



STORIES: foSTering early childhOod media liteRacy competencIES
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STORIES: SCIENTIFIC RESEARCH REPORT (IO2)

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| Description | This report is the final output of the STORIES scientific research (IO2). The report presents the background, methodology and results. The report is internal, and its content will be used to publish journal papers. |

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1 Introduction

This report gathers the outcomes of the STORIES research. The report is intended as an internal master document presenting the relevant background, methods, instruments and results, and serving as a basis for more specific research publications. The key research findings are also summarised in the public Guidelines document (IO6).

After this introduction, Section 2 describes the theoretical background, summarising relevant previous literature that pertains to the topic of the project (Section 2.1), and presents the STORIES research framework and the research questions (Section 2.2). Section 3 presents the methodology of the research, more specifically the research process (Section 3.1), participants (3.2), data collection (3.3), and data analysis (3.4).

The next part is dedicated to the findings. The sections are organised by research questions, and the first three of them address the RQ's shared by all partners. Section 4 presents findings related to digital narrative elements in children's stories (RQ1). Section 5 addresses the characteristics of the DST process (RQ2). Section 6 presents results that are related to teachers' competences in the DST process (RQ3). The next three sections present findings of additional, partner-specific research questions. Section 7 deals with children's agency in the DST process (RQ4, Finland), Section 8 addresses the role of DST in developing children's creativity (RQ5, Italy), and Section 9 is related to the role of DST in children's social-emotional development (RQ6, Turkey).

Finally, the last part of the report sums up the lessons learned based on the research activities and results. Section 10 presents a brief summary of the research findings as well as the upcoming journal papers, while Section 11 provides some recommendations for future research activities.

2 Background and Research Framework

We can break down the STORIES approach into key concepts as follows: The project activities aim at fostering children's **media literacy** (i.e., the process of **media education**) by focusing on **digital storytelling** within the domain of **early childhood education** (see Figure 2.1).

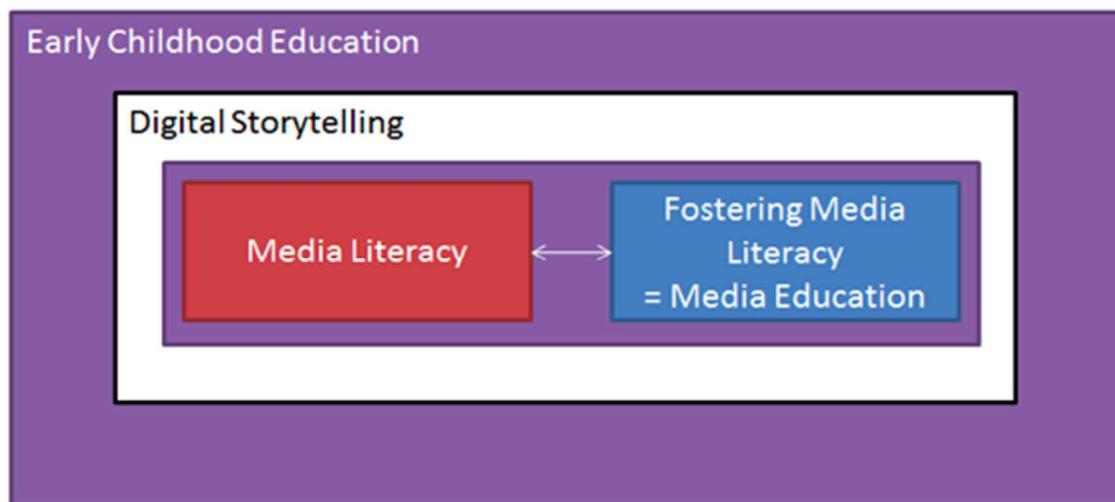


Figure 2.1. The concepts of the STORIES approach

This means, essentially, that we need to examine the concepts of media literacy and media education through the lenses of the digital aspect, the storytelling (narrative) aspect, and the early childhood education context. The following subsection summarises relevant literature related to the main dimensions of the STORIES approach.

2.1 Theoretical Background and Relevant Previous Research

2.1.1 *Media Literacy*

As **media literacy** has become an increasingly topical issue in policy, practice, and research alike, it has been defined and conceptualised in many different ways. One aspect shared by most definitions is that media literacy entails both use and production (see e.g., Buckingham, 2007; Dezuanni, 2015). A much quoted definition of media literacy characterises it as the ability to access, analyze, and produce information for specific outcomes (Aufderheide, 1993). Buckingham (2003) has conceptualised media literacy into four areas relating to production (e.g., understanding aspects related to the process, distribution and the interests involved in creating media messages), language (understanding the creation of meanings through different genres, codes, etc.), representation (issues related to interpretations, inclusion and exclusion of information from messages, objectivity and bias, etc.), and audience (understanding the role of different audiences in the use of media).

However, media literacy seems to lack a universal definition that would be both generally agreed upon and highly applicable across the range of contexts in which media literacy plays a key role. Definitions such as that of Aufderheide (1993) have been viewed by many researchers (see e.g. Livingstone, 2004; Martens, 2010; Palsa & Ruokamo, 2015) as too broad and not concrete enough for designing educational strategies in practice or for addressing the specificities of different contexts and domains in research. Therefore, these broad definitions should rather be seen as umbrella concepts providing a high level of abstraction and encompassing a variety of literacies associated with different types of media, different media contents, or different media-related dimensions or phenomena (Livingstone, 2004; Palsa, 2016).

2.1.2 Media Education

The concept of **media education** is closely related to that of media literacy. Like media literacy, media education has also been defined in different ways, but on a very general level, we can say that media education is the process and media literacy is its goal or outcome (e.g. Buckingham, 2003; Kupiainen & Sintonen, 2009; Palsa, 2016).

Some researchers have called for more comprehensive or detailed definitions. Martens (2010) points out that affective processes - that is, learners' emotional involvement in the media - may not be adequately addressed alongside the cognitive aspect; Buckingham's (2003) definition, for example, focuses only on knowledge and skills. Along the same lines, Vesterinen (2011, p. 6) argues that in addition to knowledge and skills, media literacy should be seen as an "attitude for participation and as a process of media analysis and production". Furthermore, Buckingham (2003) talks about teaching and learning *about* media. This can be seen to exclude learning *with* or *through* media - which Vesterinen (2011, p. 6) suggests should be included in the definition.

Another aspect to media education is that it happens in interaction between the educator, the learner, and the media culture (Kupiainen & Sintonen, 2009). As "media culture" is a very broad concept, this also calls for context-specific definitions.

As discussed above, in order to meaningfully apply the concepts of media literacy or media education in practice or in research, they will need to be situated in a specific context (e.g., Palsa & Ruokamo, 2015). Livingstone (2004) has argued that instead of one idea of media literacy, we must "develop an account of literacies in the plural, defined through their relations with different media rather than defined independently of them". Palsa (2016) mentions examples of specific media literacies related to different media tools, contents, and phenomena, quoting studies that have focused on television literacy, film literacy, or game literacy, or even mobile video literacy.

2.1.3 Digital Media Literacy in Early Childhood Education

Several authors have discussed the characteristics of digital media literacy (using this or a related term). For example, Buckingham (2007) emphasises that media literacy involves the ‘writing’ (i.e. **production**) dimension as well as ‘reading’ (i.e. **use**), and points out the new **opportunities and challenges presented by digital technology for both**. Dezuanni (2015, citing Jenkins, 2006) highlights the difference of digital media literacy to traditional literacy education through its focus on **non-written modes afforded by different digital technologies**.

In Hobbs’ (2010) definition of “digital and media literacy”, the elements of accessing, analyzing, and producing content (that were introduced above as the components of media literacy in general) are accompanied by three additional elements: **creating content in a variety of forms** (that is, making use of the multimodal opportunities provided by digital technologies), **reflecting** on one’s own communication behaviour, and taking **social action** by working to share knowledge and solve problems and participating as a member of a community.

Dezuanni (2015), on the other hand, draws upon actor-network theory to complement the most commonly used sociocultural views to media literacy, arguing that especially in the digital media environment, the role of material objects should be taken into account as one actor in the network where learning occurs. He defines digital media literacies as being “produced by **negotiations within networks as students and teachers interact with digital technologies, media concepts and materials**” (Dezuanni, 2015). In the early childhood context, Burnett (2010) also suggests drawing upon actor-network theory for conceptualizing young children’s engagement with digital tools and contents in new ways

The social and interaction-focused aspect seems to be highlighted by many authors as an important dimension particularly in digital media literacy. Buckingham (2007) discusses that while media education has traditionally tended to rely on collaborative work, the use of digital technology often tends to individualise the process of production. Therefore, digital media education should aim to facilitate opportunities for **collaboration** in meaningful ways.

Media education and educators’ readiness for implementing it have yet to be researched extensively from the perspective of young children and early childhood pedagogy (Dezuanni, 2015; Salomaa, 2016). Burnett (2010; Burnett & Daniels, 2016) calls for more extensive exploratory research that would enable us to better understand how new technologies contribute to children’s literacy within educational settings; the processes, choices and roles associated with meaning-making with and beyond new technologies. In terms of pedagogical practices, Edwards (2013) calls for approaches where practices would more strongly integrate play and technologies.

One interesting and relevant study from the perspective of the STORIES research is Marsh’s (2006) study on digital animation in early childhood. She examined how children

understood different affordances provided by digital media, the transformation of semiotic material to another mode, and the time-space dimensions of animation, as well as the roles of children in the process. Furthermore, Petersen (2015) points out the **importance of digital tools' affordances for understanding young children's agency in relation to their use of digital devices**. She studied the use of digital tablets and found, for example, that certain affordances of the touch screen, the portability of the tablet, and the use of pictorial modes within the applications, contributed to children's agency within the activities conducted with the tablet device.

2.1.4 Digital Storytelling as a Pedagogical Process

The following text passages have been extracted from the *STORIES Manual of Best Practice of Digital Storytelling in Early Childhood Education* (Bertolini & Contini, 2018).

Definitions of Digital Storytelling

There are many definitions of digital storytelling, but in general terms, digital storytelling 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 visual channel (images, videos, graphics, etc.). Moreover, it is a story that is recorded and shared to 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. Digital 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 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.

In light of this, 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 is one method for using these digital devices to support the educational process.

Digital Storytelling and Learning

In general, Moon (1999) suggests that digital storytelling can offer a «vehicle to facilitate learning» (in Boase 2013, p. 10). Also Barret (2006) in his meta-analysis emphasised the DST capacities to support learning. He underlined also its ability to promote the learning of all students, taking the path of inclusion.

According to Daniels (2010) and Sessoms (2008) the process of composing a story in a digital format is like a traditional story where the process of learning is interweaving meaning-making opportunities (Yuksel, 2011). Therefore, to identify areas that are promoted by this method (DST), it is useful to ask what skills are fielded both by the task of invention of stories (**storytelling**) and the task of invention of digital stories (**digital storytelling**).

The process of **constructing a story** requires numerous cognitive strategies to come into play, such as *comparing, selecting, inferring, arranging, and revising information*. The process leads to the construction of a new story based on *existing information (prior knowledge stored in long-term memory) reflection, supposition and evaluation* (Boase 2013). Inventing stories requires the ability to use their knowledge, and combine them in a new way (for Vygotskij it is creative act and thinking) establishing temporal and causal links between the parties (Boase 2013). We can say, moreover, that inventing stories asks students to use the causal thinking in which the narrator seeks to fit their experience into some form of *narrative schema* (to be intended as the knowledge we have of the story grammar) (Robinson & Hawpe 1986, in Boase 2013). In the task of inventing stories, also *critical thinking skills* are involved (Boase 2013). Critical thinking is the mental process of discernment, analysis and evaluation, which should reconcile scientific evidence with common sense (Boase 2013). Inventing and telling a story is, in fact, a task that requires to monitor the process of invention and the “quality” of story: whether the story is understandable, it is interesting/fun, deciding what to leave and what to omit, in what order to place and combine information, etc. The

quality of the resulting story, is linked by the subject's ability to reviewing, to reflect and meta-reflect (metacognition) on the story and its construction process. According to Garrety (2008), storytelling is in fact primarily a tool to reflect.

Boase (2013, p.10) says that “**digital storytelling** has the potential to empower students”. Firstly, this process increases *students’ media and technology literacy*: know how to choose the most appropriate technology, to use it appropriately, combining different types of messages (visual, verbal, sound, etc.) to build a new message. Intellectually and emotionally, creating a story involves cognitive processes of reflection, evaluation and creation, while technically the production of a digital story can require some degrees of new media literacy (Boase 2013).

Digital storytelling, like storytelling, is recognised as a useful tool in the promotion of a *deep learning* too, that Ausubel (2000) called “meaningful learning”. Meaningful learning takes place when the subject acquires new information, links and makes interacting with the knowledge you already have in memory until the construction of new knowledge structures. As a result of connecting the consolidated elements of knowledge with new knowledge, the new knowledge will be held in memory permanently (Ausubel, 2000). Findings from other studies (Yuksel, Robin, and McNeil, 2011) suggest that digital storytelling supports student *understanding of subject area knowledge*, overall academic performance, as well as writing, technical, presentation, and research skills. In addition to these skills, the results confirm that students’ thinking, social, language, reflection and artistic skills are positively affected when their teachers use digital storytelling in their classroom.

As stated above of storytelling, digital storytelling also promotes the *creativity* of individuals, perhaps even more so supported (Boase 2013, Garrety, 2008). Digital storytelling can also be an educational opportunity to promote relations among students. In particular, this occurs when the invention of the stories takes place in a cooperative way, when the children invent stories together.

There are very few studies about using **digital storytelling in early childhood educational settings**. As part of these few studies that have addressed the use of digital storytelling in kindergarten, the researchers say that the practice of the invention of stories allows preschoolers to consolidate their knowledge about the world and to foster the acquisition of vocabulary, fluency of language and the symbolic and metaphorical thinking (Farrell & Nessell, 1982; Collins, 1999 and 1985 Yuksel Maguire 2011). According to Petrucco and De Rossi (2009) and Garrety (2008), the practice of storytelling in preschool also supports emergent literacy, namely it enhances the first learning in preparation to the ability to read and write.

The Digital Storytelling Process

Digital storytelling results in a product that is multimedia and digital. The Centre for Digital Storytelling (2010) has identified the major components of a digital story as follows:

- Point of View shows the purpose and 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,
- 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 which 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).

Digital storytelling, however, is also a process: the process necessary to build the story (Petrucco & De Rossi, 2009). According to them, the construction of a digital story requires the following steps:

- Choice of *purpose/aim* and *audience* of the story
- Choice of the availability of human and technological *resources*
- Implementation:
 - a) Choose the *theme* and the type of story (choice of topic on which making up a story.) Compared with the schema of the stories;
 - b) *Storyboard*: design/invention of the story;
 - c) Production video, digital photos (drawings and / or photos)
 - d) *Assembly* and processing images and audio music
 - e) Spread the video and evaluation on the audience feedback to improve the product (with the class group/For other sections/For Parents).

Many authors (Boase 2013; Barret 2006) state that the practice of digital storytelling requires the use of strategies focused on children: where children are active protagonists and the adult is the facilitator and “director”. Ohler (in Boase, 2013) argues that in the practice of digital storytelling is important as a first step it is important to ask the children to invent a story, an oral one in preschool. According to Boase (2013) stories that are invented orally tend to be more personal than those that are invented in writing. The oral invented stories are more fluid, less static and have more chances to revision. Stories invented in written form are more “fixed” and refer more often to a particular time or event. 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).

Garrety (2008), De Rossi and Petrucco (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*. For example, it is effective to ask the children to invent a story together collaboratively. It is also useful to listen to the story of other children who can comment on it. This discussion may be useful to review the story. This continuous and cyclical process of “invention–discussion–revision” allows the large group of children to discuss the meanings building together. For these aspects, the practice of digital storytelling is also useful to support the quality of relations and social cohesion of the child group. In terms of supporting *creativity*, five crucial aspects emerge: organization of time; possibility to explore and experiment with

different spaces and materials; interaction and collaboration between children in open-ended problem-solving situations; promotion of the association and combination of different symbolic languages and systems; and educator's attitude related to fostering creativity (Creanet, 2013).

2.1.5 Dimensions of Children's Narratives

The following text passages have been imported from the internal working document "*Notes on Research theme 1, Narrative competence (Narrativity)*" (UNIMORE, October 2016) and partially from the *STORIES Manual of Best Practice of Digital Storytelling in Early Childhood Education* (Bertolini & Contini, 2018).

Recognition of signs, categorisation, continuous integration (inference) are common operations which are necessary for the comprehension of visual and verbal texts (Cardarello, 2009; Lumbelli, 2009). A great deal of research has found that the comprehension process depends largely on the reader's ability in drawing inferences (Oakhill & Cain, 2012). Such skills, which appear problematic in school learning years (OECD-PISA, 2012), are already active during early childhood (Kendeou et al., 2005).

Narrative competence refers to coherence and cohesion making in a narrative discourse, and includes the following skills (Rollo, 2007).

- Making COHERENCE: story consists of the sequence of events (START-PROGRESS-END)
- Making COHESION: use of connectives, conjunctions, adverbs that "hold together" the sentences.
- Narrating and weaving the plan-dimension of events and actions and the plan-dimension of internal states (emotions, intentions, involving the THEORY OF MIND).
- Respecting for cause and effect relationships among events;
- Telling narrative events in the correct temporal sequence;

Children's narratives have long been the subject of studies both aimed at identifying the cognitive and linguistic structures that underlie the narrative competence, and to investigate the development stages.

In a quite recent research paper in psycholinguistics, D'Amico, Albano, Marano and Devescovi (2008) have proposed a brief literature review that we mention below.

Karmiloff-Smith (2001) identifies in narrative one of the milestones language development, because storytelling requires the child the ability to take into account and integrate simultaneously a large number of factors. This is why, despite in the children's language grammatical distinctions are present at utterance level in a relatively early age, full mastery of discourse is goal is reached later.

In Psychology literature (Hudson & Shapiro 1991; McCabe & Peterson 1991; Baumgartner, Devescovi, & D'Amico 2000), it was noted that narrative competence involves the integration of different types of knowledge:

- Conceptual knowledge, which refer to a general knowledge of the world, of people and things that is told and how relate and interact. Such knowledge includes, specifically of different narrative genres, the representation of generalized events, the memory of specific episodes and knowledge of the most common types of social interactions;
- Linguistic knowledge, including required linguistic devices for drafting a story, from the use of pronouns and connective to the identification of tenses and the selection of appropriate vocabulary;
- Structural knowledge regarding knowledge of macrolinguistic structural components of various narrative genres;
- Pragmatic knowledge, referring to narrator's perspective on events and on the context in which the story takes place and then the ability to express evaluations on events and characters in the story.

Narrative discourse development has strong implications for emergent literacy in preschool children (Dickinson & McCabe, 1991). The ability to tell a coherent narrative predates and predicts successful adaptation to school literacy (e.g., Feagans, 1982). Children tell each other many forms of narrative (personal anecdotes, parodies, film retellings, fantasies), but more than half of their conversational narratives concern real personal experiences (Preece, 1987). Preschool children are more able to structure their oral personal narratives in a sophisticated way than to structure general scripts of personal experience or fictional stories (Hudson & Shapiro, 1991), although this comparative advantage of fact over fiction in terms of structural sophistication does not apply to the story-writing of older schoolaged children (Freedman, 1987), perhaps as a result of increased exposure to fictional stories from books. In spontaneously told fantasy stories, the plots of children between the ages of 7 and 9 approximate those of fairy tales (Botvin & Sutton-Smith, 1977; Hudson & Shapiro, 1991).

Fiction narrative is a complex and more formalized genre with conventional and shared rules (therefore called "grammars") that identify some basic elements, constituting an invariant structure and binding in marking the evolution of the events.

Referring for more details on the first part of the Manual Book (Bertolini & Contini, 2018), let's try to add some specifications to clarify our reference to the **schema theory** and **story grammar** in suggesting some contents/indicators.

Coherence refers to the structural knowledge concerning the elements of a story and refers to the model of the Story grammar, or schema, as defined by Rumelhart (1975), taking the notion of mental scheme of Bartlett (1932). Coherence has therefore to do with the mechanisms by which the mind organizes its knowledge, recalling it to memory and using it to interpret new knowledge. Many studies have been performed with the aim to demonstrate that both children and adults have a mental schema related to stories and their ability to

understand and remember them varies according to the story presented is poorly structured or, on the contrary, well-formed (D'Amico, Devescovi, & Tonucci, in Vicari & Caselli 2002).

The *scheme of stories* identifies structural regularities in the narrative texts, whose constituent parts are abstract categories related to the type of information that appear in the stories, and the order in which they follow each other. According to Stein & Glenn (1979), Setting and Episod are the prior categories, while each complete Episode is subdivided in five more categories. The categories include the introduction of the context and characters (Setting), the initial event that triggers the actions of the characters (Initiating event), the Attempts by the protagonist and other characters for a resolution of the problem, and finally the direct Consequences and characters' Reaction. Each category refers to a specific type of information and carries a different function in history.

One category may contain multiple informations about states, actions or events. These information are linked to each other by three types of relations:

- AND = simple co-occurrence;
- THEN = temporal relationship;
- CAUSE = relationship of cause and effect.

The structure of a story can be described in terms of a tree diagram that represents a hierarchical system of categories of the stories and the logical relationships that connect them. This knowledge guides the individual to the formulation of hypotheses about events and to interpret events (Peterson & McCabe 1983; Stein & Glenn 1982; Levorato 1988).

Story grammar knowledge enhance both listener's/reader's comprehension and the ability to retell a story or generate a novel story (Stein & Glenn, 1979, 1980). Glenn and Stein (1980) have suggested a developmental taxonomy for the acquisition of story grammar. Seven different levels have been identified ranging in complexity from simplest to most complex structure level, described by the presence / absence of certain structural properties.

| Levels | Properties | | | | | | |
|------------------------|--------------------|----------------|------------------|------|------|---------------|-------------|
| | Related statements | Temporal order | Causal relations | Goal | Plan | Complications | Interaction |
| 0 Unrelated statements | - | - | - | - | - | - | - |
| 1 Descriptive sequence | + | - | - | - | - | - | - |
| 2 Action sequence | + | + | - | - | - | - | - |
| 3 Reactive sequence | + | + | + | - | - | - | - |
| 4 Abbreviated sequence | + | + | + | + | - | - | - |
| 5 Complete episode | + | + | + | + | + | - | - |
| 6 Complex episode | + | + | + | + | + | + | - |
| 7 Interactive episode | + | + | + | + | + | + | + |

Figure 2.2 Episode structure (Hedberg & Stoel-Gammon, 1986).

The first stories told by children simply contain a series of actions taken in sequence and connected by temporal relations and were defined as descriptive sequences (Peterson and McCabe, 1983).

In some cases, stories told by children 4 years, may also contain an initial event followed by a consequence or a reaction of the main character, but hardly these incomplete episodes are brought to an end.

One of the most extensive studies on the narrative production in children is a cross-linguistic investigation conducted by Berman & Slobin (1994), along with collaborators in various countries, which used, as elicitation mode, the "reading" of a silent book (a picture book without written parts): "Frog Where Are You?" (Mayer 1969). The study showed that few children of three years (17%) introduced some initial element of the event, and even fewer (10%) conclusions. Between 4-5 years the initial description of the event grew up to appear in the stories told by two-thirds of children, while references to the attempt and the conclusion was contained in about half the stories.

