Guidelines for Digital Storytelling in Early Childhood Education

STORIES
media & language

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Table of Contents page

1. INTRODUCTION

The STORIES project aimed to carry out an action study and a research involving a large number of educators and teachers and preschool children. Drawing on the experience and guidance of researchers and scholars, educators and teachers planned and presented digital storytelling projects to the children involved. The macro-objective of the project was to recognize the educational and didactic aspects that characterize the good practices of digital storytelling in preschool age. Furthermore, there were many micro-objectives: to encourage media literacy, to foster children's narrative skills and to promote educators and teachers' skills in using technology for educational purposes.

Several partners were engaged in monitoring the experiences.

Four countries (IT, DE, TK, FI) and six partners were involved in the project.

COOPSELIOS (IT) was the project coordinator. It is a cooperative of services to the person and to infancy, leading body in pedagogical innovation, leveraging on and originally reinterpreting the well–known Reggio Emilia Approach. Coopselios ECEC services (infant–toddler centers and preschools) have many educators and teachers already trained on the storytelling paradigm/techniques, and participated in several projects introducing digital media at kindergartens.

UNIVERSITY OF MODENA AND REGGIO EMILIA (IT). It has experience in national projects about text comprehension / storytelling with preschool children, using visual and audiovisual materials. Furthermore, it participated in the previous EU project CREANET for developing a creativity framework in ECEC, particularly valuable for the work with media.

COMPUTER LEARNING (IT). It is a Cooperative society expert in following any organisation (especially school institutions) in the process of acquiring and introducing new media technologies and devices according to their everyday life needs and practices. Computer Learnig provided the I-Theatre to some of the schools that participated to this project. I-Theatre is an interactive and integrated collaborative learning tool, based on digital storytelling, designed specially to young children aged 3 to 10 years. The overall interaction is simple and intuitive: it does support the animation making process by using a basic visual language and a tangible interface, based on objects that suit the way children naturally experience the world, connecting it with the enthusiasm related to brick-building games.

JYVASKYLAN YLIOPISTO (FI). The research team has both coordinated and participated in many national and international projects dealing with educational technologies. The team already worked in partnership with University of Modena and Reggio Emilia within the aforementioned EU project Creanet, investigating the relation between creativity and technology in the ECEC context.

MIMAR SINAN FINE ARTS UNIVERSITY (TK). The research group has competence in EU projects; ranging from Educational Sciences (allowing cognitive science ob-

servations) and Graphic Design. It collaborates with University of Modena and Reggio Emilia in projects with local schools aimed at promoting and assessing children creativity at all levels.

PÄDAGOGISCHE HOCHSCHULE KARLSRUHE (DE). The research group is specialized in language learning in ECEC and media education. The university is involved in projects focusing on the use of DST for foreign language learning (English), in partnership with local schools, working in strong synergy with educators and external cooperation.

2. DST AND MEDIA LITERACY IN ECEC

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2.1 When the narration meets the technologies: the DST. An educational perspective

Children are now born into a media–dominated society. From very early infancy, they interact with technology so much that they are often referred to as "digital natives". Nevertheless, such early exposure and familiarity with technology does not necessarily translate into digital competency. The STORIES project explores this context, aiming to provide an opportunity to promote media literacy in kindergartens.

In particular, the STORIES objective is to contribute to the development of digital competency through digital storytelling by combining, as the name suggests, digital tools with narration.

Mankind has been handing down knowledge since the beginning of time. Stories continue to be a way of teaching children. By telling stories to children, adults create an experience and invite the child to tell stories, cultivating their ability to understand and invent stories.

It is possible to explore the digital storytelling framework through two key words: *media literacy* and *narration. Media literacy* regards the fact that digital storytelling implies the use of technology. From a very early age, despite regularly using and interacting with technology, young children do not possess digital competency as an inborn skill (Prensky, 2000). Promoting it means forming individuals who will be able to use technology independently, critically, functionally and intentionally. This is a strategic educational objective, part of the broader skill set referred to as active citizenship. More precisely, the literature reports that media literacy concerns the use of media and production with the media. Furthermore, it relates to affective and attitudinal components (*Dezuanni, 2015; Palsa, 2016*). Media literacy can be considered as the product of media education. Media education is the process that supports the development of media literacy (Buckingham, 2003). Media education proposes digital storytelling as a possible path and a possible tool for the development of media literacy.

Storytelling presents two different sides (Rollo, 2007). On the one hand, it means listening to stories being told; for instance, the many occasions children have to listen to adults telling them stories. Stories provide an opportunity to interact with an adult, to feel emotions, to get to know and to experience the world in an indirect and safe way. On the other hand, the word storytelling refers to the process of making up the stories. The Erasmus+ STORIES project uses this second definition of storytelling in order to promote children digital and narrative competency and to enhance educators and teachers' competence to use technology for educational purposes. Constructing stories is a "natural thing and action" to do for humans, in virtue of the narrative thinking we possess and which al-

lows us to explain and understand our world, as well as to organize knowledge using the narrative form. According to Bruner (1986–1996), both adults and children are capable of narrative thinking. This means that the human species tends to organize and explain our experiences by creating narratives. Children are competent storytellers thanks to the narrative thinking skills they can draw on, that also emerge through symbolic play (Yuksel, 2011). When children pretend to be doctors, for example, they are making up a story. In Vygotskij's idea of creativity (1962), making up stories is also a creative act, because in order to do it children must combine the things they know to create something new. This invention has to happen within given boundaries, namely those regarding the organization of the stories' grammar. Therefore, making up stories is an open task which allows children to act freely (the freedom to make up any plot they want) but within a number of restrictions framing thought and action.

Inviting children to invent stories (storytelling) means nurturing their narrative thinking as well as a variety of other skills, including linguistic and creative ones. Digital storytelling also stimulates digital competency. Making up stories means activating prior knowledge and using materials to build new narrative sequences. The process allows children to acquire new knowledge about the world and to consolidate the knowledge they already have (Barret, 2006). Moreover, it enables them to acquire or consolidate their skills (digital and narrative) through action. Ausubel (2000) would call this process "learning by discovery" (as compared to mechanical learning).

Digital storytelling is therefore the practice of making up stories and telling them in more than one language: verbal, visual, audio and digital.

According to the Digital Storytelling Association (2002), «Digital Storytelling is the modern expression of the ancient art of storytelling by using digital media to create media– rich stories to tell, to share, and to preserve».

In a similar way, Garretty (2008) states that the Digital storytelling is the result of the combination of storytelling and digital tools: «Digital storytelling combines the art of telling stories with digital tools such as graphics, audio and video» (Garrety, 2008, p. 6).

There are many definitions of digital storytelling, but in general terms it is defined as «telling stories and sharing information with multimedia tools and resources» (Yuksel, 2011).

A digital story is a media artefact. It is a story told using – in an integrated and combined way – the sound channel (verbal language, sounds, etc.) and the visual channel (images, videos, graphics, etc.). Moreover, it is a story recorded and shared trough digital media (Boase, 2013; Garrety, 2008). According to Robin (2008 in Yuksel 2011), it is the practice of using digital tools to tell a story.

According to Boase (2013) and Yuksel (2011), the *power* of digital storytelling derives precisely from the combined use of different forms and channels of communication. Moreover, the final product that is obtained has the advantage of being more durable in time, more accessible and more easily transferable. Dig-

ital storytelling is a very powerful communication tool, as new digital technologies have become less expensive and more widely available to larger numbers of people (McLellan, 2006 in Yuksel 2011).

Garrety (2008) distinguishes five kinds of digital storytelling employed and employable in school, from primary to higher education:

— *Traditional digital storytelling*: the students tell a story about personal events and experiences of their lives. In this sense, Meadows (2003) describes the digital stories like: «Short, personal multimedia tales told from the heart».
— *Digital stories of learning*: the student describes a content–knowledge. Digital storytelling becomes a tool that supports learning, because it forces students to deal in non–superficial content: to synthesise it, to turn it into a story, to tell not only with words but also with pictures and sounds. The product of this process can be understood as the *story of an individual's learning* (Garrety, 2008).
— *Digital stories of project–based learning:* in this peculiar type of digital storytelling the focus regards the process related to the construction of the story. Both project–based learning and digital storytelling adventures call for complex learning environments that focus on meaningful engagement with real–life problems (Season 2005, in Garrety 2008 p. 19).
— *Digital stories of social justice and culture*: where the student builds and tells stories on issues concerning justice, community development and culture.
— *Digital stories of personal reflection*: in this case, the digital storytelling is to be intended as a tool to support reflective practice.

STORIES proposes to understand better how in preschool contexts it is possible to support children in the production of digital stories both experiential and fictional.

Several authors claim that digital storytelling can be considered as a *method*, a strategy that can be used in a variety of ways and with many different possible outcomes. According to Boase (2013), it's a method for using digital devices *to support the educational process.*

2.2 How to support children in the construction of digital stories? A literature review.

To answer this question, the STORIES research group has covered two paths: the analysis of international literature and the analysis of some DST practices conducted in ECEC.

The literature states that it's important that the practice of digital storytelling is built on and from a story: «The Importance of having a story at heart of a digital story — with a beginning, an end and some development and interest between

5

this points» (Boase, 2013, p. 2). At the heart of digital storytelling there is a story, (a text, not a description), ruled by temporal and causal links. We can think of a story as a chain of events (Mishler 1995 in Boase, 2013). This implies that in a story there are causal links and thematic coherence, as well as a temporal order (Rollo, 2007). The story, moreover, is characterized by *a plot*. The plot combines the events on the whole story (Boase, 2013). In addition, the story must have a *general meaning*. For this reason, when we create a story, we have *to select the information we want to tell*: we have to choose what to show. Indeed, a story does not replicate reality, depending on what you choose to tell and from what "angle" you show different aspects, and gives rise to "teachings" /different meanings (Boase, 2013).

The Centre for Digital Storytelling (2010) has been very influential in identifying the *major components of a digital story* by breaking the creative process into *seven steps* (which are aspects that characterize the digital storytelling). This process, known as "The Seven Elements of Digital Storytelling" includes the following components:
— A Point of View showing the purpose and the author's perspective of the story;
— A Dramatic Question arouses the audience's curiosity and will be given an explanation by the end of the story,
— The Emotional Content involves the audience in terms of the emotions;
— The Gift of Voice is a voice (tool) that helps the audience understand the story;
— The Power of Soundtrack is the music that supports the story;
— Economy avoids overloading the viewer with excessive use of visuals and/or audio;
— Pacing provides a rhythm to the story and deals with how slowly or quickly the story is told (Centre for Digital Storytelling, 2010 in Yuksel 2011, Barret, 2006).

Hall (in Yuksel 2011) states that it is possible to support young children in the invention of stories in three different ways:
— The first way is *self–recorded stories*. In this type, children have self–recorded what they want to say in a story. The teacher *can tape record* the children telling their stories. Although young children have difficulties creating precise tales, they have the advantage of hearing their own voices when creating stories. In this technique, Hall suggests some rules for educators and teachers. "The major rule is that children *must not listen to their story immediately,* after they have recorded it" (Yuksel 2011, p. 87). According to Boase (2013) claims that at the first time children invent the story and then educators and teachers audio–record or write the story. Later, children hear the invented story. This listening is the basis for the next elaboration, revision and realisation of the story in digital form.

— The second way to tell a story is through *adult recorded stories.* In this type of storytelling, the adults type young children's words and *frequently repeat the words to them* (such as reflective listening, 1951). Hall (2001) stated: «The process of typing the stories was itself revealing about children's ability to control their language» (in Yuksle 2011, p. 90). In this case, the adult recorded story is a procedure educators and teachers may follow to create their digital stories.

