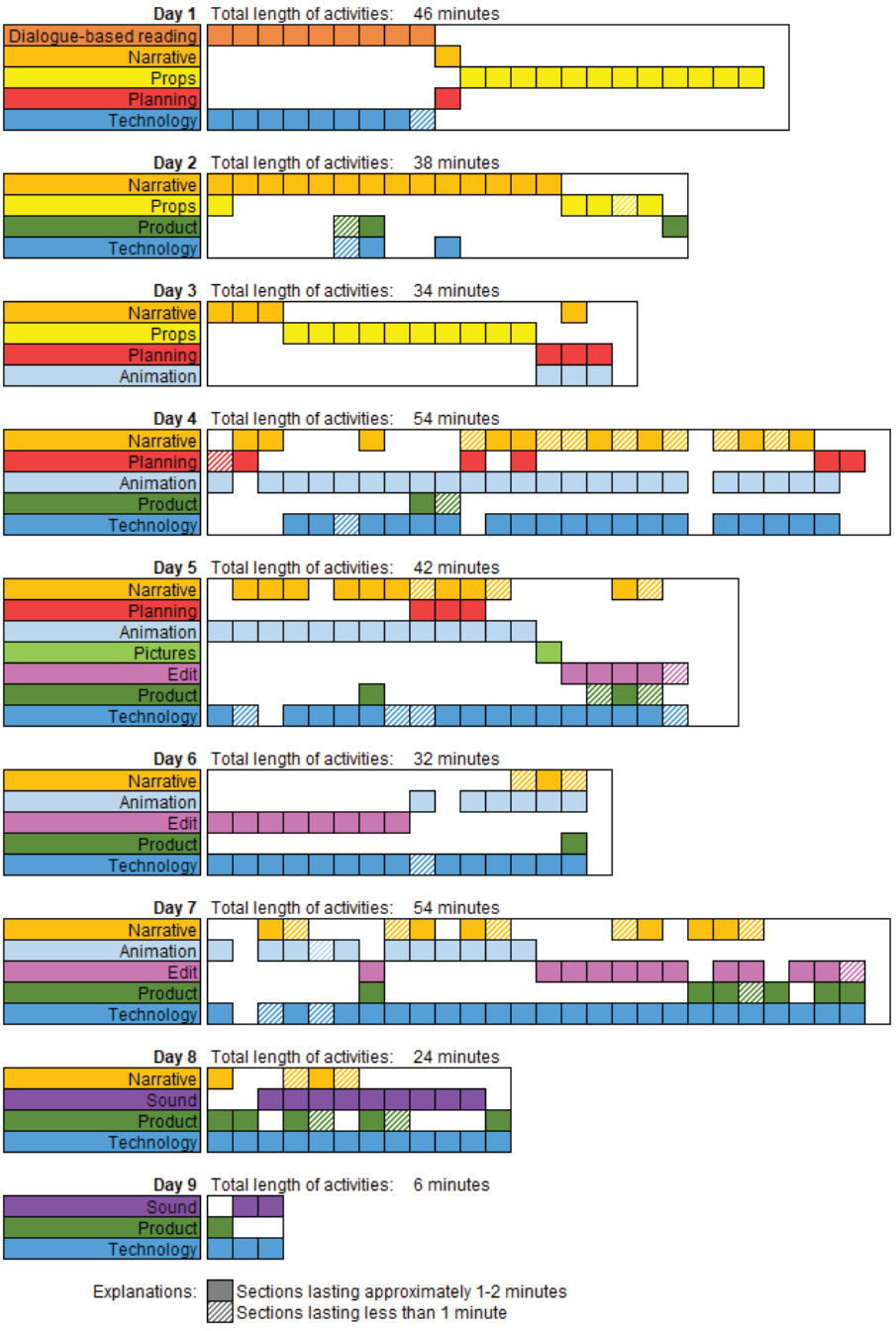
Jeg har lyst til å snakke med Marianne og de andre barna i gruppa om prosessen og produksjonen med å lage en fortelling på iPaden.

1. Det er greit for meg at Marianne filmer noen av aktivitetene.
2. Det er greit for meg at Marianne og noen andre forskere ser på videoopptaket etterpå.
3. Det er greit for meg at Marianne snakker med barnehagelæreren dersom jeg sier noe som Marianne blir usikker på.
4. Det er greit for meg at Marianne tar bort navnet mitt, og ikke skriver/forteller hvem jeg er.
5. Jeg vet at jeg kan si nei og trekke meg fra samtaler og aktiviteter når som helst.

Mitt navn/signatur/spesielle merke _____

Datoen i dag _____

Appendix 9 – Activities in one case



Part 2 – The articles

Article I

Undheim, M. (2020). "We need sound too!" Children and teachers creating multimodal digital stories together. *Nordic Journal of Digital Literacy, 15*(3), 165-177. https://doi.org/10.18261/issn.1891-943x-2020-03-03

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"We Need Sound Too!" Children and Teachers Creating Multimodal Digital Stories Together

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Abstract
In most contemporary societies there is broad access to a range of digital technologies. However, in the current debate concerning digital technology in early childhood education and care institutions (ECEC), digital technologies are often referred to merely as screens. This paper contributes to the current research by exploring the technology-mediated creation process when groups of young children (age 4–5) create multimodal digital stories in collaboration with a teacher. The theoretical perspectives informing the study are technological pedagogical content knowledge (TPACK) and professional digital competence. The study is a qualitative multiple-case study with two cases. The empirical material consists of video observations of the creation processes, which have been analysed inductively. The analysis shows that recording sound and sharing are the most important for the children. Further, the technology-mediated creation process is characterised by a complex interplay of non-digital and digital activities in which the teachers' professional digital competence is an important factor.

Keywords
Technology-mediated creation process, multimodal digital stories, early childhood education and care (ECEC), kindergartens, digital technology

Introduction

Most children in contemporary societies grow up in cultures with broad access to various digital technologies in their everyday lives (Chaudron et al., 2018; Medietilsynet, 2018). However, in the current debate concerning digital technology in early childhood education and care institutions (ECEC), digital technologies are often referred to merely as screens (e.g., Dahle et al., 2020). Drawing on Burnett and Daniels (2016) and Kucirkova (2014), I consider meaning-making as an entwined activity between on-screen and off-screen activities and traditional and digital resources as complementary resources. Despite an increasing number of empirical studies related to digital technology with children from new-borns to eight-year-olds over the last decade, there have also been calls for more studies focusing on the youngest children's experiences of creating with digital technology (e.g., Burnett & Daniels, 2016; Hsin et al., 2014; Marsh, 2010) and producing digital stories (Garvis, 2016). This paper contributes to the current research by exploring the technology-mediated creation process when groups of children (age 4–5) create multimodal digital stories in collaboration with a teacher.

Multimodal Digital Stories in ECEC

The Norwegian *Framework plan for kindergartens*[1] (Udir, 2017) highlights children's and teachers' creative exploration and inventive use of digital technology as a central part of ped-

agogical practice. Play, learning through everyday activities based on children's interests, and children's rights to participate are some of the core values in Norwegian kindergartens (Børhaug et al., 2018; Udir, 2017). According to the framework plan, it is important for children to discover and listen to a variety of stories and expressions as well as to create their own stories. When creating stories, non-digitally and digitally, the children are given opportunities to express their meanings and ideas about matters that are important to them (Udir, 2017).

A multimodal digital story can be defined as a story expressed through different modalities (e.g., voice, gesture, music, pictures and words) and presented digitally (e.g., Kucirkova, 2018; Marsh, 2010). In the previous research, three types of multimodal digital stories created by young children (age 0–8) in collaboration with teachers or researchers in ECEC are found. The first type is *digital stories made of pictures and text*, for example, children's drawings or paintings (Letnes, 2014), ready-made images from software or the Internet (Sakr et al., 2016; Skantz Åberg et al., 2015; Wohlwend, 2017), or children's photographs (Letnes, 2014). The second type is *stop-motion animation movies* – for example, using two-dimensional drawings (Leinonen & Sintonen, 2014), three-dimensional play materials, or homemade figures (Fleer, 2018; Letnes, 2014; Palaiologou & Tsampra, 2018; Petersen, 2015). The third type is *videos of children* (Hesterman, 2011). Digital technology introduces new opportunities to the process of creating multimodal digital stories, and can contribute by serving as a resource (Letnes, 2014). The technology makes it easy to modify products during the creation process, for example by changing or deleting elements (Fleer, 2018; Sakr et al., 2016). Digital technology also provides opportunities for adding sound, for example, voice-overs (Fleer, 2018) and creating special effects, for example, flying in a homemade spaceship (Hesterman, 2011). Further, digital technology provides possibilities for children to capture a story and watch it repeatedly as the story develops and as a finished product (Garvis, 2016; Letnes, 2014). A multimodal digital story is also easy to share (Fleer, 2018; Garvis, 2016; Letnes, 2014; Marsh, 2010). When watching their story together with others – for instance, peers or parents – children are given opportunities to experience the multimodal digital story from new perspectives (Letnes, 2014).

The studies included here present various ways of creating multimodal digital stories with young children. However, several of the studies focus merely on digital activities – that is, activities with tablets or computers; less is known about how digital activities are entwined with traditional non-digital activities. Further, the multimodal digital stories presented in the studies are mostly made individually or in pairs, not in groups. The research question in this paper is as follows: *What characterises the technology-mediated creation process when groups of young children create multimodal digital stories in collaboration with a teacher?*

Theoretical Framework

Pedagogy is considered to be a core knowledge domain in Norwegian ECEC (Børhaug et al., 2018; Udir, 2017). When including digital technology in pedagogical practices, teachers' knowledge and ability to reflect and make critical choices are crucial (Jernes et al., 2010; Stephen & Edwards, 2018). Such knowledge and ability is a central aspect in *professional digital competence* [2], which can be defined as "knowledge about ICT and digital tools related more clearly to children's cultural formation, *bildung*, connected to the content, the strategies (working design) as well as values related to the society of tomorrow" (Alvestad &

1. Kindergartens in Norway are pedagogical ECEC institutions for children ages 0–5. The framework plan is a regulatory framework for the content and tasks of kindergartens.
2. The Norwegian term is *profesjonsfaglig digital kompetanse* (PfDK).

Jernes, 2014, p. 7). In the context of creating multimodal digital stories, I understand pedagogy in terms of the teachers' aims and reasons for *why* they create the stories, and digital technology in terms of the methods, *how* a multimodal digital story is created. Content is related not only to the ECEC curriculum, but also to knowledge of *what* a multimodal digital story is. This understanding of pedagogy, technology, and content can be seen in line with Mishra and Koehler's (2006) *technological pedagogical content knowledge* (TPACK). According to Mishra and Koehler, integrating digital technology in pedagogical practice requires a unique and context-based combination of technology, pedagogy and content. Teachers' knowledge of the complex interactions among these three knowledge domains, and how to combine them in situ, is central (Mishra & Koehler, 2006). In contrast, the findings from previous studies indicate that teachers' pedagogical or technological knowledge dominate practice (Jernes et al., 2010; Manfra & Hammond, 2008; Undheim & Vangsnes, 2017). Teachers' pedagogical aims define their use of technology when creating digital documentaries with students in school (Manfra & Hammond, 2008), and their choices related to content are based on pedagogical justifications when creating digital stories with children in ECEC (Undheim & Vangsnes, 2017). In a study of teachers' use of digital technology in ECEC, the teachers emphasised their technological knowledge; however, at the same time, they expressed a lack of knowledge of how to include digital technology in their pedagogical practice (Jernes et al., 2010). This is supported by two recent national surveys (Fagerholt et al., 2019, p. 25; Fjørtoft et al., 2019, p. 129), in which Norwegian ECEC practitioners highlight a lack of digital competence as the most limiting factor in their use of digital technology in ECEC. In light of this, teachers' knowledge of how to combine technology, pedagogy and content in situ – in collaboration with the children during the creation process – is important, as emphasised in professional digital competence and TPACK (Alvestad & Jernes, 2014; Dardanou & Kofoed, 2019; Mishra & Koehler, 2006).

Methods

Research Design

The study is a qualitative multiple-case study with two cases, with a focus on observable contemporary events in situ (Creswell, 2013; Yin, 2014), to provide an in-depth exploration of the technology-mediated creation process. In each of the two cases, six children (age 4–5) and one teacher created a multimodal digital story together.