Table 2.1 Story structure levels – ordered from least to most complex (Glenn and Stein, 1980; Hedberg and Wesby, 1993; Liles, 1987; Steing, 1988; Peterson and McCabe, 1983)

| Story Structure Levels | Developmental Age | Description |
|-------------------------|--|---|
| 1. Descriptive Sequence | Preschool | Describes character(s), surroundings, and habitual actions with no causal relations |
| 2. Action Sequence | Preschool | Lists actions that are chronologically but not causally ordered |
| 3. Reactive Sequence | Preschool | Includes a series of actions, each of which automatically causes other actions, but with no planning involved; no clear goal-directed behavior |
| 4. Abbreviated Episode | About 6 years | Provides aims or intentions of a character but does not explicitly state the character's plan to achieve aims; planning must be inferred |
| 5a. Incomplete Episode | Around 7-8 years | States planning, but one or more of the three essential story grammar parts of a complete episode is missing: IE (Initiating Event), A (Attempt), or C (Conclusion). |
| 5b. Complete Episode | Around 7-8 years | Includes aims and plans of a character; may reflect evidence of planning in the attempts of a character to reach the goal; has at minimum an initiating event, an attempt, and a consequence; uses words like <i>decided to</i> |
| 5c. Multiple Episodes | Around 7-8 years | Is a chain of reactive sequences or abbreviated episodes, or a combination of complete and incomplete episodes |
| 6. Complex Episode | Around 11 years | Includes elaboration of a complete episode by including multiple plans, attempts, or consequences within an episode; includes an obstacle to the attainment of a goal; may include a trick as in "trickster tales" |
| 7a. Embedded Episode | Around 11 years | Embeds another complete episode or reactive sequence within an episode |
| 7b. Interactive Episode | None established by research; beyond 11-12 years | Describes one set of events from two perspectives, with characters and goals influencing each other; may have a reaction or consequence for one character serving as an initiating event for another character |

2.1.6 Teacher Competences as a Component of the DST Process

The rapid developments in technology influence many areas including education. Children in today's classrooms encounter technology-based learning opportunities and real-life experiences, which are aimed at raising future digital citizens (Martin, 2016). Along this journey of being a world citizen, we can say that the initial point is preschool education, which is the first contact of children to schooling. Khoo, Merry, Nguyen, Bennett and MacMillan (2015), pointed out that many studies, focusing on the effects of integrating digital technologies to children's educational environments reveal that technology-based learning experiences, which are designed to be a part of children's natural learning environments within pedagogically sound frameworks are valuable. From this perspective, the need for today's teachers to consider how to use technology to make learning process more effective is obvious. Therefore, professional development activities enabling preschool educators to grasp the potential of technology and use technology effectively in their classroom becomes prominent (Zavenbergen, 2007). This necessity is also underlined in some of the educational policy documents. For instance, in a 1996 position statement by the National Association for the Education of Young Children (NAEYC), teachers' competency in choosing relevant technology was evaluated as equivalent as choosing other classroom materials. As a matter of fact, this document places a great deal of responsibility on the early childhood teacher to, "critically examine the impact of technology on children and be prepared to use technology to benefit children" (NAEYC 1996, p.1). The responsibility of teachers to use developmentally appropriate methods to successfully integrate technology to early childhood curricula is also underlined in the ECEC policies at other countries of the World such as Australia, New Zealand, U.K., Portugal, Sweden and Denmark (Plumb, Kautz, & Tootell, 2013).

Within this presented framework, technology use of teachers to offer quality learning experiences for children is emphasized. In this vein, technology related competencies become important criteria among preschool teacher competencies. However, research implies that teachers find their models insufficient in terms of technology use, think that teacher education programs do not cover technology issues and their programs do not have enough practice opportunities (Arslan, 2006; Christanse, 2002; European Commission, 2001). This underlines the need for effective training programs for teachers for integrating technology effectively to their every-day classroom activities. Therefore the following competence oriented teacher training model was developed.

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, 1f., 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.

Competence is typically defined as a multilayered concept consisting of cognitive, skill-based, and affective components - or knowledge, skills, attitudes, values, and ethics (*KSAVE*) (Binkley et al., 2012; European Commission, 2018; Griffin, Care & McGaw, 2012; Spencer & Spencer, 1993; Weinert, 2001; CoRE, 2011a; OECD, 2005). This means having theoretical background knowledge on the topic in question, practical skills to exploit this knowledge effectively, as well as certain attitudinal characteristics that are conducive to using these skills - such as openness, responsiveness, persistence, and an ability to see failures and mistakes as learning opportunities (Binkley et al., 2012).

When it comes to *teacher competences*, the aforementioned definition can be said to translate as “an integrated set of personal characteristics, knowledge, skills and attitudes that are needed for effective performance in various teaching contexts” (Tigelaar, Dolmans, Wolfhagen & Van Der Vleuten, 2004, p. 255). In the context of game-based pedagogy, for example, teachers have been found to require a set of competences entailing pedagogical, technological, collaborative, and creative areas (Nousiainen, Kangas, Rikala & Vesisenaho, 2018). Pedagogical competences (curriculum-based planning, tutoring, and assessment) stem from teachers' theoretical *knowledge* and translate into practical skills when they are applied in the pedagogical process, while technological competences (analysing technological tools and overcoming technology-related obstacles) often develop through hands-on activities, their principal starting point being in the dimension of practical *skills* (Nousiainen et al., 2018). Finally, the dimension of *attitude* or personal stance plays the main part in terms of collaborative (sharing, co-development, and networking) and creative (playful stance, improvisation, creative self-development) competence areas (Nousiainen et al., 2018). In addition, organisational culture also has a key role in facilitating innovative practices and peer support (Shear, Gallagher & Patel, 2011). Teaching can thus be seen as a complicated practice that includes knowledge about the subject matter and teaching methods, as well as the ability to integrate different digital and non-digital tools and resources into the pedagogical process (cf. Koehler & Mishra, 2009), supported by personal attitudes and organisational values.

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, p. 33).

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

In light of the STORIES context (that is, digital storytelling in early childhood education), the different layers of competence can be broken down as follows (adapted from Nousiainen et al., 2018):

- Knowledge: General professional knowledge on early childhood pedagogy; Knowledge of relevant policy developments and guidelines (e.g., early childhood curricula); Context-specific background knowledge (understanding of media education and media literacy; main concepts related to storytelling and narrative elements)
- Practices: Practical digital competences (awareness of relevant tools; ability to use these tools); Translating curricular goals into hands-on practices
- Values: Playful approach; Courage to try; Seeing failures as learning opportunities

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 what we consider to be 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.

Competencies for Digital Storytelling

First and foremost STORIES aims at fostering media literacy competencies. Thus, educators 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 need to be competent in teaching media literacy (cf. Blömecke 2000, Tulodziecki 2012), which cannot be acquired by explanations, but by using and reflecting media. Therefore, educators are rather coaches attending the use and reflection of media than presenters of contents. For educators it is therefore important to know about ways to implement pedagogic strategies in kindergartens. 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 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 DST 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, 158).

The required competencies go beyond media competence, whereby media competence is an important condition for media pedagogical action (cf. Moser 2012, Blömecke 2000, Tulodziecki 2012).

According to the structural elements of CoRE (knowledge, practices and values), the following competencies are needed for educational specialists to implement media pedagogical work with digital storytelling (Table 2.2):

Table 2.2: Teacher 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 <i>Digital Storytelling</i> 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 | | |

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Example from a STORIES Partner Country: Case Turkey

Within the General Competencies of Teaching Profession prepared by Ministry of National Education of Turkey, technology related competencies are also involved. Preschool teacher competencies have three areas, being, (1) Professional knowledge, (2) Professional skills and (3) Attitudes and values. These three areas are made up from 11 competencies and 65 related indicators (Ministry of National Education of Turkey, 2017). There are three indicators which directly include teachers' technological and technology-based material preparation skills (Table 2.3).

Table 2.3. General Competencies of Teaching Profession: Indicators of Teachers' Technological and Technology-Based Material Preparation Skills (Ministry of National Education of Turkey, 2017)

| Competency Area | Competency | Indicator |
|--------------------|--|---|
| Professional Skill | To create learning environments | Prepares instructional materials according to the objectives. |
| | To guide teaching and learning process | Uses information and communication technologies effectively in teaching and learning process. |
| | | Uses relevant tools, instruments and materials effectively in teaching and learning process. |

As use of technology becomes an important competency for preschool teachers, a substantial amount of research in Turkey focused on relationships between teachers and technology/technological materials. These studies emphasized that preservice preschool teachers have the lowest self-efficacy level related with using instructional materials, among other areas of preservice teacher education (Korkmaz, 2011) perceive themselves less efficient in raising awareness about the use of information and communication technologies in daily life (Bağ & Ay, 2017; Ekinci & Kaya, 2016) and have lowest competency levels in using latest technologies and computers (Karataş, 2002). This line of research points out that technology related competencies do not get deserved attention among the other professional competencies at preschool level. According to Korkmaz (2011), although teachers have positive attitudes towards instructional materials, they cannot make an effective use of these materials. The reason for this can be found in the problems that teachers experience by developing technology-based materials and integrating them meaningfully with learning activities. At this point, digital storytelling comes forth as a promising up to date pedagogical approach. Digital storytelling incorporating traditional storytelling with technological affordances of today's world, offers meaningful ways to integrate technology to learning environments (Harriman, 2011). In addition, digital storytelling transforms personal technological products such as music, photos and videos retrieved from digital cameras and MP3 players, to educational technology materials by enabling an easy, fun and seamless transfer to educational environments. By this way, digital storytelling provides teachers opportunities to develop their technology related competencies (Heo, 2009).

In Turkey, however, teachers are not at a desired level by integrating technological facilities to the activities of their profession. As a matter of fact, majority of preschool teachers are not familiar with technology-based pedagogical activities. For instance, Uslupehlivan and Erden (2016) found that including preschool level, pre-service teachers associate digital stories with "e-book" applications at most. Amount of research focusing on digital storytelling approach at preschool level is also considerably low. Specifically, Şimşek, Usluel, Sarica and Tekeli (2018), within a content analysis study, covered 15 articles and 12 theses on DST and among these studies only two of them conducted on preschool level. In these studies, moreover, the focus was mainly on digital dimension rather than telling stories in an educational context. In other words, DST as a tool is overly emphasized and there are misconceptions related with multimedia and DST. Although these studies refer to the various roles of DST such as facilitating self-expression reflection, none of them

has a component on sharing experiences. These findings signify that, in Turkey, there is a concern about the perception of DST as a pedagogical approach.

In this vein, to effectively transfer the opportunities DST approach offers for pedagogical contexts, competent teachers, who are participated at least one DST workshop and competent on both theory and practice is a necessity (Şimşek, Usluel, Sarıca & Tekeli, 2018). Regarding this point, before starting the STORIES project, preschool teachers attended a teacher's training program focusing on integrating DST in preschool educational settings. By this way, we also aimed to contribute to the children's journey of being digital citizens by creating technology-based quality learning experiences. Teachers, on the other hand, also find an opportunity to develop their technology related competencies emphasized by Ministry of National Education of Turkey. After the training program, each teacher carried out six DST projects, in two consecutive academic years. In Turkey, teachers were asked to use their own originally developed digital stories by three of these projects. This enables them to be effective leaders to guide digital story creation process within a sound pedagogical framework (Uslupehlivan, Erden & Cebesoy, 2017). Therefore, teachers' digital stories are conceptualized as one of the indicators about their guidance skills and competency levels in terms of DST projects.

2.1.7 Children's Agency in DST Activities

The DST process entails interaction between children, adults, and various non-human participants. The latter consist of digital devices and applications used as storytelling tools, non-digital artifacts utilised as props and support materials, and spaces in which the activity takes place. All participants, both human and non-human, jointly contribute to children's agency (cf. Paju, 2013).

We can also speak about authoritative (i.e. human) resources which are used for managing allocative (non-human) resources (Giddens, 1979). However, as the physical, social and cultural context enhances or restricts children's agency in various ways, the relationship between authoritative and allocative resources can be seen as reciprocal. A child as an agent is able to act 'in another way' in a given context, which requires power and resources. In addition to structural and power-relationship factors there is also a time-dimension linked with children's agency: they build their agency on earlier experiences. (Giddens, 1979.)

Agency and children' possibilities for action in the kindergarten environment are shaped by the objects around them and the way in which the spaces are organised (Paju, 2013). The increasing presence of digital tools among all other objects in the kindergarten – and the ways in which their affordances are utilised – adds an interesting dimension to examining this theme.

Children's understanding of different affordances offered by digital media has been previously studied e.g. in the context of digital animation. Marsh's (2006) study found that children had an emergent understanding of the affordances of digital media: they understood what was made possible by digital tools (e.g. in terms of sound effects and movement) when recreating their non-digital stories digitally (Marsh, 2006).

There are also studies on the affordances of specific digital tools, such as tablets. It has been found that certain affordances in tablet devices (touch screen, portability, and the use of pictorial modes within applications) may support children's agency (Petersen, 2015). For example, tablets have been found to afford both full play activities (i.e., using a specific game or app in the way it has been intended to be used) and so-called playful subversions (for example, messing around with different apps or the operating system) (Fróes & Tosca, 2018). Both of these ways of use are important in terms of children's agency: being able to independently and self-directedly use apps without being dependent on adults' assistance and having the ability to playfully explore the tablet, thereby becoming familiar with the device beyond individual apps. Furthermore, affordances of tablets and digital cameras can be collaboratively constructed and shaped by the ideologies and interactive practices of classrooms, homes, and communities (Rowe & Miller, 2017). Here, especially the portability of these tools plays an important role.

2.1.8 Creativity and DST

The following text is a combination of text passages that appear in the *STORIES Manual of Best Practice of Digital Storytelling in Early Childhood Education* (Bertolini & Contini, 2018) and in Section 8 of this document, in conjunction with the results pertaining to the creativity-related research question.

Emergent technologies show significant potential in relation to the possibility of combining children's perceptions with immersive imageries, as to allow a more extensive interaction with the contexts explored by children (Gallagher, 2015). If we consider perception to be active and based on a set of interaction possibilities (Gibson, 2013), digital technology can then be reinterpreted as a tool that contributes to predispose those peculiar contexts defined by Kirsh as *enactive landscapes*, meaning structures that offer chances to find new affordances based on the involved subjects' current interests (Kirsh, 2013). By affordances we mean not only objects' properties, but also relational qualities: even though many properties are absent in unstructured objects, the shape of a peculiar object can suggest new affordances when explored and manipulated. When children act on props, their actions can be considered as "guided" by the affordances perceived. Acting affordances can therefore explain the process allowing children to perceive something different than what is present in terms of perception. Within learning contexts offering access both to non-structured materials and the possibility to explore it through digital technologies, so to create a visual narrative structure, children have been offered the possibility to augment their metaphorical imageries, by not being limited to see a single possibility of interaction with objects. It appears, moreover, how the inherent meaning of an object is not what defines it. Instead, the social and communicative elements appear to be central: what affects the object, more than an individual instance, is in large part the fact that it is acted within intersubjective engagements. As claimed by enactivist accounts of meaning making processes, new meanings can be established within an intersubjective space by leveraging on social affordances and mutual understanding (Hutto, 2012).

An object can afford different actions in the context of symbolic play. Yet, importantly, to consider such domains transfer as metaphorical activities, certain limitations need to be set. Drawing on Winner's instance, we can consider children's instances of metaphor (both verbal and visual) to be genuine if the new meaning-making process appears adequately grounded in resemblance (Winner,

1979) – even though, by comparing them with the metaphors made by adults, we usually notice a minor metalinguistic awareness of the formers.

The effective use of ICT to enable creativity is dependent upon careful consideration of the human–computer interface. As Cook and Woollard point out in (Hayes and Whitebread 2006, p. 107), less well–designed icons can impede ICT–based creativity and the development of ICT capability. It is also important that the ICT activities are embedded in physical experiences to ensure that the relationships between functions and “real” activities are appreciated.

Moreover, it is observed frequently that children’s creativity grows rapidly, if they are not isolated. Most children by their nature want to share, show and use technologies together with others. Digital technologies thus are a kind of strong icebreaker (Druin 1999) which helps bring children of different natures and interests closer or give them opportunity to get to know each other. Activities with ICT can significantly support communication and collaboration among children as well as their develop-ment in the social domain.

2.1.9 Social-Emotional Development and DST

Schools are social places and learning is a social process (Zins, Bloodworth, Weissberg, & Walberg, 2004). In this process, it is aimed not only to develop cognitive behaviors, but also to develop students' emotional, social and cognitive competencies in a holistic way. However, as stated by Elias (2006), widespread acceptance that ‘academic learning can take place in school and social and emotional learning can take place outside the school’ can lead educators to the wrong point, which causes social competences to be a lost part of education. However, the deficiency left in any area of development naturally affects other areas as well; because learning and development are integrated in a holistic approach. The social-emotional learning domain, which aims to help students develop attitudes, behaviors and understanding they need to be healthy individuals from the emotional, social, cognitive, and physical perspective, is complementary to other areas of learning; in other words, the social emotional learning field influences what we learn and how we learn (Denham & Brown, 2010; Elias et al., 1997; Elias & Weissberg, 2000; Johnson & Johnson, 2004).

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). It encompasses both intra- and interpersonal processes. Besides, the core features of emotional development include the ability to identify and understand one’s own feelings, to accurately read and comprehend emotional states in others, to manage strong emotions and their expression in a constructive manner, to regulate one’s own behavior, to develop empathy for others, and to establish and sustain relationships (National Scientific Council on the Developing Child, 2004, 1).

In literature (Cohen, 2001; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Elias et al., 1997; Elias & Weissberg, 2000; Elias, 2006; Elias & Mocerri, 2012; Greenberg, Domitrovich, Weissberg, & Durlak, 2017; Payton et al., 2008), there are some conclusions about the fact that

providing social-emotional learning practices in learning environments contribute to the increase of academic achievement of students, decrease of negative behaviors, development of students' making sensible decisions and controlling their behaviors, improvement of communication and problem-solving skills, and the positive change of school and classroom climate. In addition, it is also possible to find longitudinal research (Jones, Greenberg, & Crowley, 2015) that includes important findings about the fact that social-emotional learning from childhood to adolescence affects the behavior of students in all developmental areas positively. In the light of these effects, social-emotional learning has been a crucial issue in recent years, especially in the pre-school period, with respect to children's readiness and adaptation to the school and children's gaining necessary skills (such as; cooperating with others, respecting others' rights and emotions, empathy) which are also needed during adulthood stage (Durualp, 2014).

Social-emotional learning skills can be developed in different ways for different individuals. For this reason, the differentiation of learning environments contributes to reach all the learners, to develop their skills and to have the learning environment have the learning paths of learners' choice. Elias (2006) states that beyond modeling, role playing, artwork, dance, drama and using materials; using digital media, using computer technologies and internet can also be considered as applications for differentiation of learning environments. Besides, Robin (2008) emphasizes that the digital narrative approach is an effective method and tool for attracting students with different learning styles and contributing to their collaborative work. Thus, it is reported by several research (Ayvaz-Tunç & Karadağ, 2013; Baki, 2015; Bozdoğan, 2012; Doğan & Robin, 2008; Dupain & Maguire, 2005; Sadik, 2008; Yang & Wu, 2012; Yüksel, Robin, & McNeil, 2011) that digital storytelling improves the skills of creative thinking, critical thinking, problem solving and evaluation while increasing the level of social participation, narrative skills and learning motivations. Moving from this perspective of that digital storytelling is an effective model; examining how the children's social-emotional behaviors change within digital storytelling activities, in terms of their verbal and non-verbal interactions and narrative elements in story creation process, is conceptualized as one of the interest area in STORIES Project (as cited in Gözen & Cırık, 2017).

2.2 STORIES research framework

As defined above, the project examined media literacy in the context of digital storytelling (DST) taking place in the domain of early childhood education (ECE). This was also established as the lens through which we have examined the kindergartens' activities. That is, we have adopted an integrated perspective that encompasses all of the aforementioned main concepts.

Within this overall scope, we are primarily interested in *children's media literacy* in the ECE DST context on the one hand and *teachers' ability to support it* on the other hand. Breaking down these two dimensions in more detail, we have established three shared research themes related to three perspectives:

1. The product perspective
2. The process perspective
3. The perspective of teachers' competences

2.2.1 Main Research Questions

For each perspective, we have defined one shared research question that shall be addressed by all partners (see Figure 2.3):

- Which digital narrative elements occur in children’s digital stories? (RQ1)
- What are the characteristics of the interactive process of building a digital narrative in a digital storytelling project in ECE? (RQ2)
- What are the teachers’ competences in ECE DST on an individual and a collective level? (RQ3)

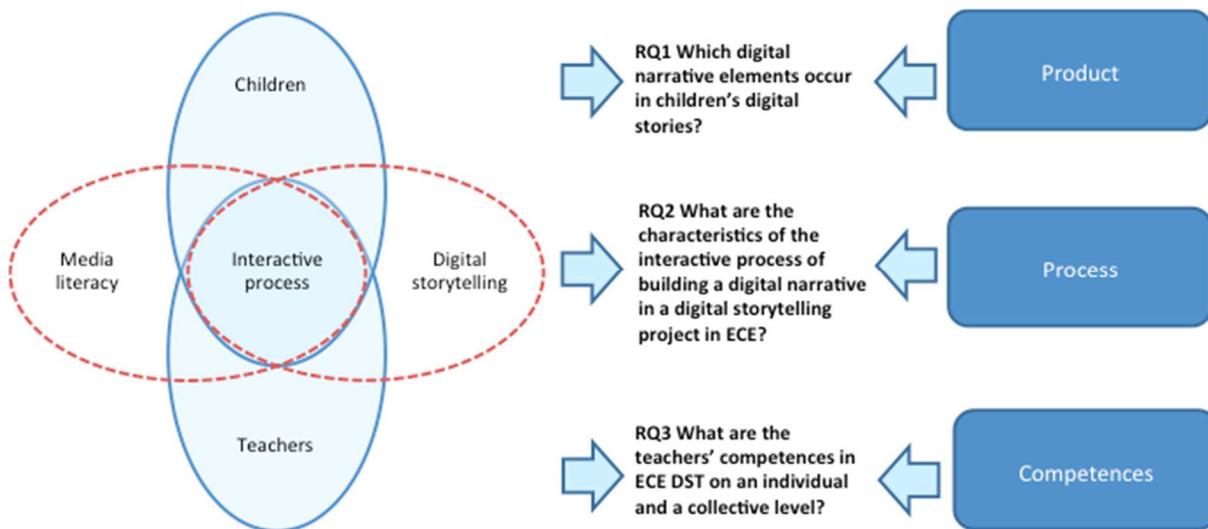


Figure 2.3. Research perspectives and questions

The first research question focuses on the **product** perspective and **children’s** media literacy; that is, it examines the final digital stories created by children during the digital storytelling activities. The concept of “digital narrative elements” integrates the narrative and media elements, emphasising the affordances and opportunities of different digital tools for multimodal storytelling. As there will be stories made with various different tools and techniques (i-Theatre, specific storytelling apps, combinations of different tools), the aim is to analyse what the stories are like in terms of narrative characteristics supported by the digital dimension, and how the stories reflect the tools that are used and vice versa. From a practical point of view, the purpose is to provide material for enhancing teachers’ understanding on *what the introduction of digital tools means for storytelling in ECE*.

The second research question is related to the **process** perspective, looking at digital storytelling as an interactive process between **the children and the teachers**. This question has a development-oriented focus. It aims at understanding what kind of aspects are included in the interactive process of digital storytelling for supporting children’s media literacy, including those related to the roles of the teacher (e.g., pedagogical strategies used), the children (motivation, active participation, etc.), and the technological tools. It provides rich descriptions of different ways of carrying out the

process. From a practical point of view, the purpose is to allow for the *development of guidelines for teachers on the implementation of digital storytelling in ECE*.

The third research question is concerned with the **competence** perspective; that is, **teachers'** capacity to support children's media literacy through digital storytelling. This question includes the element of perceived and observed competences. The aspect of perceived competences (in implementing digital storytelling with children) will be addressed by all partners, in addition to which individual partners may collect data for assessing teachers' observed skills (in constructing their own digital stories). The perceived competences entail the dimensions of knowledge, skills/practices, and attitudes/values. In line with the CoRe report, competences are not seen merely as *individual* but also on a *collective* level; that is, on the level of the whole institution. From a practical point of view, the purpose is to *support teachers' self-reflection on their capacity to support media literacy with DST*.

2.2.2 Additional Research Questions

To support the three main research questions shared by all partners, we have also specified the following additional questions addressed by specific partners. They provide complementary perspectives to the main questions, also allowing individual partners to pursue their specific research interests without increasing all partners' workload.