— The third way is *symbolic play as storytelling*. In this type, children create their stories during their sociodramatic/pretend play. This is a collaborative storytelling experience. Hall (2001) described this way of telling story as «a complex phenomenon, and the fact that it often happens relatively spontaneously and seamlessly is a compliment to children's intellectual and narrative abilities» (in Yuksel 2011, p. 96).

The second way proposed by Hall (in Yuksel 2011) to support the invention of stories by children is similar to the *storycrafting method* (Karlsson, 2013). This method has been used with subjects of any age, in individual or group contexts. In this method, the adult encourages children to invent a story. While children speak, the adult writes "word for word" what children say. When children have finished speaking, the adult re-reads the invented story, without evaluating and in a way that looks like the verbal "verbal mirroring" (reflective listening) technique (Rogers, 1951, 1982). While listening to the story, children can edit it. The final version of the story has been offered to an audience of adults or children who do not know the story.

According to Petrucco and De Rossi (2009), the storyboard technique can facilitate children in the process of converting an orally invented story in a digital text. Children who use the storyboard technique draw a sequence of images, which represents the story they have invented previously in the oral form. The digital story comes through the integration of the sequence of images with the oral history. When children create the storyboard, they draw a sequence of images-that tells the story.

Usually, the invention of the stories is supported and facilitated by the use of *open questions.* The teacher, with a few well–designed open questions, can support the construction/invention of the stories (Boase 2013).

Fantasy, in the invention of stories, can also be supported by the "fantastic binomial" technique (Rodari, 1973).

Garrety (2008), Petrucco and De Rossi (2009), Yuksel (2011) and Boase (2013) indicate that in the practice of digital storytelling it is useful to invite the children to work in *small groups*.

Since inventing stories requires a certain level of creativity, the STORIES group has also carried out a review of the literature regarding the didactic aspects that can support the creative attitude in the preschool context. Some elements emerge as important from this review:

- The organization of an extended time in which children can think, create and review their productions.
- A space that changes during the time, accompanying and supporting children's growth and learning processes.
- The presence and availability of different non-structured materials. Proposing to small groups of children problematic situations open to various modalities of resolution.
- Supporting the connected use of multiple languages.
- Finally, the presence of a non-judgmental adult who accompanies children during their experiences.
- An adult who predisposes a project taking into account the ideas and hypotheses of children (Gariboldi & Catellani, 2013).

2.3 The analysis of some good DST practices carried out in the world before the STORIES project.

After the study of the reference literature (summarized briefly above), STORIES research group collected and analyzed nineteen practices, fourteen from European contexts (Italy, Finland, Germany and Greece) and five from non–European contexts (Turkey and Australia). These practices were documented or published between 2009 and 2016. Practices are published in journals and books at the national or international circulation. Few practices are available only from internal documents and material in schools (more examples of good practices are indicated in Bertolini & Contini, 2018).

The collected material has been explored in order to gather information about the following main themes: organization of time, organization of space, materials used, technology involved, narrative incipit, strategies to develop the story and adult role in the educative process, social dimension of the activities and main critical points.

The 19 best practices collected and examined were primarily conducted in order to promote technological, communicative (narrative, linguistic or sometimes even a second language) and social skills.

The practices examined were carried out over long and extended periods (more than three months) in both open and closed spaces. In some cases, they were carried out in specific spaces: workshops set up specifically to perform digital storytelling. In most cases, they involved small groups of children who were asked to make up new stories based on stories they already knew (such as Elmer or folk tales) or popular contexts (the sea and the things living in it). Often, the children were firstly asked to think up the theme of the story, then to produce the visual part (drawings, photos, etc.), and only at the end to combine the two technologies, in order to make the story digital. The technologies used most often were digital cameras, both for taking photos and making videos, computers with videomaking tools, I–theatre, which combines a variety of technologies (to elaborate both visual and audio content) and an overhead projector to show to

the children the stories produced during and at the end of the process. Adults often acted as supervisors and the children were given multiple opportunities to reflect on and modify their work.

The educators and teachers involved in the examined practices discussed the difficulties they encountered in terms of organizational issues (time and space) and their own limited technological skills. It was therefore clear that, in order to support and coordinate children's digital storytelling, educators and teachers need to know more than just how to make up a story. The more training is provided to educators and teachers, the more effective digital storytelling activities will be; when adequately prepared, educators and teachers could not only explain the character and specific nature of the storytelling, but also move more freely in digital worlds, use multiple languages and solve organizational problems regarding time and space (Bertolini & Contini, 2018).

The review of the literature and the examination of good practices in the literature (which constitute the IO1) are corporated into the training model for educators and teachers which was developed in theSTORIES project .

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3. DIGITAL STORYTELLING IN EARLY CHILDHOOD EDUCATION: A TRAINING MODEL FOR EDUCATORS AND TEACHERS

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3.1 Introduction

Within the STORIES project a competence-oriented training model for digital storytelling (DST) was developed. It is oriented towards national and international educational policies and thus, aims to contribute to the quality and transparency in early childhood education trainings and programmes (cf. Fröhlich-Gildhoff et al. 2011).

The training model was implemented in all partner countries to qualify the educators and teachers for the DST-projects. A time frame of 20 hours was set in advance. Due to the different framework conditions between the partner countries, a modularised training was developed to ensure the most flexible individual adaptation to local conditions. Furthermore, a modularised training supports the transparency and permeability of the educational system enabling a wide range of occupational development opportunities as demanded in scientific literature (e.g. Oberhuemer 2008).

3.2 Competencies in ECEC

The competence orientation also claimed for ECEC is linked to a shift from input- to output orientation. The output orientation focuses on action competencies to be acquired and not on content to be taught by teachers/trainers (input). Referring to such output orientation, the European Qualifications Framework (EQF) aims to improve comparability of learning outcomes and thereby, to make educational paths more permeable and internationally connectable and comparable (European Commission 2017, Fröhlich-Gildhoff et al. 2011). This should facilitate lifelong learning, ensure the quality of services and thus, contribute to professionalization.

Professionalism can be defined as conscious action that is reflected and justified from an informed perspective. Thus, professional action goes beyond competent action insofar that professional action always is reflected action (Fröhlich-Gildhoff et al. 2011). Critical reflection is often considered the most important element of professional action (Urban 2008, cf. CoRe 2011a). Professionalization is a constant process in which one's own practices and beliefs are constantly questioned in relation to changing contexts. It can therefore be seen as a lifelong process.

There are countless definitions of the concept of competence in scientific literature that vary greatly depending on the subject area (Fröhlich-Gildhoff et al. 2011, Weinert 2001a, Klieme, Hartig & Rauch 2008). Weinert defines competencies as "the cognitive abilities and skills that individuals have or can acquire in

order to solve certain problems, as well as the motivational, volitional and social components and abilities that enable them to use these solutions successfully and responsibly in various situations" (Weinert 2001b, 27). This concept of competence considers psychosocial resources (cognitive, practical, motivational, emotional and social components) and contexts as essential parts of competence and can thus be understood as systemic and dynamic (Klieme, Hartig & Rauch 2008). Thus, competence cannot be limited to a cognitive dimension. Competencies are considered a multidimensional concept consisting of several components such as knowledge, skills, attitudes, creative skills, motivation and values (Weinert 2001a, 2001b, CoRe 2011a, European Commission 2018a, 2018b, OECD 2005).

The definition of competencies for educators and teachers in ECEC is dealt with in "Study of competence requirements of staff in early childhood education and care" (CoRe) (CoRe 2011a, 2011b). CoRe aims to define Europe-wide competence requirements and thus, to bring together the historically different educational systems of the individual European countries (see Oberhuemer, Schreyer & Neumann 2010) in a Europe-wide early childhood education professional profile. As part of the CoRe project, a systematic analysis of international scientific literature was realised on the basis of which competencies for educators and teachers in ECEC were defined.

CoRe considers competence as an important concept that is of central importance for understanding professional practice in early childhood education. Competence is looked at multi-dimensionally and systemically: Competence involves the dimensions of knowledge, practices and values that unfold at all levels of the educational system. CoRe considers four dimensions of professional competencies: 1. individual competencies, 2. institutional competencies, 3. inter-institutional and inter-agency competencies and 4. competencies of governance. CoRe places critical reflection at the centre of professional competence as only critical reflection enables the combination of the dimensions of knowledge, practice and values. The intention of such a definition is to turn away from a technical view of things to a reflective perspective (CoRe 2011b).

Since the training model developed within the STORIES project shall be applied in various European countries, the following explanations are based on CoRe. Only an international framework can meet the demand for mobility, transparency and permeability (cf. Fröhlich-Gildhoff et al. 2011).

Along the structural elements of CoRe (knowledge, practices and values) specific competencies needed for early childhood educational specialists to apply media education with digital storytelling were identified.

3.3 Competencies for *Digital Storytelling*

The ability to combine the dimensions of knowledge, practice and values through critical reflection is central for educational specialists (Fröhlich-Gildhoff 2017, CoRE 2011a, cf. OECD 2005). Although these dimensions cannot be separated in practice, the following competence model illustrates the dimensions with its specific competencies separately. It contains the necessary individual competencies needed for the media pedagogical implementation of digital storytelling projects. The competencies proposed below serve as a guide for the development of educational trainings and programmes and not for the standardisation of practice in ECEC.

First and foremost STORIES aims at fostering media literacy competencies. Thus, educators and teachers need to know what is meant by this term (concept). Furthermore, they need to acquire media literacy competencies themselves. Such competencies include the use and production of media as well as its critical reflection (e.g. Moser 2012).

Besides having media literacy competencies, educators and teachers need to be competent in teaching media literacy (cf. Blömecke 2000), which cannot be acquired by explanations, but by using and reflecting media. Therefore, educators and teachers are rather coaches attending the use and reflection of media then presenters of contents. For educators and teachers it is therefore important to know about ways to implement pedagogic strategies in ECEC. Digital storytelling as a situated didactical approach could be one way of fostering media literacy in this way.

In order to successfully put digital storytelling into practice, the educators and teachers need knowledge about the structure and features of digital stories as well as knowledge about the basic steps for planning a digital storytelling project. They also need to have the necessary practice for implementing a digital storytelling project as well as the ability to assess the potential of digital storytelling for competence-building. The knowledge of approaches to teaching and learning (constructivism vs. cognitivism) creates the basis for successful work with media-didactic approaches such as digital storytelling (cf. Blömecke 2000).

The required competencies go beyond media literacy competencies, whereby media literacy competence is an important condition for media pedagogical action (cf. Moser 2012).

According to the structural elements of CoRe (knowledge, practices and values), the following competencies are needed to implement media education with digital storytelling:

TABLE 1: Competencies for *Digital Storytelling*

Knowledge	Practice	Value
The educators/teachers...		
know the terms 'media literacy' and 'media education' and can differentiate them from one another	can operate at least one technology for implementing digital storytelling projects	have a positive and open attitude towards technology
know about young childrens' media usage and current studies thereto	master the basic operations of technologies for producing digital stories	can explain the potential of digital storytelling for competence-building and reflect on it
know about current issues on the perceptions and impacts of media and media contents;	can create a media product based on the digital storytelling approach.	can justify media usage in ECEC and reflect on it
know educational and social policies	can plan and implement digital storytelling projects	adopt *Digital Storytelling* as a child-centred approach that views children as competent active agents and as protagonist of their own learning (1)
know about the possibilities and limitations of media education in ECEC	can apply their theoretical knowledge about digital storytelling in practice	understand learning as a co-constructed and open-ended process that ensures the childrens' successful social engagement and encourages further learning (1)
know constructivist theories and practices on learning	can integrate digital storytelling projects in the pedagogical routine in their ECEC institution	
know the structure and features of (digital) stories		
know the basic steps for planning a digital storytelling project		
know techniques allowing them to plan and implement digital storytelling projects		
know scenarios for implementing digital storytelling in ECEC institutions		
know concepts for action-oriented work with digital stories		

(1)cf. CoRE 2011b

3.4 Training Model
The training model developed within the STORIES project can be implemented in order to achieve these competencies.