Participants

The participants were recruited from a Norwegian research project (Mangen et al., 2019). Both teachers were female, aged 44 and 47, with 15–20 years of experience as ECEC teachers. One of the teachers had previously made a few multimodal digital stories; however, the other teacher was doing it for the first time. Neither of them had previously used digital technology in a creation process with a group of children over several days. Both teachers expressed that they saw their participation as a good opportunity to learn more about using digital technology with children. To provide the teachers some technical help to get started, they were given the opportunity to attend a workshop focusing on how to create multimodal digital stories on tablets.

Data and Data Collection

The process began with the shared reading of a picture book app as inspiration and ended with a display of the final products. All the activities planned by the teachers during these

creation processes are included in the cases. All activities took place in separate rooms, with only the six participating children, the teacher, and I present. The teachers were responsible for the activities while I participated as an observer, taking notes and video-recording the activities. Both cases followed the same case study protocol to maintain the logic of replication and the same chain of evidence, as well as to strengthen the study's reliability and validity (Yin, 2014). To ensure the quality of the study, a pilot study was conducted.

Based on experiences from the pilot study, all activities were video-recorded to capture the multimodal complexity, the different layers of information occurring simultaneously, and the temporal and sequential records of the process (Flewitt, 2006; Heikkilä & Sahlström, 2003). The activities were recorded with a small, hand-held digital camera with integrated microphone to capture sound, focusing on group activities. I placed myself close enough to capture the interactions between the teacher and the children, the conversations, the body movements, and the artefacts, without interrupting them physically. The video observations were collected over a period of two months; this paper draws on 14 hours of video from 18 days.

Analysis

Both teachers described the creation process by focusing on the activities. Inspired by their descriptions and the creation process in Letnes's study (2014), I viewed *activities* as a means of coding what the teachers and children were doing during the process. The videos were analysed inductively through constant comparison analysis, inspired by grounded theory (Glaser & Strauss, 1967; Leech & Onwuegbuzie, 2008), in NVivo (QSR International Pty Ltd., 2018). The analysis began with a within-case analysis in which each case was analysed separately, followed by a cross-case analysis with both cases (Creswell, 2013). By drawing on observable data, my aim is to provide an in-depth exploration of the creation process in situ, including the teachers' comments during the process; however, their reflections of the process are not included. Descriptions of the codes were added to a codebook to ensure consistent coding. The codes were refined and adjusted several times during the analysis, and some were grouped into broader categories; Tables 1 and 2 are the final codebooks.

Table 1 Codebook – Non-digital activities

Categories	Codes	Description of the code
Narrative		Activities and conversations concerning the different aspects related to the development of the narrative
	Composing	Conversations about which characters to include in the narrative and what the characters would do
	Repeating	Repeating what they had agreed on, specifying some elements or extending the narrative
	Discussing	Conversations about adjustments during the process from oral to multimodal digital story
	Re-telling	Activities when they were retelling the narrative, e.g. recording the narrator's voice
Props		Activities and conversations concerning the props
	Making	When they were making props, e.g. clay figures
	Drawing/ painting	When they were drawing or painting, including conversations about what they were drawing or painting
	Discussing	Conversations about what to use as props and how to make them, and what else they needed
Planning		Conversations about what they were going to do and when, including questions about who would prefer to do what

Table 2 Codebook – Digital activities

Categories	Codes	Description of the code
Animation		Activities and conversations concerning the different aspects related to making the animations
	Animating	Moving the characters, one step at a time while taking the pictures and creating the animations
	Preparing	Preparations with the props and tablet when getting ready to animate the scenes
	Discussing	Conversations concerning how to animate
Pictures		Activities and conversations concerning the pictures
	Searching	Searching for pictures on the Internet and conversations about them
	Discussing	Conversations concerning the pictures, e.g. how to take pictures
	Photograp-hing	Photographing drawings and text posters
Product		Conversations and utterances concerning the products they were making, e.g. when watching the animated scenes, reading the e-book, or listening to the sound recordings
Editing		Activities and conversations concerning aspects related to editing the e-book or movie
	Cropping	Cropping and editing the pictures in the e-book
	Changing tempo	Changing the movie's tempo, in the iMovie app
	Copying	Copying pictures, in the Stop Motion Studio app
	Deleting	Deleting pictures, in the Stop Motion Studio app
	Title and text	Writing and adding text to the e-book and movie
	Discussing	Conversations concerning editing
Sound		Conversations concerning sound recordings
	Recording	Recording children's voice and creating a narrator's voice for the e-book and movie
	Discussing	Conversations concerning the recordings, e.g. when listening to the narrator's voice
	Adding	Adding voice recordings and music to the e-book or movie
	Searching	Searching for music on the Internet
	Creating	Creating their own music, in the Auto Rap app
Play		Events when the children spontaneously engaged in play
Technology		Activities and conversations concerning the use of technology
Shared dialogue-based reading		Transcriptions of the shared dialogue-based reading activity

Ethics

During the research process, I have reflected and thoroughly thought through every aspect. I have been sensitive and flexible, shown respect, and made adjustments as needed in collaboration with the participants. This approach is emphasised by several authors with regard to the practice of being a reflexive researcher (e.g., Alvesson & Sköldberg, 2018; Guillemin & Gillam, 2004). I consider the collaboration between the participants and the

researcher to be important in the development and construction of empirical knowledge, which is closely connected to the context and the specific group where the researcher also influences the situation, as noted by Alvesson and Sköldberg (2018). The preliminary findings of the analysis were discussed with the teachers to validate the findings (see Jernes & Alvestad, 2017). The teachers confirmed the analysis of the activities and the creation process.

The study was approved by the Norwegian Centre for Research Data (NSD), and all participants provided their informed consent. Trust, loyalty and confidentiality were essential in the interactions between the researcher and participants, both teachers and children. Ethical guidelines, as stated by NESH (2016), were taken into account and followed during the entire research process. The participants' confidentiality was ensured by anonymising their names and other identifiers.

Results

The participants in the two cases made two different multimodal digital stories (Table 3). In case 1, six children and one teacher made an e-book of drawings, paintings, photos, text, music, songs, and speech called *The Wedding*. It is about a rooster who is getting married to his dream princess and their large wedding with 12345 guests. In case 2, six other children and their teacher made a stop-motion animation movie with Duplo blocks and clay figures, text, a narrator, and music called *Rapunzel*. It has clear references to the narrative of *Rapunzel*, who is trapped in a castle by her stepmother and rescued by a prince.

Table 3 Presentation of the two cases

The cases	Multimodal digital story	Activities involved	Technology used
Case 1: The Wedding	An e-book made of drawings, paintings, photos, written text, music, songs, and narrator voice	Shared dialogue-based reading, narrative, props, pictures, product, editing, sound, and display of the final product	iPad Book Creator (Red Jumper Limited, 2018) Auto Rap (Smule, 2017) YouTube (Google LLC, 2018)
Case 2: *Rapunzel*	A stop-motion animation movie made of Duplo and clay figures, written text, narrator voice, and music	Shared dialogue-based reading, narrative, props, planning, animation, product, editing, sound, and display of the final product	iPad Stop Motion Studio (Cateater LLC, 2017) iMovie (Apple, 2018)

Through an inductive approach to the analysis of the video observations, and with a focus on what the teachers and children were doing during the creation process, two main analytical categories were identified: *non-digital activities* and *digital activities*. Non-digital activities are activities that occur during the process where digital technology is not used, while digital activities are activities where the use of digital technology plays an important role (see the final codebooks; Tables 1 and 2). *The creation process* will also be described.

Non-Digital Activities

During the analysis of the video observations, the non-digital activities of narrative, props, and planning were identified.

The narrative activity concerns the various aspects related to the development of the narrative, such as when the teachers and children were discussing which characters to

include in the narrative and what the characters would do. In the case of *The Wedding*, the children and teacher composed the narrative while the children were drawing, indicating an interconnection between the narrative and props activities (Excerpt 1).

Excerpt 1, from *The Wedding*

The children and the teacher are sitting by the table; the children are drawing props.

Child 1: I'm drawing a princess.

Teacher: What is the princess doing?

Child 1: She is…

Child 2: Getting married to a man.

Child 1: Jumping.

The narrative being composed in Excerpt 1 was continued, and, together, Child 1 and Child 2 decided that the princess was going to jump to another city to marry a man. During the process, the participants reiterated the elements on which they had agreed, specified some elements or extended the narrative, for example, when the character in Excerpt 1 was changed from a man to a rooster. The narrative activity also includes conversations about adjustments in the process from oral to multimodal digital story and the recording of the children's voices.

Props is an activity performed quite differently in the two cases due to how the multimodal digital stories were produced. The actions included in props are, for example, when a child was making a clay figure to use in *Rapunzel*, the child said, "The head is going to be yellow, and the body is going to be red." The props activity includes activities when the children were drawing or painting, scenarios such as when a child said, "I am going to make a cake" and then began to draw. In the beginning of the process, both groups discussed what materials to use to create props and how to make them. Later in the process, the conversations were about which props they had made and what else they needed.

Planning involves discussions about what the children were going to do and when, for example, "On Monday we will make the characters." The teachers' questions about who would prefer to do what are also included in this code.

Digital Activities

Several digital activities were identified during the analysis of the video observations, such as animation, pictures, product, editing, sound, and play.

Animation was performed only in the *Rapunzel* case. When animating the scenes, two or three children collaborated. One or two children moved the characters, one step at a time, while another child took the pictures with the tablet. Animation includes the preparations that are made with the props and tablet when the children and teacher were getting ready to animate the scenes. One day, when they were preparing the props, one of the children suddenly said, "I know what we can use. The sky…," and went and found a blue mattress. Another child replied, "We need a sky," and helped to place the mattress against the wall as a background. Then, the children looked at the tablet to see if the mattress looked similar to the sky. The animation activity includes discussions about how to do animation

and why. For instance, when one of the children began to move the character before the other children were ready, the teacher explained, "You need to wait, don't move [the character] before we have started to take pictures, or it won't show in the movie."

Events when the children searched for pictures on the Internet and discussed them or when the children photographed their drawings or text posters are coded as pictures (Excerpt 2).

Excerpt 2, from *The Wedding*

The teacher and children are searching for pictures of weddings on the tablet and have found a picture.

Teacher: What do you think they have done?

Child 1: Got married.

Teacher: How can you tell?

Child 1: They are standing like this. [The child imitates how the couple in the picture is standing.]

Child 2: Because they look beautiful.

The product activity includes discussions and utterances related to the products they were making – for example, when a child suddenly began to talk about the sound while composing the narrative: "We have to change our voice… we cannot talk like we usually talk." When watching one of the animated scenes for *Rapunzel*, the teacher described a movement in the movie: "Wow, we can see the trees moving." "That's because it's windy," one of the children replied. When watching the animated scenes, the children often made comments about the characters' movements. Questions related to sharing the product are also included in this code – for example, when one of the children asked, "When are we going to show the book to the others?"

Activities when the participants edited the e-book or movie are coded as editing – for example, cropping pictures, changing the movie's tempo, copying and deleting pictures, and writing titles and text. The children quickly learned how to delete unwanted pictures: "I need to put this one in the trash," one of the children said when looking through the pictures for *Rapunzel*. Discussions about editing, how to do it, and why, are coded as editing. When adding text to the pictures for *The Wedding*, the teacher showed and explained how they could change the size of the letters.

In both cases, sound was the activity the children spoke most about during the process. The children clearly expressed that sound was important, for instance when they were watching an animated scene one of the children expressed, "They don't talk! We need sound too!" Sound includes events when the children recorded their voices and created a narrator for the e-book and movie and discussions about the recordings – for example, when they were listening to the recorded voices. Sound includes events when the participants added their voice recordings and music to the e-book or movie. "Can you see? It looks like a note. When we see a sign like that, it very often has to do with sound or music," the teacher said while showing the children where to click to add sound. In the case of *The Wedding*, they also searched for music on the Internet and created their own music in an app.

Events when the children spontaneously engaged in play – for example, with the drawings or characters – are coded as play. In the case of *The Wedding*, there were examples of

rhyming when the children talked about their drawings while they were drawing. The children also played with the technology, for example when exploring the possibilities of taking photographs with the tablet.