- How does children's agency manifest in the DST process? (RQ4; Finland)
- Developing young children's creativity: what can we learn from DST practice in early childhood settings? (RQ5; Italy)
- How do digital storytelling 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? (RQ6; Turkey)

The fourth research question focuses on the **children's** perspective to the digital storytelling process, tapping into children's agency and their experience on their learning. The question is complementary to RQ2 where the focus is more on the teachers' reflections on the process. From a practical point of view, this question contributes to the *development of guidelines for implementing digital storytelling in ECE* by ensuring that the children's active role is taken into consideration.

The fifth research questions explores how DST can contribute to the development of young children's **creativity**. Digital storytelling appears as a favorable environment in which to track processes and products of children's creativity. During the invention of stories, in fact, children can meet various occasions when resolving problem situations through the combination of elements which they own - tangible or intangible; verbal or visual - up to the construction of something new. These are the reasons why the UNIMORE research group will explore the stories invented during the activities of digital storytelling to examine the creative processes of children. Specifically, the group takes as a privileged indicator of creativity the metaphorical device, intended as a semantic device which can be both verbal and visual, in which two different domains are made to interact, by projecting on one the other's characteristics, producing in this way an extension and integration of meanings.

The sixth research question focuses on the role of DST in children's **social-emotional development**. Media-literacy skill, the basic variable of STORIES Project, is not only a skill in early childhood education that covers skills based on verbal, visual, auditory, symbolic or body language based facilities provided by media components but also covers social and emotional skills. On the other hand, in the process of developing media literacy skills, digital storytelling is 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. From this point of view, this research question "*How do the children's social-emotional behaviors change within digital storytelling activities, in terms of their verbal and non-verbal interactions and narrative elements exhibited individually in story creation process?*" focuses on examining the development/change of behaviors that children exhibit both individually and during verbal and nonverbal group interactions in various stages of the story building process with regard to the dimensions of socio-emotional development area (i.e. self-awareness, self-management, social awareness, relationship skills, and responsible decision-making). In this respect, the research question comprises a process perspective on children's media literacy in the context of ECE.

3 Methodology

3.1 Research Process

The overall research process followed the design-based research (DBR) structure (see Figure 3.1): an iterative approach carried out in actual contexts as a collaborative effort between researchers and practitioners (Wang & Hannafin, 2005). The DBR approach emphasises multidimensional dialogue between theory, practice, and design outcomes with the aim of advancing learning theory, educational practice, and the design process (e.g., Barab & Squire, 2004; Design-Based Research Collective, 2003; Wang & Hannafin, 2005).

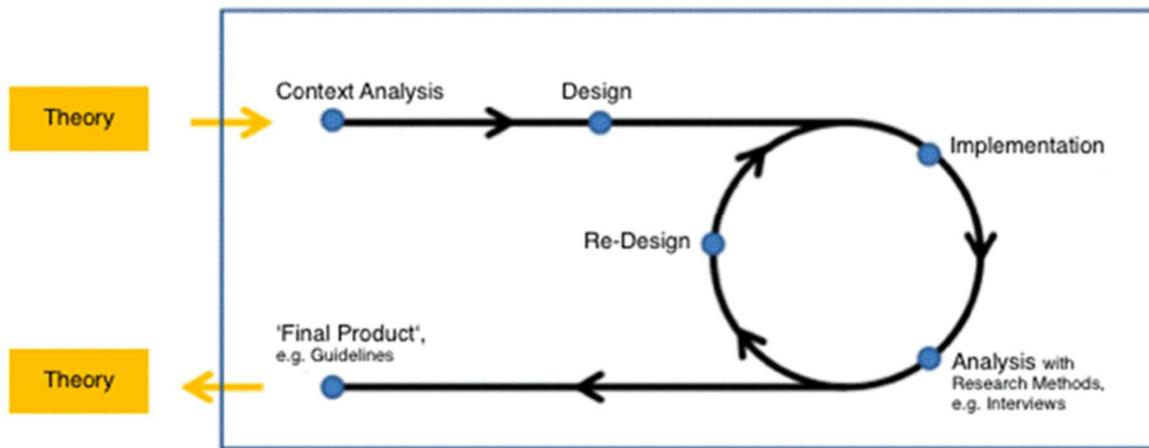


Figure 3.1. The design-based research process

In this project, the DBR process consisted of two cycles where teachers implemented digital storytelling with children (Figure 3.2).

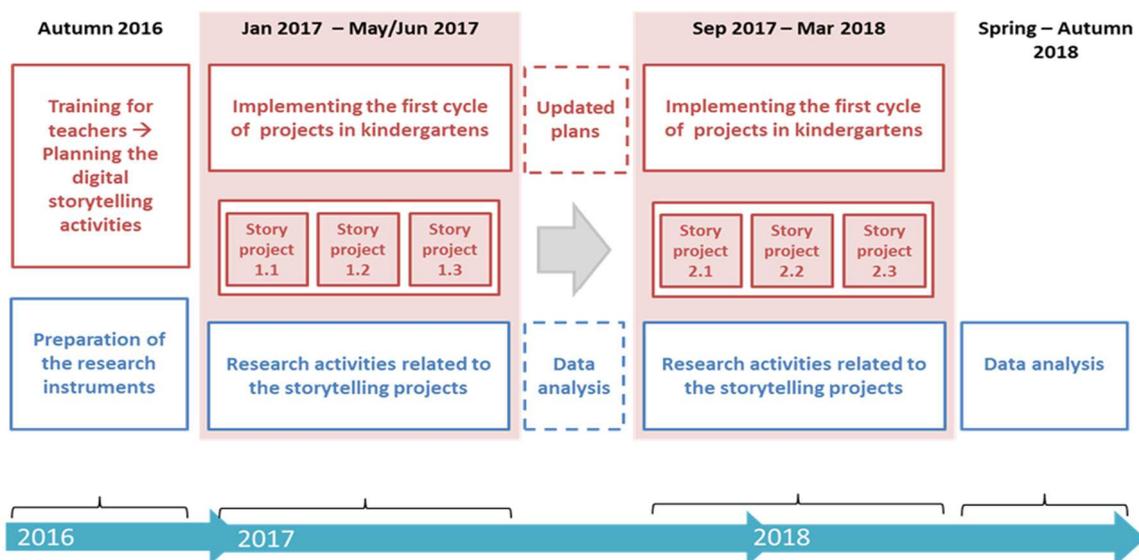


Figure 3.2. Timeline of the activities

The groundwork for the planning of these projects was laid during a DST training course provided by the researchers in Autumn/Winter 2016-2017. The involved teachers designed their storytelling activities under the researchers' guidance. At the same time, the researchers finalised the research instruments that were used to collect data during the activities.

Starting in January 2017, the digital storytelling activities began in the kindergartens. The first cycle took place between January and June 2017, covering a time span of approximately five months (the exact duration varied slightly between countries and individual kindergartens). During this period, each teacher was instructed to implement a series of three different digital storytelling projects with his/her group.

Between the iterations, the researchers shared experiences from the first cycle and highlighted certain aspects that needed to be improved. They also revised the research instruments based on participants' feedback and the quality of research data obtained. The second series of projects was implemented during an approximately six-month-long period from September 2017 to March 2018. When planning their projects, the teachers had the opportunity to reflect on the process and adapt it based on the researchers' preliminary observations and their own experiences from the first cycle.

When carrying out their activities, the teachers were free to adapt them on the go in order to respond to emerging needs and contextual elements. Throughout the implementation, non-intrusive supervision from the research team was available to them.

Research data was collected during the whole process (see Section 3.3 for more details). Preliminary analysis began after the first cycle, with the aim of discovering issues and aspects that needed to be changed or improved in the second cycle. After the second cycle finished, the research team focused on the final analysis of the whole data set and reporting the results.

3.2 Participants

The DST projects were implemented in 19 kindergartens/schools in four countries. Table 3.1 describes the participants.

Table 3.1. Research participants

| Country | Name of kindergarten/ preschool | Total number of children participating in the projects | |
|----------------|--|---|----------------------------|
| | | Academic Year 2016-2017 | Academic Year 2017-2018 |
| Finland | <ol style="list-style-type: none"> 1. Neulaskangas Kindergarten, Jyväskylä 2. Säynätsalo Kindergarten, Jyväskylä 3. Kindergarten Marias Asyl, Helsinki 4. Kindergarten Tunturi, Helsinki | 150 | 240 |
| Germany | <ol style="list-style-type: none"> 1. Kindertagesstätte im Lebenshilfehaus, Karlsruhe 2. Kindertagesstätte Sonnensang, Karlsruhe 3. Kindertagesstätte Mühlwichtel , Karlsruhe 4. Gemeinschaftsschule Neubulach 5. Kindertagesstätte Neubulach | 35 | 55 |
| Italy | <ol style="list-style-type: none"> 1. La Ginestra Kindergarten, Poviglio 2. Arcobaleno Kindergarten, Novellara 3. Zenit Kindergarten, Boretto 4. Soliani Scutellari Kindergarten, Brescello 5. Arcobaleno Kindergarten, Guastalla 6. Haiku Kindergarten, Reggio Emilia | 152 | 159 |
| Turkey | <ol style="list-style-type: none"> 1. Özel Şişli Terakki Preschool, İstanbul 2. Özel Florya Kindergarten, İstanbul 3. Preschool of Özel Evrim Schools, İstanbul 4. Şehit Mehmet Selim Kiraz Preschool, İstanbul | 77 | 82 |

3.3 Data Collection

In terms of data collection, the project adopted a mixed-method approach (Creswell & Plano Clark, 2007; Johnson, Onwuegbuzie & Turner, 2007) combining both qualitative and quantitative data. One of the specificities of the project is the need to combine data from four different countries (and in at least four different languages), which means that our data collection instruments and analysis protocols had to be designed in such a way that allowed us to integrate all this data as effortlessly and reliably as possible.

Several types of data were collected during the project, including artefacts, documentation, questionnaires and interviews, as well as observational data. In each country, the local research partner was responsible for the collection of all the research data. A shared set of core instruments was used by all partners, and additional data collection tools were applied by individual partners to address partner-specific research questions.

Table 3.2 provides an overview of the data. The instruments themselves can be found in the appendices of this report.

Table 3.2. Research data

| Data | Research question | Instrument | Country | Size of data |
|--|------------------------------------|---|-----------------------------------|--|
| Children's digital stories | RQ1, RQ5 | Appendix 4 (Digital Story Evaluation Form), Appendix 5 (Digital Story Evaluation Form Coding Guide) | All | 174 digital stories in total (TR=59 + IT=59 + FI=36 + DE=20) |
| Project sheets & Additional section | RQ1, RQ2, RQ6 (Additional section) | Appendix 1 (Project Sheet), Appendix 6 (Additional Section; Observation Grid for Children's Social-Emotional Development within Digital Storytelling Process) | All & Additional section: Turkey | 146 project sheets in total (TR=36 + FI=37 + IT=59 + DE=14) Additional section: 44 social-emotional development grids |
| Yearly project summaries | RQ2, RQ3 | Appendix 2 (Yearly Project Summary) | All | 53 yearly project summaries in total (TR=12 + FI=18 + IT=16 + DE=7) |
| Supporting data (Intermediate outcomes or documentation; video recordings) | RQ2, RQ4 | | Finland (RQ2, RQ4) & Turkey (RQ2) | |
| Teacher questionnaires | RQ3 | Appendix 3 (Questionnaire/Self-Report Form for Teachers) | All | 66 baseline answers (TR=28, IT=22, FI=8, DE=8). 50 repeated measures (TR=28, IT=17, FI=5, DE=0) |
| Teachers' digital stories | RQ3 | Appendix 7 (Evaluation Form for Teachers' Digital Stories with Coding Guide) | Turkey | 12 teachers' digital stories |
| Group interviews with teachers | RQ3 | Appendix 8 (Teachers' Interview Questions) | Finland | 13 teachers interviewed |
| Group interviews with children | RQ4 | | Finland | 51 children interviewed |

In the following subsections, we present the role of the aforementioned data in answering each of the research questions.

3.3.1 Data Pertaining to the Products (RQ1)

Digital stories: The digital stories produced by the children during the activities implemented in the kindergartens were the main source of data for RQ1: they were used to *identify the digital narrative elements* used by the children. At the end of the project, the total number of stories was 174 (86 of which were produced during the first project cycle and 88 during the second cycle).

Project sheets: Teachers were asked to fill in a fixed-format project sheet (see Appendix 1) for each project they carried out with their groups; that is, each teacher was expected to fill in six project sheets altogether (three between January and June 2017 and three between September 2017 and March 2018). The total number of project sheets produced was 146, 69 of which were produced during the first project cycle and 77 during the second cycle. In the project sheet, the teachers described the activity, reported their assessment/judgement of the activity, described possible changes made during the activity, and wrote down any additional notes and comments relevant to the activity. The project sheet was slightly modified between the two project cycles, as feedback from teachers suggested that they had experienced the task of filling in the project sheets as too time-consuming and labour-intensive. For RQ1, the role of the project sheets was to *set the context* in order to help researchers interpret the final stories and the affordances of technology for storytelling.

3.3.2 Data Pertaining to the DST Process (RQ2)

Yearly summaries: In addition to project-specific documentation, teachers were asked to provide a yearly summary, that is, a brief summary of their activities after each project year (see Appendix 2). “Project year” refers to one DBR cycle (see Figures 3.1 and 3.2). That is, the summaries were provided in June 2017 for the first series of projects (first project year; Cycle 1) and in March 2018 for the second series of projects (second project year; Cycle 2). Altogether, 53 yearly summaries were produced (28 during the first cycle and 25 during the second). The purpose of the yearly summaries was to *reflect on the whole process in a holistic way*, and they serve as the main source of data for RQ2.

Project sheets: Project sheets, i.e. teachers’ fixed format descriptions (see Section 3.3.1) of each project, provided detailed information on the tools, techniques, prompts, and other aspects entailed in creating each story. They also indicated any changes that were made to original plans. In other words, for RQ2, the project sheets provided *process-related data on the level of individual projects*.

Outcomes or documentation of intermediate phases: Material related to intermediate phases of individual story projects was collected with the aim of supporting the analysis of the process. This data complements the project sheets and yearly summaries, *demonstrating concretely the process* through which the final digital stories were created. In practice, this intermediate material consists

of any type of material that serves to illustrate the process, such as draft versions, notes from planning sessions with children, recordings of improvising the story through play (with or without technology), and so forth.

Observation / video recording: Finland and Turkey performed observation and/or video recording of the digital storytelling activities in order to collect additional data. The role of the observational data is aimed at *deepening the process description on the whole or examining a specific part of the process in particular detail.*

In Turkey, researchers observed implementation of each project by making visits to each of four participating schools between February-June 2017 for the 1st implementation year (2016-2017 academic years) and between November 2017-March 2018 for the 2nd implementation year (2017-2018 academic years). Cycles of visits were carried out to observe both introductory activities before the creation of digital stories and process of digital story creation through six projects implemented in each class. Description for those observation visits are provided in Table 3.3. During visits, Turkish researchers not only reported anecdotal notes but also collected process-related photos and/or video recordings as additional data.

Table 3.3. Descriptions for researchers' observations on digital storytelling activities in Turkey

| Name of kindergarten/ preschool | 2016-2017 Academic Year | | 2017-2018 Academic Year | |
|--|-----------------------------------|------------------------------------|-----------------------------------|------------------------------------|
| | Date Interval of the Observations | Total Duration of the Observations | Date Interval of the Observations | Total Duration of the Observations |
| Özel Şişli Terakki Preschool, Istanbul | February 2017 – June 2017 | 5 hours | November 2017- March 2018 | 5 hours |
| Özel Florya Kindergarten, Istanbul | | 13 hours | | 5 hours |
| Preschool of Özel Evrim Schools, Istanbul | | 7,5 hours | | 5 hours |
| Şehit Mehmet Selim Kiraz Preschool, Istanbul | | 10,5 hours | | 5 hours |

In Finland, teachers in two kindergartens were given video recording equipment for the second project year and asked to document the activities to the extent that was feasible for them.

3.3.3 Data Pertaining to Teachers' Competences (RQ3)

Teachers' digital Teachers' digital stories: Additionally, digital stories created by the teachers were used as research data to *gain better understanding of the teachers' competencies*. The purpose is that the extent to which and the ways in which they use different media elements can give additional insight on the level of their digital competences and preferences. The teachers' creations can also be useful in order to account for the possible effect that teachers' preferences may have on the creations of the children in their groups. The use of teachers' stories as research data was optional, and it was implemented in Turkey. Turkish teachers developed various numbers of digital stories to use in their project activities during the implementation process. However, for the analysis, the amount of digital stories was limited to three digital stories created in both project years: one during the training (a total of 4 stories), another for one of the projects in the first cycle (a total of 4 stories), and a third one for one of the projects in the second cycle (a total of 4 stories).

To evaluate digital stories created by the participant teachers, "Evaluation Form for Teachers' Digital Stories" (see Appendix X: Evaluation Form for Teachers' Digital Stories with Coding Guide) was used. This form is developed based on "Digital Story Evaluation Form" which is constructed by all STORIES Project partners to evaluate children's digital stories. The form consists of five sections: (1) Narrative elements, (2) Digital story elements (3) Story grammar assessment, (4) Media elements, (5) Technology elements. Section 1, 3, 4, and 5 are adopted from Digital Story Evaluation Form which was developed by the partners of STORIES Project to assess the quality of the digital stories of children created during two consecutive academic years, whereas section 2 is developed by the Turkish researchers.

This second section, entitled "Digital Story Elements", covers eleven performance criteria within a rubric. Three performance levels – insufficient, moderate and sufficient – are defined for each criterion existing in the rubric. To decide on digital story elements, which will be on the rubric, an extensive literature review (Lambert, 2010; Robin & Pierson, 2005; Yüksel, Robin & McNeil, 2011; Green, 2011; Buckner, 2016; Jakes, & Brennan, 2005; Kearney, 2011) has been conducted. In line with related literature, the rubric was developed based on seven elements specified by Digital Storytelling Center and adopted by Robin and Pierson (2005). According to this, the final form of the rubric was formed by listing the criteria, which will be used to evaluate the performance. After that, performance levels were specified and defined.

To ensure content validity, the rubric was reviewed by two curriculum development and one measurement and evaluation specialists. For language and meaning, views of a Turkish language specialist have been taken. According to the views of the specialists, the rubric took its final form, covering these eleven elements: (1) Purpose, (2) A dramatic question/problem, (3) Content, (4) Voice of the narrator(s), (5) The power of the soundtrack, (6) Visual elements, (7) Economy, (8) Language, (9) Pacing, (10) Contribution of the message to children's development, (11) Clarity of the message.

To obtain indicators on scoring reliability, the data obtained from the first implementation of the rubric on the first digital stories of the participant teachers' was used to estimate the inter-participant consistency. By using the rubric, three researchers evaluated teachers' digital stories

independently and the codes with regards to the coding scheme in data collection tool given to the same digital story were compared. Based on the compromise reached between the researchers, the rubric is concluded to work appropriately.

Teacher questionnaires: In order to capture the teachers' *attitudes and perceived competences*, a questionnaire was administered twice during the process: before the first project cycle and after the second cycle. The questionnaire (see Appendix 3) addressed attitudes and competences related to the teachers' capacity to implement DST in ECE and support children's media literacy with DST. The questionnaire was based on the contents of the teachers' training course implemented before the first project cycle, and thereby it also supported the evaluation of the transfer of the training contents to practice. In order to enable transnational comparisons, the questionnaires included mainly quantitative items, supported with open-ended comment fields. Altogether, 66 teachers answered the questionnaire before the project activities and 50 teachers also after the project activities.

Yearly summaries: The holistic reflections of the process in the yearly summaries (see Section 3.3.2) provided supporting data also for RQ3, highlighting *areas where the teachers feel their competences have enhanced*.

Group interviews with staff and focus group interviews with teachers: Furthermore, in order to tap into the *collective dimension of competences*, group interviews with 13 teachers were conducted as an optional data collection activity in Finland. In two kindergartens, teachers were interviewed three times (before project activities, after the first project cycle, and after the second cycle), in addition to which teachers in one additional kindergarten were also interviewed after the second cycle. In Italy, a focus group discussion was held after the second project year with 14 practitioners involved in the project.

3.3.4 Data Pertaining to Children's Experiences (RQ4)

Group interviews with children: In Finland, children's experiences were collected at the end of the second project year in order to gain an understanding of the children's views about *their agency and learning during the process*. The aim of children's interviews was to complement other methods that approached the digital storytelling activities mainly through the eyes of adults (i.e., teachers' documentation and researchers' analysis of the outcomes). Moreover, children's interviews can be used to deepen and explain the findings based on the analysis of digital stories, such as the roles played by different media elements and reasons for building stories in a certain way. Altogether, 51 children from three kindergartens were interviewed.

3.3.5 Data Pertaining to Creativity (RQ5)

Digital stories: In Italy, the finalized stories and the activity records have been analyzed to explore whether there appear metaphorical devices, in which contexts they emerge and which features they have.

3.3.6 Data pertaining to Social-Emotional Development (RQ6)

Additional project sheet section: In order to gain understanding on the role of digital storytelling activities to support children’s social-emotional development, Turkey has conducted a longitudinal study on the change and development of children’s social-emotional behaviors based on qualitative data obtained through teachers’ recorded systematic observations on each child’s behaviors in story creation process regarding several sub-dimensions of social-emotional developmental area.

The study group consists of 44 children aged between 48-72 months, who continuously participated in total of the six digital storytelling projects implemented in both of the implementation years (2016-2017 and 2017-2018 academic years) of STORIES Project, held in a total of four pilot kindergartens in Istanbul. The projects were implemented by 12 practice teachers in 2016-2017 academic years and by 17 practice teachers in 2017-2018 academic years under the guidance and counseling of Turkish researchers.

Research data were obtained by practice teachers’ systematically observing the social-emotional learning behaviors of children during each project all through both academic years and recording their observations using a specific observation grid which is constructed by the Turkish researchers (see Appendix 6: Observation Grid For Children’s Social-Emotional Development Within Digital Storytelling Process). This grid was presented to the teachers’ attached to the project sheets. The grid was formed based on five main dimensions of social-emotional learning (self-awareness, self-management, social awareness, relationship building and responsible decision-making) and the qualifications contained in 25 sub-dimensions of them, which are defined by The Collaborative for Academic, Social, and Emotional Learning (CASEL, 2016), Elias (2006) and Greenberg et al. (2017). Similar tools developed for the same purpose by several researchers (Del-Moral et al., 2016) were also examined. Hence, Table 3.4 presents the social emotional learning competences within dimensions and sub-dimensions, considered in the process of developing the observation grid.

Table 3.4. Dimensions and sub-dimensions of social-emotional learning behaviors

| Dimension | Sub-dimension |
|--|--------------------------|
| <p>SELF-AWARENESS The ability to accurately recognize one’s own emotions, thoughts, and values and how they influence behavior. The ability to accurately assess one’s strengths and limitations, with a well-grounded sense of confidence, optimism, and a “growth mindset.”</p> | Identifying emotions |
| | Accurate self-perception |
| | Recognising strengths |
| | Self-confidence |
| | Self-efficacy |
| <p>SELF-MANAGEMENT The ability to successfully regulate one’s emotions, thoughts, and behaviors in different situations – effectively managing stress, controlling impulses, and motivating oneself. The ability to set and work toward personal and academic goals.</p> | Impulse control |
| | Stress management |
| | Self-discipline |
| | Self-motivation |
| | Goal-setting |
| | Organisational skills |
| <p>SOCIAL AWARENESS The ability to take the perspective of and empathize with others, including those from diverse backgrounds and cultures. The ability to understand social and ethical norms for behavior and to recognize family, school, and community resources and supports.</p> | Perspective-taking |
| | Empathy |
| | Appreciating diversity |
| | Respect for others |
| <p>RELATIONSHIP SKILLS The ability to establish and maintain healthy and rewarding relationships with diverse individuals and groups. The ability to communicate clearly, listen well, cooperate with others, resist inappropriate social pressure, negotiate conflict constructively, and seek and offer help when needed.</p> | Communication |
| | Social engagement |
| | Relationship-building |
| | Teamwork |
| <p>RESPONSIBLE DECISION-MAKING The ability to make constructive choices about personal behavior and social interactions based on ethical standards, safety concerns, and social norms. The realistic evaluation of consequences of various actions, and a consideration of the well-being of oneself and others.</p> | Identifying problems |
| | Analysing situations |
| | Solving problems |
| | Evaluating |
| | Reflecting |
| | Ethical responsibility |

Based on the definitions of the social-emotional learning behaviors given above (CASEL, 2016), the grid was composed of two parts entitled “Children’s Verbal and Non-Verbal Group Interactions in Story Creation Process” and “Narrative Elements Exhibited Individually in Story Creation Process”. The grid includes 25 observation units (behaviors) in total, 17 of which take place under the first part whereas 8 of which take place under the second part. At the end of each digital storytelling project, teachers were asked to record their observations on children’s interaction in

story creation process for each child using the grid within three categories: (1) Child does not demonstrate the behavior (2) Child's behavior is in progress and, (3) Child demonstrates the behavior regularly.