3.4.1 Didactic Concept
Having completed the training, the educators and teachers should be able to implement their own digital storytelling project and to justify it from a media pedagogical perspective.

The didactic design follows a constructivist view of learning assuming that knowledge is a result of individual construction processes (e.g. Reich 2002, Reinmann-Rothmeier & Mandl 1999). For this reason, learner-centred methods building on the participants' previous knowledge and creating authentic learning situations are chosen.

The course of the training can be depicted as follows: First, the participants acquire basic media pedagogical knowledge and learn about the approach of digital storytelling. Then, they make their own digital story on the basis of which they finally plan and implement a digital storytelling project in their institution. During the planning phase, the trainer takes up an advisory role. The trainer takes action only as required. The final project planning is then discussed with the trainer before the participants independently implement the project in their institution.

The second part of the training is, thus, similar to the structure of Cognitive Apprenticeship (Collins, Brown & Newman 1989): The participants first learn about an expert's approach they then apply themselves in an authentic learning situation. After the phase of modelling within which the procedure is presented and explained, the learner takes on an active role and is supported by the teacher/trainer (scaffolding) who gradually withdraws during the learning process (fading). In the phase of reflection, a metacognitive strategy helping to rethink and, if necessary, modify one's own approach, is additionally practiced.

3.4.2   Modules
The training model is divided into the following modules:
1. DST pedagogical approach
2. Technical training
3. Laboratory project work
4. Design of educational projects

Module 1: Digital Storytelling Pedagogical Approach
Within Module 1, the participants acquire pedagogical (content) knowledge in order to implement media projects based on digital storytelling in their ECEC institutions.

Module 1a: Media Literacy and Media Education

The participants address the terms of 'media literacy' and 'media education' and reflect on how they relate to the lives of young children in a media society. They also look at (national) social and educational policies, on the basis of which they decide on whether and if so, why and how new media could, or rather should be used in ECEC.

Moreover, this module deals with learning theories (cognitivism vs. constructivism) and provides the participants with the pedagogical basis for designing media products. This forms the basis for the participants to explain the pedagogical surplus of digital storytelling.

Module 1b: Digital Storytelling

Using good-practice examples, the participants approach the format of the digital story and work on its structure and features. Furthermore, this module provides participants with the basic steps for planning a digital storytelling project in ECEC institutions. From a practice-oriented perspective, they learn about techniques to develop and create digital stories with young children. With regard to young childrens' cognitive, social-emotional and linguistic development, this provides the basis on which the participants reflect on the potential of digital storytelling for facilitating multiple literacy skills in ECEC. The participants also gain insights into how digital storytelling can be implemented in the pedagogical routine in ECEC institutions.

Module 2: Technical Training

Module 2 offers information on the functions and operations of the technical equipment needed for realizing digital storytelling projects.

Module 3: Laboratory Project Work

Within Module 3, the participants develop and create own (digital) stories. This module aims at deepening and applying the pedagogical and technical basis laid in the preceding modules.

Module 4: Design of Educational Projects

Within Module 4, the participants develop their own digital storytelling project including the aims, contents, techniques as well as the implementation in their institutions.

Module Overview

Module 1: Digital Storytelling Pedagogical Approach

Module 1a: Media Literacy and Media Education	
Working Load	3 h
Participation Requirements	-
Qualification Objectives / Competencies	The educators/teachers...... • know the terms 'media literacy' and 'media education' and can differentiate them from

	one another; • know about young childrens' media usage and current studies thereto; • know about current issues on the perceptions and impacts of media and media contents; • know educational and social policies; • can justify media usage in ECEC and reflect on it; • know about the possibilities and limitations of media education in ECEC. • know constructivist theories and practices on learning
Contents	media literacy and media education; media literacy and communication; reflexive, self-determined and creative media usage; educational basis of media usage (cognitivism vs. constructivism)
Course Type	face-to-face
Forms of Learning	question-oriented teaching and learning, pair- and group work
Module 1b: Digital Storytelling	
Working Load	5 h
Participation Requirements	module 1a
Qualification Objectives / Competencies	The educators/teachers...... • know the structure and features of (digital) stories; • know the basic steps for planning a digital storytelling project; • know techniques allowing them to plan and implement digital storytelling projects; • can explain the potential of digital storytelling for competence-building and reflect on it; • know scenarios for implementing digital storytelling in ECEC institutions; • know concepts for action-oriented work with digital stories.
Contents	structure of stories; importance of stories for the pedagogical work in ECEC institutions; traditional and digital narrative forms; digital storytelling in ECEC institutions; digital storytelling and competence-building
Course Type	face-to-face
Forms of Learning	pair- and group work

Module 2: Technical Training	
Working Load	1 h
Participation Requirements	basic technical knowledge
Qualification Objectives / Competencies	The educators/teachers…… • know several technologies for implementing digital storytelling projects; • can operate at least one technology for implementing digital storytelling projects.
Contents	depending on the project: laptops or camera, tablets or the i-theatre
Course Type	e-learning (video clips)
Forms of Learning	self-study

Module 3: Laboratory Project Work	
Working Load	4 h
Participation Requirements	module 1 and module 2
Qualification Objectives / Competencies	The educators/teachers…… • master the basic operations of technologies for producing digital stories; • create a media product based on the digital storytelling approach.
Contents	creating a digital story
Course Type	face-to-face
Forms of Learning	project work, presentation of results, pair- and group work

Module 4: Design of Educational Projects	
Working Load	7 h
Participation Requirements	module 1, module 2 and module 3
Qualification Objectives / Competencies	The educators/teachers…… • can plan and implement digital storytelling projects; • can apply their theoretical knowledge about digital storytelling in practice;

	• can integrate digital storytelling projects in the pedagogical routine in their ECEC institution.
Contents	planning a digital storytelling project
Course Type	blended learning methodology: • face-to-face introductory session (1h) • independent work with individual advice either online or in person (5 h) • face-to-face final meeting (1 h)
Forms of Learning	project work

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4. SCIENTIFIC ACHIEVEMENTS

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This chapter presents the main results of the STORIES research. The DST activities conducted in the project were examined from several perspectives. They were formulated into three main research questions shared by all partner countries and three partner-specific questions.

1. Which digital narrative elements occur in children's **digital stories**?

2. What are the characteristics of the interactive **process** of building a digital narrative in a DST project in ECE?

3. What are the educators and teachers' **competences** in ECEC DST on an individual and a collective level?

4. How does children's **agency** manifest in the DST process? (Finland)

5. Developing young children's **creativity**: what can we learn from DST practice in early childhood settings? (Italy)

6. How do DST activities support children's **social-emotional development,** in terms of children's verbal and nonverbal group interactions and the narrative elements exhibited individually in story creation process? (Turkey)

In the following sections, we will briefly summarise the key findings related to each question.

4.1 Digital Narrative Elements in Children's Digital Stories

The first research question addressed the **product** perspective. It examined the final digital stories (N=174) created by children in all partner countries. The analysis focused on narrative characteristics supported by the digital dimension: how the stories reflected the tools used and vice versa. The analysis was based on different elements of narrative competence (e.g., Rollo, 2007) and levels of story structure (Glenn & Stein, 1980; Leslie, 1987; Peterson & McCabe, 1983) as well as previous research on digital affordances in the ECEC context (e.g., Marsh, 2006; Petersen, 2015).

The stories created during the project varied by their type and characteristics. In some factors, there was variation between countries but mainly they were in the same line. The most common story characteristics can be seen from Table 1. Additionally, associations between story structures and different factors were analysed and a weak correlation was found between story structure level and different degrees of provided narrative structure; it seems that when the prompt for the storytelling process was less structured, the stories created had a higher-level narrative structure.

TABLE 1. Most common characteristics of the stories

Most common characteristic	Percentage of stories
Story structure	
Descriptive-action sequence	35,6
Level of Detail	
Reactive sequence	24,7
Product type	
Animation	54,0
Story starting point	
Stimuli for original construction	60,7
Provided structure	
No structure. The child chooses the topic and formulates a narrative.	34,7
Story type	
Fictional story	79,9

Many different technological devices were used to create the stories but only computers and tablets were used in the majority of the stories. The multimodal aspect of digital storytelling was also clearly visible in the stories: there were many different media elements embedded in the stories as can be seen from Table 2.

TABLE 2. Five most common multimedia elements and most commonly used devices

Multimedia element	*Percentage of stories*
Narrating voice	71,3
Dialogue	55,7
Mood music (background music, does not originate from the action)	21,8
Written text	21,3
Diegetic music (originates from a source within the film's world)	14,9
Used device (by either children or educators and teachers, or both)	*Percentage of stories*
Computer	65,5
Tablet	56,3
Camera	36,2
i-Theatre	24,1
Smartphone	15,5

Besides different devices, many different software were also used on computers and tablets: storytelling apps, video editors, animation apps, digital book apps, i-Theatre's own software, and other. There was, however, no significant difference in story structure levels between the different types of software.

In order to examine the affordances of different tools (devices or software), we analysed the associations between the tools and the multimedia elements found in stories made with them. In Table 3, a green cell indicates that a particular multimedia element was especially likely to appear in stories made with a

specific tool, while a red cell means that the element was not likely to be present in stories made with the tool. In blank cells, there was no statistically significant association between the tool and the multimedia element.

TABLE 3. Associations between multimedia elements and device or software types.

Multimedia element	Device type					Software type				
	Computer	Tablet	Camera	i-Theatre	Smartphone	Storytelling apps	Video editors	Animation apps	Digital book apps	i-Theatre software
Drawings/pictures/words		-		+		-	-	+		+
Written text			+	-		-	+	-	+	-
Dialogue				+			-		-	+
Narrating voice										
Mood music										
Diegetic music										
Sound effects		+		-				+	-	-

Associations between different multimedia elements were also found. When written text was embedded in the story, it was less likely that narrating voice or dialogue was present. Then again, there was a positive correlation between written text and mood music. Mood music and children's drawings/pictures/words had a negative correlation but with diegetic music instead of mood music, the correlation was positive. Sound effects and diegetic music had a positive correlation between them. There were also significant associations between multimedia elements and story structure levels: stories with narrating voice, dialogue or sound effects seemed to have a more advanced story structure than stories without them.

4.2 Characteristics of the DST Process

The second research question was related to the **process** perspective, looking at digital storytelling as an interactive process between the children and the educators and teachers. The main data consisted of project sheets (N=146) and yearly project summaries (N=53) with which the educators and teachers documented the DST activities they implemented during each project year.

4.2.1 The Context of the DST Projects

According to project sheets, projects were carried out mostly with one group and as a whole class, and groups were formed most often according to children's interests, age, and social skills. The durations of the projects varied between 1 week and 6 months, consisting mostly of 9-12 sessions in the first year and 5-6 sessions in the second year. The most typical space for the project activities was the classroom, followed by classroom digital corner in the first year and digital laboratory in the second year. In addition to digital tools, various additional ma-

terials were used: drawing and painting supplies, photos and images, and articles from the environment were the most commonly used ones.

Most of the project sheets stated the promotion of children's narrative skills as the main aim of the project, and teaching methods included especially DST, discussion and questioning. In approximately half of the projects, the stories were triggered with the aid of circle time activities (open-ended questions, discussion, analogy, etc.) or presenting children visual (photos, pictures, cartoon, documentary, movie, etc.) or auditory elements (songs, sound effects, i.e. animal sound, etc.). There were some aspects that the educators and teachers would have done differently if they had been able to start over; for example, they would have provided more possibilities for children to use technology.