The Creation Process

In both cases, the creation process began with a shared reading activity as inspiration and ended with a display of the finished products. The analysis shows a combination of activities during the nine days of the creation process; see Figure 1. Sometimes the teachers involved the children by explaining what they would do afterwards or the following day, for example: "When we have animated all the scenes, we will do something called editing." However, during the creation process, both teachers mainly focused on the ongoing activities, and less on the process as a whole.

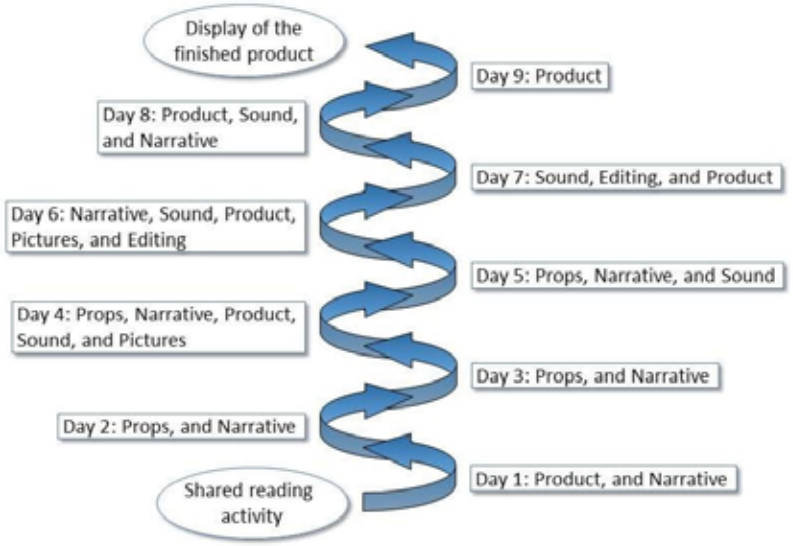

Figure 1 Activities during the process in the case of *The Wedding*.

In the case of *The Wedding*, the narrative and props activities were often performed at the same time, and the analysis indicates a close connection between these two non-digital activities. There are also close connections between the narrative and digital activities of sound, editing, product, and play in both cases and between narrative and animation in the *Rapunzel* case. These digital activities inspired and influenced changes and adjustments to the narrative during the process. According to the analysis, there are no clear connections between the non-digital activity of props and the digital activities of pictures, product, and sound. The searches for pictures and music were performed while the children were drawing, which could indicate an interconnection between these activities. However, the searches were mainly done by the teacher while the children were drawing; therefore, I consider these activities to be separate activities that happened to occur at the same time. Later in the process, the children stopped drawing and became involved in the digital activities of pictures and sound together with the teacher.

Analysis of the time spent on the activities during the creation process shows that in both cases, no digital technology was used for approximately 50% of the total time. In the case of *The Wedding*, the participants spent most time on props (40%), narrative (23%), sound (20%), and product (17%) while in the *Rapunzel* case, they spent most time on animation (35%), narrative (25%), and props (17%). In both cases, the teacher decided when to use digital technology, and which apps. In the case of *The Wedding*, the teacher used one of the apps presented in the workshop in addition to a webpage and another app; in the *Rapunzel* case, the teacher only used apps presented in the workshop (Table 3). Both teachers introduced the tablet as a tool to create by showing the children how to use the apps.

Discussion

Drawing on the previous research on creating multimodal digital stories in ECEC and informed by TPACK and professional digital competence, this paper aims to answer what characterises the technology-mediated creation process when groups of young children create multimodal digital stories in collaboration with a teacher.

Recording Sound and Sharing

For the children, it was especially important to record sound and to share the product. In both cases the teachers made the decision of what they were going to do – for instance, what activity and whether they would use digital technology. However, the observations indicate that some of the choices made by the teachers during the process, for example, regarding sound, were strongly influenced by the children. The utterance, "They don't talk! We need sound too!" is an example of this. Similarly, in the case of *The Wedding*, the children clearly expressed that they wanted to create their own music. The pedagogical aspect regarding the activities was dominant in the ways the teachers framed the activities and involved the children; the teachers supported the children's interests and gave the children time and space to participate and play. The importance of sharing a multimodal digital story with peers is highlighted in previous studies; by showing their finished product to peers or parents, children are given an opportunity to experience the product from new perspectives (Letnes, 2014). However, the findings of this study show that the children also put into words what they see and share perspectives about the product with each other during the creation process, which I interpret as equally important.

Complex Interplay of Non-Digital and Digital Activities

The creation process in both cases can be characterised as a complex interplay of non-digital and digital activities. Some activities took place at the same time without being connected, while other activities took place at the same time and were closely connected. However, the digital technology provided the creation process with new possibilities, as has been emphasised by several researchers (Fleer, 2018; Garvis, 2016; Letnes, 2014; Marsh, 2010). Both teachers introduced the tablet as a tool to create by showing the children how to use some specific apps. The tablet was used for editing, photographing drawings, recording sound, and animation. Thus, at the same time, no digital technology was used for approximately 50% of the total time spent in both cases. This finding highlights the importance of understanding traditional non-digital activities such as narrative and props and digital activities as complementary in the creation of multimodal digital stories, as highlighted by Burnett and Daniels (2016) and Kucirkova (2014). In a technology-mediated creation pro-

cess, meaning-making occurs as an entwined activity between non-digital and digital activities.

Teachers' Professional Digital Competence

The findings in this paper highlight the importance of having enough knowledge about digital technology to be able to reflect and make critical choices not only about how to include digital technology in pedagogical practice, but also about when to use technology in activities with the children (Alvestad & Jernes, 2014; Børhaug et al., 2018; Jernes et al., 2010; Stephen & Edwards, 2018). The teachers in this study included technology in a critical and reflexive way by adjusting the use of technology for the children and the activities. This indicates an understanding of how to use technology with the age group, and pedagogic reflections regarding techniques, working methods and equipment (Alvestad & Jernes, 2014; Mishra & Koehler, 2006). Thus, to have knowledge of pedagogy, content and technology is not enough; teachers also need knowledge of how to combine these elements in situ together with the children during the creation process as in professional digital competence and TPACK (Dardanou & Kofoed, 2019; Mishra & Koehler, 2006). Moreover, as also shown in this paper, creating a multimodal digital story can be accomplished without much previous experience in using digital technology with children, as one of the participating teachers was doing so for the first time. Both teachers have many years of experience as ECEC teachers but very little experience in creating multimodal digital stories; thus, they were eager to learn. Further analysis could be conducted to investigate which of the technological experience or the pedagogical experience and motivation is more important.

Conclusion

In this paper, two technology-mediated creation processes are explored and described. The analysis shows that in a creation process in which a group of young children and a teacher use digital technology to create a multimodal digital story, recording sound and sharing are most important for the children. Further, the creation process is characterised as a complex interplay of non-digital and digital activities. The findings in this study highlight the importance of seeing non-digital and digital activities as complementary and entwined activities in the meaning-making. The digital technology – the tablet – played an important role in this creation process by providing possibilities for editing, photographing drawings, recording sound, and animation. The tablet was used as a tool to create.

The study is an example of how two teachers used digital technology to create multimodal digital stories, in two different ways, together with groups of children. The findings draw on observable data and cannot offer any insights about the teachers' thoughts or reflections regarding their choices related to the creation process. Thus, there is a need for more research on the various aspects related to the creation of multimodal digital stories – for example, how the teachers involved the children and the interactions among the participants.

The findings from this study indicate that teachers' professional digital competence is an important factor when involving children in a creation process with digital technology, which includes their knowledge of how to use the technology during the process, integrated with pedagogical and content-based judgements and experience (Alvestad & Jernes, 2014; Børhaug et al., 2018; Dardanou & Kofoed, 2019; Jernes et al., 2010; Stephen & Edwards, 2018). Drawing on the results from this study, there is a need for more focus on aspects related to teachers' professional digital competence in ECEC and teacher education.

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Article II

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Teachers' pedagogical strategies when creating digital stories with young children

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ABSTRACT
Digital technology is a central part of young children's everyday lives in most societies today. This paper contributes to current research by exploring two teachers' pedagogical strategies when creating digital stories together with groups of six kindergarten children (age 4–5). The study has a qualitative, multiple-case study design. The analysis was performed inductively across the two cases. The findings show that when creating digital stories with young children, teachers' various pedagogical strategies are equally important for the process and product: *Inviting to dialogue, Explaining the practical,* and *Instructing for results.* An encouraging tone characterises the teachers' communication. The research findings contribute to knowledge of how teachers involve groups of children in technology-mediated story creation processes by highlighting the pedagogical perspectives when using digital technology.

KEYWORDS
Collaborative creation process; digital stories; kindergarten children; teachers' pedagogical strategies; digital technology

Introduction

This paper reports findings from a study exploring children's and teachers' collaborative use of digital technology in two Norwegian kindergartens, and contributes to contemporary research on the use of digital technology with children in early childhood education and care (ECEC). The purpose is to explore and describe the pedagogical strategies used by two teachers when they involve groups of six children (age 4–5) in collaborative, technology-mediated, story creation processes. The term digital story is used in this paper to refer to technology-mediated stories that are expressed and presented digitally through several modalities, for example, pictures, words, sounds (e.g. Kucirkova 2018). The digital stories that the participants created in this study were an e-book and an animated movie. In response to a call for more research regarding the youngest children's creation with digital technology (e.g. Burnett and Daniels 2016; Hsin, Li, and Tsai 2014; Marsh 2010), this study complements other studies in the field by emphasising the teachers' pedagogical strategies.

Digital technology is a central part of young children's everyday lives in most societies today (Chaudron, Di Gioia, and Gemo 2018; Medietilsynet 2018), yet 'only

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recently emerging in ECEC' (OECD 2017, 168). OECD describes digital technology as 'a learning tool to improve learning processes' (OECD 2017, 283), while UNESCO highlights creativity, curiosity, exploration, sharing, and problem solving in relation to digital technology (Kalas 2010; OECD 2017, 87). In Norway, teachers' pedagogical use of digital technology with the children is emphasised in the *Framework Plan for Kindergartens*, focusing on digital practices to 'encourage the children to play, be creative and learn' (Udir 2017, 44), in line with OECD (2017) and UNESCO (Kalas 2010). Further, the plan emphasises how staff can support and promote children's development and learning through child-centred play-based pedagogy by drawing on children's interests and experiences; group activities and children's active participation in society are highly valued (Udir 2017). We consider the process of creating digital stories a good opportunity for children to experience using digital technology in a collaborative process in which they can express their own meanings and ideas. However, research shows a lack of digital competence among Norwegian kindergarten staff, especially regarding pedagogical use of digital technology (Fagerholt et al. 2019; Fjørtoft, Thun, and Buvik 2019).

Previous research

The need for teachers to understand and have knowledge of digital stories to be able to support and help children in their creation of the stories is highlighted by several researchers (e.g. Fleer 2018; Klerfelt 2007; Leinonen and Sintonen 2014; Letnes 2014; Marsh 2006; Palaiologou and Tsampra 2018; Rowsell 2013; Undheim and Vangsnes 2017). Letnes (2014) emphasises the proximal teacher who interacts, supports, and communicates with the children during the process. There seems to be a need for the supporting teacher during the process to achieve the goal of creating a digital story, for example, to facilitate turn taking and coordinate activities (Fleer 2018, 955). According to Klerfelt (2007), it may sometimes be useful to give short instructions, for example, those related to technical aspects; thus, when creating the narrative, a complex and rich dialogue with children is important.

Several researchers have explored young children creating digital stories individually or in pairs, focusing mainly on digital activities (e.g. Klerfelt 2007; Marsh 2006; Petersen 2015; Skantz Åberg 2017; Skantz Åberg, Lantz-Andersson, and Pramling 2015). Other studies have explored the entire process of creating digital stories, including activities with and without digital technology (e.g. Fleer 2018; Leinonen and Sintonen 2014; Letnes 2014, 2019; Undheim Forthcoming). The technology itself does not improve the pedagogical situation; thus, it provides new opportunities in the context of digital stories, for example, for meaning-making, creation, collaboration, and sharing (Fleer 2018; Letnes 2014). To capture 'the special characteristics of how teachers use digital technologies for play, learning and development', Fleer (2017, 123) introduces digital pedagogy; to emphasise the importance of connecting and embedding the technology appropriately to the pedagogical practice.