Validity evidence for the grid was collected following the process of expert review and subsequent revision. On the basis of eight experts' opinions, the content of the grid was considered valid. Teachers were also asked to state their holistic observations of social-emotional learning behaviors that children can exhibit and to support these observations with additional explanations and anecdotal records.

3.4 Data Analysis

3.4.1 Analysing the Products (Digital Stories by Children) (RQ1)

The first step in the analysis of the digital stories was to code the elements of the stories according to a common framework. For this purpose, a specific instrument (Digital Story Evaluation Form) was developed. Due to the stories being produced in national languages, each partner was responsible for analysing the stories produced in their country. In order to ensure there was a shared understanding of the coding principles, the evaluation form was accompanied by a coding guide. The instruments used in the coding of the stories can be found in Appendices 4 and 5.

The data from each country were aggregated into a shared SPSS file. The data were analysed with statistical methods. Descriptive statistics were provided to describe the frequencies of different story elements in the whole data set and in each country. The more detailed statistical analysis examined 1) factors associated with the complexity of the story structure and 2) factors related to the different multimedia elements used in the stories. Based on normality tests performed to the data, mainly non-parametric tests were used. The process of analysis is described in more detail in the results section (Section 4).

3.4.2 Analysing the DST Process (Yearly Project Summaries, Project Sheets and Additional Data Related to the Process) (RQ2)

In this research, the analysis for the process-related data (see Section 5) was both quantitative and qualitative, occurred as a continuous process. Based on the nature of the process-related data obtained from (1) project sheets which were filled in a fixed-format by practice teachers of all countries for each project they carried out with their groups; (2) yearly summaries which teachers were asked to provide a brief summary of their activities after each project year and (3) observation notes, video recordings and photos collected during the entirety of classroom observations as additional data by Finland and Turkey, quantitative descriptive analysis based on frequencies and percentages was used to describe the data obtained from close-ended items included in the project sheets and yearly project summaries, categorical content analysis was used to define the data obtained from open-ended items in those research tools and, qualitative descriptive analysis were

used to summarize the data gathered through researchers' observations, anecdotal notes, video-recordings and photos.

As stated by Lambert & Lambert (2012), the goal of qualitative descriptive analysis is a comprehensive summarization which focuses on discovering the nature of the specific events under study. It involves a straight forward descriptive summary of the informational contents of the data that is organized in a logical manner. Data collection in a qualitative descriptive study may include not only structured, open-ended, individual or focus group interviews but also observations, and examination of records, reports, photographs, and documents. Apart from the other qualitative approaches, data analysis of qualitative descriptive research does not use a pre-existing set of rules that have been generated from the philosophical or epistemological stance of the discipline that created the specific qualitative research approach. Rather, in this kind of analysis, codes are generated from the data in the course of the study. In the same vein, Yıldırım & Şimşek (2016) defines descriptive analysis as a technique in which direct quotations from the collected data are provided to ensure an in-depth investigation of content. Moving from the objective to present findings in an organized and interpreted manner, in this research, the qualitative data gathered through researchers' observations, anecdotal notes, video-recordings and photos were presented and interpreted either by summarizing the findings in consideration of research variables or providing direct quotations and/or content to support the findings from project sheets and yearly project summaries.

On the other hand, content analysis is a family of systematic, rule-guided techniques used to analyze the informational contents of textual data and defined as the categorization, summarizing, and interpretation of verbal and written data for the purpose of extracting meaning from the gathered information, as well as seeking to understand relationships between concepts (Fox, 1969; Mayring, 2007; Strauss & Corbin, 1998). Within content analysis, data categories can be developed beforehand or during the process of text analysis (Coffey & Atkinson, 1996; Stemler, 2001). For this study, together with utilizing predetermined and fixed concepts, inductive codes and categories were also determined according to concepts extracted from the collected data. In the code and category planning, the principles of defining observation units those were compatible with the study's aim, simplicity, and comprehensibility was considered (Weber, 1990). The code and category plans were developed collectively by all project partners.

3.4.3 Analysing the Teacher Competencies (Teacher Questionnaires and Digital Stories by Teachers) (RQ3)

The teacher questionnaires were analysed in order to obtain an understanding of 1) the baseline of the teacher competencies and 2) the development of the competencies after the implementation of DST activities. Statistical tests were used to analyse the quantitative, Likert-scale data pertaining to the teachers' self-assessed competencies (see Section 6 for more details). Open-ended answers as well as teacher interviews were analysed by categorising the contents thematically in a data-driven way.

Data obtained by four of five sections [(1) Narrative elements (3) Story grammar, (4) Media elements and (5) Technology elements] included in "Evaluation Form for Teachers' Digital Stories"

were analyzed based on descriptive techniques. The indicators of the qualities of teachers' digital stories under those four sections are described by frequencies and percentages. On the other hand, data from the second section of the evaluation form, entitled (2) Digital Story Elements and which covers eleven performance criteria within a rubric were analyzed based on total scores. One-way ANOVA for Repeated Measures -which is a particular test to compare three or more group means where the participants are the same in each group and when participants are measured multiple times to see changes to an intervention- was used to determine whether teachers' ability to create digital stories has changed or developed over time, in terms of digital elements in the stories. In the analyses, .01 and .05 levels of significance were adopted; and SPSS 20.00 was used.

3.4.4 Analysing Children's Agency (Interviews with Children and Teachers) (RQ4)

Data related to RQ4 consisted of children's digital stories, kindergarten teachers' documentation of the DST activities, and Finnish teachers' and children's interviews. The qualitative analysis of the data focused on identifying issues related to the following aspects: 1) the digital and non-digital tools and materials used in the stories, 2) the physical spaces in which the stories were created, 3) time-related aspects, 4) the children's and adults' roles in the DST processes, and 5) the children's experience of their agency in the process. The results are presented in Section 7.

3.4.5 Analysing the Observations on Creativity (RQ5)

Digital storytelling activities realized in Reggio Emilia's Preschool ateliers and miniateliers were observed in order to identify instances of metaphor in the digital story creation process. The focus was on examining how children found new affordances and metaphorized daily unstructured objects by actively exploring and including them within a visual narrative structure (see Section 8 for more details).

3.4.6 Analysing the Observations on Social-Emotional Development (RQ6)

Data obtained from observations on social-emotional development were analyzed based on descriptive and graphical techniques (see Section 9). The numbers of children exhibiting behavior of change throughout six projects are described by frequencies and percentages, while the direction of the observed longitudinal change is illustrated by graphs. Teachers' additional observations and supplementary explanations are also summarized, and supported by anecdotal recordings.

4 Results: Digital Narrative Elements in Children's Stories (RQ1)

This section presents the findings related to RQ1 (Which **digital narrative elements** occur in children's digital stories?). We examine all stories (produced during both project cycles) together, providing both descriptive statistics to get an overview of the stories (Section 4.1) and an examination of associations between the digital and narrative elements used in the stories (Section 4.2).

4.1 Descriptive Statistics

4.1.1 Story Structures and Type of Product

As Table 4.1 shows, descriptive-action sequence was the most common story structure in all of the stories (35,6 %). In Turkey reactive sequence was the most common (40,7 %) In Italy descriptive-action sequence was the most common (40,7 %) and goal-directed sequence was the most common structure in Finland (47,2 %) and Germany (55 %). No-structure sequence was the least common structure in every country.

Table 4.1. Story structures (all countries)

| | Frequency | Percent |
|-----------------------------|------------|--------------|
| No-structure sequence | 8 | 4,6 |
| Descriptive-action sequence | 62 | 35,6 |
| Reactive sequence | 45 | 25,9 |
| Goal-directed sequence | 59 | 33,9 |
| Total | 174 | 100,0 |

As to level of detail (Table 4.2), the reactive sequence was the most common in all the stories (24,7 %) and the complex episode was the least common (1,7 %). Between countries there was such variation that in Turkey reactive sequence was the most common (40,7 %) and in the rest of the countries the complete episode was the most common. In Italy (28,8 %), Finland (27,8 %) and Germany 40 %.

Table 4.2. Level of detail (all countries)

| | Frequency | Percent |
|----------------------|------------|--------------|
| Unrelated Statements | 8 | 4,6 |
| Descriptive Sequence | 33 | 19,0 |
| Action Sequence | 31 | 17,8 |
| Reactive Sequence | 43 | 24,7 |
| Abbreviated Sequence | 10 | 5,7 |
| Complete Episode | 42 | 24,1 |
| Complex Episode | 3 | 1,7 |
| Interactive Episode | 4 | 2,3 |
| Total | 174 | 100,0 |

The most common product type (Table 4.3) was animation; 54 % of all the stories were animations. In Turkey 62,7 %, Italy 33,9 %, Finland 47,2 % and in Germany 100 % of the stories were animations.

Table 4.3. Product type (all countries)

| | Frequency | Percent |
|----------------------|------------|--------------|
| Still-image sequence | 27 | 15,5 |
| Animated Slideshow | 15 | 8,6 |
| Animation | 94 | 54,0 |
| Movie | 26 | 14,9 |
| Mixed | 12 | 6,9 |
| Total | 174 | 100,0 |

4.1.2 Starting Point, Amount of Narrative Structure and Type of Story

As can be seen in Table 4.4, stimuli for original construction was the most common starting point for all the stories (60,7 %). It was also the most common in Turkey 98,3 %, Italy 45,8 % and Finland 40 %. In Germany, the most common starting point was children's narratives 40 %.

Table 4.4. Starting point (all countries)

| | | Frequency | Percent | Valid Percent |
|--------------|-----------------------------------|------------|--------------|---------------|
| Valid | Children's play script | 26 | 14,9 | 15,0 |
| | Children's narratives | 26 | 14,9 | 15,0 |
| | Stimuli for original construction | 105 | 60,3 | 60,7 |
| | Stimuli for story retelling | 16 | 9,2 | 9,2 |
| | Total | 173 | 99,4 | 100,0 |
| Missing | System | 1 | 0,6 | |
| Total | | 174 | 100,0 | |

Considering the provided structure for the stories (Table 4.5), it was most common that the children chose the topic and formulated the narrative. This was the case in 34,7 % of all the stories. Between countries there was some variation. In Turkey it was most common (47,5 %) that the children were given one or more potential story characters, a physical setting and possibly an event. In Italy (64,4 %) and Finland (50 %) it was most common to have no structure and the children chose the topic and formulated a narrative. In Germany it was most common to give a topic and ask the children to tell a story (50 %).

Table 4.5. Provided structure (all countries)

| | | Frequency | Percent | Valid Percent |
|--------------|---|------------|--------------|---------------|
| Valid | No structure. The child chooses the topic and formulates a narrative. | 59 | 33,9 | 34,7 |
| | The child is given a topic and is asked to tell a story. | 42 | 24,1 | 24,7 |
| | The child is given one or more potential story characters, a physical setting, and possibly an event. | 37 | 21,3 | 21,8 |
| | The child is given setting, characters, and an initiating event and is asked to complete the story. | 20 | 11,5 | 11,8 |
| | High degree of structure. The child is told a story, and is asked to reformulate that story. | 12 | 6,9 | 7,1 |
| | Total | 170 | 97,7 | 100,0 |
| Missing | System | 4 | 2,3 | |
| Total | | 174 | 100,0 | |

As Table 4.6 illustrates, fictional/makebelieve story was the most common story type in all of the stories (79,9 %). It was also the most common in every individual country: Italy (79,7 %), Finland (77,8 %), Germany (81,8 %) and Turkey (78 %).

Table 4.6. Type of story (all countries)

| | Frequency | Percent |
|------------------------------|------------|--------------|
| Script | 22 | 12,6 |
| Personal/Factual Story | 4 | 2,3 |
| Fictional/Make-believe Story | 139 | 79,9 |
| Other | 9 | 5,2 |
| Total | 174 | 100,0 |

4.1.3 Technology Used

Many different technological devices were used in the creation of the stories but only computers and tablet computers were used in a majority of the stories. All the other devices were used only in a minority of the stories or in individual stories (Table 4.7).

Table 4.7. Devices used by different user groups (all countries)

| Device | Only child | | Only teacher | | Both | | Neither | | Total f |
|---------------------------------|------------|------|--------------|------|------|------|---------|------|---------|
| | f | % | f | % | f | % | f | % | |
| Computer | 4 | 2,3 | 71 | 40,8 | 39 | 22,4 | 60 | 34,5 | 174 |
| Tablet device | 24 | 13,8 | 12 | 6,9 | 62 | 35,6 | 76 | 43,7 | 174 |
| i-Theatre | 36 | 20,7 | - | - | 6 | 3,4 | 132 | 75,9 | 174 |
| Smartphone | 11 | 6,3 | 6 | 3,4 | 10 | 5,7 | 147 | 84,5 | 174 |
| Camera | 5 | 2,9 | 22 | 12,6 | 36 | 20,7 | 111 | 63,8 | 174 |
| Webcam | 5 | 2,9 | - | - | 3 | 1,7 | 166 | 95,4 | 174 |
| Document camera | - | - | - | - | 5 | 2,9 | 169 | 97,1 | 174 |
| Digital pen camera / microscope | 3 | 1,7 | - | - | - | - | 171 | 98,3 | 174 |
| Interactive projector | 1 | 0,6 | - | - | - | - | 173 | 99,4 | 174 |
| Drawing pad | 1 | 0,6 | - | - | - | - | 173 | 99,4 | 174 |
| Digital audio recorder | 16 | 9,2 | 12 | 6,9 | 16 | 9,2 | 130 | 74,7 | 174 |
| Microphone | 15 | 8,6 | 4 | 2,3 | 1 | 0,6 | 154 | 88,5 | 174 |
| Scanner | 2 | 1,1 | 7 | 4,0 | 9 | 5,2 | 156 | 89,7 | 174 |
| Projector | - | - | 22 | 12,6 | 25 | 14,4 | 127 | 73,0 | 174 |
| Printer | - | - | 12 | 6,9 | 3 | 1,7 | 159 | 91,4 | 174 |
| Other | 16 | 9,2 | 1 | 0,6 | 2 | 1,1 | 152 | 87,4 | 174 |

In order to be able to compare the use of different devices more clearly, we made a new dichotomous variable where “only child”, “only teacher” and “both” were coded as “yes” and “none” was coded as “no”. Using the new variable, we examined the use of the principal technologies (computer, tablet, i-Theatre, smartphone, and camera) by country (Table 4.8).

Table 4.8. Devices used by any user group (all countries)

| Device | Turkey | | Italy | | Finland | | Germany | |
|--------------------|--------|------|-------|------|---------|------|---------|------|
| | f | % | f | % | f | % | f | % |
| Computer used | 37 | 62,7 | 57 | 96,6 | 6 | 16,7 | 14 | 70,0 |
| Tablet device used | 24 | 40,7 | 27 | 45,8 | 33 | 91,7 | 14 | 70,0 |
| i-Theatre used | 26 | 44,1 | 7 | 11,9 | 3 | 8,3 | 6 | 30,0 |
| Smartphone used | 17 | 28,8 | 4 | 6,8 | 2 | 5,6 | 4 | 20,0 |
| Camera used | 0 | 0 | 54 | 91,5 | 0 | 0 | 9 | 45,0 |

Computer was most used in Italy, where it was used either by the teacher, children or both in 96,6 % of the stories created. In Finland it was used the least, in only 16,7 % of the stories. Tablet device was most used in Finland, where it was used in 91,7 % of the stories. Tablet computers were least used in Turkey, in 40,7 % of the stories. i-Theatre was least used in Finland. Only 8,3 % of the stories utilized i-Theatre. Turkey used i-Theatre the most, in 44,1 % of the stories created. In Turkey and Germany, smartphones were used at least in one fifth of the stories, while in Italy and Finland, they were used in only 5-7% of them. Camera was used in as many as 91,5% of Italian stories and 45% of German stories, while it was not used at all in Turkey and Finland.

4.1.4 Multimedia Elements

As seen in Table 4.9, children’s drawings were embedded in 82,2 % of all the stories and they were embedded in the majority of all the individual countries’ stories: Turkey 94,9 %, Italy 72,9 %, Finland 66,7 % and Germany 100 %. Written text was included only in 21,3 % of all the stories. In Italy written text was found in 39 % of the stories and in Finland in 33,3 % when in the rest of the rest of the countries it was hardly evident: Turkey 1,7 % and Germany 5 %.

Narrating voice was heard in the majority of the stories (71,3 %). Turkey 72,9 %, Italy 74,6 %, Finland 58,3 % and Germany 80 %. Dialogue was found in a bit over half of all the stories (55,7 %). Italy was the only country where dialogue wasn’t found in the majority of the stories (42,4 %). Turkey 64,4 %, Finland 52,8 % and Germany 75 %.

Mood music was found in only 21,8 % of all the stories. In all the other countries: Turkey 13,6, Italy 18,6% and Germany 5 % mood music was present in a minority of the stories, but in Finland it appeared in 50 % of the stories. Diegetic music was found only in 14,9 % of all the stories and was in a clear minority of the stories in every country: Turkey 6,8 %, Italy 16,9 %, Finland 25 % and

Germany 15 %. Sound effects were embedded in 47,1 % of all the stories. They were found in about half of the stories in each country: Italy 49,2 %, Finland 55,6 % and Germany 55 % except for Turkey in which they were found in a bit fewer stories (37,3 %).

Table 4.9. Multimedia elements included in the stories (all countries)

| Device | Turkey | | Italy | | Finland | | Germany | | All countries | |
|--------------------------------------|--------|------|-------|------|---------|------|---------|------|---------------|------|
| | f | % | f | % | f | % | f | % | f | % |
| Children's drawings, pictures, words | 56 | 94,9 | 43 | 72,9 | 24 | 66,7 | 20 | 100 | 143 | 82,2 |
| Written text | 1 | 1,7 | 23 | 39 | 12 | 33,3 | 1 | 5,0 | 37 | 21,3 |
| Narrating voice | 43 | 72,9 | 44 | 74,6 | 21 | 58,3 | 16 | 80,0 | 124 | 71,3 |
| Dialogue | 38 | 64,4 | 25 | 42,4 | 19 | 52,8 | 15 | 75,0 | 97 | 55,7 |
| Mood music | 8 | 13,6 | 11 | 18,6 | 18 | 50,0 | 1 | 5,0 | 38 | 21,8 |
| Diegetic music | 4 | 6,8 | 10 | 16,9 | 9 | 25,0 | 3 | 15,0 | 26 | 14,9 |
| Sound effects | 22 | 37,3 | 29 | 49,2 | 20 | 55,6 | 11 | 55,0 | 82 | 47,1 |

4.2 Associations between Digital and Narrative Elements

4.2.1 Narrative Elements: Factors Related to the Complexity of the Story Structure

One part of the research question is related to narrative elements – which are represented by the story structure levels in our data. Thus, we examined whether there were differences in story structure levels when examined through different factors.

Running the Shapiro-Wilk test of normality (Table 4.10) revealed that the story structure level variable was not normally distributed. Hence, non-parametric tests were used in the following steps of the analysis.

Table 4.10. Normality test

| | Kolmogorov-Smirnov ^a | | | Shapiro-Wilk | | |
|------------------------|---------------------------------|-----|------|--------------|-----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| STRUCTURE_LEVEL_DETAIL | .162 | 174 | .000 | .927 | 174 | .000 |

a. Lilliefors Significance Correction

Story Structure Level and Initiation of the DST Activity

First, we examined potential differences in story structure levels based on different aspects of the initiation of the DST activity. These included starting point of the story (i.e., narrative incipit), the amount of narrative structure provided, and the type of narrative produced.

A Kruskal-Wallis test showed a significant difference in story structure levels ($H(3) = 10.656, p = .014$) between different **narrative incipits**. Pairwise comparisons, however, did not indicate statistically significant differences between any individual incipits.

A scatter plot of the relationship between the story structure level and different degrees of **narrative structure provided** suggested a possibility of a weak monotonic association. A Spearman's rho correlation (Table 4.11) was run to assess the relationship, and it indicated a weak, statistically significant negative correlation ($r_s = -.173, p = .024$). Thus it appears that, interestingly, an approach where the prompt was less structured resulted in stories with somewhat higher-level narrative structures. However, as mentioned and as can be seen from the scatterplot, the correlation was very weak.

Table 4.11. Correlation between story structure level and narrative structure provided (Spearman’s rho)

| | | STUCTURE_PROVIDED | STRUCTURE_LEVEL_DETAIL |
|----------------|------------------------|-------------------------|------------------------|
| Spearman's rho | STUCTURE_PROVIDED | Correlation Coefficient | 1.000 |
| | | Sig. (2-tailed) | .024 |
| | | N | 170 |
| | STRUCTURE_LEVEL_DETAIL | Correlation Coefficient | -.173* |
| | | Sig. (2-tailed) | .024 |
| | | N | 174 |

*. Correlation is significant at the 0.05 level (2-tailed).

Finally, a Kruskal-Wallis test showed a significant difference in story structure levels ($H(3) = 25.160$, $p < .001$) between different **types of narrative**. Pairwise comparisons indicated a significant difference between stories categorised as “other” (mean rank = 17.17) and those labelled as fictional/make-believe stories (mean rank = 93.30) or scripts (mean rank = 89.55). No significant differences existed between any other pairs. The finding that the “other” category differs from the rest is most likely due to the fact that it was primarily used to label such stories that did not fit into any of the other categories – which often meant that there was something problematic with the structure of the story.

Story Structure Level and Technologies Used

In order to test for potential differences in the story structure levels by **device** used, we used dichotomous variables that indicated whether a specific device had been used in the making of a specific story or not. In practice, the original values that specified whether the device had been used by “only children”, “only adult”, or “both” were recoded as “yes”, while the value “none” was recoded as “no”. We only recoded the devices that were used the most; that is, **computer, tablet device, i-Theatre, smartphone, and camera**. We ran Mann-Whitney U tests to examine potential differences between story structure levels and the use or non-use of each device, but found no significant differences in any of the tests.

The **software used** was originally asked as an open-ended question. In order to examine the role of the type of software used to create a specific story, we created a new variable where we categorised the software into six types, and each story was assigned one type of software based on the main application used in the creation of said story.

- Storytelling app (stories made with software specifically intended for DST, such as Puppet Pals or Toontastic)
- Video editor (stories made by putting together video clips and/or photos with video editing software)
- Animation app (stories made with software designed for making animations, such as iMotion or Stop Motion Studio)
- Digital book app (stories made with software intended for making digital books or presentations by combining different media elements, e.g. Book Creator, PowerPoint)
- i-Theatre (stories made with the software of the i-Theatre device)

- Other

We ran a Kruskal-Wallis test that showed no significant difference in story structure levels between the different types of software.

4.2.2 Digital Affordances: Factors Related to the Use of Different Multimedia Elements

The other part of this research question deals with digital affordances. We are interested in examining associations between the use of specific **multimedia elements** (drawings, written text, speech (narration, dialogue), diegetic and non-diegetic music, and sound effects) and certain other factors related to the technological or narrative dimension (device used, software used, product type, and story structure level).