In the second year, tablets exceeded computers (used only by educators and teachers) and the iTheatre (used only by children) as the most commonly used device, having already been the most common device that was used by both educators and teachers and children. Regarding different software, both the diversity in the type of the software and the number of specific applications used increased from the first year to the second. Puppet Pals was the single most used application by children in both years. Camera application was one of the most frequently used ones in the first year, whereas more complicated applications (such as Windows Movie Maker and Stop Motion Studio/iMotion) came to the fore in the second year. Ensuring that children encountered a large number of applications with different functions and features can be seen as an effort that contributes to the development of media literacy skills in children.

4.2.2 Educators and Teachers' Assessment of Children's Media Skills

In the yearly summaries, educators and teachers were asked to assess the benefits of the DST projects in terms of the media and technical skills of children. In their first-year assessments, the emphasis was on more technical skills, while in the second year, it was highlighted that children demonstrated development in using media positively on an awareness level. In the following, we present the educators and teachers' observations of children's media literacy development on several more specific sub-dimensions.

Children mostly demonstrated quite basic *technical skills* when interacting with a device or application. They also had a chance to develop their *visual* (especially taking photos using relevant devices) and *art skills* in the DST activities. As to *narrative skills,* children showed competency in integrating characters into a story but there was room for development in other elements of stories such as setting, plot and presence of a problem or a surprise action.

In terms of *understanding of multimodality,* most improvement occurred in being aware of differences between the properties offered by different modes (e.g. verbal, visual, sound, tactile). In the DST projects, children also found opportunities to demonstrate and develop their *pre-writing skills* and their *understanding of the foundations of audio-visual language*. Within the latter skill, children

both recognised the components of audio-visual language and showed evidence of understanding how to apply this knowledge by creating a digital story with various applications and in various product types (e.g., photo story, animation or movie).

Improvement observed in different *critical skills* indicated that children became more competent in these skills in the scope of DST: they were able to evaluate their products and make changes or repeat some aspects based on their evaluations. Finally, *awareness of audience* was challenging for the children. Creating products by taking peers' interests into consideration can be seen as a higher-level skill, and in order to observe development in awareness of audience in this age group, more practice and experience is required.

4.2.3   Educators and teachers' Assessment of Children's Social Skills

Besides media skills, the educators and teachers evaluated how the children demonstrated social skills in the DST activities. Across all countries, cooperation had the highest percentage in the first project year. In the second year, both cooperation and respect to others had the highest percentages. Thus, in addition to children having experience on working together to create a mutual product, the activities also gave them opportunities to respectfully interact with their friends.

In terms of more specific sub-dimensions of social skills (relationships, communication, cognitive skills, play disconnection/disruption), there were some differences in emphasis between countries, but the overall results were rather similar. Children mostly showed positive attitudes and actions regarding *relationships* with their friends. Children in most participant countries also demonstrated development in basic *communication* skills such as listening and asking questions. However, a need for development was evident in skills such as commenting on and/or responding to other children's ideas and engaging in dialogues. In terms of *cognitive skills*, children showed improvement in introducing new topics or ideas verbally, sharing ideas, building on ideas coming from others, and expressing their own theories or ideas verbally, graphically or physically. Very small percentages of children in all countries showed any *disconnected or disruptive behaviour* throughout the project activities.

4.3 Teacher Competences in DST in the ECEC Context

The third question was concerned with the **competence** perspective; that is, educators and teachers' capacity to support children's media literacy through digital storytelling. We examined the educators and teachers' perceived competences, consisting of the dimensions of knowledge, skills/practices, and attitudes/values (Binkley et al., 2012; European Commission, 2018; Tigelaar, Dolmans, Wolfhagen & Van Der Vleuten, 2004). Furthermore, in line with the CoRe report (CoRe, 2011), competences are not seen merely as *individual* but also on a *collective* level; that is, on the level of the whole institution. The principal data consisted of teacher questionnaires (before and after, N=66 and N=50, respec-

tively). This data was complemented by teacher (N=13) interviews from Finland, focus groups with practitioners (N=14) from Italy, and educators and teachers' digital stories (N=12) from Turkey.

4.3.1 Pedagogical Use of Digital Tools and Attitudes towards Technology

Computer, projector, camera and webcam were available for most of the educators and teachers in their institutions – more commonly than tablets, smartphones, and the i-Theatre. Computers and cameras were also the most frequently used digital devices in pedagogical activities. Besides using digital devices for documentation, the most common pedagogical use of digital tools was supporting, illustrating or demonstrating topics that were discussed or worked on. Digital devices were used less often for production, practicing, or playing. Digital storytelling was a completely new practice for more than half (56,1 %) of the educators and teachers.

Educators and teachers considered technology to have potential especially in terms of keeping up to date with new media developments in the field, discovering new aspects of teaching methods, and becoming familiar with children's media culture and use. Their views about the potential of technology for their pedagogical practice were positive, especially for enriching pedagogical activities and promoting the development and dissemination of novel and creative ideas.

4.3.2 Educators and teachers' Perceived Competences

Educators and teachers self-assessed their own competences on four dimensions: *media literacy* in general, *DST* competence, *technical* skills in using digital tools to make digital stories, and *practical* competences to plan and implement DST as part of their work. We examined whether any of the dimensions were associated with specific background factors, and the only dimension where we found significant differences between any groups was DST competence. Educators and teachers over 50 years of age experienced their competence in DST significantly lower than younger age groups. Also, educators and teachers who had vocational training perceived their DST competence as lower than those with a college or bachelor's degree. Not surprisingly, those educators and teachers who had had at least some previous experience with DST perceived their DST competence as higher than those without any experience.

We also examined possible differences in the educators and teachers' perceived competences between the beginning and the end of the project activities. A statistically significant increase was found in all four dimensions: media literacy, DST, technical, and practical competences. Thus, we can conclude that the educators and teachers' competences both in theoretical and practice-oriented aspects related to digital storytelling enhanced during the participation in the STORIES activities.

4.3.3 Educators and teachers' Digital Stories

In Turkey, digital stories created by educators and teachers were analysed in order to identify their strengths and areas for development. Overall, it was observed that the majority of the digital stories were at a sufficient level in terms of different digital story elements. The elements that were displayed most competently in the educators and teachers' digital stories were content (consistency between introduction, development and conclusion, and their relation to the purpose of the story), language (clarity, simplicity, and appropriateness in terms of content and grammar) and economy (economical presentation of visual and verbal elements and appropriateness of duration). The element on which the educators and teachers' scored the lowest was the power of the soundtrack; that is, the soundtrack was not completely coherent with the emotional content of the story's respective parts or had a disruptive effect on the voice of the narrator.

4.3.4 Perceived Benefits and Challenges of Digital Tools and DST

In the qualitative data (open-ended answers, interviews, and focus groups), educators and teachers brought up different benefits achieved through the pedagogical use of technology, or more specifically DST. One main aspect was the promotion of *21st-century skills* (Binkley et al., 2012). Digital activities were seen to foster creativity (especially in the DST context), critical thinking, problem solving, and decision-making. DST in particular was associated with learning collaboration and communication skills such as negotiation. Information literacy and ICT literacy also emerged from the answers: as a versatile tool, technology was seen as a way for children to both use and produce their own content. Educators and teachers also mentioned technology as a means of becoming familiar with other cultures and supporting children's agency, participation, autonomy, and engagement – thereby supporting their self-confidence and familiarising them with adopting an active role in society. In interviews, the role of DST as a tool for pedagogical documentation and as a way of creating more interaction with children's parents was also mentioned.

Aspects related to *language and literacy* were also prominent. The multimodality associated with digital tools allowed the children to express themselves in ways that went beyond written and spoken language (especially visual and graphical representation). However, technology (and especially the DST approach) was also seen as a tool to develop traditional literacy skills, including narrative competences, grammatical and phonological skills, and also as a way of identifying potential problems in language development.

The main *challenges* faced by the educators and teachers in the use of technology or DST included, for example, technology-originated obstacles (such as non-functioning hardware or software, Internet connectivity issues, or limited access to online resources), lack of competence (limited technological skills or lack of experience with DST), managing children's use of technology (negotiating rules, issues with attention, limited technological skills), and organisation of the pedagogical process (time, appropriate spaces, relevant material). As primary

ways of *overcoming problems and enhancing their competences*, the educators and teachers mentioned trainings, collegial support, and readiness to improvise when necessary. The educators and teachers recommended a thorough exploration of the devices and applications beforehand, in order to learn their limitations and potentials. Overall, the educators and teachers emphasised their own role in ensuring pedagogically meaningful use of digital tools.

4.4 Children's Agency in the DST Process

In the fourth question, we examined how different elements of the DST process contributed to **children's agency** and what was the children's subjective experience of their learning and agency. Building on previous research, we were interested in identifying agency-related affordances of the digital tools and non-digital materials, the use and ownership of spaces, and the interaction between the participants involved in the storytelling (cf. Fróes & Tosca, 2018; Giddens, 1979; Marsh, 2006; Paju, 2013; Petersen, 2015; Rowe & Miller, 2017). Our data, collected during both project cycles, consisted of Finnish educators and teachers' (N=13) and children's (N=51) interviews, complemented by children's digital stories, educators and teachers' documentation of the DST activities, and Turkish researchers' observations of the DST activities.

4.4.1   Digital Tools

Child-friendliness, flexibility, device compatibility, and *educators and teachers' user experience* were identified as aspects affecting children's agency. The first three are directly related to particular devices or applications. Intuitive, child-friendly tools (especially those specifically designed for storytelling) enabled children to complete their stories independently, but the flipside was that one-purpose tools were experienced as inflexible in the long run, limiting the children's opportunities for expression. Being able to do every step of the story-creation process on the same device also supported children's ability to work independently. Finally, educators and teachers' previous experiences with different tools play a role in terms of agency because those affect their decisions about which tools to provide for the children.

4.4.2   Spaces and Non-Digital Materials

DST activities offered the children *more control over the spaces used*. Sometimes it was the *content* of the story (e.g., using certain toys in outdoor locations or organising spaces in non-typical ways) and sometimes the *process* (e.g., the need to have a quiet space for recording sounds) that gave the children access to new spaces. DST also introduced a *digital dimension to non-digital play*, which was important for agency because it allowed the children to document their ephemeral non-digital play worlds permanently and to share them with others, which signified that their play was valued.

4.4.3   Time

A *long and complex story-making process* could lead to lack of ownership even if the process was planned in a pedagogically meaningful way. On the other hand, it was important that *plenty of time be reserved for playful exploration* of the digital tools before embarking on more goal-oriented DST activities. This is also related to the *development of agency over time*: children's earlier (digital) experiences – positive or negative – are reflected in later activities. Giving *children responsibility to organise their time* and activities was also highlighted.

4.4.4 Role of Adults

In terms of children's agency, adults can be seen as *gatekeepers* and *balance-seekers.* The former pertains to how they manage non-human resources in DST (cf. Giddens, 1979) while the latter is more related to interacting with human participants. As gatekeepers, educators and teachers have the responsibility to provide opportunities for agency by ensuring that there is a relevant and varied selection of tools available and by managing time resources. The balance-seeker role refers to how the educators and teachers seek the optimal way of designing and supporting the DST process in light of children's agency. It means, for example, balancing the degree of adult involvement in the story creation so that the outcome is genuinely a product of the child. Children's interviews highlighted the adults' role especially as *initiators* of the DST process: the adults suggested making digital stories but the children came up with the actual stories.