However, most of these previous studies emphasise only the children or the activity, to a lesser extent the teachers. Hence, in our study, the knowledge of teachers' pedagogical strategies is highlighted. The research question driving this paper is as follows: *What pedagogical strategies are in use by two kindergarten teachers when they create technology-mediated stories with groups of children?*

Theoretical framework

Interactions between the participants and their collaborative contribution to activities are seen as important for quality learning and development in ECEC, according to sustained shared thinking (SST) (Siraj-Blatchford and Sylva 2004; Sylva et al. 2004). SST is explained as 'an episode in which, two or more individuals "work together" in an intellectual way to solve a problem […]. Both parties must contribute to the thinking and it must develop and extend thinking' (Sylva et al. 2004, 36). To listen to the children, respect their decisions and choices, observe body-language, show genuine interest, invite the children to elaborate, clarify ideas, suggest, remind, encourage, and ask open questions are central aspects within SST (Brodie 2014, 65), which can be interpreted as teachers' pedagogical strategies. SST is closely connected to the more competent other (Vygotsky 1986) and scaffolding (Wood, Bruner, and Ross 1976), which in play and everyday activities requires interpretation and guidance by the teacher in situ (Dewey 1902, 13).

Teachers' interactions with children can be seen as a combination of spacious and narrow interactional patterns, according to Bae (2012). A spacious interactional pattern is characterised by teachers who are attentively present in the interaction, focused on the children's attention, and open to meta-communicative signals; in contrast to a narrow pattern where the teachers are more in control of the situation. Children's experiences, participation, and opportunities to express thoughts and feelings are best supported by a spacious pattern (Bae 2012). To describe how teachers can actively support children when using digital technology, Plowman and Stephen (2007) introduce distal and proximal guided interaction. Distal refers to teachers' pedagogical framing and facilitating of activities, for example, planning and providing resources, while proximal refers to how teachers can directly support and help children, the direct face-to-face interaction, such as, explaining, instructing, prompting, supporting and providing feedback (Plowman and Stephen 2007, 18–19).

In this paper, we explore the pedagogical strategies used by two teachers during the creation process with groups of children by embedding SST, spacious and narrow interactional patterns, and guided interaction in the analysis.

Methodology

Research design

This study takes a qualitative multiple-case study approach, focusing on observable contemporary events in two collaborative processes (Yin 2014). Two cases are included, each consisting of one kindergarten teacher and six children (aged 4–5) who have created a technology-mediated story together. The collaboration between the participants and researchers is seen as important for the development and construction of empirical knowledge (Alvesson and Sköldberg 2018).

Participants

The participating teachers and children were recruited from a Norwegian research project; the teachers were invited by the authors, and the children were invited by the teachers (Mangen et al. 2019). Both teachers were female, age 44 and 47, with 15–20 years of

experience as kindergarten teachers. One of them had made a few digital stories earlier, but the other did it for the first time. The teachers were technically supported of how to make a digital story in a workshop held by the first author, prior to the research period.

Data collection

In both cases, the technology-mediated story creation started with a shared reading activity to inspire the children to create their own story and finished with a display of the completed product. Other activities during the creation process were, for example, creating narrative, drawing and creating props, photographing, animating, recording sound, editing, and watching the products (Undheim Forthcoming).

Based on experiences from a pilot study, we saw video-observation as a valuable method for capturing the multimodal complexity in the interactions between the children and teachers in situ. Video-observation is considered a valuable method for capturing layers of information that occur simultaneously by providing a rich source of information with temporal and sequential records of verbal and non-verbal interactions (see Cowan 2014; Flewitt 2006; Heikkilä and Sahlström 2003; Luff and Heath 2012). The kindergarten teachers were responsible for the activities during the process, while the first author participated as an observer, took notes, and video-recorded these activities. The researcher sat close enough to capture the verbal and non-verbal interactions and communication among the participants and artefacts without interrupting them physically; we are interested in the interactions among the participants.

This paper draws on video-observations of the activities (14 h of video from 18 days). Some utterances from the pre- and post-interviews and daily reflections with the teachers are also included, to offer insights into their reflections and explanations of the process.

Data analysis

The research question indicates an open approach to the empirical material, with a focus on the teachers' pedagogical strategies of how to involve the children in the creation process. The video-observations and interviews were transcribed by the first author (in Hyper Transcribe) (Researchware 2013), focusing on the content within the conversation and the verbal and non-verbal communication about and related to the activities. However, as with all transcriptions, these are re-presentations of the situations (Cowan 2014). To provide a rich description of the two cases and strengthen the construct validity, the empirical material was analysed at different levels and combined in several ways (Yin 2014, 121). The analysis was performed inductively, through a constant comparison analysis (Leech and Onwuegbuzie 2008), based on written transcriptions in NVivo (QSR International Pty Ltd. 2018) and by watching the videos. We started with a within-case analysis in each case separately, followed by a cross-case analysis (Creswell 2013). Some of the first codes of how the teachers involved the children in the process were to ask, confirm, describe, engage, explain, extend, fantasise, inspire, instruct, invite, motivate, organise, re-narrate, repeat, provide feedback, summarise, and wonder. These codes have been refined and adjusted several times, and grouped into broader categories. To ensure consistent coding, descriptions of the codes were included in a codebook; the pedagogical strategies presented in Table 1 is the final codebook, which is the result of a back-and-

Table 1. Codebook – teachers' pedagogical strategies.

Categories	Codes	Description of the code
Describing	Describe	The teacher describes how something looks, what happens (in the e-book and the animation movie), what the children are doing, etc.
Explaining	Explain	The teacher explains what they are going to do and why, answers questions and explains what something means
Instructing	Instruct	The teacher instructs the children by telling them what to do (without any explanation, short messages)
Inviting	Ask about facts	The teacher asks questions about facts related to the process and product
	Ask about opinion	The teacher asks questions about opinions, e.g. about who would like to do what
	Clarify ideas	The teacher clarifies ideas and gives the children a chance to confirm and explain more thoroughly
	Give choices	The teacher gives the children choices among different alternatives
	Inspire	The teacher inspires the children by presenting alternative viewpoints, new ideas, or suggestions
	Invite	The teacher invites the children to dialogue about the e-book, the drawings, or the narrative, and encourages the children to elaborate their thoughts and say more
	Repeat	The teacher repeats what the children have said, often in an asking tone, to encourage them to say more
	Wonder	The teacher encourages the children to wonder about things happening to the product or during the process, e.g. by asking open questions
Motivating	Motivate	The teacher motivates the children to start or continue, e.g. the conversation or an activity, verbally or non-verbally
	Encourage	The teacher encourages the children to look at something special, indirectly and directly
Organising	Organise	The teacher organises the activities and the children by telling them who is doing what and where
Providing feedback	Provide feedback	The teacher gives the children encouragements for efforts, verbally or non-verbally
Supporting	Support	The teacher supports the children's utterances and/or confirms that something is «correct»

forth process between the empirical material and theory. Several of the incidents were coded with two or more codes, indicating interconnections (Ritchie, Spencer, and O'Connor 2003) (Figure 1). As a way of looking for patterns and interesting aspects and develop a further understanding of the teachers' pedagogical strategies, a classical content analysis was also carried out (in NVivo) (Leech and Onwuegbuzie 2008).

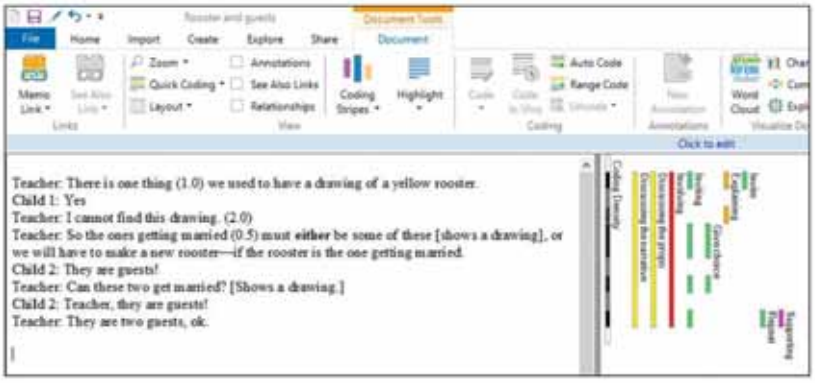

Figure 1. A screenshot from NVivo that shows the inductive coding of an excerpt from one of the cases.

Our interpretations are based on our pre-understanding and subjective experiences of past events which, in connection with theories, construct our horizon, as learned from the hermeneutical circle (Alvesson and Sköldberg 2018; Gadamer 2013). Transparent research requires reflexivity that includes a clarification of values and attitudes (Alvesson and Sköldberg 2018; Guillemin and Gillam 2004; NESH 2016). We are aware of our own pre-understanding, which has been reflected upon and taken into account through an iterative process in dialogue with the teachers (see Gadamer 2013; Jernes and Alvestad 2017).

Ethics

The Norwegian Centre for Research Data (NSD) has approved the study and all participants gave their informed consent. In line with other researchers in the field, we acknowledge the children as competent and knowledgeable participants (e.g. Danby 2017; Kjørholt 2005; Lunn Brownlee et al. 2017). To make sure the children understood the purpose of the study and their role, the first author visited both groups and spoke with the children prior to the data collection; why we wanted them to participate, what we wanted them to do, and their right to say *no* at any time (Danby and Farrell 2005). The children's consents were re-affirmed during data collection, which proved to be a good way to ensure the children's protection and active participation, in line with Danby and Farrell (2005).

Trust, loyalty and confidentiality are important for us; to ensure the participants' confidentiality, the names and other identifiers are anonymised. This is closely connected to being a reflexive researcher, in line with *EECERA's Ethical Code* (Bertram et al. 2015) and *NESH's Research Ethics* (2016). To validate the preliminary findings, the participating teachers were invited to a dialogue meeting in which preliminary reflections regarding the analysis were discussed. This meeting confirmed the analysis of the teachers' verbal and non-verbal communication and their different ways of involving the children during the process.

Results and discussion

In this paper, we focus on the pedagogical strategies used by two teachers when they involved children in technology-mediated story creation processes. First, we will present the process and the context, and we will then describe and discuss the teachers' pedagogical strategies.

The creation process

In case 1, one teacher and six children made an e-book called *The Wedding*; in case 2, another teacher together with six other children made a stop-motion animation movie called *Rapunzel* (Table 2).

During the creation process, the teachers prepared for various activities, for example, Props (e.g. drawing, painting, and creating clay figures), Narrative (e.g. composing and discussing the narrative), Animation (animating the scenes), Sound (e.g. recording narrator voice and discussing the recordings), and Product (e.g. watching the products and discussing them). These were the activities that they spent the most time on. Props and

Table 2. Presentation of the two digital stories.

Digital story	The story is about	Made of	Technology used
An e-book called *The Wedding*	A rooster who marries his dream princess and their large wedding	Drawings, paintings, photos, written text, music, songs, and narrator voice	iPad and Book Creator (Red Jumper Limited 2018)
A stop-motion animation movie called *Rapunzel*	Rapunzel who is trapped in a castle by her stepmother and rescued by a prince A troll, a monster, a lion and a leopard are also included	Duplo- and clay figures, written text, narrator voice, and music	iPad and Stop Motion Studio (Cateater LLC 2017) and iMovie (Apple 2018)

Narrative are examples of non-digital activities, without any use of digital technology, while Animation, Sound and Product are examples of activities in which digital technology was central (Undheim Forthcoming). A child-centred pedagogy was essential in all activities, which we will describe next to provide insight of the context.

Context: child-centred pedagogy

Both teachers mentioned children's participation several times during the pre-interviews, with references to the Framework Plan (Udir 2017). They clearly expressed that they wanted to involve the children as much as possible in the process. Both teachers had made a brief plan for the process; thus, they said that they were prepared to change their plan: 'I have **kind of** made a plan, but then I need to listen to the children and include their ideas'. Both teachers emphasised *the process* and *children's participation* as the two most important factors; they wanted the process to be enjoyable for the children. However, one of the teachers expressed that the completed product did matter for the children; creating a product that the children could enjoy and were happy to share with others was important for her. The children's interests are central in Nordic pedagogy (Udir 2017). Thus, the teachers' overall knowledge of the situation is equally important (Dewey 1902, 1963; Letnes 2014; Plowman and Stephen 2007); 'The planning must be flexible enough to permit free play for individuality of experience and yet firm enough to give directions towards continuous development of power' (Dewey 1963, 58). There was a clear link between the beginning and the end of both creation processes. The process took nine days in both cases, which gave the participants enough time to dwell on the process. The children were mostly eager to participate, but some of the children chose not to participate on some of the days; they would rather play or do other activities and used their right to say *no* (Danby and Farrell 2005).