Associations between Multimedia Elements and Device Used

The occurrence of different multimedia elements in the stories was presented as dichotomous variables indicating whether a specific multimedia element was present in a story or not. Similarly, as seen above, dichotomous variables were made of the **devices** used in the creation of the stories. We examined the possible associations between the multimedia elements and the devices used with a chi-square test.

Children's Drawings, Pictures, or Words

A chi-square test was performed, and there were significant relationships between the occurrence of children's drawings, pictures, or words and the use of the following devices:

- **Tablet:** $\chi^2(1, N = 174) = 11.637, p = .001, \phi = -.259$. Stories that were made with tablets were *less* likely to include drawings, pictures, or words produced by the children than those not created with a tablet.
- **i-Theatre:** $\chi^2(1, N = 174) = 12.002, p = .001, \phi = .263$. Stories that were made with the i-Theatre device were *more* likely to include drawings, pictures, or words produced by the children than those not created with the i-Theatre.

No relationship was found between the occurrence of children's drawings, pictures, or words and the use of the following devices:

- **Computer:** $\chi^2(1, N = 174) = .298, p = .585$.
- **Camera:** $\chi^2(1, N = 174) = 1.309, p = .252$.

For the following devices, the criteria for a chi-square test were not met (at least one cell had an expected count of less than 5). Therefore, Fisher's exact test was used.

- **Smartphone:** No significant relationship was found ($p = 1.000$).

Written Text

A chi-square test was performed, and there were significant relationships between the occurrence of written text and the use of the following devices:

- **i-Theatre:** $\chi^2(1, N = 172) = 12.045, p = .001, \phi = -.265$. Stories that were made with the i-Theatre device were *less* likely to include written text than those not created with the i-Theatre.
- **Camera:** $\chi^2(1, N = 172) = 11.209, p = .001, \phi = .255$. Stories in which camera was used were *more* likely to include written text than those not created with the camera.

No relationship was found between the occurrence of written text and the use of the following devices:

- **Computer:** $\chi^2(1, N = 172) = .073, p = .787$.
- **Tablet:** $\chi^2(1, N = 172) = .003, p = .960$.
- **Smartphone:** $\chi^2(1, N = 172) = .170, p = .680$.

Narrating Voice

A chi-square test was performed, and no significant relationship was found between the occurrence of a narrating voice and the use of any particular device:

- **Computer:** $\chi^2(1, N = 174) = 1.755, p = .185$.
- **Tablet:** $\chi^2(1, N = 174) = .003, p = .957$.
- **i-Theatre:** $\chi^2(1, N = 174) = .133, p = .715$.
- **Smartphone:** $\chi^2(1, N = 174) = .662, p = .416$.
- **Camera:** $\chi^2(1, N = 174) = 2.046, p = .153$.

Dialogue

A chi-square test was performed, and there were significant relationships between the occurrence of dialogue and the use of the following devices:

- **i-Theatre:** $\chi^2(1, N = 172) = 7.322, p = .007, \phi = .205$. Stories that were made with the i-Theatre device were *more* likely to include dialogue than those not created with the i-Theatre.

No significant relationship was found between the occurrence of dialogue and the use of the following devices:

- **Computer:** $\chi^2(1, N = 174) = 1.226, p = .268$.
- **Tablet:** $\chi^2(1, N = 174) = .656, p = .418$.
- **Smartphone:** $\chi^2(1, N = 174) = .675, p = .411$.
- **Camera:** $\chi^2(1, N = 174) = 1.713, p = .191$.

Mood Music (Non-diegetic)

A chi-square test did not indicate significant relationships between the occurrence of non-diegetic music (i.e., mood music) and the use of any specific device:

- **Computer:** $\chi^2(1, N = 174) = 1.250, p = .263$.

- **Tablet:** $\chi^2(1, N = 174) = .924, p = .337.$
- **i-Theatre:** $\chi^2(1, N = 174) = 3.201, p = .074.$
- **Smartphone:** $\chi^2(1, N = 174) = .206, p = .650.$
- **Camera:** $\chi^2(1, N = 174) = .451, p = .502.$

Diegetic Music

A chi-square test did not indicate significant relationships between the occurrence of diegetic music (i.e., music that comes from a source visible in the story) and the use of any of the following devices:

- **Computer:** $\chi^2(1, N = 174) = .187, p = .666.$
- **Tablet:** $\chi^2(1, N = 174) = .076, p = .783.$
- **i-Theatre:** $\chi^2(1, N = 174) = 2.650, p = .104.$
- **Camera:** $\chi^2(1, N = 174) = .391, p = .532.$

For the following devices, the criteria for a chi-square test were not met (at least one cell had an expected count of less than 5). Therefore, Fisher's exact test was used.

- **Smartphone:** No significant relationship was found ($p = .248$).

Sound Effects

A chi-square test was performed, and there were significant relationships between the occurrence of sound effects and the use of the following devices:

- **Tablet:** $\chi^2(1, N = 174) = 9.034, p = .003, \phi = .228.$ Stories that were made with a tablet device were *more* likely to include sound effects than those not created with a tablet.
- **i-Theatre:** $\chi^2(1, N = 174) = 5.812, p = .016, \phi = -.183.$ Stories that were made with the i-Theatre device were *less* likely to include sound effects than those in which it was not used.

No significant relationship was found between the occurrence of sound effects and the use of the following devices:

- **Computer:** $\chi^2(1, N = 174) = .054, p = .817.$
- **Smartphone:** $\chi^2(1, N = 174) = .911, p = .340.$
- **Camera:** $\chi^2(1, N = 174) = .171, p = .679.$

Associations between Multimedia Elements and Software Used

A chi-square test was performed, and there were significant associations between the type of software used and the following multimedia elements:

- **Dialogue:** $\chi^2(4, N = 170) = 16.453, p = .002, \text{Cramer's } V = .311.$ When examining the cross-tabulation, the observed and expected frequencies could be said to be significantly different (adjusted residual ≥ 1.96 or ≤ -1.96) in the categories of video editor and digital book app (where the observed count was lower than the expected count) as well as i-Theatre (where the observed count was higher than the expected count).

- **Sound effects:** $\chi^2(4, N = 170) = 15.905, p = .003, \text{Cramer's } V = .306$. When examining the cross-tabulation, the observed and expected frequencies could be said to be significantly different (adjusted residual ≥ 1.96 or ≤ -1.96) in the categories of animation app, digital book app, and i-Theatre. For animation apps, the observed frequency was higher than the expected one, while it was lower than the expected frequency for digital book apps and the i-Theatre.

For the following multimedia elements, the criteria for a chi-square test were not met (at least one cell had an expected count of less than 5). Therefore, Fisher's exact test was used.

- **Children's drawings, pictures, or words:** A significant association was found ($p < .001$). When examining the cross-tabulation, the observed and expected frequencies could be said to be significantly different (adjusted residual ≥ 1.96 or ≤ -1.96) in all categories of software type except digital book apps. The observed count was higher than the expected one for animation apps and the i-Theatre and lower than expected for storytelling apps and video editors.
- **Written text:** A significant association was found ($p < .001$). When examining the cross-tabulation, the observed and expected frequencies could be said to be significantly different (adjusted residual ≥ 1.96 or ≤ -1.96) in all categories of software type. The observed count was higher than the expected one for video editors and digital book apps and lower than expected for storytelling apps, animation apps, and the i-Theatre.
- **Narrating voice:** No significant association was found ($p = .655$).
- **Mood music:** No significant association was found ($p = .130$).
- **Diegetic music:** No significant association was found ($p = .072$).

Associations between Different Multimedia Elements

Chi-square tests found significant relationships between the following pairs of multimedia elements:

- **Children's drawings, pictures, or words and Mood music:** $\chi^2(1, N = 174) = 4.114, p = .043, \phi = -.154$. There was a *negative* association between the occurrence of mood music and the presence of drawings, pictures, or words produced by children in a story.
- **Written text and Narrating voice:** $\chi^2(1, N = 172) = 26.238, p < .001, \phi = -.391$. There was a *negative* association between the occurrences of written text and narrating voice in a story.
- **Written text and Dialogue:** $\chi^2(1, N = 172) = 15.840, p < .001, \phi = -.303$. There was a *negative* association between the occurrences of written text and dialogue in a story.
- **Written text and Mood music:** $\chi^2(1, N = 172) = 6.790, p = .009, \phi = .199$. There was a *positive* association between the occurrences of written text and mood music in a story.

- **Diegetic music and Sound effects:** $\chi^2(1, N = 174) = 4.090, p = .043, \phi = .153$. There was a *positive* association between the occurrences of diegetic music and sound effects in a story.

No significant relationships were found between the following pairs of multimedia elements:

- **Children’s drawings, pictures, or words and Written text:** $\chi^2(1, N = 172) = .413, p = .520$.
- **Children’s drawings, pictures, or words and Narrating voice:** $\chi^2(1, N = 174) = .229, p = .633$.
- **Children’s drawings, pictures, or words and Dialogue:** $\chi^2(1, N = 174) = 2.917, p = .088$.
- **Children’s drawings, pictures, or words and Sound effects:** $\chi^2(1, N = 174) = 1.811, p = .178$.
- **Written text and Diegetic music:** $\chi^2(1, N = 172) = 3.115, p = .078$.
- **Written text and Sound effects:** $\chi^2(1, N = 172) = 2.702, p = .100$.
- **Narrating voice and Dialogue:** $\chi^2(1, N = 174) = .939, p = .332$.
- **Narrating voice and Mood music:** $\chi^2(1, N = 174) = .001, p = .974$.
- **Narrating voice and Diegetic music:** $\chi^2(1, N = 174) = 2.750, p = .097$.
- **Narrating voice and Sound effects:** $\chi^2(1, N = 174) = 1.430, p = .232$.
- **Dialogue and Mood music:** $\chi^2(1, N = 174) = 3.668, p = .055$.
- **Dialogue and Diegetic music:** $\chi^2(1, N = 174) = .045, p = .832$.
- **Dialogue and Sound effects:** $\chi^2(1, N = 174) = 2.614, p = .106$.
- **Mood music and Diegetic music:** $\chi^2(1, N = 174) = 1.428, p = .232$.
- **Mood music and Sound effects:** $\chi^2(1, N = 174) = 2.262, p = .133$.

For the following pair, the criteria for a chi-square test were not met (at least one cell had an expected count of less than 5). Therefore, Fisher’s exact test was used.

- **Children’s drawings, pictures, or words and Diegetic music:** A significant relationship was found ($p = .024$). There was a *negative* association between the occurrence of diegetic music and the presence of drawings, pictures, or words produced by children in a story.

Associations between Multimedia Elements and Story Structure

To test the association between the story structure level and the use of different multimedia elements, we used the Mann-Whitney U test.

The story structure level was significantly more advanced in stories where a **narrating voice** was present (median = 4.0; Q1= 3.0 – Q3 = 6.0) than in those where it was not (median = 3.0; Q1= 2.0 – Q3 = 6.0), $N = 174, U = 2340, p = .010$).

Similarly, the level was significantly more advanced in stories where **dialogue** was used (median = 4.0; Q1= 3.0 – Q3 = 6.0) than in stories without dialogue (median = 3.0; Q1= 2.0 – Q3 = 4.5), $N = 174, U = 2602, p < .001$).

The level was significantly more advanced also in stories that used **sound effects** (median = 4.0; Q1= 3.0 – Q3 = 6.0) compared to stories that did not have any sound effects (median = 4.0; Q1= 2.0 – Q3 = 5.0), $N = 174, U = 2985, p = .015$).

In the other media element variables (children's drawings, pictures, or words; written text; mood music; and diegetic music) there were no significant differences in the story structure level between whether the element occurred in the story or not.

5 Results: Characteristics of the DST Process (RQ2)

This section presents the findings related to RQ2 (What are the characteristics of the **interactive process of building a digital narrative** in a digital storytelling project in ECE?)

5.1 Findings Based on the Project Sheets

In the scope of the STORIES Project's implementations, teachers from partner countries (IT, TR, FI, and DE) were asked to fill in a fixed-format project sheet for each project they carried out with their groups. The total number of project sheets produced within the STORIES Project lifetime was; 146, 69 of which were produced during the 1st project cycle (f=27 by IT; f=18 by TR; f=18 by FI, and f=6 by DE) and 77 during the 2nd cycle (f=32 by IT; f=18 by TR; f=19 by FI, and f=8 by DE). The role of the project sheets was to *set the context* in order to help researchers interpret the final stories and the affordances of technology for storytelling. Here, key findings have been presented based on data of all partner countries.

5.1.1 Findings on Descriptive Information

The first focus under this heading is number of teachers who implemented the digital storytelling project in their classrooms. When both the years of implementation and all countries are evaluated together, it is found that mostly two teachers performed the projects within classes or groups. The range of the number of teachers was 1-3 in the 1st implementation year, while the range was 1-5 in the 2nd year. Digital storytelling practices conducted by a single teacher were only observed in Finland and Germany; and for Finland, the number of practices conducted by a single teacher is found to be the highest in both implementation years.

The age of children participating in project implementations is another variable examined under this heading. The distribution of the age of children in terms of two different implementation years and countries is given in Table 5.1.

Table 5.1. Age of children

| Age of Children | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|-------------------------------|---------|----------------------|----|-------|----------------------|----|-------|-------|----|-------|
| | | N | f | % | N | f | % | N | f | % |
| 36-48 months (3 years) | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | FI | 18 | -- | -- | 19 | 2 | 10.5 | 37 | 2 | 5.4 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | -- | -- | 77 | 2 | 2.6 | 146 | 2 | 1.4 |
| 36-60 months (3-4 years) | IT | 27 | 3 | 11.1 | 32 | -- | -- | 59 | 3 | 5.1 |
| | TR | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | FI | 18 | 2 | 11.1 | 19 | -- | -- | 37 | 2 | 5.4 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 5 | 7.2 | 77 | -- | -- | 146 | 5 | 3.4 |
| 36-72 months (3-4-5 years) | IT | 27 | -- | -- | 32 | 3 | 9.4 | 59 | 3 | 5.1 |
| | TR | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | FI | 18 | 3 | 16.7 | 19 | 1 | 5.3 | 37 | 4 | 10.8 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 3 | 4.3 | 77 | 4 | 5.2 | 146 | 7 | 4.8 |
| 48-60 months (4 years) | IT | 27 | 15 | 55.6 | 32 | 1 | 3.1 | 59 | 16 | 27.1 |
| | TR | 18 | 18 | 100.0 | 18 | -- | -- | 36 | 18 | 50.0 |
| | FI | 18 | 1 | 5.6 | 19 | 1 | 5.3 | 37 | 2 | 5.4 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 34 | 49.3 | 77 | 2 | 2.6 | 146 | 36 | 24.7 |
| 48-72 months (4-5 years) | IT | 27 | 9 | 33.3 | 32 | 11 | 34.4 | 59 | 20 | 33.9 |
| | TR | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | FI | 18 | 4 | 22.2 | 19 | -- | -- | 37 | 4 | 10.8 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 13 | 18.8 | 77 | 11 | 14.3 | 146 | 24 | 16.4 |
| 60-72 months (5 years) | IT | 27 | -- | -- | 32 | 17 | 53.1 | 59 | 17 | 28.8 |
| | TR | 18 | -- | -- | 18 | 18 | 100.0 | 36 | 18 | 50.0 |
| | FI | 18 | -- | -- | 19 | 5 | 26.3 | 37 | 5 | 13.5 |
| | DE | 6 | 6 | 100.0 | 8 | 8 | 100.0 | 14 | 14 | 100.0 |
| | Total | 69 | 6 | 8.7 | 77 | 48 | 62.3 | 146 | 54 | 37.0 |

The findings show that; the majority of participant children's ages are between 48-60 months for the 1st implementation year (49.3%) and between 60-72 months in the 2nd academic year (62.3%). Some of the partner countries have also stated that there were project implementations involving age groups other than the defined categories. In this context, it is seen that in Finland children aged 18-37 months were also involved in the 1st year's projects, while children aged 24-72 months, 27-50 months, 30-39 months and 34-50 months were involved in the 2nd year's projects. In Germany, in both the 1st and the 2nd year's projects, 48-84 month olds and 84-96 month olds children were also involved. However, the percentages of "other" age groups, participating at the projects are small.

As a basic principle of the STORIES project, the digital storytelling projects were carried out within a small group work consisting of 3-8 children. When the classroom size, in terms of total number of children in the class, is small, usually the whole class participated in the projects whereas when the classroom size is large, a certain number of groups were selected from the classroom or the whole class is divided into several small working groups to perform the digital storytelling activities simultaneously. On the basis of countries, when the number of small groups of each class participating in the projects was examined, it was seen that, in Italy and Finland, the practices were mostly carried out by a single group selected from the whole class in the 1st implementation year. In

Turkey and Germany, on the other hand, mostly two small groups were constituted from each class for the digital storytelling activities. In the 2nd year of implementation, in Italy, there were mostly three working groups from each class whereas mostly four working groups has been established in Turkey, and a single working group has been established in Finland and Germany. However, when both the years of implementation and all countries are taken together, projects were found to be carried out mostly with one group.

When durations of each project are examined, the duration is found to vary between 1 week and 6 months for both of the years. The highest percentages in this range are at 2-3 weeks and 3 months for the 1st year and at 1 month for the 2nd year. Teachers dedicated mostly 9-12 sessions to the project activities in the 1st year and 5-6 sessions in the 2nd year. Average duration of the sessions was 40-60 minutes in both years.

Another review under this heading has been carried out on the aims of the projects implemented. The findings are presented in Table 5.2.

Table 5.2. Aim of the projects

| Aim of the Project | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|---|---------|----------------------|----|-------|----------------------|----|-------|-------|-----|-------|
| | | N | f | % | N | f | % | N | f | % |
| To develop technological competences | IT | 27 | 18 | 66.7 | 32 | 27 | 84.4 | 59 | 45 | 76.5 |
| | TR | 18 | 9 | 50.0 | 18 | 4 | 22.2 | 36 | 13 | 36.1 |
| | FI | 18 | 8 | 44.4 | 19 | 9 | 47.4 | 37 | 17 | 45.9 |
| | DE | 6 | 3 | 50.0 | 8 | 8 | 100.0 | 14 | 11 | 78.6 |
| | Total | 69 | 38 | 55.1 | 77 | 48 | 62.3 | 146 | 86 | 58.9 |
| To promote narrative skills | IT | 27 | 24 | 88.9 | 32 | 29 | 90.6 | 59 | 53 | 89.8 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 10 | 55.6 | 19 | 8 | 42.1 | 37 | 18 | 48.6 |
| | DE | 6 | 5 | 83.3 | 8 | 8 | 100.0 | 14 | 13 | 92.9 |
| | Total | 69 | 57 | 82.6 | 77 | 63 | 81.8 | 146 | 120 | 82.2 |
| To enhance social and collaborative skills and learning | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | 14 | 77.8 | 18 | 18 | 100.0 | 36 | 32 | 88.9 |
| | FI | 18 | 3 | 16.7 | 19 | 5 | 26.3 | 37 | 8 | 21.6 |
| | DE | 6 | 5 | 83.3 | 8 | 8 | 100.0 | 14 | 13 | 92.9 |
| | Total | 69 | 22 | 31.9 | 77 | 31 | 40.3 | 146 | 53 | 36.3 |
| To reach the objectives of the educational program | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 1 | 5.6 | 19 | 7 | 36.8 | 37 | 8 | 21.6 |
| | DE | 6 | 1 | 16.7 | 8 | 1 | 12.5 | 14 | 2 | 14.3 |
| | Total | 69 | 20 | 29.0 | 77 | 26 | 33.8 | 146 | 46 | 31.5 |

Findings, obtained through teachers' reporting on the aims of the project have revealed that, the prominent aim reported in the majority of the total projects is "to promote narrative skills" in both years (82.6% for the 1st year; 81.8% for the 2nd year; 82.2% for the total). This is found to be followed by "to develop technological competences" (58.9% for the total) and "to enhance social and collaborative skills and learning" (36.3% for the total). "To reach the objectives of the educational program" had the least percentage, which is observed approximately in one third of the entire projects (31.5% for the total). There are also "other" aims reported by the partners; such as, "to support children's agency", "to promote independent work", "understanding the environment" or "to make the children to tell parts of a story in foreign language". However, among the "other"

aims reported by the teachers, “enhancing creativity” and “to spark children’s imagination” appears as prominent for the 1st year and “to enforce the relationship between technological competences”, and “to improve personal skills” appear as prominent for the 2nd year.

The country-specific results show that, for Turkey, “to reach the objectives of the educational program” is another prominent aim besides from promoting narrative skills, observed in all projects implemented. Especially for Turkey, we can infer that, apart from promoting narrative skills, reaching the goals of the educational program was an important aim for teachers. The reason for this can be that in Turkey, a national curriculum is implemented in all levels of education; therefore, teachers included the objectives of this curriculum in their project sheets. Developing technological competences also comes forth in the 2nd year for Finland, observed almost in half of the projects implemented, and for Germany, observed in the whole projects implemented, whereas enhancing social skills stands out in both years for Germany (83.3% for the 1st year; 100.0% for the 2nd year) and in the 2nd year for the entire projects implemented in Turkey. We can infer that, teachers found out the opportunities that DST projects offer to promote social skills of children. According to Plowman, Stephen, and McPake (2010), there is a paradigm shift from the previous understanding that social skills such as dialogue did not have an important role in technology mediated environments. In other words, human-technology interaction and interpersonal interaction are emphasized more in research on technology integrated learning environments.

The last variable considered under this heading was the theme of the projects and it has been seen that teachers and children chose variety of themes for their projects; among these themes, “nature” and “friendship” come forth for the 1st year while the 2nd year’s projects were mostly on “friendship”, “adventure” and “fairy tales”.

5.1.2 Findings on Project Plan

Under this heading, “*Educational Context Analysis*”, “*Project Description*” and “*Activity Plan*” is examined within separate sub-headings, respectively.

1) Educational Context Analysis

The first focus under this sub-heading is the selection criteria used in the process of constituting small working groups of children (*project group makeup*) who would attend the digital storytelling practices and create digital stories as the final products of each project. The findings are presented in Table 5.3.