4.4.5 Children's Perceived Agency

The children reported experiencing active agency especially in *the design and creation of characters* and *planning and execution of the content* through negotiation with others. Children had also identified various *rules* in the course of the DST activities and understood that their agency involved respecting these rules. Some of the rules were related to the use of devices while others pertained to the interaction between participants and to the overall DST process. As to the children's perception of *learning from the process,* they mentioned story-creation skills such as storytelling, use of imagination, and story planning. Additionally, skills related to the use of particular devices were highlighted.

4.5 Children's Creativity in the DST Practice in ECEC

The fifth research question explored how DST can contribute to the development of young children's **creativity**, especially through metaphors. In addition to language, metaphor can be instantiated as well through non-linguistic modalities such as gestures and images (Lakoff, 1979). Emergent technologies show great potential for combining children's perceptions with immersive imageries to allow a more extended interaction with the contexts explored by children (Gallagher, 2015), and for predisposing *enactive landscapes*, meaning structures that offer chances to find new affordances based on the subjects' current interests (Kirsh, 2013). By referring to constructionists' theory of narrative as a meaning

making act (Bruner, 1991), through DST activities realised in several Preschool contexts, the children iinvolved in the project were offered an interesting context to explore new possible affordances and metaphorize common objects by reinterpreting and tinkering with them in order to create a visual narrative structure.

4.5.1 Instances of Metaphor in the DST Process

During the creation of a story plot, a group of 4-year-old children decides to set a scene in a swamp, where some other characters of the story live. One of the children, in a dialogue transcribed by the researchers, says that *"swamps are black"*, and *"they're always dark"*. Another child agrees, and does propose to use a little black mat to represent a swamp. Here we can identify some propaedeutic elements of metaphorical processes: nevertheless, it still represents a process centred on the research of resemblances, without implying a genuine production of visual metaphors, such as those that we are about to discuss.

During the creation of another digital story, a group of 5-year- old children decided to use a yellow balloon falling from a bottled water dispenser as to narrate a scene in which a spaceship throws a bomb of broth on a coloured word. As underlined in the scientific literature, young children tend to focus on perceptual or surface-level similarities, such as colour, shape or texture in order to make categorizations (Namy & Gentner, 2002). Focusing on the similarities that children identify on perceptual bases can provide a possibility to shift from usual conceptualizations, as to foster the exploration of novel possible ones. (Van Weelden, Maes, Schilperoord, & Cozijn, 2011). The identified resemblance, in this case, is based on shape and colours, but in order to understand the scene the visual code must inevitably be connected to the verbal code. As suggested by semiotic studies, the written message usually has an anchoring role: it can in fact reduce the polysemy of the image by connecting it to a defined range of possible meanings (Barthes, 1964).

In order to show the explosion of the bomb, and the successive falling of the broth on the city, a 5-year-old child proposes to use a piECEC of yellow wool, and to throw it from a table while she is filmed. Before taking such a decision, the group has discussed other possible solutions with the teacher: *"We could render the broth with some yellow temperas"*, says Marisol. *"We could also find a circular shaped object, like a balloon"*, answers Luca. In this process we can observe how an important component of visual metaphor processing, comparing objects belonging to different conceptual domains, can be positively affected by similarities that children identify in objects' characteristics. From the conversations, recorded by the educators and teachers, we observe how the children possessed the literal names of the objects in question: therefore, we are allowed to consider the discussed processes as genuine instances of metaphor.

4.6 Children's Social-Emotional Development in DST Activities

The sixth research question focused on children's **social-emotional development** during the story building process. Social and emotional development refers to a child's developing capacity to experience, manage and express the full range of positive and negative emotions; develop close, satisfying relationships with other children and adults; and actively explore their environment and learn (Cohen et al., 2005). The data consists of observation grids of children (N=44) who participated in six digital storytelling projects in Turkey during two academic years. The grid (cf. CASEL, 2016; Elias, 2006; Greenberg et al., 2017) was based on 25 observation units under two parts entitled "Children's Verbal and Non-Verbal Group Interactions in Story Creation Process" and "Narrative Elements Exhibited Individually in Story Creation Process". Data were analysed based on descriptive and graphical techniques.

The overall findings revealed that the digital storytelling activities not only resulted in significant changes in social-emotional learning behaviours of children, exhibited both individually and during verbal and nonverbal group interactions in various stages of the story building process, but also gave signs on development in cognitive skills.

Changes were found to arise mostly in terms of self-management, self-awareness and relationship skills within "working through a plan (organization and repetition)", "adapting to different contexts and study groups" and "demonstrating critical thinking skills during story creation" behaviours, displaying a developmental pattern. At the same time, 87.5% of the total change observed in behaviours in the first year and 87.9% of the total change observed in behaviours in the second year resulted in a steady improvement, moving from demonstrating the behaviour "in progress" to demonstrating the same behaviour on a "regular basis". In this context, it can be said that the advantages of the DST approach accentuated by relevant literature (i.e. improvement of communication, collaborative working and higher-order thinking skills) (Baki, 2015; Bozdoğan, 2012; Robin, 2008; Dupain & Maguire, 2005; Sadik, 2008; Ayvaz-Tunç & Karadağ, 2013; Yang & Wu 2012; Yüksel, et al., 2011) are supported by the findings related to the change observed most frequently in the behaviours.

The least change, on the other hand, was observed in terms of "defining story characters and expressing them visually" behaviour. It can be said that this behaviour is largely based on the development of children's cognitive skills, which are related to age and learning. Educators and teachers' observations also supported the finding that children's narrative skills have not yet reached the desired level and that they need teacher support in this regard. However, the beginner levels of the children who did progress in this category were lower than those of the other children in the class, and in this sense their progress suggests a significant contribution of digital storytelling approach to social-emotional development.

The majority of children exhibiting progressive behavioural changes in the first year continued to exhibit the same behaviour in a regular improved pattern

in the second year. The observations and anecdotes of the educators and teachers also showed that problems that arose in the implementation of the first projects were mostly left behind by the subsequent project implementations; children progressed in a positive and steady manner in self-awareness, self-management, social-awareness, relationship building and responsible decision-making skills.

In addition, all social-emotional behaviours of the children who exhibited no change in both project years were consistently recorded in the categories of "in progress" or "regular basis". There are also a few examples of circular changes where the child progressed from a lower level and returned to baseline. Educators and teachers explained these kinds of situations with anecdotal records that some of the children experienced temporary adaptation problems with their groups directly related to their age and/or developmental stages.

Based on the findings, digital storytelling has important implications and appeared as an innovative way of achieving holistic development of children in terms of cognitive, social and emotional skills, not only with individual activities involving children but also with activities based on reciprocal relationships involving peer groups, families and other stakeholders.

4.7 Conclusions

Regarding the **digital stories** produced by the children, one of the most interesting findings was that a more open-ended starting point was associated (albeit weakly) with a higher-level story structure. One possible explanation might be found in children being motivated by having more say in the story creation and this leading to more detailed storylines. There was no significant difference in story structure level between different types of software, which suggests that each software type is equally suitable for developing narrative skills within DST. However, some multimodal elements were associated with specific types of tools, pointing out particular affordances offered by them. For example, with various tablet apps it was easy to include elements such as sound effects or written text in the stories but less easy to import children's drawings, while the i-Theatre strongly guided towards the inclusion of children's drawings and spoken dialogue but not of written text or sound effects.

It was found that the **DST process** supported children's linguistic, social, and emotional competences and media literacy in many ways. In particular, it was a useful approach for learning negotiation, creativity, taking others into account, and expressing oneself in different ways. One key aspect is making the DST activities meaningful for the children, for example by tying them to other current pedagogical contents or using them as an extension of children's existing play. Educators and teachers' perceived **competences** enhanced during the project in all measured areas, including both individual (related to media literacy, DST, and technical use of digital tools) and collective, practice-oriented competences (cf., CoRe, 2011) such as realising DST projects in the institution and addressing re-

lated issues with parents. Even though many educators and teachers experienced the training provided in the project as somewhat time-consuming, its practice-oriented nature made it important and rewarding. Overall, the educators and teachers' attitudes towards digital pedagogy and DST were positive: these approaches were viewed relevant especially for developing children's 21st-century skills (Binkley et al., 2012), active engagement, and both new and traditional literacies.

In summary, we can suggest that a variety of tools and applications be used in DST activities to provide children with opportunities to develop their media literacy by expressing themselves with different multimodal elements. We saw that tablets became more frequently used in the course of the project; one of their perks in DST is that the whole process can be done on the same device, which supports children's autonomous work and eliminates some steps where technical problems may come into play. Careful planning of the whole DST process and becoming familiar with the tools in advance is vital in order to ensure the pedagogical relevance of the activities, to anticipate possible obstacles, and to prepare for efficient and versatile use of spaces, time, and materials. Furthermore, readiness to improvise and to come up with alternative plans in case of unexpected changes is often required in the DST activities.

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5. BEST PRACTICES FOR USING DST IN ECEC

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5.1 Introduction

In today's digital era, it is important to integrate the education process with new generation technologies. In this context, it has become more important for the children, who will form the society of the future, to offer educational services in harmony with the age they live in. Thus, the gap between the school environment, where access to technology is relatively limited, and the "outside" world, where mobile devices are used as a source of information access, will close. On the one hand, the effective use of technology has been suggested to have an important role to increase pupil motivation and engagement (Marks et al., 2013). As Gubacs (2004) stated, it would not be wrong to say that effective teaching in the modern era demands the integration of technology into classroom educators and teachers' teaching because the ability to integrate technology into the learning and teaching process as a tool will not only help children in product development process, but also will serve as part of the teaching content or as a tool to help create an efficient teaching and learning environment (Moursund, 1999). It is then important to focus on how technology can be adapted to learning-teaching processes and to establish best practices on how to integrate technology, especially in early childhood, to make new tech tools, toys, and creative ways available. However, the literature (DiPietro, et al. 2008; Donohue, 2003; Hastie, Chen &, Kuo, 2007; Rubegni, Colombo & Landoni, 2013; Thompson, 2014) emphasizes that little is known about good practices related to teaching in online settings and emphasizes the uncertainty of how to use different forms of technology (i.e. on-line or off-line) in the classroom or how to develop best practices for digital applications in instructional design for children.

Since the major aim of the STORIES Project is enhancing awareness in creative use of digital media and improving applicability of the digital storytelling (DST) as a proper pedagogical approach, methodology and learning model to effectively face opportunities and challenges of using media in early childhood education (ECE); in other words, making the use of technology available in the domain of ECEC through the DST approach with regards to the dimensions of 1) fostering children's media literacy and 2) fostering educators and teachers' ability to support it in the context of DST; an approach to the integration of technology in the domain of ECEC is presented here by examining the best educational practices of DST implemented within STORIES Project in order to guide the practitioners, and to enable early childhood educators and educators and teachers create a qualified child-technology-learning triangle through digital storytelling projects.

5.2 Research Process

Educators and teachers from STORIES partner countries (IT, TR, FI, and DE) implemented a series of three different digital storytelling projects with their

group of children in the 1st cycle of implementation between January and June 2017, covering a time span of approximately five months. Following the 1st cycle, the second series of three more projects was implemented during an approximately six-month-long period from September 2017 to March 2018 in the 2nd cycle; that is, six project sheets altogether were filled in by each school/class/teacher from each participating country all through the STORIES Project's lifetime.

Taking into consideration a list of criteria, which was designated together with all the partners based on literature mentioned above and which cover dimensions related to the (1) individual characteristics of project implementation process, (2) individual characteristics of the products created by children and (3) composite items including characteristics of both process and product together, two projects were chosen as "best practices" by each country; from the perspective of project planning, implementation processes and the quality of the products developed. Each best practice was examined as a case study and the main features of these practices were presented as a demonstration of the common characteristics of qualified practices of DST in ECE.