Through an inductive analysis of how the teachers' involved the children, several pedagogical strategies were identified (Table 1). An encouraging tone characterised the interactions in both cases. In the following sections, we will describe and discuss the three most frequently used pedagogical strategies during the five activities that they spent the most time on: *Inviting to dialogue*, *Explaining the practical*, and *Instructing for results*.

Inviting to dialogue

During the process, we experienced both teachers as open-minded and child-centred, encouraging the children to participate actively and giving them time and space to contribute verbally and non-verbally; interpreted as inviting. The analysis of the videos shows that

inviting to dialogue was used as a pedagogical strategy by both teachers in all the various activities during the process; in eight different ways (Table 1). The words used by the teachers, their non-verbal communication, and their tone of voice all played a part in the analysis. The following examples from the empirical material illustrate the teachers' ways of inviting.

In *The Wedding*, one of the main characters was a rooster, drawn by one of the children early in the process. Some days later, the teacher could not find this drawing. She explained the situation to the children and invited them to a dialogue about what to do by providing them with several solutions: to make a new rooster or change the main character. The teacher found a drawing of two people and asked the children if one of them could be the main character. 'They are guests!' one of the children said. The teacher repeated the question: 'Can these two get married?' The child did not like the idea of changing a drawing of guests to the main character and clearly expressed this: 'They are guests!' The teacher repeated the child's answer and confirmed by saying 'ok'. The teacher then placed the drawing of the guests together with the other guests and re-focused the attention towards some other pictures.

In the *Rapunzel* case, the children created the narrative before they started to animate, but there were still many choices to make during the process. Sometimes the teacher invited the children to dialogue when they were animating by encouraging them to make a choice about where to move the characters: 'Where are they going now?' the teacher asked. 'I'm going in that direction', the child replied and moved the lion a step towards himself. Very often when animating, the children responded verbally and non-verbally to the teacher's questions, as shown in the example from *Rapunzel*.

During the process, unexpected things sometimes happened, for example, when one of the children clicked on the tablet and started the movie when they were animating. Both the children and the teacher started laughing, and the teacher asked in a wondering tone, 'What have you clicked on now?' Other times during animation, the teacher invited the children to dialogue by making a wondering comment, 'I wonder what happens now'. In this example, the child responded non-verbally to the teacher's comment by moving the character one step further.

Both teachers encouraged the children to participate during the process, verbally and non-verbally, by tuning into the children, listening carefully, observing the children's body language, asking open-ended, wondering questions, and asking questions to clarify ideas and understand. These ways of inviting the children to dialogue can be understood in terms of SST (Sylva et al. 2004). Both teachers expressed that they were interested in and respected the children's ideas and opinions, as shown by the example with the rooster and guests, which can be seen as an example of spacious interactional pattern (Bae 2012). The creation process developed during interactions among the children, teachers, materials, activities, and a clearly defined goal – to create a technology-mediated story together. The teachers expressed that they did not have the answers but needed help from the children; meaning was created during the interactions and discussions among the participants, as highlighted by Letnes (2014). Both teachers managed to establish joint attention with the children during the activities, which is a prerequisite for proximal guided interaction (Plowman and Stephen 2007). It seemed that each child felt respected and appreciated, in line with SST (Sylva et al. 2004) and spacious interactional pattern (Bae 2012).

Klerfelt (2007) and Plowman and Stephen (2007) describe digital activities as less dialogue-rich activities, with an absence of talk between teachers and children when children use computers. The analysis in this study, however, shows that the teachers deliberately invited the children to a rich dialogue in all the activities. These findings, in contrast to the other studies, might have been identified because the digital activities in our study were part of a collaborative creation process.

Explaining the practical

During the process, both teachers explained to the children what they were going to do and why, what something meant, and answered questions. The analysis of the videos shows that explaining the practical was used as a pedagogical strategy by both teachers in all activities during the process, with and without digital technology. Some of the children thought it was strange that they could create the story themselves, and the teacher had to explain, clarify and confirm this several times (Excerpt 1).

Excerpt 1, from *Rapunzel*:

Child 1: Can we decide?
Teacher: Yes, that's what I have told you, you are making this, I'm just helping you.
Child 2: Me too?
Teacher: You too! I am not making this. […] All I do is write down what you are saying.

When they were animating, the teacher often invited the children to dialogue about the activity by explaining what was happening, asking questions about what they were doing, or highlighting specific things as an invitation for the children to find a solution themselves. Other times the children needed help with seeing whether the characters were actually showing in the picture or not or needed a reminder that one of the children was still visible in the picture; a similar finding as in Fleer's (2018) study. The teacher sat next to the child taking the photos, looking at the tablet during the process (Figure 2). The children moving the characters were not able to see what was visible in the picture unless they moved towards the tablet. Sometimes the teacher helped the children by explaining how far they could move the characters (Excerpt 2).

Excerpt 2, from *Rapunzel*:

Child 1 is lying on the floor and Child 2 is standing by the chair (see Figure 2).

Child 1: [Moves the monster].
Teacher: There! Now the monster is in the movie! Then … you can take a picture [to the other child].
Child 2: [Takes a picture].
Teacher: Then you can move the monster a little, not much, just a little.
Child 1: [Moves the monster a little].
Teacher: Like that, not further, it is important not to take too … big steps.
Child 1: [Moves towards the tablet to see how it looks].
Child 2: [Takes a picture].
Teacher: Great!

The teacher explained several times where it would be best to sit and stand when they were animating, trying to avoid too many pictures with children in them. However, she also

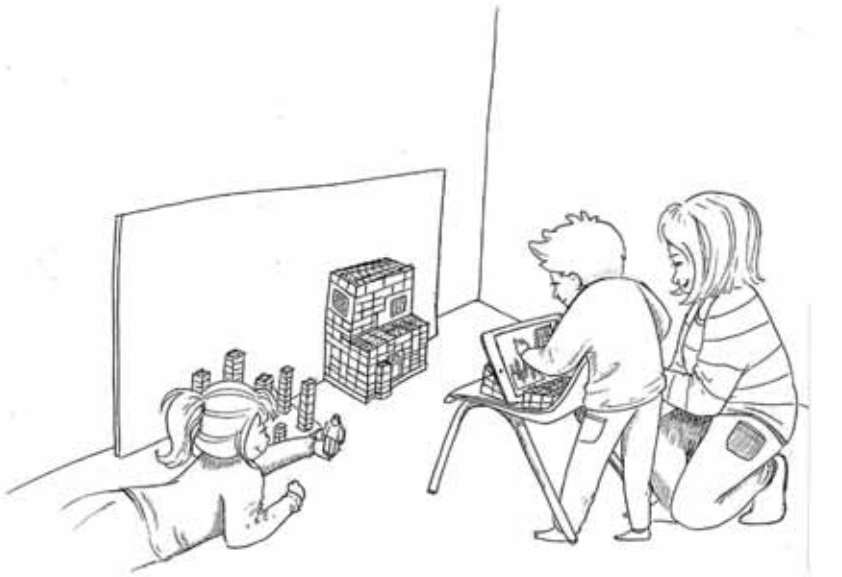

Figure 2. Animating one scene. Illustrated by Tilde Hoel Torkildsen.

explained that it did not truly matter because they could delete those afterwards when editing.

In both cases, when recording sound, the teachers explained what to do and why verbally as well as non-verbally by pointing. 'We can click there', the teacher said, 'It says *add sound*'. 'What does that mean?' one of the children asked. The text in the app was in English, which the Norwegian children did not understand. The teacher saw this as a valuable opportunity to highlight differences between the languages and explained what it meant. Sometimes the teachers showed the children where to click while explaining, as in this example, especially during the first times, but very often the teacher just pointed where to click.

As shown in the included excerpts, the teachers used explaining as a strategy to support and scaffold the children in the activities (Wood, Bruner, and Ross 1976); to support the children in experiencing and understanding the different steps in the process beyond what they could initially manage. There seems to be a larger focus on learning when the teachers used explaining as a strategy to involve the children, as opposed to when they used inviting.

Explaining the practical can be understood as a narrow interactional pattern, however, our analysis shows that very often the teachers used explaining in combination with inviting as in spacious interactional pattern (Bae 2012). The teachers involved the children in the process by first explaining and showing and then letting them do it by themselves, as in proximal guided interaction; other times the teachers supported the children by just being there, as in distal guided interaction (Plowman and Stephen 2007). The teachers were able to interpret their observations of the situation and the children and act in response to this, in line with Bae (2012) and Plowman and Stephen (2007); they were able to regulate when explanation was needed.

Instructing for results

When the teachers explained something to the children, they told them what to do and why. Sometimes they instructed the children by telling them what to do without any explanation. This was mostly done after the teachers had already explained to the children what to do and why. Typical ways of giving instructions were, 'Oh, there! Oh wait … we have to wait', 'Say *out of the picture*', 'Then you stop', 'New picture', and 'No, you must move out from the picture'.

Animation was the activity with the most instructing; there was hardly any instructing in the other activities. This was the first time that the children animated, and the activity took place on the floor, which made it easy for the children to bump into the props. The teacher explained where to sit and stand and why, but the children still needed some reminders during the activity to be able to finalise the product.

Excerpt 3, from *Rapunzel*:

Teacher:	… then Child 1 must move the stepmother … again.
Child 1:	[Moves the stepmother and moves herself one step back].
Teacher:	And say 'out of the picture'.
Child 2:	Out of the picture.
Child 1:	[Moves a little further].
Child 2:	[Takes a picture].

The children did as the teacher told them and seemed to accept the instructions (Excerpt 3); they seemed to recognise the teacher's communication in situ as meaningful and relevant.

Instruction is a central part of proximal guided interaction (Plowman and Stephen 2007) and was used as a way to scaffold the children in their creation process (Wood, Bruner, and Ross 1976), for example, on where to sit and stand. Instructing can be described as a narrow interactional pattern (Bae 2012); the teachers took responsibility and control of the situation. Thus, instructing is a necessary part of the process. Several times during animation, the children started to role-play with the props, which is in itself a worthy part of childhood, but in this particular process, it was important for the teacher to maintain the direction to finalise the product. Animation is a relatively demanding activity, with several things happening at the same time, as Excerpts 2 and 3 show. According to the analysis, it is important for progress that teachers take on the role as the more competent other (Vygotsky 1986) and sometimes use a slightly more closed dialogue. Instruction is not a commonly used term in child-centred pedagogy, but the teachers' use of instruction seems to be necessary to finalise the product (Bae 2012; Jernes 2013; Klerfelt 2007). Both teachers demonstrated, instructed and organised activities; thus, they also participated in joyful interactions with the children and gave positive feedback and support.

Conclusion

We have identified several pedagogical strategies used by the teachers in this study to involve the children, presented as three categories: *Inviting to dialogue*, *Explaining the*

practical, and *Instructing for results*. Both teachers invited the children to a rich dialogue during all activities; they showed genuine interest and respected the children's ideas and opinions and encouraged the children to participate actively, in line with SST (Sylva et al. 2004) and spacious interactional pattern (Bae 2012). The teachers explained the practical by supporting and scaffolding the children during the process (Plowman and Stephen 2007; Wood, Bruner, and Ross 1976) and by observing the children and regulating when explanation was needed (Dewey 1902). Explaining was often used in combination with inviting, combining narrow and spacious interactional patterns (Bae 2012). Sometimes the teachers instructed for results by giving short instructions (Plowman and Stephen 2007; Wood, Bruner, and Ross 1976), which seems to be necessary to finalise the product (Bae 2012; Jernes 2013; Klerfelt 2007). These findings are of special interest from a pedagogical perspective, by highlighting the pedagogy in technology-mediated creation processes, in line with digital pedagogy (Fleer 2017).