Table 5.3. Working group selection criteria

| Selection Criteria | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|---|---------|----------------------|----|-------|----------------------|----|------|-------|----|------|
| | | N | f | % | N | f | % | N | f | % |
| Gender | IT | 27 | 2 | 7.4 | 32 | 2 | 6.2 | 59 | 4 | 6.8 |
| | TR | 18 | 4 | 22.2 | 18 | 3 | 16.7 | 36 | 7 | 19.4 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 6 | 8.7 | 77 | 6 | 7.8 | 146 | 12 | 8.2 |
| Age | IT | 27 | 12 | 44.4 | 32 | 22 | 68.8 | 59 | 34 | 57.6 |
| | TR | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | FI | 18 | 4 | 22.2 | 19 | 6 | 31.6 | 37 | 10 | 27.0 |
| | DE | 6 | 5 | 83.3 | 8 | 7 | 87.5 | 14 | 12 | 85.7 |
| | Total | 69 | 21 | 30.4 | 77 | 35 | 45.5 | 146 | 56 | 38.4 |
| Language skills | IT | 27 | 6 | 22.2 | 32 | 9 | 28.1 | 59 | 15 | 25.4 |
| | TR | 18 | 7 | 38.9 | 18 | 7 | 38.9 | 36 | 14 | 38.9 |
| | FI | 18 | 3 | 16.7 | 19 | 3 | 15.8 | 37 | 6 | 16.2 |
| | DE | 6 | -- | -- | 8 | 3 | 37.5 | 14 | 3 | 21.4 |
| | Total | 69 | 16 | 23.2 | 77 | 22 | 28.6 | 146 | 38 | 26.0 |
| Academic skills | IT | 27 | 5 | 18.5 | 32 | 2 | 6.2 | 59 | 7 | 11.9 |
| | TR | 18 | 9 | 50.0 | 18 | 3 | 16.7 | 36 | 12 | 33.3 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 14 | 20.3 | 77 | 6 | 7.8 | 146 | 20 | 13.7 |
| Interests | IT | 27 | 15 | 55.6 | 32 | 15 | 46.9 | 59 | 30 | 50.8 |
| | TR | 18 | 3 | 16.7 | 18 | 3 | 16.7 | 36 | 6 | 16.7 |
| | FI | 18 | 8 | 44.4 | 19 | 5 | 26.3 | 37 | 13 | 35.1 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 26 | 37.7 | 77 | 23 | 29.9 | 146 | 49 | 33.6 |
| Social skills | IT | 27 | 5 | 18.5 | 32 | 12 | 37.5 | 59 | 17 | 28.8 |
| | TR | 18 | 7 | 38.9 | 18 | 11 | 61.1 | 36 | 18 | 50.0 |
| | FI | 18 | 3 | 16.7 | 19 | 2 | 10.5 | 37 | 5 | 13.5 |
| | DE | 6 | 1 | 16.7 | 8 | 1 | 12.5 | 14 | 2 | 14.3 |
| | Total | 69 | 16 | 23.2 | 77 | 26 | 33.8 | 146 | 42 | 28.8 |
| Years of school attended | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | 2 | 11.1 | 18 | 6 | 33.3 | 36 | 8 | 22.2 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | 6 | 100.0 | 8 | 5 | 62.5 | 14 | 11 | 78.6 |
| | Total | 69 | 8 | 11.6 | 77 | 11 | 14.3 | 146 | 19 | 13.0 |
| Previous working group membership | IT | 27 | 1 | 3.7 | 32 | 3 | 9.4 | 59 | 4 | 6.8 |
| | TR | 18 | 1 | 5.6 | 18 | -- | -- | 36 | 1 | 2.8 |
| | FI | 18 | 5 | 27.8 | 19 | 1 | 5.3 | 37 | 6 | 16.2 |
| | DE | 6 | 4 | 66.7 | 8 | 4 | 50.0 | 14 | 8 | 57.1 |
| | Total | 69 | 11 | 15.9 | 77 | 8 | 10.4 | 146 | 19 | 13.0 |
| Children's own choice | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | FI | 18 | 4 | 22.2 | 19 | 3 | 15.8 | 37 | 7 | 18.9 |
| | DE | 6 | 3 | 50.0 | 8 | 1 | 12.5 | 14 | 4 | 28.6 |
| | Total | 69 | 7 | 10.1 | 77 | 4 | 5.2 | 146 | 11 | 7.5 |
| No criteria/ random sampling | IT | 27 | 1 | 3.7 | 32 | 1 | 3.1 | 59 | 2 | 3.4 |
| | TR | 18 | 3 | 16.7 | 18 | 3 | 16.7 | 36 | 6 | 16.7 |
| | FI | 18 | 4 | 22.2 | 19 | 2 | 10.5 | 37 | 6 | 16.2 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 8 | 11.6 | 77 | 6 | 7.8 | 146 | 14 | 9.6 |
| Single group because of insufficient number of children | IT | 27 | -- | -- | 32 | 1 | 3.2 | 59 | 1 | 1.7 |
| | TR | 18 | 2 | 11.1 | 18 | 2 | 11.1 | 36 | 4 | 11.1 |
| | FI | 18 | 1 | 5.6 | 19 | -- | -- | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 3 | 4.3 | 77 | 3 | 3.9 | 146 | 6 | 4.1 |

When the *group selection criteria* across the countries with regards to educational context analysis are examined, it is found that teachers preferred “age” as a group makeup criterion at most (38.4% for the total). This criterion has also the highest percentage (45.5%) in the 2nd year. It is thought that cohesion of learning and developmental characteristics of children of similar ages is effective in bringing the age variable to the forefront. In addition, for the 1st year, “interests” category has the highest percentage (37.7%). In a very low number of projects (4.1% for the total), activities were carried out as a single group because of insufficient number of children.

The country-specific results based on total number of projects implemented in both project years showed that, teachers from Italy (44.4% for the 1st year; 68.8% for the 2nd year) and Germany (83.3% for the 1st year; 87.5% for the 2nd year) also indicated “age” as the most used criteria for forming small groups, whereas for Finland, the highest percentage (44.4% for the 1st year; 26.3% for the 2nd year) is in “interests” criterion. As a matter of fact, a selection criterion focusing on children's interests can be seen as a significant contributor to the motivation of the children and the strengthening of the learning process. Finally, for Turkey, “social skills” comes forth as a group selection criterion (38.9% for the 1st year; 61.1% for the 2nd year; 50.0% for the total). It can be said that in accordance with enhancing social skills emphasis as a prominent aim, especially teachers in Turkey are mostly found to give importance to form groups considering children’s social skills.

Contextualization of the project is also examined under this sub-heading. When contextualization of the projects with regards to educational context analysis is examined, it is found that the majority of participant children have previous experience and familiarity to narration in both years. Most children also have experience and familiarity to technologies in 2016-2017 academic years. Moreover, their percentage has increased in 2017-2018 academic years. The percentage of children having experience and familiarity to digital storytelling was low in the 1st year of the project, however, it increased considerably in the 2nd year.

2) Project Description

Another interest under the heading of the “*Project Plan*” is the description of the projects. In this context, the teachers were primarily asked to report to the project sheets what the behavioral changes expected from the children as a result of the project implementation (*expected objectives and outcomes*) were. However, this large-scale qualitative data, which was reported in the framework of each partner country’s national ECE curriculums, is presented in detail in the Appendices of “***Report on Best Educational Practices of Digital Storytelling in Early Childhood Education***” drafted by the Turkish partner (Mimar Sinan Fine Arts University), which is one of the STORIES Project’s outputs, within two selected best practice examples from each partner country.

Under this heading, *experience spaces, resources and materials used beyond digital devices and teaching methods and educational strategies* are also examined. Table 5.4 below presents the findings regarding the experience spaces in which the projects are implemented.

Table 5.4. Experience spaces

| Experience Space | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|----------------------------|---------|----------------------|----|-------|----------------------|----|-------|-------|-----|-------|
| | | N | f | % | N | f | % | N | f | % |
| Classroom | IT | 27 | 19 | 70.4 | 32 | 32 | 100.0 | 59 | 51 | 86.4 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 15 | 83.3 | 19 | 6 | 31.6 | 37 | 21 | 56.8 |
| | DE | 6 | 1 | 16.7 | 8 | 2 | 25.0 | 14 | 3 | 21.4 |
| | Total | 69 | 53 | 76.8 | 77 | 58 | 75.3 | 146 | 111 | 76.0 |
| Classroom's digital corner | IT | 27 | 19 | 70.4 | 32 | 27 | 84.4 | 59 | 46 | 78.0 |
| | TR | 18 | 4 | 22.2 | 18 | -- | -- | 36 | 4 | 11.1 |
| | FI | 18 | -- | -- | 19 | 4 | 21.1 | 37 | 4 | 10.8 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 23 | 33.3 | 77 | 31 | 40.3 | 146 | 54 | 37.0 |
| Digital laboratory | IT | 27 | 7 | 25.9 | 32 | 24 | 75.0 | 59 | 31 | 52.5 |
| | TR | 18 | -- | -- | 18 | 5 | 27.8 | 36 | 5 | 13.9 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | -- | -- | 8 | 3 | 37.5 | 14 | 3 | 21.4 |
| | Total | 69 | 7 | 10.1 | 77 | 32 | 41.6 | 146 | 39 | 26.7 |
| Teachers' room | IT | 27 | 1 | 3.7 | 32 | 2 | 6.2 | 59 | 3 | 5.1 |
| | TR | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | FI | 18 | 8 | 44.4 | 19 | 2 | 10.5 | 37 | 10 | 27.0 |
| | DE | 6 | 2 | 33.3 | 8 | -- | -- | 14 | 2 | 14.3 |
| | Total | 69 | 11 | 15.9 | 77 | 4 | 5.2 | 146 | 15 | 10.3 |
| School garden | IT | 27 | 8 | 29.6 | 32 | 6 | 18.8 | 59 | 14 | 23.7 |
| | TR | 18 | 5 | 27.8 | 18 | 3 | 16.7 | 36 | 8 | 22.2 |
| | FI | 18 | 4 | 22.2 | 19 | -- | -- | 37 | 4 | 10.8 |
| | DE | 6 | 1 | 16.7 | 8 | -- | -- | 14 | 1 | 7.1 |
| | Total | 69 | 18 | 26.1 | 77 | 9 | 11.7 | 146 | 27 | 18.5 |
| Out of school space | IT | 27 | 8 | 29.6 | 32 | 6 | 18.8 | 59 | 14 | 23.7 |
| | TR | 18 | 5 | 27.8 | 18 | 8 | 44.4 | 36 | 13 | 36.1 |
| | FI | 18 | 4 | 22.2 | 19 | 2 | 10.5 | 37 | 6 | 16.2 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 17 | 24.6 | 77 | 16 | 20.8 | 146 | 33 | 22.6 |

When *experience spaces* are examined, it is determined that DST activities took place mostly in the “classroom” both in the 1st (76.8%) and 2nd year (75.3%), and across all countries for the total projects implemented throughout both years (76.0%). This is followed by “classroom’s digital corner” (33.3%) in the 1st year, and by “digital laboratory” (41.6%) in the 2nd year. The percentage about the use of digital laboratory is improved dramatically in the 2nd year; from 10.1% to 41.6%. From this point on, we can infer that teachers made use of digital facilities that schools offer them throughout the DST projects. The minimum percentage (10.3%) regarding the activity spaces is found at “teachers’ room” category.

Comparing the two project years across all countries, “digital laboratories” has emerged as an experience space according to difference in the percentages found in each year. As a matter of fact, digital laboratory preferences of teachers as an activity space in Italy and Germany also improved most. For Finland, this improvement is occurred in “classroom digital corner”. For all partner countries, we can conclude that there is evidence that teachers began to consider about the learning spaces, where they can integrate technology to their projects more easily. We can also suggest having a more variety in educational spaces, based on the low percentages of other spaces such as school garden or out of school venues.

Table 5.5 below presents the findings regarding another variable considered under this heading: the resources and materials used beyond digital devices during the implementations of the projects.

Table 5.5. Resources and materials used beyond digital devices

| Resources and Materials | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|---|---------|----------------------|----|-------|----------------------|----|-------|-------|-----|-------|
| | | N | f | % | N | f | % | N | f | % |
| Concrete play objects | IT | 27 | 6 | 22.2 | 32 | 15 | 46.9 | 59 | 21 | 35.6 |
| | TR | 18 | 9 | 50.0 | 18 | 5 | 27.8 | 36 | 14 | 38.9 |
| | FI | 18 | 8 | 44.4 | 19 | 5 | 26.3 | 37 | 13 | 35.1 |
| | DE | 6 | 3 | 50.0 | 8 | 5 | 62.5 | 14 | 8 | 57.1 |
| | Total | 69 | 26 | 37.7 | 77 | 30 | 39.0 | 146 | 56 | 38.4 |
| Drawing and painting materials | IT | 27 | 18 | 66.7 | 32 | 28 | 87.5 | 59 | 46 | 78.0 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 8 | 44.4 | 19 | 9 | 47.4 | 37 | 17 | 45.9 |
| | DE | 6 | 6 | 100.0 | 8 | 7 | 87.5 | 14 | 13 | 92.9 |
| | Total | 69 | 50 | 72.5 | 77 | 62 | 80.5 | 146 | 112 | 76.7 |
| Books | IT | 27 | 7 | 25.9 | 32 | 6 | 18.8 | 59 | 13 | 22.0 |
| | TR | 18 | 7 | 38.9 | 18 | 10 | 55.6 | 36 | 17 | 47.2 |
| | FI | 18 | 1 | 5.6 | 19 | 7 | 36.8 | 37 | 8 | 21.6 |
| | DE | 6 | 4 | 66.7 | 8 | 5 | 62.5 | 14 | 9 | 64.3 |
| | Total | 69 | 19 | 27.5 | 77 | 28 | 36.4 | 146 | 47 | 32.2 |
| Photos and images | IT | 27 | 19 | 70.4 | 32 | 24 | 75.0 | 59 | 43 | 72.9 |
| | TR | 18 | 17 | 94.4 | 18 | 18 | 100.0 | 36 | 35 | 97.2 |
| | FI | 18 | 2 | 11.1 | 19 | 10 | 52.6 | 37 | 12 | 32.4 |
| | DE | 6 | 2 | 33.3 | 8 | 3 | 37.5 | 14 | 5 | 35.7 |
| | Total | 69 | 40 | 58.0 | 77 | 55 | 71.4 | 146 | 95 | 65.1 |
| Musical instruments | IT | 27 | 3 | 11.1 | 32 | 13 | 40.6 | 59 | 16 | 27.1 |
| | TR | 18 | 6 | 33.3 | 18 | 1 | 5.6 | 36 | 7 | 19.4 |
| | FI | 18 | 1 | 5.6 | 19 | -- | -- | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | 2 | 25.0 | 14 | 2 | 14.3 |
| | Total | 69 | 10 | 14.5 | 77 | 16 | 20.8 | 146 | 26 | 17.8 |
| Objects from nature | IT | 27 | 2 | 7.4 | 32 | 8 | 25.0 | 59 | 10 | 16.9 |
| | TR | 18 | 5 | 27.8 | 18 | 3 | 16.7 | 36 | 8 | 22.2 |
| | FI | 18 | 2 | 11.1 | 19 | 4 | 21.1 | 37 | 6 | 16.2 |
| | DE | 6 | 3 | 50.0 | 8 | 2 | 25.0 | 14 | 5 | 35.7 |
| | Total | 69 | 12 | 17.4 | 77 | 17 | 22.1 | 146 | 29 | 19.9 |
| Real world objects | IT | 27 | 4 | 14.8 | 32 | 8 | 25.0 | 59 | 12 | 20.3 |
| | TR | 18 | 11 | 61.1 | 18 | 9 | 50.0 | 36 | 20 | 55.6 |
| | FI | 18 | 5 | 27.8 | 19 | 3 | 15.8 | 37 | 8 | 21.6 |
| | DE | 6 | 4 | 66.7 | 8 | -- | -- | 14 | 4 | 28.6 |
| | Total | 69 | 24 | 34.8 | 77 | 20 | 26.0 | 146 | 44 | 30.1 |
| Structured or non-structured articles from the physical environment | IT | 27 | 19 | 70.4 | 32 | 24 | 75.0 | 59 | 43 | 72.9 |
| | TR | 18 | 9 | 50.0 | 18 | 9 | 50.0 | 36 | 18 | 50.0 |
| | FI | 18 | 4 | 22.2 | 19 | 4 | 21.1 | 37 | 8 | 21.6 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 32 | 46.4 | 77 | 37 | 48.1 | 146 | 69 | 47.3 |
| Materials for experiential activities | IT | 27 | -- | -- | 32 | 1 | 3.1 | 59 | 1 | 1.7 |
| | TR | 18 | -- | -- | 18 | 4 | 22.2 | 36 | 4 | 11.1 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | -- | -- | 77 | 6 | 7.8 | 146 | 6 | 4.1 |
| 3D models | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | 8 | 44.4 | 18 | 12 | 66.7 | 36 | 20 | 55.6 |
| | FI | 18 | 1 | 5.6 | 19 | 2 | 10.5 | 37 | 3 | 8.1 |
| | DE | 6 | 1 | 16.7 | 8 | 2 | 25.0 | 14 | 3 | 21.4 |
| | Total | 69 | 10 | 14.5 | 77 | 16 | 20.8 | 146 | 26 | 17.8 |

The use of materials in early childhood is very important, because children cannot learn without real, direct first-hand experiences. The physical environment needs to be wide ranging, both indoor and outdoor, with natural and manufactured objects (Bruce, 2011). Also, as young children work with different materials, they come to learn about and appreciate their affordances. Each material invites and offers possibilities that orient children in certain directions when they use it (Edwards & Willis, 2000). When *other resources and materials used beyond digital devices* are examined, it has been observed that the practices also included different materials for children to play, communicate, learn and express themselves in accordance with the recommendations in the literature.

It has been observed that the most frequently used materials in both the 1st (72.5%) and 2nd (80.5%) project cycles and in total (76.7%) were "drawing/painting materials". Drawing and painting activities have an important place for this age group. Because, as stated by Brooks (2009), the changes in children's thinking become visible through their drawings. In addition, these materials are also important means of improving children's creativity (Edwards & Wright, 1995). Bruce (2011) also emphasizes drawing and painting activities among those that need to be done every day in early childhood. Another advantage of these materials is that they are among the easiest materials to be reached economically. Pacini-Ketchabaw, Kind, and Kocher (2016) list five materials which are often found in early childhood education spaces: paper, charcoal, paint, clay and blocks. The presence of these materials in all schools can be considered as one of the reasons for the high frequency of use. Also, the use of children's drawings in the storyboards in the process of digital story making is one of the factors that make use of these materials more frequent than others. In this context, the most used materials of drawing and painting within the scope of STORIES project can be seen as a result supporting the literature.

Besides these, the largest increase from the 1st project cycle to the 2nd cycle has occurred in the use of "photos/images"; moving from 58.0% to 71.4%. This increase can be attributed to two reasons: firstly, visual materials such as photos, pictures, book covers, videos, animations, posters, etc. cover a wide range of teaching materials and through these materials, verbal expressions gain more meaning in the eyes of children; secondly, visual materials play a crucial role in triggering the thinking process in building a narrative. It is thought that the reason why the teachers have used the visual materials more in the 2nd year may be attributed to these materials' positive effects observed in the 1st project year.

The least used materials, on the other hand, appeared as "materials for experiment" (4.1%), "musical instruments" (17.8%) and "3D models" (17.8%) in total. Especially the experimental activities are practices which require preliminary preparation; the use of these materials primarily involves the process of interacting with the content and an effective planning and implementation process. In this respect, one reason for the less use of experimental materials can be attributed to the fact that teachers may have problems in planning and implementation of the experiments as highlighted in the literature (Akcanca, Gürler & Alkan, 2017; Özbey, 2006; Kocakulah & Savaş, 2011). In addition, the fact that the experimental materials are not available at every school for economic reasons can be seen as one of the reasons for less preference (Karamustafaoğlu & Kandaz, 2006; Kıldan & Pektaş, 2009). In this context, it is thought that one reason for the lower use of experimental materials may be that teachers may have problems in planning and implementing experiments as highlighted in the literature.

In addition to those mentioned above, it has also been determined that note taking tools, worksheets, lotto, memory cards, colored cards, mind maps, song cards, and/or story cards are commonly used as additional instructional materials in the partner countries in the process of project implementations. It can be said that the type of the materials used depend on both the facilities of the school and the nature/content of the learning activities conducted. However, in accordance with cognitive development levels in early childhood, reaching children with more concrete materials is important in triggering their thinking processes and supporting their understanding of the content. From this viewpoint, it is thought that in the activities within DST projects, natural and/or real-life objects/materials and 3D models should be provided more to children.

The final focus under this heading is *teaching methods and educational strategies*. Relevant findings are presented below within Table 5.6.

Table 5.6. Teaching methods and educational strategies

| Teaching Methods and Educational Strategies | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|---|---------|----------------------|----|-------|----------------------|----|-------|-------|-----|-------|
| | | N | f | % | N | f | % | N | f | % |
| DST | IT | 27 | 25 | 92.6 | 32 | 32 | 100.0 | 59 | 57 | 96.6 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 7 | 38.9 | 19 | 6 | 31.6 | 37 | 13 | 35.1 |
| | DE | 6 | 6 | 100.0 | 8 | 8 | 100.0 | 14 | 14 | 100.0 |
| | Total | 69 | 56 | 81.2 | 77 | 64 | 83.1 | 146 | 120 | 82.2 |
| Role playing/drama | IT | 27 | 10 | 37.0 | 32 | 5 | 15.6 | 59 | 15 | 25.4 |
| | TR | 18 | 13 | 72.2 | 18 | 12 | 66.7 | 36 | 25 | 69.4 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | 3 | 50 | 8 | 1 | 12.5 | 14 | 4 | 28.6 |
| | Total | 69 | 26 | 37.7 | 77 | 19 | 24.7 | 146 | 45 | 30.8 |
| Discussion | IT | 27 | 22 | 81.5 | 32 | 30 | 93.8 | 59 | 52 | 88.1 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 11 | 61.1 | 19 | 7 | 36.8 | 37 | 18 | 48.6 |
| | DE | 6 | 2 | 33.3 | 8 | 7 | 87.5 | 14 | 9 | 64.3 |
| | Total | 69 | 53 | 76.8 | 77 | 62 | 80.5 | 146 | 115 | 78.8 |
| Questioning | IT | 27 | 20 | 74.1 | 32 | 32 | 100.0 | 59 | 52 | 88.1 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 3 | 16.7 | 19 | 2 | 10.5 | 37 | 5 | 13.5 |
| | DE | 6 | 2 | 33.3 | 8 | 7 | 87.5 | 14 | 9 | 64.3 |
| | Total | 69 | 43 | 62.3 | 77 | 59 | 76.6 | 146 | 102 | 69.9 |
| Problem solving | IT | 27 | 10 | 37.0 | 32 | 4 | 12.5 | 59 | 14 | 23.7 |
| | TR | 18 | 1 | 5.6 | 18 | -- | -- | 36 | 1 | 2.8 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 11 | 15.9 | 77 | 4 | 5.2 | 146 | 15 | 10.3 |
| Direct instruction | IT | 27 | 6 | 22.2 | 32 | 4 | 12.5 | 59 | 10 | 16.9 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 24 | 34.8 | 77 | 23 | 29.9 | 146 | 47 | 32.2 |
| Demonstration | IT | 27 | 8 | 29.6 | 32 | 11 | 34.4 | 59 | 19 | 32.2 |
| | TR | 18 | 3 | 16.7 | 18 | 3 | 16.7 | 36 | 6 | 16.7 |
| | FI | 18 | 4 | 22.2 | 19 | 8 | 42.1 | 37 | 12 | 32.4 |
| | DE | 6 | 6 | 100.0 | 8 | 8 | 100.0 | 14 | 14 | 100.0 |
| | Total | 69 | 21 | 30.4 | 77 | 30 | 39.0 | 146 | 51 | 34.9 |

| | | | | | | | | | | |
|------------------------|-------|----|----|-------|----|----|-------|-----|----|-------|
| Educational play | IT | 27 | 5 | 18.5 | 32 | 10 | 31.2 | 59 | 15 | 25.4 |
| | TR | 18 | 12 | 66.7 | 18 | 6 | 33.3 | 36 | 18 | 50.0 |
| | FI | 18 | 1 | 5.6 | 19 | 1 | 5.3 | 37 | 2 | 5.4 |
| | DE | 6 | 4 | 66.7 | 8 | 1 | 12.5 | 14 | 5 | 35.7 |
| | Total | 69 | 22 | 31.9 | 77 | 18 | 23.4 | 146 | 40 | 27.4 |
| Narration | IT | 27 | 11 | 40.7 | 32 | 21 | 65.6 | 59 | 32 | 54.2 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 4 | 22.2 | 19 | 6 | 31.6 | 37 | 10 | 27.0 |
| | DE | 6 | 5 | 83.3 | 8 | 7 | 87.5 | 14 | 12 | 85.7 |
| | Total | 69 | 38 | 55.1 | 77 | 52 | 67.5 | 146 | 90 | 61.6 |
| Cooperative learning | IT | 27 | 7 | 25.9 | 32 | 7 | 21.9 | 59 | 14 | 23.7 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 10 | 55.6 | 19 | 11 | 57.9 | 37 | 21 | 56.8 |
| | DE | 6 | 6 | 100.0 | 8 | 8 | 100.0 | 14 | 14 | 100.0 |
| | Total | 69 | 41 | 59.4 | 77 | 44 | 57.1 | 146 | 85 | 58.2 |
| Brainstorming | IT | 27 | 14 | 51.9 | 32 | 30 | 93.8 | 59 | 44 | 74.6 |
| | TR | 18 | 7 | 38.9 | 18 | 7 | 38.9 | 36 | 14 | 38.9 |
| | FI | 18 | 6 | 33.3 | 19 | 4 | 21.1 | 37 | 10 | 27.0 |
| | DE | 6 | 5 | 83.3 | 8 | 7 | 87.5 | 14 | 12 | 85.7 |
| | Total | 69 | 32 | 46.4 | 77 | 48 | 62.3 | 146 | 80 | 54.8 |
| Experiment | IT | 27 | -- | -- | 32 | 2 | 6.2 | 59 | 2 | 3.4 |
| | TR | 18 | 6 | 33.3 | 18 | 9 | 50.0 | 36 | 15 | 41.7 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 6 | 8.7 | 77 | 11 | 14.3 | 146 | 17 | 11.6 |
| Gallery walk | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | 5 | 27.8 | 18 | 3 | 16.7 | 36 | 8 | 22.2 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 5 | 7.2 | 77 | 3 | 3.9 | 146 | 8 | 5.5 |
| Site visit/observation | IT | 27 | 6 | 22.2 | 32 | 6 | 18.8 | 59 | 12 | 20.3 |
| | TR | 18 | 4 | 22.2 | 18 | 10 | 55.6 | 36 | 14 | 38.9 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 10 | 14.5 | 77 | 17 | 22.1 | 146 | 27 | 18.5 |
| Project-based learning | IT | 27 | 11 | 40.7 | 32 | 24 | 75.0 | 59 | 35 | 59.3 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 29 | 42.0 | 77 | 43 | 55.8 | 146 | 72 | 49.3 |

When *teaching methods and educational strategies* are examined, it has been determined that DST appears to be the most commonly used teaching method in both the 1st (81.2%) and 2nd (83.1%) implementation years of STORIES Project (82.2% for the total). Barrett (2006) refers to the DST's goal of deep learning and student participation. Achieving this goal requires the use of child-centered teaching methods and techniques in the DST process. When the teaching methods and educational strategies used in the STORIES project are examined, it is seen that the teachers try to plan the process in order to promote deep learning and student participation and try to provide the method and strategy variety to attract each child into the learning process. On the other hand, keeping in mind that DST is the basic approach both as a teaching method and an educational strategy adopted in STORIES Project, it is remarkable to find out that DST is reported as a used teaching method/educational strategy only in 82.2% of the total projects implemented. However, the reason for this situation is thought to be due to the fact that teachers neglected to note down this method on the project sheets; considering DST is regarded as the basic assumption of the STORIES Project, they might have thought that it was not necessary to record this.