5.3 A Holistic Assessment on the Results and A Synthesis: Main Features of Best Educational Practices of DST in ECE

In the context of the common features of the initiatives undertaken by the STORIES Project, starting from the selected digital storytelling projects and children's relevant products referred as best educational practices; a holistic assessment on the results has been presented below at first; then, taking into consideration the properties of best educational practices emphasized in the relevant literature and common properties drawn from the analysis of selected best educational practices of STORIES Project, a synthesis of the main features of best educational practices of DST in ECEC has been presented as basic principles that will throw light on the road map in the process of developing and implementing a successful DST project in ECE.

When the selection criteria considered as important to refer a DST project as a "best practice" in ECEC within the STORIES Project are examined, the emphasis is mostly on the role of teacher as offering children a non-judging context, as a facilitator and as a regulator in conducting at least four consecutive theme-related sessions for the project activities, as well as acting as a promoter who leads children in meeting at least the first three categories of story structure/levels of story grammar development (descriptive sequence, action sequence and reactive sequence) in story making process. As also mentioned in the *Manual Book of Best Practice about Digital Storytelling in Early Childhood* (2016) reported at the initial stages of STORIES Project, making up coherent stories means activating knowledge and using materials to build new narrative sequences. This process allows children to acquire new knowledge about the world and/or to consolidate the knowledge they already have. Moreover, it enables

them to acquire or consolidate their skills (digital and narrative) through action, which is termed as "learning by discovery" by Ausubel (2000). This not only gives the child opportunity to gain different experiences with rich material support, but also gives attention to children's active participation and autonomy. This emphasis brings to mind the concept of constructivist learning. In addition to this, it is seen that the main goals of the projects are also important in the best practice selection process. Attaining products related to the objectives of the project implementation process, and the compatibility of the main goals and the teaching methods and techniques used also appeared to be among the most selected criteria. This points out that a DST project in ECEC is not just a technology-driven approach to product development; the fact that the construction of the product making process is designed in accordance with the objectives also affects the quality of a DST project.

The overall findings have resulted in supporting the fact that, as well as being crucial in any kind of learning process (Brooks & Brooks, 1999; Marlowe and Page, 2005; Fok & Watkins, 2007), it is also important to provide a constructivist learning environment in the process of development a DST project in ECE. It is clear, based on the results, that supportive environments rich in teaching-learning methods and materials, in which the teacher has a facilitator role and the learners have an active participant role will not only suggest a rich learning experience in ECEC (Berris & Miller, 2011; Brewer, 2004; Loebach, 2004; Nuikkinen, 2011; Rentzou, 2014; Taylor, 2009) but also will provide more autonomy to the child both in the storytelling process and in the use of technology. It should not be forgotten in the process of digital story creation that both narrating skills, including story grammar development phases, and skills of integrating these narratives with the technology should be equally emphasized, and the autonomy of the child must be ensured in both processes.

Moreover, a well-designed environment allowing autonomy will also enable the child to internalize the digital storytelling process by supporting the development of unique products. However, it should be avoided to see the digital storytelling practices as just a digital product creation process; thus, the digital narratives are prepared within the framework of a main goal and constructing the learning process in such a way as to meet this initial goal will enable the resulting product –the digital stories- emerge in meaningful contexts. In accordance with this, the use of digital and non-digital elements in a combined way in the products has found to be another important factor in making it easier for children to connect with their own lives. Thus, this connection already arises as one of the basic features of best practices mentioned by both Daniels and Bizar (2005) and Zemelman, Daniels, and Hyde (1998). Beyond any doubt, as stated by not only prominent theorists such as Werner, Piaget, and Montessori, but also by many other researchers (Berris & Miller, 2011; Brewer, 2004; Loebach, 2004; Nuikkinen, 2011; Rentzou, 2014; Taylor, 2009); the physical environment is an active, indispensable and inseparable part of the learning process as well as an

instrument in both suggesting and supporting a rich learning experience, especially in early learning process. From this perspective, it can be said that well-planned environments have been found to be offered to children almost in half of the best practices of STORIES Project; besides, offering well-designed experience spaces, which supports children's cooperating, communicating, sharing, and working together or individually, occurs as important elements in best practices.

Based on the relevant literature and overall results gathered by the analysis of the common properties of selected best practices, it is concluded that main features of best educational practices of DST in ECEC can be defined as given below, within three different perspectives: (A) Educators and teachers' Role, (B) Characteristics of the Setting, and (C) Planning the Process and Evaluation Activities of the Digital Storytelling Projects.

A. Educators and teachers' Role

A1. *Intending the main role as: a facilitator who encourages children's discovery and invention skills in a constructivist manner, and main tasks as: offering children a non-judging context, supervising the children during DST activities, using guiding questions, preparing the environment and the materials a prior to the main activities, and helping consistency in the use of technologies.*

It is emphasized by many researchers that (Berris & Miller, 2011; Brewer, 2004; Loebach, 2004; Nuikkinen, 2011; Rentzou, 2014; Taylor, 2009; Tout, 2016), to have a facilitator role implies to offer children support and advice when needed, and to provide a rich learning environment and the necessary scaffolding and teaching of skills when necessary. Educators and teachers need to develop children's abilities to; (1) identify and recognize the connections between the relevant objectives and the real world to support them to be able to transfer their skills to new contexts, (2) reflect and think about their own performances during the acquisition of new skills, (3) represent, communicate and discuss the outcomes, and (4) incorporate the use of appropriate technologies. Moving from this viewpoint, we can say that, within the perspective of digital storytelling activities conducted in ECE, the main role of teacher as a facilitator can be seen as a strategy to enable children create a digital story through undertaking an investigation and applying a range of knowledge and skills. This critical role of the teacher is quite essential in order for providing children autonomy both in storytelling process and in the use of technology, and for giving children the opportunity to be the unique owners of the final products –the digital stories.

A2. *Supporting children's active participation in story's construction process as designers of each story´s component; planning child-centered learning processes and DST activities, which covers at least four consecutive theme-related sessions dedicated through children's interest.*

Hohmann and Weikart (1995) emphasizes that, the child's personal interests, questions, and intentions lead to exploration, experimentation, and the construction of new knowledge and understanding. In this context, to foster children's growth by building on children's interests, needs, strengths, understandings and capacity within a safe and caring environment and using those as the basis in planning any kind of learning process is a way to ensure that learning is not only interesting but also meaningful and relevant to children. That kind of planning also promotes children's active participation in the learning process, which is an inventive process in which children combine materials, experiences, and ideas to produce effects that are new to them, within the perspective of digital storytelling activities conducted in ECE. Accordingly, another role of preschool educators and educators and teachers can be defined as: to promote children's involvement in story's construction process and to enable them be the designers of each story´s component by planning child-centered learning processes and DST activities, which involve at least four consecutive thematic sessions dedicated through children's interest.

A3. *Promoting children's resulting in a coherent story in terms of story grammar, which meets at least the first three categories of story structure/levels of story grammar development (descriptive sequence, action sequence and reactive sequence); to enable children be connectors of elements apparently distant, following the phases of "Verbal-Visual-Technology" in digital story development process, which includes the consecutive steps of choosing the topic and formulating a narrative in the first stage; creating the visuals of the story by drawing or painting in the following stage; and digitalizing the components/use of technologies to develop the multimedia story artefacts –the digital story- in the final stage.*

When pre-school children are considered, resulting in a coherent story in terms of story grammar can be seen as a meaningful flow in the construction of the narrative in terms of understandability and harmony, and the narrative's meeting at least the first three categories of story structure/levels of story grammar development (descriptive sequence, action sequence and reactive sequence) can be accepted as an indicator of a coherence in the story grammar. Based on the findings obtained through the analysis on best practices of STORIES Project, educators and teachers are recommended to follow the phases of "Verbal-Visual-Technology" in digital story development process, including the consecutive steps of choosing the topic and formulating a narrative in the first stage, creating the visuals of the story by drawing or painting in the following stage, and digitalizing the components/use of technologies to develop the multimedia story artefacts in the final stage, to enable children be connectors of elements apparently distant and to result in a coherent story, in terms of story grammar.

A4. *Including versatile ways of using technology and making use of the affordances of digital tools in an efficient way; to enable children represent correlations of multimodal elements in digital story making process.*

The extent to which we benefit from the advantages of technology depends on the intended use and how effectively it is used. When the main focus is fostering cognitive, affective, social-emotional and media literacy competencies in early childhood within digital storytelling, which requires an expanded *multimodal* approach to multiliteracy (New London Group, 1996) that focuses on an understanding of multiple discourses and forms of representation because of its structure combining of the art of storytelling and digital tools; such as graphics, audio and video (Garrety, 2008), instead of the existing monolingual, monocultural, and standardized literacy pedagogy that focuses on reading and writing, educators and teachers should accompany children to the most effective and adequate use of technology. Understanding of multimodality can be defined as understanding messages and meanings in accordance with personal interests and using different communicative modes (eg. verbal, visual, sound, tactile). Accordingly, to enable children represent correlations of multimodal elements, by including versatile ways of using technology and making use of the affordances of digital tools in an efficient way seems to be another role of the teaches to carry out an effective DST project.

> **A5**. *Promoting children´s autonomous use of technologies in digital story making process by offering children technological tools and applications with "touch user interface" or "tangible user interface", which are more convenient for preschool children's age level and motor development, instead of "graphical user interface".*

When compared with printed books and video, touch screen devices permit very young children to engage interactively in an intuitive fashion with simple actions as touching, tapping, or dragging the objects on the touchscreen and getting a response from the objects (Lovato & Waxman, 2016; Wang et al., 2016). On the other hand, as stated by Hendricks (2016), learning with tablets gives children the opportunity to practice learning matters at their own level and pace, without affecting the rest of their classmates, and children hold more positive attitudes towards the tablet-based learning method than towards the traditional learning method. In line with the relevant literature, we also reported in the *STORIES Scientific Research Report* that tablets with touch user interfaces were the most used devices by children autonomously in both implementation years of STORIES Project, as well as iTheatre, which has a tangible user interface. The findings from the best practices of DST in ECEC have also revealed that the most convenient interfaces for children's autonomous use were touch and tangible user interfaces. Considering these results, another role of the preschool educators and teachers' has been defined as promoting children´s autonomous use of technologies in digital story making process by offering children technological tools and applications with "touch user interface" or "tangible user interface".

A6. *Being a part of a professional learning community to result in both; enhancing knowledge and skills on contemporary initiatives in ECEC (new teaching methods/educational strategies, use of technology in ECE, etc.) and providing improvement and development in children's learning.*

Professional learning communities can be seen as ongoing professional development opportunities and instructional support. It is obvious that such an opportunity will increase the quality of education, especially in terms of preschool education. As stated by Copple and Bredekamp (2009), the quality and accountability improves when everyone involved with the child understands the outcomes they want to achieve, the plans for helping the children achieve them, the progress of ongoing assessment, and how to analyze the results. In this way, educators and teachers can create a continuing conversation about their understandings of early childhood practice and discuss all possibilities with other educators and teachers. Since the literature (Fairfield, 2011) identifies that these communities have a positive impact on educational change and social justice for all students, it is important for pre-school educators and teachers to be part of a professional learning community where they can collaborate on the more effective use of innovative approaches such as digital storytelling, and share examples of good practices with each other.