In contrast to findings from other studies, we found mostly proximal guided interaction in this study (Plowman and Stephen 2007); the teachers worked mostly directly with the children, which can be seen in relation to the concept of children's right to participation (Udir 2017; UN 1989). The children's interests are central, however, the teachers' overall knowledge of the situation is equally important (Dewey 1902; Letnes 2014; Plowman and Stephen 2007); this combination was taken care of in both cases by how the teachers involved the children in the different activities during the process.

In response to a call for more research regarding young children's creation with digital technology, the study contributes to other studies in the field by emphasising how the teachers involved the children. The findings draw on observational data from two cases and are supported by interview data. It would be interesting to discuss the findings more thoroughly with teachers, perhaps in an action-based research study. Another interesting perspective would be to explore the interactions among the participants more deeply, or the digital stories that were created.

The findings show that in technology-mediated story creation processes with young children, in which digital technology is used in some activities but not in all, teachers' various pedagogical strategies are equally important for the process and product. An encouraging tone characterised both teachers' communication during the process, when they invited the children to dialogue, explained the practical, and instructed for results. Inviting and explaining were used as pedagogical strategies during all activities, while instructing was mostly used during animation. In line with other studies within ECEC (Jernes 2013; Klerfelt 2007), the teachers' use of instruction during some of the digital activities seems to be necessary to achieve the goal of creating a technology-mediated story together. The findings contribute to knowledge of teachers' pedagogical strategies in collaborative, technology-mediated, story creation processes with young children. Implications for policy and practice might be to reflect and take into account new knowledge of children's participation in technology-mediated story creation processes, in which a combination of spacious and narrow interactional patterns is essential (Bae 2012); especially in a world where digital technology is emerging within ECEC and a central part of many young children's lives.

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Article III

Undheim, M., & Hoel, T. (Accepted with some revisions). An animated story created by a group of young children. *Journal of Early Childhood Literacy.*

An animated story created by a group of young children

This paper contributes to the contemporary focus on literacy and digital stories in early childhood education and care (ECEC). When a group of young children (4-5 years old) create an animated story together, they might collaborate, both with their peers and with their teacher. Still, we know little of how the animated story evolves through such a collaborative creation process and how different modalities contribute to the story. This study draws on social semiotic multimodal perspectives as the theoretical framework. The study is a qualitative case study, focusing on contemporary events in a Norwegian kindergarten. The empirical material consists of video-recorded field observations of the process as well as the final product; both the process and the final product are analysed. Through an exploration of the development of the verbal narrative, three analytical strands are identified: i) the verbal narrative in the final product, ii) the multimodal narrative in the final product, and iii) the literary devices applied by the children during the process. The research findings contribute to the knowledge of emphasising different affordances when children create an animated story, seen in light of prominent and less prominent modalities in the product; in particular, knowledge of the kineikonic mode.

Keywords: animated story, collaboration, young children, social semiotics, multimodal literacy, early childhood education, kineikonic mode

Introduction

Moving image:	A female character opens the door and walks into the woods.
Narrator voice:	"Once upon a time step-mother was going for a walk."
Moving image:	The female character moves through the woods.
Narrator voice:	"She walked and walked and walked."
Moving image:	The female character stumbles and falls on a small rock.
Narrator voice:	"And then she fell on a rock and didn't see anything."
Moving image:	The female character walks back towards the house, jumps up, and falls down.
Narrator voice:	"And then she went home again, she took a shortcut up and then she fell down and."
Moving image:	The female character opens the door and walks into the house.

This excerpt is from a stop-motion animated story collaboratively created by six children (age 4-5) and a teacher in a Norwegian kindergarten. The animated story is about a princess named Rapunzel, who is trapped in a house by her step-mother. The children have used elements from the fairy tale genre, and in the short excerpt, the step-mother walks from the house, into the woods, and then returns home. There are few other similarities with traditional narratives; it is free from conflict and tensions in the overall plot line. The narrator voice describes what happens in the story without elaborating the narrative. The children participated with

enthusiasm during the creation process. At the end, when the animated story was finished, the children clearly expressed that they were very proud of the product they had created together.

This paper investigates the various modalities used in the children's story. As such, it contributes to the contemporary focus on literacy and digital stories in early childhood education and care (ECEC). The use of digital technology in ECEC is a fast-growing field, with a call for more research regarding the youngest children's creation with digital technology (e.g., Burnett, 2010; Burnett and Daniels, 2016; Hsin et al., 2014; Marsh, 2010), digital stories (Garvis, 2016), and classroom-based early literacy learning with digital technology (Flewitt et al., 2015). When a group of young children create an animated story together, they might collaborate, both with their peers and with their teacher. Still, we know little of how the animated story evolves through such a collaborative creation process and how different modalities contribute to the story. The purpose of this paper is to describe and explore how different modalities contribute to the development of an animated story created by six children and a teacher in collaboration by focusing on both the creation process and the final product.

An animated story is a multimodal digital story expressed through several modalities (e.g., moving images, voice, music, pictures, and written text) and presented digitally (Kress, 2010). A specific characterisation of an animated story is the sequences of still images that create an illusion of movement, for example, to make a clay figure appear to be walking (Marsh, 2006).

Narratives, especially oral narratives elicited through shared reading and storytelling, have a long tradition in Norwegian kindergartens (Birkeland et al., 2018; Tønnessen and Hoel, 2019). The Norwegian *Framework Plan for Kindergartens* highlights the importance of conveying texts and stories to children (Udir, 2017). Young children today are increasingly engaged with digital texts and narratives, and digital books are one way to enrich children's literacy experiences (Kucirkova, 2017). Telling an oral story is a linguistic activity with its own culturally distinctive features and its own development; hence, creating an animated story using multiple modalities is also a literacy activity (Rowsell, 2013). Children's experiences with digital books and narratives can inspire children to collaborate and create their own stories (Flewitt et al., 2015; Kucirkova, 2019), including digital stories, as highlighted by the Norwegian Framework Plan for Kindergartens (Udir, 2017). When creating an animated story, children develop several skills, such as understanding narrative, multimodality and the genre of animation (Marsh, 2006: 506).

Previous research on young children (age 0-8) creating animated stories

There is a growing body of research on children's animated stories, mostly related to older children (e.g., Mills, 2008; Mills, 2011). Letnes (2014, 2019) and Fleer (2014, 2017, 2018) explore how groups of children have created stop-motion animated stories together with teachers or researchers, emphasising the interaction between the participants during the process. In one study, the kindergarten group had just finished a theme-period on pirates, and pictures from the process show that the pirate theme inspired the children to make an animated story about pirates (Letnes, 2014, 2019). The children created the narrative through dialogue and interaction with each other and the teacher; they discussed which characters to include and the actions of those characters and agreed on the story's main plot. Some adjustments were made when they animated the scenes. The animated story developed—and meaning was created—through an interplay of different modalities during the creation process (Letnes, 2014: 172). In Fleer's studies (2014, 2017, 2018), the children created animated stories based on well-known fairy tales; the children's role-playing was an important part of the creation process. Fleer expected the technical part to be most challenging for the children but found that it was most difficult for the children to conceptualise the story line, to place the objects within the view of the camera, and to take a series of photographs to make the animation sequences (Fleer, 2017).

A central element when creating an animated story, emphasised by several researchers, is the transduction process from an oral story to an animated story (Fleer, 2018; Letnes, 2014; Marsh, 2006; Palaiologou and Tsampra, 2018). Marsh (2006) explored young children creating stories individually; first the children planned the stories on paper, then they animated them. According to Marsh, key aspects of the children's paper-based narratives were maintained during the transduction from the paper-based narratives to digital media. However, some of the children found it difficult to understand how to create the animated movement; they tended to photograph the key aspects of the story, treating each picture as one scene, instead of photographing a series of still pictures to create an illusion of movement (Marsh, 2006).

While some studies mostly focus on the digital part of creating the animation (Fleer, 2014, 2017; Marsh, 2006; Petersen, 2015), other studies describe the process of creating an animated story from a wider perspective by focusing on both non-digital and digital activities during the process (Fleer, 2018; Leinonen and Sintonen, 2014; Letnes, 2014; Palaiologou and Tsampra, 2018). However, all these studies focus on the process, not the final product; it is

therefore unknown, for example, how the original fairy tales in Fleer's studies (2014, 2017, 2018), influenced the final products created by the children.

In a study of Norwegian 6- and 7-year-old children's language use in storytelling, Hoel (2016: 240) found that none of the 70 children's narratives had a complete and coherent plot structure. In another study, Nicolopoulou (2011) saw that when focusing on narrative form and semantic content, rigidly holding onto one narrative norm and ignoring the context in which the narrative is created, "the child's story is fragmented into elements that, taken in isolation, do not fully capture the point of telling and listening to stories," (2011: 31-32). As a result, it is difficult to capture the features that make the creation of narratives engaging and important for children. Both Hoel (2013) and Nicolopoulou (2011) emphasise the importance of viewing children's narratives in light of the social context in which the narratives are created, for example, the culture of kindergarten. Several researchers highlight the way children remix and build on previous stories, often inspired by popular culture, when creating their own stories (Hoel, 2013, 2016; Rowsell and Harwood, 2015; Sakr et al., 2018). Children's experiences with narratives through, for example, shared reading, oral fairy tales, and movies, influence how the children create their own narratives (Hoel, 2016).

This paper contributes to other studies on young children creating animated stories by emphasising both the creation process and the final product. The research question driving this study is as follows: *In what ways do the different modalities contribute to developing an animated story created by a group of children and a teacher in collaboration?*

Theoretical perspectives

Narrative theory

A central element of animated stories is the narrative, which can be defined as "extended discourse forms in which at least two different events are described such that the relationship between them (temporal, causal, contrastive, or other) becomes clear" (Ninio and Snow, 1996: 175). Narratives often consist of one or more characters who act, sequences of events leading to consequences or new events, and a plot (Bruner, 2003). In a traditional narrative structure, there is often a beginning, followed by a middle section and then a final section. In the beginning, the contact between the narrator and the audience is established, the characters are introduced, and the action is initiated. In the middle section, the action gradually builds up through sequences that build on each other and create a holistic plot; often something unexpected happens, or there is a breach. In the final section, there is usually a resolution, often with a direct link to the beginning, creating a whole and coherent narrative (Bruner,

2003). Narratives in children's literature and fairy tales often follow this traditional narrative structure, sometimes based on a home-out-home structure (Birkeland et al., 2018).

From verbal narratives to multimodal narratives

Barton introduces the ecological metaphor for literacy; he highlights "how literacy is embedded in other human activity," emphasising the need to see literacy in relation to social contexts and social practices (Barton, 2007: 32). Literacy used to be a term related only to reading and writing; however, digital technology has reshaped how we read, write, and create texts (Barton, 2007; Sefton-Green et al., 2016). Today, a one-sided focus on verbal language may be referred to as "mere literacy" (New London Group, 1996), in contrast to seeing communication as a combination of several modes, as in social semiotic multimodal perspectives (Kress, 2010; Kress and Jewitt, 2003; Kress and van Leeuwen, 2001).

Modes are semiotic resources socially made and used in a social context to create meaning; what counts as a mode in one culture may not be recognised as a mode in another culture (Kress, 2010). Each mode has specific affordances and potentials; pictures, for example, can give an overview, words can highlight action, while sound can create a mood. Sometimes the modes complement and highlight each other, for example, text and pictures in a picture book, a narrator voice and pictures in a picture book app, and sound and pictures in a digital story; other times, the modalities overlap and communicate the same message. The transduction from one mode to another is also essential, for example, from an oral story to an animated story (Kress, 2010).

In a creation process, there are many choices to make, and the focus moves from using to creating, foregrounding the choices the creators make during the process to communicate a message (Kress, 2010; Kress and Jewitt, 2003). Central questions are, "What do we want to express and why?" and "What modalities can we use, what are their affordances, and how can each mode contribute to the story?" (Tønnessen, 2012: 74, our translation). When creating an animated story, the children can experience how to create meaning through various modalities (Tønnessen, 2012), and the personal interest of the maker is central (Kress, 2010).