The most used methods in the projects in both the 1st and 2nd implementation years, following DST approach, have appeared as discussion (78.8%) and questioning (69.9%); of both are methods that encourage children to think, to express what they think and to ask questions.

On the other hand, country-based findings showed that there are some differences among countries in terms of the most used methods. For example; In Italy, DST, discussion and questioning methods are the most commonly used methods in both the 1st and the 2nd project years. The most commonly used methods in Finland are cooperative learning and discussion. In Turkey, DST, discussion, questioning, cooperative learning, project-based learning, direct instruction and narration methods are found to be used in all projects, while in Germany, cooperative learning, demonstration and DST methods are used in all projects. Although there are differences among countries in terms of the most used methods, it can be said that questioning and discussion methods are commonly and frequently used in all countries.

As a matter of fact, as mentioned by Bay and Hartman (2015) and Mac Naughton and Williams (2009), questioning is a method frequently used in early childhood learning activities to enable children to learn, think and interact; while the discussion method allows the pupils to attend the lessons and teachers to constantly check children's understanding of the relevant concepts (Samuelsson, 2010). Brooks and Brooks (1999) also emphasize the structure of the child-centered learning environments that gives opportunity to high-level thinking skills, discussions, questions, and dialogues. In some of the partner countries, the implementation of DST practices in a project-based learning context can also be considered as a reason to interpret this finding. This is because the starting point in project-based learning activities is the "driving questions" that guide teaching and trigger children's thinking processes, and the debates that arise from answers to these questions (Krajcik & Blumenfeld, 2006); such a structure also supports the use of questioning and discussion methods. Frequent use of these methods within STORIES Project implementations can be accepted as an indicator of attaching importance to the use of methods which effectively promote active learning throughout the projects implemented. In addition, another finding obtained on the use of the brainstorming in the 2nd year (62.3%) more than in the 1st year (46.4%) could be interpreted by the fact that in the 2nd project year, teachers gave more space to the activities that would bring the children's creative thinking process to the foreground.

On the other hand, the project-based learning method required by the basic framework of project implementations under STORIES is another method in which the percentage of use (49.3% in total) is expected to be much higher. However, the findings show that this method has only been adopted in half of the projects all through the two project years, except for Turkey, in which all the digital storytelling projects are carried out in the context of project-based learning. One of the causes of this finding is again regarded as the neglect of the teachers and another reason may be that project activities conducted within a few sessions in some classes may have been carried out as a performance task development process.

The least used methods within the scope of the implemented projects are determined as gallery walk (5.5%), problem solving (10.3%), experiment (11.6%), and site visit/observation (18.5%) in both of the implementation years.

When the least-used methods are evaluated on the basis of countries, it has been observed that, during the project implementations throughout the project years, gallery walk method has not been used in Italy; problem solving, gallery walk, and experiment methods have not been used in Finland; and project-based learning, site visit, gallery walk, experiment, direct instruction, and problem solving methods have not been used in Germany. On the other hand, the diversity of the methods used in Turkey were found to be higher than in other countries; there is no unused method, but the problem solving (2.8%) and demonstration (16.7%) methods are the least used methods. All those methods mentioned require an attentive preparation process; for example, the teacher must arrange the classroom as a gallery with appropriate materials in advance within the gallery walk method; must prepare experiment materials and environment in advance in experiment method; must make a trip-observation plan and organization in advance within the site visit/observation method; and to create meaningful problem situations within problem solving method. Less use of these methods may be due to the fact that teachers have not been able to allocate enough time for the preliminary processes because of their out-of-project workloads.

Specifying of teaching methods is influenced by many factors such as the characteristics of the group of children, the project theme, the content of the learning process, the objectives of the activities, the characteristics of the learning environment and teachers' competencies. For this reason, it is important to evaluate the selected teaching methods within the teaching context and to choose the most appropriate method for the current conditions. As noted by Baviskar, Hartle, and Whitney (2009), child-centered constructivist learning contents have no standard rules and steps that are processed in a standard way by everyone. What is important is that the teacher takes care of the individual differences in the class, designing an environment where ideas and questions are clearly expressed, and planning appropriate learning activities (Brooks & Brooks, 1999). The diversity seen in the methods used in the projects can be regarded in this perspective. However, it is possible to say that there are no big differences in the 1st and 2nd years in terms of the methods used, and that a child-centered approach is observed in the selected methods.

3) Activity Plan

Participant teachers were also asked to report their activity plans under the heading of the “*Project Plan*” partaking in the project sheets. In this context, the teachers were asked to report in detail the “introductory activities”, “digital story making process”, “use of digital technologies”, and “evaluation and assessment”, respectively. However, similar to the situation mentioned under the sub-heading of “Project Description” regarding the objectives and outcomes of the project, this large-scale qualitative content is once again presented in detail in the Appendices of “***Report on Best Educational Practices of Digital Storytelling in Early Childhood Education***” drafted by the Turkish partner (Mimar Sinan Fine Arts University), which is one of the STORIES Project’s outputs, within two selected best practice examples from each partner country.

5.1.3 Findings on Activity Report

Under this heading, “*Incipit*”, “*Use of Technologies during Activities*” and “*Project Evaluation*” is examined within separate sub-headings, respectively.

1) Incipit

The item of interest under this sub-heading, namely “Incipit”, which comprises the initiating chance/prompt of the storytelling activity; such as children’s oral narratives, recall of personal or shared memories, drawings, and acting/role play or teacher’s questions/prompts for initiating the thinking process (e.g. shared book readings, conversational procedures – ‘to tell a story, to get a story’, or any way of offering a visual or oral stem – a single picture, an illustrated book, a photo album, a narrative incipit – to build upon, or a complete story to retell). In this context, the participant teachers were asked to describe the elements that triggered the stories. Table 5.7 below presents the findings on this item.

Table 5.7. Incipit: Elements that triggered the stories

| Incipit | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|---|---------|----------------------|----|-------|----------------------|----|-------|-------|----|-------|
| | | N | f | % | N | f | % | N | f | % |
| Circle time activities | IT | 27 | 12 | 44.4 | 32 | 15 | 46.9 | 59 | 27 | 45.8 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 3 | 16.7 | 19 | 4 | 21.1 | 37 | 7 | 18.9 |
| | DE | 6 | 5 | 83.3 | 8 | 7 | 87.5 | 14 | 12 | 85.7 |
| | Total | 69 | 38 | 55.0 | 77 | 44 | 57.1 | 146 | 82 | 56.2 |
| Singing songs with children | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | 12 | 66.7 | 18 | 10 | 55.6 | 36 | 22 | 61.1 |
| | FI | 18 | -- | -- | 19 | 2 | 10.5 | 37 | 2 | 5.4 |
| | DE | 6 | -- | -- | 8 | 3 | 37.5 | 14 | 3 | 21.4 |
| | Total | 69 | 12 | 17.4 | 77 | 15 | 19.5 | 146 | 27 | 18.5 |
| Presenting children digital stories created by teachers | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | 14 | 77.8 | 18 | 10 | 55.6 | 36 | 24 | 66.7 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 14 | 20.3 | 77 | 10 | 13.0 | 146 | 24 | 16.4 |
| Presenting children visual or auditory elements | IT | 27 | 10 | 37.0 | 32 | 10 | 31.2 | 59 | 20 | 33.9 |
| | TR | 18 | 16 | 88.9 | 18 | 18 | 100.0 | 36 | 34 | 94.4 |
| | FI | 18 | 5 | 27.8 | 19 | 6 | 31.6 | 37 | 11 | 29.7 |
| | DE | 6 | -- | -- | 8 | 2 | 25.0 | 14 | 2 | 14.3 |
| | Total | 69 | 31 | 44.9 | 77 | 36 | 46.8 | 146 | 67 | 45.9 |
| Educational plays | IT | 27 | 2 | 7.4 | 32 | 3 | 9.4 | 59 | 5 | 8.5 |
| | TR | 18 | 12 | 66.7 | 18 | 6 | 33.3 | 36 | 18 | 50.0 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | 4 | 66.7 | 8 | -- | -- | 14 | 4 | 28.6 |
| | Total | 69 | 18 | 26.1 | 77 | 9 | 11.7 | 146 | 27 | 18.5 |
| Reading/presenting story books/ 3-D books/ silent books | IT | 27 | 1 | 3.7 | 32 | 5 | 15.6 | 59 | 6 | 10.2 |
| | TR | 18 | 7 | 38.9 | 18 | 10 | 55.6 | 36 | 17 | 47.2 |
| | FI | 18 | 1 | 5.6 | 19 | 6 | 31.6 | 37 | 7 | 18.9 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 9 | 13.0 | 77 | 21 | 27.3 | 146 | 30 | 20.5 |
| Role play/drama/ puppet show/ stage play | IT | 27 | -- | -- | 32 | 1 | 3.1 | 59 | 1 | 1.7 |
| | TR | 18 | 12 | 66.7 | 18 | 13 | 72.2 | 36 | 25 | 69.4 |
| | FI | 18 | 1 | 5.6 | 19 | 2 | 10.5 | 37 | 3 | 8.1 |
| | DE | 6 | 4 | 66.7 | 8 | 1 | 12.5 | 14 | 5 | 35.7 |
| | Total | 69 | 17 | 24.6 | 77 | 17 | 22.1 | 146 | 34 | 23.3 |
| Presenting children real world objects or objects from nature | IT | 27 | -- | -- | 32 | 8 | 25.0 | 59 | 8 | 13.6 |
| | TR | 18 | 13 | 72.2 | 18 | 9 | 50.0 | 36 | 22 | 61.1 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | 1 | 16.7 | 8 | -- | -- | 14 | 1 | 7.1 |
| | Total | 69 | 14 | 20.3 | 77 | 17 | 22.1 | 146 | 31 | 21.2 |

| | | | | | | | | | | |
|--|-------|----|----|-------|----|----|-------|-----|----|-------|
| 2D/3D material production with children | IT | 27 | 7 | 25.9 | 32 | 6 | 18.8 | 59 | 13 | 22.0 |
| | TR | 18 | 9 | 50.0 | 18 | 11 | 61.1 | 36 | 20 | 55.6 |
| | FI | 18 | 1 | 5.6 | 19 | 1 | 5.3 | 37 | 2 | 5.4 |
| | DE | 6 | 6 | 100.0 | 8 | 4 | 50.0 | 14 | 10 | 71.4 |
| | Total | 69 | 23 | 33.3 | 77 | 22 | 28.6 | 146 | 45 | 30.8 |
| Site observation | IT | 27 | 3 | 11.1 | 32 | 9 | 28.1 | 59 | 12 | 20.3 |
| | TR | 18 | 6 | 33.3 | 18 | 10 | 55.6 | 36 | 16 | 44.4 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 9 | 13.0 | 77 | 19 | 24.7 | 146 | 28 | 19.2 |
| Presenting children concrete play objects | IT | 27 | 1 | 3.7 | 32 | -- | -- | 59 | 1 | 1.7 |
| | TR | 18 | 8 | 44.4 | 18 | 5 | 27.8 | 36 | 13 | 36.1 |
| | FI | 18 | 3 | 16.7 | 19 | -- | -- | 37 | 3 | 8.1 |
| | DE | 6 | -- | -- | 8 | 2 | 25.0 | 14 | 2 | 14.3 |
| | Total | 69 | 12 | 17.4 | 77 | 7 | 9.1 | 146 | 19 | 13.0 |
| Presenting children critical/background /initial information | IT | 27 | -- | -- | 32 | 2 | 6.2 | 59 | 2 | 3.4 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 1 | 5.6 | 19 | 2 | 10.5 | 37 | 3 | 8.1 |
| | DE | 6 | 6 | 100.0 | 8 | 8 | 100.0 | 14 | 14 | 100.0 |
| | Total | 69 | 25 | 36.2 | 77 | 30 | 39.0 | 146 | 55 | 37.7 |
| Experiential activities | IT | 27 | 9 | 33.3 | 32 | 10 | 31.2 | 59 | 19 | 32.2 |
| | TR | 18 | 6 | 33.3 | 18 | 10 | 55.6 | 36 | 16 | 44.4 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 15 | 21.7 | 77 | 21 | 27.3 | 146 | 36 | 24.7 |
| Telling stories | IT | 27 | 4 | 14.8 | 32 | 5 | 15.6 | 59 | 9 | 15.3 |
| | TR | 18 | 13 | 72.2 | 18 | 16 | 88.9 | 36 | 29 | 80.6 |
| | FI | 18 | 1 | 5.6 | 19 | 5 | 26.3 | 37 | 6 | 16.2 |
| | DE | 6 | 5 | 83.3 | 8 | 4 | 50.0 | 14 | 9 | 64.3 |
| | Total | 69 | 23 | 33.3 | 77 | 30 | 39.0 | 146 | 53 | 36.3 |
| Gallery walk | IT | 27 | -- | -- | 32 | 1 | 3.1 | 59 | 1 | 1.7 |
| | TR | 18 | 3 | 16.7 | 18 | 3 | 16.7 | 36 | 6 | 16.7 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 3 | 4.3 | 77 | 4 | 5.2 | 146 | 7 | 4.8 |
| Meeting specialists | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | 1 | 5.6 | 18 | 5 | 27.8 | 36 | 6 | 16.7 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 1 | 1.4 | 77 | 6 | 7.8 | 146 | 7 | 4.8 |
| Drawing/painting activities | IT | 27 | 6 | 22.2 | 32 | 8 | 25.0 | 59 | 14 | 23.7 |
| | TR | 18 | 18 | 100.0 | 18 | 18 | 100.0 | 36 | 36 | 100.0 |
| | FI | 18 | 1 | 5.6 | 19 | 1 | 5.3 | 37 | 2 | 5.4 |
| | DE | 6 | 1 | 16.7 | 8 | 1 | 12.5 | 14 | 2 | 14.3 |
| | Total | 69 | 26 | 37.7 | 77 | 28 | 36.4 | 146 | 54 | 37.0 |

The elements that trigger a story may vary according to the context because of the subjective structure of the story building process. Therefore, it would not be wrong to say that the stories created in the learning-teaching process stem from the intersection of the three basic elements of the process - the children, the teacher and the environment. When we look at the starting point of the story-making process addressed in the literature, it is seen that different ideas are expressed. It is stated that children can take their story characters from many different sources; from books, films, internet, toys, or objects in the house, and that the starting point for the story can be from the toys they play, from the books they read, or from a point in real life (Cao, Lindley, Helmes, & Sellen, 2010). Sometimes asking questions to children and building up discussions on the basic elements of the narrative can also be used to form the starting point of the story (Robin & McNeil, 2012); or a

task for which the teacher specifies the basic frame can initiate the story making process (Sharple, 2002). Within the scope of the STORIES project, it is seen that all these paths mentioned in the literature are used in the story development process.

Regarding the *elements that triggered the stories (i.e. the incipit, that's the storytelling initiating chance/prompt)*; in both of the implementation years, circle time (open ended questions, discussion, analogy. etc.) activities have been appeared to act as the main element that triggered the stories in more than half of the projects (56.2% in total). This can be considered as an expected result in early childhood. This is because it is mentioned in the literature that circle time activities involve an important part of an early childhood program so that it gives young children an opportunity to learn how to be a part of a group, develop listening skills, experience music and movement, and play games. Circle time also can be a time for introducing new concepts and practicing language, math, and science skills that will be the building blocks for their future learning (Bittinger, 2004). Children find circle time activities very motivating because it is fast-paced, multi-sensory and very good fun. When engaged in circle time activities, children lose their self-consciousness and make developmental strides that can be difficult to achieve in more formal settings (Mosley, 2005). Thus, it can be said that the teachers of all partner countries have benefited from the positive contributions of circle time activities during the project implementation processes.

Regarding the country-specific findings, it is seen that circle time activities are used as the main triggers in Italy for both project years (44.4% for the 1st year; 46.9% for the 2nd year), while "presenting children critical/background/initial information" (e.g. technological expertise, theme-content-core information, i.e. history of dinosaurs, etc.) activity appeared as being used in each project in Turkey and Germany. Here, it can be said that participant teachers from Turkey and Germany preferred to present the new concepts and skills, which children would need in the digital storytelling process (Bittinger, 2004), mostly within circle time activities.

The activity of "presenting children visual (photos, pictures, cartoon, documentary, movie, etc.) or auditory elements (songs, sound effects, i.e. animal sound, etc.)" was also determined as another prominent element, observed almost in half of the total projects (45.9% in total) throughout the project years. In Finland, again, the activity of "presenting children visuals (photos, pictures, cartoon, documentary, movie, etc.) or auditory elements (songs, sound effects, ie animal sounds, etc.)" is found to be used most frequently as an incipit for both of the project years (27.8% for the 1st year; 31.6% for the 2nd year). It can be said that regarding that differences in children's learning styles allow some children to be more sensitive to verbal stimuli, teachers may want to consider individual differences among children by adding visual or verbal materials into the learning activities.

In approximately or more than one-third of the projects, drawing & painting activities (37.0% in total), telling stories (36.3% in total), and 2D/3D material production with children (30.8% in total) have also come to the forefront as remarkable triggers throughout the entire projects implemented. Relevant literature (Robson, 2006) also suggests that children's own narratives or written/oral narratives presented to children may be a starting point for developing conceptual understanding of children; through drawing, painting and other 2- and 3-dimensional representations, young children can express their ideas, thoughts and theories visually.

On the other hand, the digital stories created by teachers, educational plays, and concrete play objects (kinesthetic sand, toys, cardboard box, Cubetto, etc.) were found to have a trigger role in approximately one-fourth of the projects in the 1st year, however, those elements have turned out to be declining factors in the 2nd year. In the opposite, the elements of reading/presenting story books/3-D books/silent books and site visit/observation have emerged as an increasingly influential element in terms of triggering children stories, from the 1st year to the 2nd year. The findings have also pointed out that the activities of gallery walk (4.8% in total) and meeting specialists (again 4.8% in total) are not effective enough in triggering the stories of children, observed with the lowest percentages in both years. Less preference of these two triggers may be attributed to the need to make preparations for the activities of gallery walk and meeting specialists, and the possibility that teachers have not had enough time to do it.

Besides these, a child's spontaneous comment, children's own interests, free exploration of the app, worksheets, lotto, memory cards, and mind maps have appeared as some of the "other" incipits reported on the both year's project sheets by the teachers.

2) Use of Technologies during Activities

Here, hardwares and softwares used by children and teachers to perform any task in the whole process of project implementations are examined.

Within the scope of the research, findings obtained regarding the use of *hardware* is evaluated from two different perspectives; first is from the perspective of the user (by only children, by only teacher and by both) and the second is from the perspective of comparison of the use of different hardwares among the partner countries. Findings are presented below from each perspective, consecutively.

Use of Hardware: The User Perspective

Table 5.8 below presents the findings on hardware used by only children, according to each implementation year and the total of the both implementation years.

Table 5.8. Hardware used by only children

| Hardware | 1 st Year (N=69) | | 2 nd Year (N=77) | | Total (N=146) | |
|-------------------------------|--------------------------------|------|--------------------------------|------|------------------|------|
| | f | % | f | % | f | % |
| Computer | 4 | 5.8 | 3 | 3.9 | 7 | 4.8 |
| Tablet | 5 | 7.2 | 16 | 20.8 | 21 | 14.4 |
| iTheatre | 9 | 13.0 | 11 | 14.3 | 20 | 13.7 |
| Smartphone | -- | -- | 1 | 1.3 | 1 | 0.7 |
| Camera | -- | -- | 3 | 3.9 | 3 | 2.1 |
| Webcam | -- | -- | 5 | 6.5 | 5 | 3.4 |
| Document camera | 1 | 1.4 | -- | -- | 1 | 0.7 |
| Digital pen camera/microscope | 2 | 2.9 | 2 | 2.6 | 4 | 2.7 |
| Interactive whiteboard | -- | -- | -- | -- | -- | -- |
| Interactive projector | -- | -- | 1 | 1.3 | 1 | 0.7 |
| Motion sensing input devices | -- | -- | -- | -- | -- | -- |
| Drawing pad | -- | -- | -- | -- | -- | -- |
| Digital audio recorder | 3 | 4.3 | 15 | 19.5 | 18 | 12.3 |
| Microphone | 6 | 8.7 | 8 | 10.4 | 14 | 9.6 |
| Scanner | 3 | 4.3 | 2 | 2.6 | 5 | 3.4 |
| Slide/overhead projector | 1 | 1.4 | -- | -- | 1 | 0.7 |
| Printer | 1 | 1.4 | -- | -- | 1 | 0.7 |

From the perspective of “*use of hardware by only children*”; in the 1st year, it was seen that the most used device by only children is iTheatre (13.0%), whereas the device which is used most autonomously by the children in the 2nd year (20.8%) and in total of the both years (14.4%) is tablet. iTheatre was also among the most commonly used devices in the 2nd year of implementation (14.3%), and in terms of the total, it rank as number two among the devices autonomously used by only children, following the use of tablets. However, it is noteworthy that the digital audio recorder, which is used by 4.3% of the children in the 1st year of implementation, has begun to be used autonomously by almost one-fifth (19.5%) of the children in the 2nd year. In this respect, it has been observed that the most increase in terms of the devices used by only children is in terms of digital audio recorder.

Another noteworthy finding is that while the autonomous use of smartphones, cameras, webcams and interactive devices by only children was never seen during the 1st year of implementation, these devices were reported to be used by children, even in low percentage, during the 2nd year of implementation. Especially the smartphone has been used by children for voice recording, video recording and taking photos. In the sense of that, of course, the development of psychomotor and cognitive skills along with children's ages is also important.

On the other hand, document cameras, slide/overhead projectors and printers were found to be used autonomously by children only during the 1st year of implementation; while the interactive whiteboards (smartboards), motion sensing input devices, and drawing pads were not used by children, either autonomously or with teachers, in any of the projects throughout the two years of implementation.

Table 5.9 below presents the findings on hardware used by only teacher, according to each implementation year and the total of the both implementation years.