B. Characteristics of the Setting

B1. *To support children's social competencies, learning, and active role in the community; encouraging small group work in the whole process of digital/story making and paying attention to the heterogeneity of group structure in the project group make up process.*

Wasik (2008) states that the literature includes evidence, based on empirical findings from the guidelines and best practices, on benefits of small groups in preschool, affording both young children and their educators and teachers invaluable opportunities. Children can receive the individualized attention and instruction that may not be possible in large group activities, whereas educators and teachers can better observe how individual children perform on tasks and how they interact with other children. At the same time, Sharan (1980) points out that intentionally forming heterogeneous small groups can add the value of cooperative learning opportunities, indicating that having children with varying skill levels in small groups can promote learning for all children within that group. By composing heterogeneous groups, educators and teachers can also have the opportunity to contribute to strengthening communication, social interaction, and language skills of children, or have the opportunity to identify different skills of children when working together. In line with those given above, another empirical finding from our analysis of best practices of DST in ECEC within STORIES Project, is that young children function best within small heterogeneous groups, especially composed through the consideration of lan-

guage/expression/narrative skills, in digital storytelling activities. Accordingly, an essential feature of the setting, to support children's social competencies, agency and active role in the community, is given as; promoting small group work in the whole process of digital/story making, and paying attention to the heterogeneity of group structure in the project group make up process.

B2. *Providing resources and materials (both digital and non-digital) for children in a rich variety during both introductory activities and digital story making process to help children combine digital and non-digital materials in a creative way; to enhance flexible, creative and divergent thinking skills of children.*

There is a wide variety of learning materials for children. These include concrete play objects (kinesthetic sand, toys, cardboard box, dolls, manipulative play objects; such as LEGO, wooden blocks, etc.), drawing and painting materials (drawing paper, dry paint, pencil, crayon, watercolor paint, marker pen, paintbrush, glue, tape, scissors, etc.), story/3-D/silent books, visuals such as photos and images, musical instruments, objects from nature (pinecones, leaves, stone, etc.), real world objects (fruits, vegetables, clothes, kitchenware, salt, pepper, sugar, soap, etc.), structured or unstructured articles from the physical environment (plastics, ropes, colored pebbles, etc.), materials for experiential activities (microscope, experiment tubes, chemicals, etc.), and 3D models (models of body parts, skeleton, house, world, solar system, etc., shaded relief, puppets, etc.). To improve creative thinking in children, Oncu (2015) and Rule et al. (2011) remark that, especially unstructured objects could be useful for that purpose so that these materials stimulate criticism of the existing uses of everyday items and helps the children think of innovative ways to use or re-use objects. However, in the age we are in, learning materials are no longer exclusively associated only with traditional non-digital learning materials, but also with information and communication technologies (ICT). As stated by Dix et al. (2004), ICT tools, consisting of a wide variety of digitally formatted resources including graphics, images or photos, audio and video, simulations, animations and prepared or programmed learning modules, have in common that they are specifically designed to facilitate interaction, encourage social activities, enhance creativity, and improve knowledge and competences of children. Accordingly, to help children combine digital and non-digital materials in a creative way during both introductory activities and digital story making process and by this way, to enable children to represent flexible, creative and divergent thinking skills, pre-school educators and teachers need to prepare a setting for children which is equipped with a rich variety of both digital and non-digital resources and materials.

B3. *Offering children a variety in experience spaces, where children can interact directly and continuously with technology.*

As stated by Biddle et al. (2014) the arrangement of the experience space for any kind of activity plays an important role in children's social and language interactions, growth and development because the way the physical environment

is designed and configured influences how children feel, act, behave and learn. The physical environment will vary depending on the age and number of children in the classroom, as well as the goals of programs and specific activities in the classroom. Based on the findings of the analysis of best practices of DST in ECEC within STORIES Project, educators and teachers are recommended to offer children a variety of experience spaces, such as outdoor spaces besides the classroom or especially digital laboratories or technology workshops/ateliers during the digital story making process, where children can interact continuously with technology and thus design digital products in a more motivated way.

> **B4.** *Arrangement of the experience space/learning environment effectively; in a way that offers children an inspiring and adequate setting, in terms of physical classroom size, a naturally lit indoor design (furnishing and equipment), separate play areas/interest centers, and a rich variety of both artificial and natural learning materials/resources/play objects which are clearly visible to children.*

Research has found that children's development and the quality of their experiences are influenced by (a) the size of school facilities; (b) classroom size and density – that is, the space available for each child; (c) the way the environment is organized – are separate activity areas provided; (d) the quantity and quality of materials; (e) the furnishings and equipment; (f) the existence of space for private activities; (g) the height of the ceiling, room textures, and the color of the walls; and (h) the levels of noise (Rentzou, 2014). Based on the findings obtained through the analysis on best practices of DST in ECEC within STORIES Project, and considering the remarks from the other relevant studies (Acer et al., 2016; Edwards et al., 2014; Havu-Nuutinen & Niikko, 2014; Sheridan, Williams, & Samuelsson, 2014), indicating that the quality of any kind of learning process is related to its having well-developed, organized, and varied play materials, a naturally lit indoor design (furnishing and equipment), and separate play areas/interest centers, it is suggested that pre-school educators and teachers should set up their experience spaces in such a way that they can make the best use of digital storytelling activities, taking into consideration the above listed features.

C. Planning the Process and Evaluation Activities of the Digital Storytelling Projects

> **C1.** *Addressing one or more specific curricular objectives; keeping consistency of these objectives/reached outcomes with the teaching/learning methods and educational strategies, mainly including digital storytelling and project-based learning methods.*

One way to integrate the digital storytelling approach easily into the national ECEC curriculums is addressing one or more specific curricular objectives during planning a DST project. Since entire ECEC curriculums around the world commonly put plenty of emphasis on holistic development of children in terms of cognitive, motor, social-emotional, and language skills, and DST appears as a

good attempt to reach those objectives by enhancing awareness in creative use of digital media; building an association between the enhanced skills expected as a result of a DST project implementation and the curricular objectives will help early childhood educators and educators and teachers to implement an effective DST project. Besides, to result in any kind of best educational practice, a teacher should first be clear on what the educational objectives are, and then should choose the teaching/learning method and educational strategies that would be best suited to help children to achieve these particular objectives in the relevant context. Since project-based learning practice, which takes its roots from constructivism, offers the opportunity for effective use of technology in learning processes, an appropriate starting point for the implementation of an effective DST practice can be seen as project-based learning. At this point, together with addressing one or more specific curricular objectives and keeping consistency of these objectives/reached outcomes with the teaching/learning methods and educational strategies; the use of digital storytelling and project-based learning methods also emerge as another important feature of planning the process activities of DST projects for early childhood educators and educators and teachers.

C2. *Prior to the DST projects; carrying out preliminary activities where educators and teachers can pre-test the technologies they will use in the digital storytelling activities and where children may have experience in narration and technology use.*

Since integrating digital technologies to children's educational environments is prominent in digital age, the need for today's educators and teachers to consider how to use technology to make learning process more effective is obvious. However, it is implied by many studies (Arslan, 2006; Christanse, 2002; European Commission, 2001; Karataş, 2002; Zavenbergen, 2007) that most of the early childhood educators and educators and teachers are not yet capable enough in using technology for pedagogical purposes. To implement an effective practice of DST, pre-school educators and teachers need to improve their competency levels in using latest technologies and computers. From this point of view, carrying out preliminary activities where educators and teachers can pre-test the technologies they will use in the digital storytelling activities and where children may have experience in narration and technology use prior to the DST activities is seen as an important step for the educators and teachers to be able to implement more effective DST practices.

C3. *Monitoring the consistency of the main goal of the practices with the skills developed at the end of the digital storytelling activities through an effective assessment and documentation process; with putting great emphasis on the reflection of the process, designing the evaluation and assessment activities in a multistakeholder manner, where children's products –digital stories- can be shared with their families, other educators and teachers and other children.*

In a DST practice in early childhood, the main goal of the practices can be in a wide range of variety; such as to promote narrative/language/expressive skills, to enhance social and collaborative skills, to develop technological competencies, to reach the cognitive or motor development objective of the educational program, to foster imaginary and creative ability, etc. In any kind of learning process, it is necessary to monitor the consistency of those goals of practices with the skills developed at the end through an effective assessment and documentation process. Stacey (2015) points out that pedagogical documentation, which is a formative form of assessment and an enhanced form of observation, is a way of making children's and teacher's thinking visible, and defined "pedagogical documentation" as of records of the collaboration between children and educators and teachers, which is a powerful communication tool between children and educators and teachers, families and school, colleagues, and the public. As it stands, pedagogical documentation provides a means for reflective practice, which supports both assessment for learning and assessment as learning practices. Based on these, monitoring the consistency of the main goal of the practices with the skills developed at the end of the digital storytelling activities through an effective assessment and documentation process, and designing the evaluation and assessment activities in a multi-stakeholder and reflective manner, where children's digital stories can be shared with their families, other educators and teachers and other children is considered as another important factor to implement best practices of DST in ECE.

Based on the conclusion, practitioners are recommended to make as much effort as possible to meet the above-mentioned features of best practices so that they can design and implement qualified and effective technology-based learning activities for pre-school children through the use of the DST approach.

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6. CONCLUSIONS

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With these Guidelines the research group involved in the project has presented the main elements regarding the 3 years of research, carried in Universities and preschools located in Italy, Turkey. Finland and Germany. Within this docu-

ment, we tried to synthetize on one hand the empirical and theoretical research, on the other the educators and teachers' training model developed for the project and the main results regarding the study and the analysis of the best practice realized within the schools involved in the project. We hope that this document can foster and sustain other educators and teachers and researchers carrying out new projects related to the development of the media literacy and media education in early childhood education and care contexts.

As to foster children and educators and teachers in the process of developing digital skills, digital storytelling has been proposed as an instructional method, being it a **practice that includes both the use of technologies and narrative**. Narrative, as a matter of fact, is one of the privileged modalities by educators and teachers and children. Narrative gives the change to children to become protagonists: as Bruner declared (1986), narrative thinking is one of the elements that allows us to explain, comprehend and organize knowledge.

When educators and teachers invite children to invent stories, they're nourishing their narrative skills and enriching many other competencies, such as creativity and linguistic skills. By creating stories, children have the chance to consolidate their knowledge and acquire new ones (Barret, 2006).

Furthermore, offering to children the possibility to use technology while inventing stories fosters as the development of digital competencies and critical skills. As described, the process of media education fosters a better understanding of the digital technologies' possibilities and limits. Media education can be defined as a way **to promote media literacy** (Buckingham, 2003).

Realizing digital storytelling practices means therefore offering the chance to use technologies critically. The Digital Storytelling Ass (2002) defines this practice as "the modern expression of the ancient art of storytelling by using digital media to create media– rich stories to tell, to share, and to preserve». Another definition defines such practice as a way of «telling stories and sharing information with multimedia tools and resources» (Yuksel, 2011).

The strength of Digital storytelling, as we have seen in the previous chapters, can be identified in the combined use of different forms a channels of communication within an educational setting (Boase, 2013; Yuksel, 2011). The first goal of the STORIES research has been the revision of the scientific literature on some didactic aspects to support the media education in the Preschool context. In this first analysis' phase, 19 international DST best practices have been examined. Some interesting elements emerged, regarding in particular the fact that the role of the teacher and the educative setting can foster media literacy in early childhood education and care contexts.

Regarding the educators and teachers' role, scientific literature indicates the importance of offering children a non-judging context. Furthermore, it's important to facilitate and sustain children taking into account their ideas and hypothesis (Gariboldi & Catellani, 2013).

As for the setting of the learning contexts, an ideal element regards the possibility that the space where children create the digital artifacts evolve, according to the learning processes of the children. The presence of non-structured materials fosters as well the development of creativity (Rule et al., 2011; Oncu, 2015).

According to the preliminary researches run by the research group, the most relevant setting aspects are time and the organization of working groups. The amount of time given to the children to develop projects should be extended, and children should work in small groups, as to foster the participation of each member of the group.

The elements emerged from the analysis of the best practice and from the scientific literature brought the research group to develop a training model targeted to the educators and teachers of the countries involved. Educators and teachers have then implemented the educational practice in their schools. The training model has been proposed in each country and carried out by the researchers.