The kineikonic mode

A central element in an animated story is the animation sequences made of still pictures. However, from social semiotic multimodal perspectives, it is not the still pictures that are of interest but the motion created by these still pictures and the combination of these moving images with other modes, for example, moving images in combination with sound and/or text (Kress, 2010). To better understand the specific features of animated stories, Burn and Parker

(2003) introduce *the kineikonic mode*. The kineikonic mode "uses a range of semiotic resources to make the moving image, integrating them into the spatiotemporal flow by (re)designing and producing them within the spatial frame and the temporal sequence of the film" (Burn and Parker, 2003: 59). The kineikonic mode is an assemblage of various integrated modes used to communicate a message, composed in a coherent way through the various modalities (Burn and Parker, 2003). However, creating the connections between the spoken words and the visual images when creating moving images is often challenging, according to a professional animator interviewed by Rowsell (2013: 17).

In this paper, the children's animated story is seen in light of social semiotic multimodal perspectives (Kress, 2010; Kress and Jewitt, 2003; Kress and van Leeuwen, 2001) which consider communication to be a combination of several modes.

Methodology

Research design and participants

The study is a qualitative case study focusing on contemporary events in a Norwegian kindergarten (Yin, 2014). A group of six children (age 4-5) collaborated to create a stop-motion animated story with their teacher. The children's participation and collaboration were in line with the UNs C*onvention on the Rights of the Child* (1989) and the Norwegian Framework Plan for Kindergartens (Udir, 2017). The participating teacher and the children were recruited from another research project in Norway (Mangen et al., 2019). The teacher has 20 years of experience as a kindergarten teacher, but the animated story presented in this paper is the first stop-motion animated story she has made together with the children. Prior to the research project, the teacher attended a workshop on how to use freely available applications to create multimodal digital stories, including stop-motion animated stories.

Empirical data

The empirical material consists of video-recorded field observations of the process (6 hours of video from 9 days) and the final product. The creation process started with the shared reading of a digital picture book for inspiration and ended with a display of the stop-motion animated story (Undheim, Forthcoming) (Figure 1). After the shared reading, the teacher invited the children to talk about the digital picture book and the animated story they were going to make. The teacher encouraged the children to think of what they wanted to include in the narrative, supported the children by showing interest in their opinions, and, at the same time, inspired them by offering suggestions (Undheim and Jernes, 2020).

Figure 1: The creation process

All activities planned by the teacher during the creation process (Figure 1) took place in a separate room, with the six children, the teacher, and the first author present. The teacher planned and facilitated the activities, while the first author observed, took notes, and video-recorded the activities. The video recordings were used to capture the multimodal complexity, the different layers of information emerging at the same time, and the temporal and sequential records of the process, as undertaken in other studies before (e.g., Flewitt, 2006; Heikkilä and Sahlström, 2003).

Analysis

The video-recorded field observations from the creation process were transcribed by the first author, focusing on the content within the verbal and non-verbal communication during the activities, in Hyper Transcribe (Researchware, 2013). Then, an inductive analysis of the creation process was carried out, based on the written transcriptions and the videos, in NVivoPro (QSR International Pty Ltd., 2018). Inspired by Bamberg (2007: 173), the concept of "narratives-in-interaction" and what was happening "here-and-now" when the animated story was created were of special interest to us. This paper draws on incidents coded as the narrative activity, including dialogue about and adjustments related to the narrative during the process, for example, when the children and teacher were composing the story, making props, animating, and editing. The children's ideas related to the narrative and the animated story were categorised, focusing on who the characters were, what they were doing and where they were doing it, literary devices, and other elements mentioned by the children. To explore the

final product, a social semiotic multimodal analysis of the stop-motion animated story was carried out (Burn, 2016; Burn and Parker, 2003; Kress, 2010; Mills, 2011).

Ethics

Ethical guidelines, as stated by NESH (2016), were taken into account and followed during the entire research process. All the children and the teacher provided their informed consent. The children's assent to participate in the study was sought, acknowledging their role as active participants; this meant ensuring that they understood why they were invited to participate and what their role in the research was (Danby and Farrell, 2005).

Results and discussion

Through an in-depth exploration of the creation process and the final product, three analytical strands are identified: i) the verbal narrative in the final product, ii) the multimodal narrative in the final product, and iii) the literary devices applied during the process.

The verbal narrative in the final product

The final product is a two-minute stop-motion animated story with five scenes (Table 1). The children called it *Two Running Away* [To på rømmen], though they only talked about it as *The Rapunzel Movie*.

Table 1: The verbal narrative (narrator voice)

	English translation
Scene 1	Once upon a time (·) step-mother was going for a walk (0.01) she walked and walked (0.01) and walked (0.08) and then she fell on a rock and didn't see anything (0.02) and then she went home again (·) she took a shortcut (0.02) up (·) and then she fell down (·) and.
Scene 2	Ehm (·) once upon a time a >monster was walking in< (·) the woods (·) and then it (·) and then (0.01) it fell on a rock and hit its head and <got> up again (0.02) and then it walked towards the woods (0.01) and then (·) and then and then [laughter].
Scene 3	Once upon a time a troll was walking in the woods (·) he walked and walked and it was very windy (·) and then (0.01) we- (0.01) and then he became invi*hh*sible and fell (0.01) and then he walked (·) and into the house.
Scene 4	Em once <upon a time> (·) the lion and the leopard were fighting (0.02) (yes) (·) and then they walked through the woods (0.02) and then (0.01) and the–
Scene 5	Once upon a time the prince rescued the princess and he went into the house and the step-mother didn't see but then they went ·hhh and they fought (·) and then she was rescued and they went into the woods and disappeared.

The verbal narrative presented in Table 1 is a transcription and translation of the narrator voice in the final product. The transcription was first performed in Norwegian, in the children's dialect, and then translated to English; it is based on Jefferson's transcript symbols (2004: 24-31) (Appendix 1).

The narrator voice was performed by two children and was recorded as the children were watching the moving images at the end of the creation process. None of them had recorded their own voice for a voiceover in an animated story before. The verbal narrative presented may be described as a rendition of what the children saw happening in the animated story; the children took the role of impersonal observers who recounted events and commented from a third-person perspective. The verbal narrative consists of several genre-specific wordings or phrases, for example, "Once upon a time" [Det var en gang] and "Happily ever after" [De levde lykkelig alle sine dager] (Hoel, 2013). One girl started the first scene by saying, "Once upon a time." In the next scene, a boy expressed that he did not know how to start, and the girl suggested, "You can start by saying '*Once upon a time*'," and then he did so (Table 1). One could ask if the verbal narrative is five separate narratives, since every scene starts with the opening phrase "Once upon a time." However, the children were very clear that it was *one* story. In this specific case, the opening phrase seems to have much in common with "cue phrases", which, in writing research, are described as genre-signalling words or phrases, as a way to highlight the transition from one scene to another (Hoel, 2013). However, we interpret the use of "Once upon a time" as a way for the children to scaffold themselves to enter into narrator mode.

The children used elements from the fairy tale genre (introduction and repetition), and the verbal narrative in the five scenes has a home-out-home structure (Birkeland et al., 2018): several of the characters presented in the verbal narrative move from the house to the woods and then back into the house. Other than that, there are few similarities with traditional narratives (Bruner, 2003; Ninio and Snow, 1996). The story is free from conflict and tensions in the overall plot line; thus, some of the scenes are quite dramatic and humorous.

Based on the transcription of the verbal narrative in the final product (Table 1), one could say that the narrative is fragmented (Nicolopoulou, 2011). The use of the conjunction "and" to combine the different sections of the narrative is a common characteristic of a paratactic narrative style (Hoel, 2014). It is worth noting that the children did not verbally elaborate the narrative; they just said what was needed to describe what was happening in the moving images, without constructing a clear relationship between themselves and the audience. The verbal narrative does not reflect the children's everyday language competence

as it occurs in the video recordings from the process. The children had never made a stop-motion animated story before, and they had never recorded their voice for a voiceover before. They clearly expressed that they were unsure of how to do it, which probably influenced the final product.

In summary, the verbal narrative in the final product can be described as a rendition of what the children saw happening in the animated story; in addition, the verbal narrative is only one of the modes in this multimodal story.

The multimodal narrative in the final product

Two Running Away starts with a written text presenting the title. "News-inspired" music can be heard in the background; it is quite dramatic, indicating some action. The animated story takes place in the woods next to the house; in the middle of the woods, there is a very small rock. The children made the props and characters out of Duplo-blocks and clay. The framing of all of the scenes is composed of long shots, displaying the house, woods, and characters and most of the activity, which mainly takes place outside of the house (Figure 2).

The spatial relations between the characters and props can be seen as non-linear and random, and the narrator voice saying, "She walked and walked (0.01) and walked" indicates time. The story unfolds through four interrelated modes (Kress, 2010): verbal narrative (narrator voice), moving images, music, and written text. The combination of these modes in an animated story is described as the kineikonic mode by Burn and Parker (2003).

Figure 2: Still picture from the animated story displaying the house, the woods and the very small rock.

Table 2: Multimodal analysis of the final product, inspired by Burn (2016: 321)

Scene	Time	Framing	THE KINEIKONIC MODE					
			Verbal narrative (narrator voice)	Moving image		Music	Written text
				Mentioned by the narrator	Not mentioned by the narrator		
Written text	0.00	Data text on a still picture from the movie					
	0.01		Once upon a time (·) step-mother was going for a walk (0.01)			"News-inspired" background music	Two running away [To på rømmen]
Scene 1	0.04	Long shot: the house, and the woods with a small rock		The step-mother is standing by the open door.	Rapunzel is standing by the window inside the house.	"News-inspired" background music	
	0.07		she walked and walked (0.01) and walked (0.08)	The step-mother walks out from the house. She falls but gets up again. Then she walks towards and into the woods.			
	0.18		and then she fell on a rock and didn't see anything (0.02)	The step-mother falls on a rock but gets up again			
	0.23		and then she went home again (·) she took a shortcut (0.02) up (·)	The step-mother walks back towards the house. She jumps around the corner of the house and falls.			
	0.31		and then she fell down (·) and		Rapunzel is standing by the window inside the house. The step-mother gets up and walks towards the door and into the house.		

Scene 2	0.35	Long shot: the house, and the woods with a small rock	Ehm (·) once upon a time a >monster was walking in< (·) the woods (·) and then it (·) and then (0.01)	The monster walks into the woods.	The prince is hiding around the corner of the house as a spy. The step-mother is inside the house by the door.	"News-inspired" background music
	0.44		it fell on a rock and hit its head and <got> up again (0.02)	The monster falls behind a tree [partly on the rock]. It gets up again		
	0.51		and then it walked towards the woods (0.01) and then (·) and then and then	The monster walks out from the woods [away from the house].	Movement in the trees and a flower.	
	0.56		[laughter]		The prince moves forward as the troll is walking out of the movie.	
Scene 3	1.00	Long shot: the house, and the woods with a small rock	Once upon a time a troll was walking in the woods (·)	The troll walks through the woods. Several of the trees are moving.		"News-inspired" background music
	1.05		he walked and walked and it was very windy (·) and then (0.01) we- (0.01)			
	1.13		and then he became inv*ih*sible and fell (0.01)	The troll falls [next to the rock].		
	1.16		and then he walked (·) and <u>into</u> the house	The troll gets up and walks towards the house. The troll opens the door and walks into the house.		
Scene 4	1.23	Long shot: the house, and the woods with a small rock	Em once <upon a time> (·) the lion and the leopard were fighting (0.02) (yes) (·)	The lion and leopard are fighting.	Rapunzel is standing by the window inside the house. The prince and the horse are standing next to the house.	"News-inspired" background music

Scene 5	1.38		Once upon a time the prince rescued the princess	The prince comes riding on a horse through the woods, towards the house.	Rapunzel is standing by the window inside the house. The step-mother is standing on the house terrace.	"News-inspired" background music		
	1.43	Long shot: the house, and the woods	and he went into the house and the step-mother didn't see	The prince walks into the house.	Rapunzel opens the window. The step-mother jumps down from the terrace. The horse is standing by the door.			
	1.46	with a small rock	but then they went ·hhh and they fought (·)	The step-mother walks into the house.	Rapunzel is standing by the open window, inside the house.			
	1.49		and then she was rescued and they went into the woods and disappeared	Rapunzel and the prince come out from the house and ride together on the horse through the woods.				
Written text	1.53	Hand written text on paper	Living happily ever after			"News-inspired" background music	Living happily ever after [Lever så lykkelig alle sine dager]	
	1.56 - 2.02		The end				The end [Slutt]	

In all scenes, the attention is drawn towards the active character's movements (Table 2), which is displayed by the moving images and described by the narrator. There is a salient new character in each scene. In scene 1, the step-mother comes out from the house; in scene 3, the troll walks towards the woods. The narrator describes what we can see in the moving images, but also adds some new information, e.g., "she didn't see anything" when the step-mother falls on the rock (Table 2, scene 1). During the animation, the children re-organised the trees several times. When they watched the scenes afterwards, the teacher said, "How cool, we can see the trees moving!" "That's because it is very windy," one of the children replied. The child, who had narrated this part of the animated story, included the wind as a prominent element in the story by saying, "It was very windy" (Table 2, scene 3).