The development of a training model addressed to educators and teachers belonging to various European countries required an international reference framework. To this end, reference was made by the research group of the Stories Project to the "CoRe" definition of educators and teachers and educators' competence (CoRe 2011a, 2011b).

CoRe (Study of Competence requirements of staff in early childhood education and Care) aims to define common competence requirements and to connect different educational systems of each European country. Within this framework, competence is interpreted as a multi-dimensional systemic factor, embracing knowledge, practices and values characterizing the different levels of an educational system.

Provided that one of the major targets of the project regarded the **development of educators and teachers competences** in fostering children's media literacy, the educators and teachers involved received a dedicated training. In particular, it regarded the use, the creation the digital artifacts, followed by a critical metacognitive process. The didactic design followed a constructivist view of learning assuming that knowledge is a result of individual construction processes (Miller, 2011). Initially, the participants acquired a basic theoretical knowledge on media literacy, media education and the approach of digital storytelling.

Then, the educators and teachers involved have been asked and guided in the process of creating their own digital digital story through the project work operating methodology. In specific terms the educators and teachers, divided in small groups, went through an activity of DST, developing the narrative plot and approaching multimedia technologies, and allowing them on the one hand to comprehend the characteristics of the digital storytelling methodological approach, on the other to design with greater awareness the activities with the children. Furthermore, this specific part of the training has resulted to be of great importance for the educators and teachers, as many of them have been able to ex-

periment directly for the first time the technologies as education tools. The educators and teachers have presented and shared with the group of the colleagues their project work, and the trainers have conducted a critical reflection on the educational tools adoptable with children during a digital storytelling activity.

In the last part of the training, the educators and teachers have designed some activities to be carried with the children involved during the first year of experimentation. The experimentation has been carried with the supervision of the trainers.

The whole training has been therefore useful to foster educators and teachers' competences, knowledge and values related to the development of children digital skills. At the conclusion of the training, the educative experimentation started: educators and teachers working in Finnland, Germany, Italy and Turkey conducted digital storytelling projects during two different years.

The digital storytelling activities have then been analyzed by the researchers through 3 research questions, shared by each country. The first question regards the **digital narrative elements occurring in children's digital stories**.

From a multimodal perspective, as for the narrative elements encountered in the 174 stories analyzed, it has been noted that the complexity of the story has comprehended, in most cases, the description of the characters, the environment, and the main actions of cause/effect disposed in a chronological order. In 54% of the cases, the final product was an animation, such as a cartoon or a stop motion.

In 60,7% of the cases, the narrative plot was developed from contextual, visual or verbal stimuli offered to the children, during activities such as books reading, projection of images or the possibility to play with objects present within the school context. At the same time, the stories' structure level offered by the educators and teachers at the beginning of the digital storytelling creation process was minimal or absent.

Almost 80% of the digital artifacts is made of fictional stories. The most recurring multimedia elements concern the insertion of voice recording, sounds, or photo images and graphical images.

For instance, children have drawn the characters of a story. They have then scanned the drawings or photographed tridimensional characters shaped with clay. The devices most used for the construction of the digital stories have been computers and laptops. Such devices allowed children to explore and use various and different types of software and applications.

Among the different tools used, we also have the I-theatre: almost a quarter of the stories was created using this multi-touch digital tab. It allows children to embed autonomously drawings and images, to animate the story using directly their hands on the screen and to narrate directly the story while it is being animated. A further distinguishing feature of this tool is the fact that it fosters the relation among children, since unlike a tablet its screen props up the touch of 10 different fingers touching at a time.

The second research question concerns the **characteristics of the interactive process of building a digital narrative** in a DST project in ECEC.

More generally, we can notice evolutions when comparing the first and the second year of experimentation. This indicates that the educators and teachers reflected on their own practices and went through some changes. The length of the projects, for instance, and the number of the meetings dedicated to their development decreases from the first to the second year. Likely, it happened because of an increased familiarity developed by the educators and teachers with practices involved in the creation of digital narrative, in other cases for the desire to offer children activities increasingly concentrated in time and less dispersive.

The time designated to the Digital Storytelling activities has been, in the course of research, more and more characterized by longer periods dedicated to the experimentation, and in the second year educators and teachers
have in most cases set up a space where digital technologies could be explored in connection with other materials (spaces such as laboratories/digital ateliers). In the second year, the number of software and applications offered to the children has grown. Furthermore, compared to the first year, educators and teachers provided a **wider variety of software** useful to record, to explore new possibilities and to realize the digital narrative. This set of elements suggests that educators and teachers have gained an increasing awareness of the importance to offer numerous occasions to allow children to explore technologies, as to better develop media literacy.

By completing, the questionnaires at the end of each year of experimentation (the questionnaires were part of the evaluation tools provided by the researchers), educators and teachers have been called to evaluate the evolution of the digital competencies acquired by the children. Educators and teachers have generally stated that the greatest benefit of the digital storytelling activity has been the increase of children's digital skill level. In the second year, instead, in line with the abovementioned elements, it has been underlined the augmented awareness showed by the children when using technologies.

Such elements could also indicate that the educators and teachers have fostered their awareness towards technologies and their use in education contexts, and consequently they have been able to work on such aspects also with the children. Another element to evaluate concerns the social competencies shown by by the children involved in the project: the most expressed have been cooperation and respect of others.

We can state, in extreme summary, that according to the educators and teachers **digital storytelling activities are a useful tool to foster social competencies and media literacy in children**.

The third and last research question shared by all the countries involved in the Stories project concerns the educators and teachers' compentences in terms of

the educative use of digital technologies in early childhood education and care contexts. The perceived and self-assessed competencies appear strengthened through the evolution of the project, mainly due to fact that the projects developed within the schools were strongly connected to the daily activities. **Digital technology is interpreted by the educators and teachers involved as one of the keys for their professional development** and for the growth of the children. This element has likely been relevant for their motivation in the activities related to the research project.

These elements highlight that the general attitude showed by the educators and teachers towards the digital storytelling project has been positive, despite the initial reluctance and fear. The scientific literature (Arslan, 2006; Christanse, 2002; European Commission, 2001; Zavenbergen, 2007) outlines how today's educators and teachers and educators working in early childhood education and care contexts still lack skills in terms of using digital technologies for educational purposes.

The complete amount of digital narratives created within two years of educational experimentation corresponds to 174. At the end of the second year, and after analyzing each story – from the point of view of the digital artifacts' characteristics, of the project assessment and self-assessment documents filled by the educators and teachers – each partner did chose 2 best practices respecting certain quality criteria defined by research group. In total, 4 best practice have been selected in Italy, 2 in Finland, 2 in Turkey and 2 in Germany. The researchers have then examined such practices: it emerged how the process of development of the digital stories was not only aimed to the creation of a final product. Instead, the projects were developed in connection to other aims, experiences and goals pursued by the educators and teachers.

In line with this approach, the digital and non-digital elements were intertwined in the educational contexts, since the development of the digital storytelling activities took the start from the daily practices already present in the preschools involved. A further general characteristic of the best practices concerns the fact that the physical context is interpreted as an active, essential and inseparable element of the learning process, in the same way as the digital tools and narrative structure.

Providing learning contexts well organized, spaces fostering children's explorations, curiosity and social skills such as cooperation, communication and sharing, emerges as characteristic element in the selected best practices. From this short description, the characteristics of the best practices selected at the end of the 2 iterations appear to be in line with the elements emerged from the initial analysis of the international best practices selected in the initial phase of the project.

Through the analysis of each country's best practice, we can highlight some of the common characteristics, which can be considered as elements facilitating a positive outcome of such projects.

The teacher plays a facilitating role in the most part of the best practices,

by fostering children in the exploratory activities, by offering them a rich and non-judging context, providing the opportunity to experiment materials and invent the story. In this manner children are offered more autonomy and a more central role both in the process of constructing the narrative and in the use of technologies.

One of the tasks of the educators and teachers in these projects can be identified in the process of supporting an active participation of the children during the construction of the story, as to entrust them with a central role. The teacher guides the group of children in developing the plot, in the process of choosing the audio-visual elements and in the creation of the final digital artifact. Within this perspective, the teacher provides the children with various digital tools, granting the necessary time to explore, use and connect them. In the best practice, the technologies used by the children involved have mainly been *touch user intarface* and *tangible user interface*. The *touch user interface* accepts inputs originating from the finger touch or specific pens. The *tangible user interface* allows the user to interact with the tool through elements present in the environment (such as movements or sounds). This type of interface result more adequate to the development of digital storytelling project in early childhood education and care contexts, as they allow children **to approach the tools directly**, without needing a mediation of an adult.

Educators and teachers have also had the opportunity to be part of a research that included the possibility to go through a **professional training process**. This element has probably allowed them to overcome the initial obstacles encountered in the very first phases of the project. In particular, it gave them the possibility to share doubts and successes with the colleagues involved.

Important suggestions regarding a positive outcome of the digital storytelling projects concern the characteristics of the contexts were children develop them. Proposing the activities to **small groups of children** has surely been a successful methodology, since it did allow educators and teachers to support social competencies, the learning processes and the active participation of each child.

The groups have been created heterogeneously. This element facilitated the promotion of the learning processes through the presence of different levels of competence (Sharan, 1980).

Children have also been offered various digital and non-digital materials, as to foster a combined and creative use. This element facilitated children to build on the non-structured materials present in the section and to establish a connection with the digital tools available.

The design and predisposition of the contexts dedicated to the digital storytelling activities has been one of the elements that received more attention from the educators and teachers. The contexts have been predisposed
in such a way as to offer inspirations both towards narrative aspects and the use of the digital technologies. Furthermore, in many cases, children were offered a specific context (such as a **laboratory)** where they could explore and use the dif-

ferent functions of the digital technologies.

Finally, an important element concerns some considerations regarding the **design of the activities and the evaluation process** of the digital storytelling activities. We have noticed how the digital storytelling, intended as an educational methodology, meet the main expectations required by the ECEC curricula, such as cognitive, motor, socioemotional and linguistic development, in an holistic learning perspective.

The educational proposals were conducted starting from a project. This element allowed educators and teachers to reflect on the initial context, making connections with the ongoing projects and evaluating the project within its duration.

The final evaluation has been carried through **effective supervisory practices and documentation**, focusing the reflection on the process through which children built the digital storytelling projects, sharing the results with other children and other educators and teachers.

An important element that allowed educators and teachers to provide a effective design of the educational modules has been the fact that they have preliminary experimented the activities during the training. A part of the training, as already mentioned, foresaw that the educators and teachers would design and implement an activity of digital storytelling, as to prefigure possible proposals to provide children with.

Drawing on what we reported in conclusive chapter of the Guidelines on media literacy development in early childhood education and care contexts, we recommend the utilization of the digital storytelling practices as an educational methodology to foster digital competencies and to endorse a critical use of digital technologies in European children and educators and teachers.

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7. APPENDIX: BEST PRACTICES PRODUCTS

Some of best practices analysed by the research group are available and can be freely consulted throught the following links.

IT - The mysterious character	https://youtu.be/vwM2xuW01Sw
IT - Travelling characters	https://youtu.be/JbWxaQ9Xlyw
IT - The monkey, the dragon and the cake become friends	https://youtu.be/2HOR9h4dRLg
IT - Skateboard friends	https://youtu.be/89JBWbqDgac
Fi - Pippi pappa kycklingen (bonus)	https://youtu.be/zynCv6KcxMI

FI - Runaway animals	https://youtu.be/FQrSj6nX-nc

Fi - Sportsnews	https://youtu.be/B62O6tl8DMQ
TR - Talking Fruits Best Practice	https://youtu.be/IKRGyzVk8DM
TR - Planting a Rainbow	https://youtu.be/pIXORUvI-ko