In three of the scenes, there are characters visible in the moving images that are not mentioned by the narrators: Rapunzel in scene 1, the step-mother and the prince/spy in scene 2, and Rapunzel, the prince and a horse in scene 4 (Table 2). Early in the process, when the children and teacher were composing the narrative, the children agreed that the story should be about Rapunzel who was trapped in the house by her step-mother. Since she was trapped, she had to stand by the window all the time, the children explained (Figure 3). When preparing the props for the animation, the children placed Rapunzel behind the window in the house. However, the narrator voice does not mention Rapunzel by name *at all* in the verbal narrative; thus, the character is mentioned in the last scene only as "the princess": "Once upon a time the prince rescued the princess."

Another character who is not mentioned in the verbal narrative but is visible in the moving images is the spy; he was added to the story during the process, when the teacher and two children were preparing the setting for scene 2. The children had placed Rapunzel inside the house, and one boy had placed the prince outside next to the house (Figure 4). They were discussing whether the prince should be included in the scene or not (Excerpt 1).

Figure 3: Still picture from the animated story, Rapunzel is standing by the window inside the house.

Figure 4: Still pictures from the animated story; the prince/spy is hiding around the corner in the picture on the left and standing by the corner in the picture on the right.

Excerpt 1: The children and teacher are discussing a character in scene 2.

Girl: He is not supposed to stand there! [Moves the character away].
Boy: But he has to be there!
Teacher: Then we must decide. Do you want the prince to be present in the first scene, or not?
Girl: Not!
Boy: No! [To the girl].
Teacher: Why do you not want him to be present? [To the boy].
Girl: That is not how Rapunzel is [referring to the Disney movie]. The prince must come in at the end, after he has been running, like this [she shows with her body how the prince must run].
Teacher: But if you want him to be present [to the boy], then maybe he can hide around the corner, like a spy?
Boy: Ok, just here then [places the prince at the corner of the house, as illustrated in Figure 4].
Girl: No, that is not how Rapunzel [she stops in the middle of the sentence]. **Yes**! It is supposed to be funny also! Then Rapunzel doesn't know.
Teacher: Then nobody knows that he is standing there. That makes it both funny and a little scary, like you wanted, since he is standing there spying.
Girl and Boy: Yes! [Laughing].

The two children agreed to include the prince as a spy in scene 2 (Excerpt 1). As shown in Table 2, the prince/spy is standing by the corner of the house or hiding around the corner as a spy in several of the scenes.

The analysis of the animated story shows that all modalities—the verbal narrative (narrator voice), moving images, music, and written text—contribute to the story and play important roles in the final product (Table 2). The interplay between different modalities is

also highlighted by Letnes (2014), focusing on the creation process, not the final product. Our analysis shows that the choices made by the children during the creation process and their interests strongly influenced the final product, in line with, e.g., Kress (2010) and Tønnessen (2012).

The analysis reveals that the verbal language has a central function during the creation process, in the shaping of the story (in negotiations, discussions and retellings of what is planned) but is less important in the final product. When recording the voiceover, the children did not verbally elaborate the narrative; they just said what they saw as needed to complement the moving images, taking the other modalities' affordances into account (Kress, 2010; Tønnessen, 2012). The analysis of the multimodal narrative in the final product may indicate that the moving images are the most important modality for the children, with the verbal narrative complementing the moving images. Thus, during the creation process, the children mentioned sound several times, for example, by saying "They don't talk!" The children watched the moving images as they were recording the narrator voice, and some of the characters moved quite fast, especially in the last scene; this might have given the children less opportunity to elaborate the narrative (Table 2, scene 5). Even professional animators find it difficult to create connections between the spoken words and the visual images when creating moving images (Rowsell, 2013).

Some might say that the verbal narrative is weakened in an animated story. However, we see this in relation to one's own understanding of literacy and narrative—as either "mere literacy" or "multiliteracy" (Barton, 2007; New London Group, 1996; Sefton-Green et al., 2016)—and an exclusive focus on the final product. Elements not mentioned verbally, for example, the spy and the name of Rapunzel, are visualised through other modalities, which can be seen as an example of "show, don't tell." The children clearly see the verbal narrative as a part of the whole product, which is an essential aspect of the kineikonic mode (Burn and Parker, 2003; Mills, 2011).

"Show, don't tell" may be seen as a literary device used by the children to highlight elements not mentioned verbally; the analysis shows that the children also used other literary devices.

The literary devices applied during the process

On the first day, when the teacher encouraged the children to think of what they wanted to include in the narrative (Excerpt 2), several of the children mentioned "scary" and "funny".

Tension and humour are common literary devices in children's literature and fairy tales (Birkeland et al., 2018).

Excerpt 2: The children and teacher are discussing the narrative on day 1.

Teacher: For tomorrow, maybe you can think of what you want to make a story about.
Girl 1: A scary story.
Boy 1: I want to make a funny story.
Boy 2: I will make a monster, a scary.

The following day, the teacher described what kind of story they had talked about the previous day: "Someone said they wanted the story to be funny. And someone said they wanted the story to be scary." The teacher explained once more that they were only making *one* story and asked the children if the story could be "both scary and funny." After some discussion back and forth between the children, they agreed and confirmed that they wanted to make a story that was both scary and funny. One comment by one of the children managed to combine the different ideas from the children: "Rapunzel is actually quite scary." Several researchers highlight the way children remix and build on previous stories when they create their own stories, often inspired by popular culture (Hoel, 2013, 2016; Rowsell and Harwood, 2015; Sakr et al., 2018). Our analysis emphasises the importance of foregrounding the children's choices during the creation process, in line with social semiotic multimodal perspectives (Kress, 2010; Kress and Jewitt, 2003).

Later, when the teacher re-focused the children's attention on whom the story was going to be about, they introduced several new characters, among them the "Booga Booga Monster" and "Scary Troll." Both the monster and the troll are mentioned in the verbal narrative and are visible in the moving images in the final product, representing the personal interest of the children (Kress, 2010). However, when watching the animated story, it is not easy to understand that they are scary. Both the monster and troll move quite statically; they were made of mouldable clay by the children, but when the clay dried, the figures were no longer movable (Figure 5). To underline the scary part, the children chose a "news-inspired" soundtrack as background music for the entire animated story; it was chosen from among several available soundtracks in the application because it indicated action and a scary mood. The music can be seen as having a complementary role to the moving images and verbal narrative (Kress, 2010), emphasising the scary part.

Figure 5: The monster and the troll made by the children.

In scene 3, a lion and leopard are fighting. When the children talked about these characters while composing the narrative, they started to role-play how the lion and leopard would fight. Later, when the children were taking the still pictures for the animated scenes, they started to role-play the fight with the figures. It appears that the children and teacher "forgot" to take pictures of the fight; the few still pictures they took from this scene were mostly located outside the view of the tablet. A similar finding was recorded by Fleer (2017) and Marsh (2006). According to Fleer (2017), it was difficult for the children to conceptualise the story line, place the objects within the view of the camera, and take a series of photographs to make the animation sequences. The time consuming and elaborated fight between the lion and leopard during the process in *Two Running Away* does not appear to be an important matter in the final product; however, during the creation process, this *was* an important matter for the children.

The children participated with enthusiasm during the creation process. At the end, when the product was finished, they clearly expressed that they were very proud of the animated story they had created together; observed by the first author and mentioned by the teacher.

Conclusion

In this paper, we describe and explore the development of an animated story created by six children (age 4-5) and their teacher. The analysis shows how the animated story evolves through this collaborative creation process and how different modalities contribute to the story. In contrast to other studies in the field, we have included both the process and the final product in the analysis. Three analytical strands are identified: i) the verbal narrative in the

final product, ii) the multimodal narrative in the final product, and iii) the literary devices applied by the children during the process.

The animated story consists of five scenes that all start with a narrator voice saying, "Once upon a time" (Table 1). This may indicate that the animated story consists of five separate stories, but the children were very clear that it was *one* story. Hence, "Once upon a time" may be interpreted as a way for the children to scaffold themselves to enter into narrator mode. Based on the transcription of the verbal narrative in the final product, one could say that the verbal narrative is fragmented (Nicolopoulou, 2011). However, when we explore the multimodal narrative in the final product, we see that the children do not verbally elaborate the narrative, they just say what is needed to complement the moving images; by drawing on each modality's affordances (Kress, 2010; Tønnessen, 2012). The analysis of the animated story shows that all of the modalities contribute to the story (Kress, 2010) and play an important role in the final product: verbal narrative (narrator voice), moving images, music, and written text. The combination of these modes is described as the kineikonic mode, in which the interrelations between the modes are emphasised (Burn and Parker, 2003) (Table 2).

Some might describe the verbal narrative in this animated story as weak and fragmented, drawing on an understanding of literacy and narrative as "mere literacy" (Barton, 2007; New London Group, 1996; Sefton-Green et al., 2016). However, elements not mentioned verbally—for example, the spy and the name of Rapunzel—were in the animated story visualised through other modalities in line with the literary device of "show, don't tell". By drawing on an elaborated understanding of literacy and narrative as "multiliteracy" (Barton, 2007; New London Group, 1996; Sefton-Green et al., 2016) and including the process in the analysis, we see the verbal narrative in the animated story as one important part of the whole, which is in line with the kineikonic mode (Burn and Parker, 2003; Mills, 2011). An animated story is a way to communicate; the narrator voice can be seen as a way to include the audience in the narrative and highlight some important elements, for example, the step-mother hitting her head and the wind moving the trees. Thus, it seems to be difficult for the children to look at the animated story from another person's perspective and construct a clear relationship between themselves and the audience.

The use of digital technology in ECEC is rapidly growing, with several researchers calling for more research on the youngest children's creation with digital technology (e.g., Burnett, 2010; Burnett and Daniels, 2016; Hsin et al., 2014; Marsh, 2010), digital stories (Garvis, 2016) and classroom-based early literacy learning with digital technology (Flewitt et

al., 2015). In this study, we performed an in-depth analysis of the creation process by drawing on observational data from the process, and multimodal analysis of the final product. Another possible way to explore the development of the animated story could be to analyse the story based on time and space (e.g., Burn and Parker, 2003; Mills, 2011).

The children participated with enthusiasm during the creation process. The literary devices of tension and humour played an important role for the children during the entire process; in this way, the children's personal interests strongly influenced the final product (Kress, 2010). These findings emphasise the importance of one's keeping eyes and ears open for the magic in young children's creation processes, including and considering the process, the product, and all of the modalities—all of which are aspects that contribute to the animated story. The findings from this study contribute to the knowledge of emphasising different affordances when children create an animated story, seen in light of prominent and less prominent modalities in the product; in particular, knowledge of the kineikonic mode in an animated story is important.

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Appendix

Appendix 1: Glossary of transcript symbols (Jefferson, 2004: 24-31)

Transcript symbols	Explanations
(0.0)	*Numbers in parentheses* indicate elapsed time by tenths of seconds.
(·)	*A dot in parentheses* indicates a brief interval (±a hundredth of a second) within or between utterances.
____	*Underscoring* indicates some form of stress, via pitch and/or amplitude. A short underscore indicates lighter stress than does a long underscore.
–	*A dash* indicates a cut-off.
> <	*Right/left carats* bracketing an utterance-part indicate that the bracketed material is speeded up, compared to the surrounding talk.
< >	*Left/right carats* bracketing an utterance-part indicate that the bracketed material is slowed down, compared to the surrounding talk.
·hhh	*A dot-prefixed row of 'h's* indicates an inbreath. Without the dot, the 'h's indicate an outbreath.
wo*hh*rd	*A row of 'h's within a word* indicates breathiness.
(word)	*Parenthesised words and speaker* designations are especially dubious.
[word]	*Brackets* contain transcriber's descriptions or the original Norwegian text.

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