Table 5.9. Hardware used by only teacher

| Hardware | 1 st Year (N=69) | | 2 nd Year (N=77) | | Total (N=146) | |
|-------------------------------|--------------------------------|------|--------------------------------|------|------------------|------|
| | f | % | f | % | f | % |
| | Computer | 35 | 50.7 | 25 | 32.5 | 60 |
| Tablet | 12 | 17.4 | 2 | 2.6 | 14 | 9.6 |
| iTheatre | -- | -- | -- | -- | -- | -- |
| Smartphone | 15 | 21.7 | 7 | 9.1 | 22 | 15.1 |
| Camera | 7 | 10.1 | 11 | 14.3 | 18 | 12.3 |
| Webcam | 1 | 1.4 | -- | -- | 1 | 0.7 |
| Document camera | -- | -- | -- | -- | -- | -- |
| Digital pen camera/microscope | -- | -- | -- | -- | -- | -- |
| Interactive whiteboard | 1 | 1.4 | 6 | 7.8 | 7 | 4.8 |
| Interactive projector | -- | -- | -- | -- | -- | -- |
| Motion sensing input device | -- | -- | -- | -- | -- | -- |
| Drawing pad | -- | -- | -- | -- | -- | -- |
| Digital audio recorder | 3 | 4.3 | 8 | 10.4 | 11 | 7.5 |
| Microphone | 3 | 4.3 | -- | -- | 3 | 2.1 |
| Scanner | 3 | 4.3 | 3 | 3.9 | 6 | 4.1 |
| Slide/overhead projector | 29 | 42.0 | 21 | 27.3 | 50 | 34.2 |
| Printer | 21 | 30.4 | 7 | 9.1 | 28 | 19.2 |

From the perspective of “*use of hardware by only teacher*”; it was determined that the hardware used by only teachers in the 1st year with the highest percentage (50.7%) was computer, while the slide/overhead projectors (42.0%) and printers (30.4%) were also found to be frequently used by only teachers. However, when both the 2nd year of implementation and the sum of both years were taken into account, computer and slide/overhead projectors again emerged as the devices with the highest percentages used by only teachers.

Throughout project implementations, it has been determined that teachers have used the computers mostly in process activities with the purposes of presenting children examples of digital stories, introducing children the use of first-encountered devices (e.g. iTheatre), presenting children complementary/supportive media (pictures, photos, cartoon, documentary, movie, PoerPoint presentation) and/or creating educational content. On the other hand, it has been observed that teachers also used computers for the purposes of searching content (sound effect, visuals) and combining separate scenes of children’s digital stories in order to support children's product development processes.

During both implementation years, iTheatre, document camera, and digital pen camera/microscope have never been used by only teachers; on the other hand, the webcam and microphone, which have been observed within very low percentages in the 1st year, are found to have never been used by only teachers in the 2nd year. Among the devices used by only teacher, the largest increase in the 2nd year has come out in the use of interactive whiteboard (smartboard). On the other hand, the interactive projectors, motion sensing input devices, and drawing pads were found to have never been used by teachers, either alone or with children, to perform any task during the project years.

Table 5.10 below presents the findings on hardware used by both teacher and children, according to each implementation year and the total of the both implementation years.

Table 5.10. Hardware used by both teacher and children

| Hardware | 1 st Year (N=69) | | 2 nd Year (N=77) | | Total (N=146) | |
|-------------------------------|--------------------------------|------|--------------------------------|------|------------------|------|
| | f | % | f | % | f | % |
| | Computer | 8 | 11.6 | 27 | 25.1 | 35 |
| Tablet | 30 | 43.5 | 35 | 45.5 | 65 | 44.5 |
| iTheatre | 1 | 1.4 | 3 | 3.9 | 4 | 2.7 |
| Smartphone | 12 | 17.4 | 14 | 18.2 | 26 | 17.8 |
| Camera | 10 | 14.5 | 18 | 23.4 | 28 | 19.2 |
| Webcam | 9 | 13. | 1 | 1.3 | 10 | 6.8 |
| Document camera | 1 | 1.4 | -- | -- | 1 | 0.7 |
| Digital pen camera/microscope | 5 | 7.2 | -- | -- | 5 | 3.4 |
| Interactive whiteboard | -- | -- | -- | -- | -- | -- |
| Interactive projector | -- | -- | -- | -- | -- | -- |
| Motion sensing input device | -- | -- | -- | -- | -- | -- |
| Drawing pad | -- | -- | -- | -- | -- | -- |
| Digital audio recorder | 5 | 7.2 | 5 | 6.5 | 10 | 6.8 |
| Microphone | 6 | 8.7 | 1 | 1.3 | 7 | 4.8 |
| Scanner | 3 | 4.3 | 3 | 3.9 | 6 | 4.1 |
| Slide/overhead projector | 6 | 8.7 | 24 | 31.2 | 30 | 20.5 |
| Printer | -- | -- | 3 | 3.9 | 3 | 2.1 |

From the perspective of “*use of hardware by both teacher and children*”; the most commonly used device by both teacher and children is tablet, both in the 1st year (43.5%) and the 2nd year (45.5%) of implementation as well as in the sum of both years (44.5%), to perform any task within the scope of project implementations. Teachers often use this device for presenting children media elements (sound effects, mood music) and combining separate scenes of children's digital stories to support children's final products; and children often use it for voice recording and taking photos.

Computer (24.0%), slide/overhead projector (20.5%) and camera (19.2%) were also found to be among the devices frequently used by both teachers and children in entire projects of two years duration. Teachers have stated that they often use the camera for documentation purposes, especially during the process activities. In terms of devices used by both teachers and children, the highest increase observed from the 1st year to the 2nd year was again in terms of the use of slide/overhead projector (8.7% for the 1st year; 31.2% for the 2nd year). It is also determined that teachers lead the way in the use of this device, and the activities regarding the use of this device are mostly; presenting children examples of digital stories, presenting children complementary/supportive media elements (pictures, photos, cartoon, documentary, movie), presenting children educational content, and introducing children first-encountered devices (such as i-theatre), which are carried out during the process activities of the projects.

As mentioned in the previous findings presented under Table 8 and Table 9, motion sensing input devices and drawing pads were found to have never been used by teachers or children, to perform any task during the project years.

Use of Hardware: Comparative Perspective among the Partner Countries

Here, the findings on the use of hardware from the comparative perspective among the partner countries are presented below; firstly according to the common used hardwares among all partner

countries within Table 5.11–5.15 and then according to the hardwares used by only three partners (Table 5.16), two partners (Table 5.17) or a single partner (Table 5.18 and Table 5.19), separately and respectively. Since motion sensing input devices (e.g. Xbox Kinect) and drawing pads were found to have never been used in any of the projects, neither by children nor the teachers, these two hardwares were not included in the tables presented below.

Table 5.11. Common used hardware among all partner countries: Use of computer

| Hardware | Country | User | 1 st Year | | | 2 nd Year | | | Total | | |
|------------|--------------|--------------|----------------------|------|-------|----------------------|------|------|-------|------|------|
| | | | N | f | % | N | f | % | N | f | % |
| Computer | IT | Only child | | 4 | 14.8 | | 3 | 9.4 | 7 | 11.9 | |
| | | None | 27 | 7 | 25.9 | 32 | 2 | 6.2 | 59 | 9 | 15.3 |
| | | Only teacher | | 8 | 29.6 | | 5 | 15.6 | | 13 | 22.0 |
| | | Both | | 8 | 29.6 | | 22 | 68.8 | | 30 | 50.8 |
| | Only child | | | -- | -- | | | -- | | -- | |
| | TR | None | 18 | -- | -- | 18 | 3 | 16.7 | 36 | 3 | 8.3 |
| | | Only teacher | | 18 | 100.0 | | 12 | 66.7 | | 30 | 83.3 |
| | | Both | | -- | -- | | 3 | 16.7 | | 3 | 8.3 |
| | | Only child | | | -- | | -- | | | -- | -- |
| | FI | None | 18 | 15 | 83.3 | 19 | 15 | 78.9 | 37 | 30 | 81.1 |
| | | Only teacher | | 3 | 16.7 | | 2 | 10.5 | | 5 | 13.5 |
| | | Both | | -- | -- | | 2 | 10.5 | | 2 | 5.4 |
| | | Only child | | | -- | | -- | | | -- | -- |
| | DE | None | 6 | -- | -- | 8 | 2 | 25.0 | 14 | 2 | 14.3 |
| | | Only teacher | | 6 | 100.0 | | 6 | 75.0 | | 12 | 85.7 |
| | | Both | | -- | -- | | -- | -- | | -- | -- |
| Only child | | | | 4 | 5.8 | | | 3 | | 3.9 | |
| Total | None | 69 | 22 | 31.9 | 77 | 22 | 28.6 | 146 | 44 | 30.1 | |
| | Only teacher | | 35 | 50.7 | | 25 | 32.5 | | 60 | 41.1 | |
| | Both | | 8 | 11.6 | | 27 | 25.1 | | 35 | 24.0 | |
| | Only child | | | 4 | | 5.8 | | | 3 | 3.9 | |

Examining the use of technologies; among the common used hardwares in the projects, computers appears as prominent, and teachers reported that computers are mostly (41.1% in total) used only by them during the activities throughout the project years.

Taking into account the country-specific findings and both implementation years; computers are found to be mostly used by both teacher and children in Italy (50.8% in total), whereas in Turkey (83.3% in total), Finland (13.5% in total), and Germany (85.7%), the highest percentage was observed in the use of computers by only teachers. It is important to state here point to the Turkey-specific findings that because the technological facilities are not sufficient in most of the schools in Turkey, the teachers used computers in all of the projects of the 1st year. Autonomous use of computers by children, without teacher assistance, was only observed in Italy. However, while in Turkey and Finland, computers were used by "only teachers" through the 1st year, these devices have begun to be used also by children in the 2nd year. Since the use of computers that have graphical interfaces and are mostly used with keyboards and mouse is difficult and complicated for young children, the development of psychomotor and cognitive skills of children with increasing age is seen as the reason for this positively improvement in the 2nd implementation year.

Table 5.12. Common used hardware among all partner countries: Use of tablet

| Hardware | Country | User | 1 st Year | | | 2 nd Year | | | Total | | |
|----------|---------|--------------|----------------------|----|------|----------------------|------|--------|-------|----|------|
| | | | N | f | % | N | f | % | N | f | % |
| Tablet | IT | Only child | | 1 | 3.7 | | 12 | 37.5 | | 13 | 22.0 |
| | | None | 27 | 9 | 33.3 | 32 | 10 | 31.2 | 59 | 19 | 32.2 |
| | | Only teacher | | 6 | 22.2 | | -- | -- | | 6 | 10.2 |
| | | Both | | 11 | 40.7 | | 10 | 31.2 | | 21 | 35.6 |
| | TR | Only child | | | 2 | | 11.1 | | | 2 | 11.1 |
| | | None | 18 | 10 | 55.6 | 18 | 11 | 61.1 | 36 | 21 | 58.3 |
| | | Only teacher | | 3 | 16.7 | | -- | -- | | 3 | 8.3 |
| | | Both | | 3 | 16.7 | | 5 | 27.8 | | 8 | 22.2 |
| | FI | Only child | | | 2 | | 11.1 | | | 2 | 10.5 |
| | | None | 18 | -- | -- | 19 | 3 | 15.8 | 37 | 3 | 8.1 |
| | | Only teacher | | 3 | 16.7 | | 2 | 10.5 | | 5 | 13.5 |
| | | Both | | 13 | 72.2 | | 12 | 63.2 | | 25 | 67.6 |
| | DE | Only child | | | -- | | -- | | | -- | -- |
| | | None | 6 | 3 | 50.0 | 8 | -- | -- | 14 | 3 | 21.4 |
| | | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | | Both | | 3 | 50.0 | | 8 | 100.00 | | 11 | 78.6 |
| | Total | Only child | | | 5 | | 7.2 | | | 16 | 20.8 |
| | | None | 69 | 22 | 31.9 | 77 | 24 | 31.2 | 146 | 46 | 31.5 |
| | | Only teacher | | 12 | 17.4 | | 2 | 2.6 | | 14 | 9.6 |
| | | Both | | 30 | 43.5 | | 35 | 45.5 | | 65 | 44.5 |

It can be seen from Table 12 that, the percentage indicating tablet device usage by “only children” and by “both teacher and children” exceeds that of computer usage mentioned above throughout the project years. It also appears to have the highest percentage among all other devices used by “both teacher and children”.

From the viewpoint of country-specific findings and the users of the relevant hardware; the highest increase observed from the 1st year to the 2nd year is in the category of “only child” in Italy (33.8%), while the highest increase in Turkey (11.1%) and Germany (50.0%) has emerged in “both” category. Conversely, in terms of all countries, a dramatic decrease is observed in "only teacher" category for the 2nd implementation year. This can be seen as an indicator of the development of children’s skills in the autonomous use of technology throughout the project years.

Table 5.13. Common used hardware among all partner countries: Use of iTheatre

| Hardware | Country | User | 1 st Year | | | 2 nd Year | | | Total | | |
|----------|--------------|--------------|----------------------|------|-------|----------------------|------|-------|-------|------|------|
| | | | N | f | % | N | f | % | N | f | % |
| iTheatre | IT | Only child | | -- | -- | | 4 | 12.5 | | 4 | 6.8 |
| | | None | 27 | 27 | 100.0 | 32 | 28 | 87.5 | 59 | 55 | 93.2 |
| | | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | | Both | | -- | -- | | -- | -- | | -- | -- |
| | TR | Only child | | 6 | 33.3 | | 7 | 38.9 | | 13 | 36.1 |
| | | None | 18 | 12 | 66.7 | 18 | 11 | 61.1 | 36 | 23 | 63.9 |
| | | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | | Both | | -- | -- | | -- | -- | | -- | -- |
| | FI | Only child | | -- | -- | | -- | -- | | -- | -- |
| | | None | 18 | 17 | 94.4 | 19 | 16 | 84.2 | 37 | 33 | 89.2 |
| | | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | | Both | | 1 | 5.6 | | 3 | 15.8 | | 4 | 10.8 |
| | DE | Only child | | 3 | 50.0 | | -- | -- | | 3 | 21.4 |
| | | None | 6 | 3 | 50.0 | 8 | 8 | 100.0 | 14 | 11 | 78.6 |
| | | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | | Both | | -- | -- | | -- | -- | | -- | -- |
| Total | Only child | | 9 | 13.0 | | 11 | 14.3 | | 20 | 13.7 | |
| | None | 69 | 59 | 85.5 | 77 | 63 | 81.8 | 146 | 122 | 83.6 | |
| | Only teacher | | -- | -- | | -- | -- | | -- | -- | |
| | Both | | 1 | 1.4 | | 3 | 3.9 | | 4 | 2.7 | |

Regarding the children's direct experience with technological tools; among all the devices used by only children, the highest percentage is at iTheatre device for the 1st year. In the 1st year, iTheatre was found to be used in all the countries, other than Italy, whereas in the 2nd year, this device was not used in Germany for any of the projects. On the other hand, in Finland, it is observed that iTheatre is only used by both teacher and children for both of the years, while this device is used only by children in the other countries.

Table 5.14. Common used hardware among all partner countries: Use of smartphone

| Hardware | Country | User | 1 st Year | | | 2 nd Year | | | Total | | |
|------------|--------------|--------------|----------------------|------|------|----------------------|------|------|-------|------|------|
| | | | N | f | % | N | f | % | N | f | % |
| Smartphone | IT | Only child | | -- | -- | | 1 | 3.1 | | 1 | 1.7 |
| | | None | 27 | 23 | 85.2 | 32 | 31 | 96.9 | 59 | 54 | 91.5 |
| | | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | | Both | | 4 | 14.8 | | -- | -- | | 4 | 6.8 |
| | TR | Only child | | -- | -- | | -- | -- | | -- | -- |
| | | None | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | | Only teacher | | 10 | 55.6 | | 6 | 33.3 | | 16 | 44.4 |
| | | Both | | 8 | 14.8 | | 12 | 66.7 | | 20 | 55.6 |
| | FI | Only child | | -- | -- | | -- | -- | | -- | -- |
| | | None | 18 | 16 | 88.9 | 19 | 17 | 89.5 | 37 | 33 | 89.2 |
| | | Only teacher | | 2 | 11.1 | | -- | -- | | 2 | 5.4 |
| | | Both | | -- | -- | | 2 | 10.5 | | 2 | 5.4 |
| | DE | Only child | | -- | -- | | -- | -- | | -- | -- |
| | | None | 6 | 3 | 50.0 | 8 | 7 | 87.5 | 14 | 10 | 71.4 |
| | | Only teacher | | 3 | 50.0 | | 1 | 12.5 | | 4 | 28.6 |
| | | Both | | -- | -- | | -- | -- | | -- | -- |
| Total | Only child | | -- | -- | | 1 | 1.3 | | 1 | 0.7 | |
| | None | 69 | 42 | 60.9 | 77 | 55 | 71.4 | 146 | 97 | 66.4 | |
| | Only teacher | | 15 | 21.7 | | 7 | 9.1 | | 22 | 15.1 | |
| | Both | | 12 | 17.4 | | 14 | 18.2 | | 26 | 17.8 | |

For Turkey, the overall increase in the used hardwares is observed most at “smartphones” used by both teachers and children, throughout the project years. However, because of the limited technological facilities, to diversify technological tools, teachers in Turkey used their personal smartphones for the activities, in all through the implementation years.

The use of smartphones by only child has only been observed in the 2nd year in Italy; in other countries, this device has been used only by the teacher, or by both the teacher and the child.

Table 5.15. Common used hardware among all partner countries: Use of camera

| Hardware | Country | User | 1 st Year | | | 2 nd Year | | | Total | | |
|----------|---------|--------------|----------------------|----|-------|----------------------|----|-------|-------|----|------|
| | | | N | f | % | N | f | % | N | f | % |
| Camera | IT | Only child | | -- | -- | | 3 | 9.4 | | 3 | 5.1 |
| | | None | 27 | 13 | 48.1 | 32 | 2 | 6.2 | 59 | 15 | 25.4 |
| | | Only teacher | | 4 | 14.8 | | 10 | 31.2 | | 14 | 23.7 |
| | | Both | | 10 | 37.0 | | 17 | 53.1 | | 27 | 45.8 |
| | TR | Only child | | | -- | | -- | | | -- | -- |
| | | None | 18 | 15 | 83.3 | 18 | 18 | 100.0 | 36 | 33 | 91.7 |
| | | Only teacher | | 3 | 16.7 | | -- | -- | | 3 | 8.3 |
| | | Both | | -- | -- | | -- | -- | | -- | -- |
| | FI | Only child | | | -- | | -- | | | -- | -- |
| | | None | 18 | 18 | 100.0 | 19 | 18 | 94.7 | 37 | 36 | 97.3 |
| | | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | | Both | | -- | -- | | 1 | 5.3 | | 1 | 2.7 |
| | DE | Only child | | | -- | | -- | | | -- | -- |
| | | None | 6 | 6 | 100.0 | 8 | 7 | 87.5 | 14 | 13 | 92.9 |
| | | Only teacher | | -- | -- | | 1 | 12.5 | | 1 | 7.1 |
| | | Both | | -- | -- | | -- | -- | | -- | -- |
| | Total | Only child | | | -- | | -- | | | 3 | 3.9 |
| | | None | 69 | 52 | 75.4 | 77 | 45 | 58.4 | 146 | 97 | 66.4 |
| | | Only teacher | | 7 | 10.1 | | 11 | 14.3 | | 18 | 12.3 |
| | | Both | | 10 | 14.5 | | 18 | 23.4 | | 28 | 19.2 |

The use of camera by only child has only been observed in the 2nd year in Italy; in other countries, this device has been used only by teacher, or by both teacher and the children within a quite small percentages. On the other hand, the most frequently use of camera by only teacher (23.7% in total), and by both teacher and children (45.8% in total) is also found to appear in Italy.

Table 5.16. Hardwares used only by Italy, Turkey and Finland: Use of printer and slide/overhead projector

| Hardware | Country | User | 1 st Year | | | 2 nd Year | | | Total | | |
|--------------------------|---------|--------------|----------------------|----|-------|----------------------|-----|-------|-------|----|-------|
| | | | N | f | % | N | f | % | N | f | % |
| Printer | IT | Only child | | 1 | 3.7 | | -- | -- | | 1 | 1.7 |
| | | None | 27 | 12 | 44.4 | 32 | 28 | 87.5 | 59 | 40 | 67.8 |
| | | Only teacher | | 14 | 51.9 | | 2 | 6.2 | | 16 | 27.1 |
| | | Both | | -- | -- | | 2 | 6.2 | | 2 | 3.4 |
| | TR | Only child | | | -- | | -- | | | -- | -- |
| | | None | 18 | 11 | 61.1 | 18 | 14 | 77.8 | 36 | 25 | 69.4 |
| | | Only teacher | | 7 | 38.9 | | 4 | 22.2 | | 11 | 30.6 |
| | | Both | | -- | -- | | -- | -- | | -- | -- |
| | FI | Only child | | | -- | | -- | | | -- | -- |
| | | None | 18 | 18 | 100.0 | 19 | 17 | 89.5 | 37 | 35 | 94.6 |
| | | Only teacher | | -- | -- | | 1 | 5.3 | | 1 | 2.7 |
| | | Both | | -- | -- | | 1 | 5.3 | | 1 | 2.7 |
| Slide/overhead projector | IT | Only child | | | 1 | | 3.7 | | | -- | -- |
| | | None | 27 | 13 | 48.1 | 32 | 7 | 21.9 | 59 | 20 | 33.9 |
| | | Only teacher | | 7 | 25.9 | | 1 | 3.1 | | 8 | 13.6 |
| | | Both | | 6 | 22.2 | | 24 | 75.0 | | 30 | 50.8 |
| | TR | Only child | | | -- | | -- | | | -- | -- |
| | | None | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | | Only teacher | | 18 | 100.0 | | 18 | 100.0 | | 36 | 100.0 |
| | | Both | | -- | -- | | -- | -- | | -- | -- |
| | FI | Only child | | | -- | | -- | | | -- | -- |
| | | None | 18 | 14 | 77.8 | 19 | 17 | 89.5 | 37 | 31 | 83.8 |
| | | Only teacher | | 4 | 22.2 | | 2 | 10.5 | | 6 | 16.2 |
| | | Both | | -- | -- | | -- | -- | | -- | -- |

Printers and slide/overhead projectors have not been used in any of the projects in Germany. While use of printers by children is observed in Italy and Finland; in Turkey, this device is used only by teachers.

For Italy; another highest percentage and also the most increase observed behind “computers” used by both teachers and children, has found to occur in the use of slide/overhead projector. In Turkey and Finland, on the other hand, relevant device is found to be used only by teachers throughout the project years.

Table 5.17. Hardwares used only by Italy and Turkey: Use of digital pen camera/microscope and scanner

| Hardware | Country | User | 1 st Year | | | 2 nd Year | | | Total | | |
|-----------------------------------|---------|--------------|----------------------|------|------|----------------------|-----|-------|-------|------|------|
| | | | N | f | % | N | f | % | N | f | % |
| Digital Pen Camera/ Microscope | IT | Only child | | 1 | 3.7 | | 2 | 6.2 | 3 | 5.1 | |
| | | None | 27 | 21 | 77.8 | 32 | 30 | 93.8 | 59 | 51 | 86.4 |
| | | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | | Both | | 5 | 18.5 | | -- | -- | 5 | 8.5 | |
| | TR | Only child | | 1 | 5.6 | | -- | -- | 1 | 2.8 | |
| | | None | 18 | 17 | 94.4 | 18 | 18 | 100.0 | 36 | 35 | 97.2 |
| Only teacher | | | -- | -- | | -- | -- | | -- | -- | |
| Both | | | -- | -- | | -- | -- | | -- | -- | |
| Scanner | IT | Only child | | 3 | 11.1 | | 2 | 6.2 | 5 | 8.5 | |
| | | None | 27 | 20 | 74.1 | 32 | 25 | 78.1 | 59 | 45 | 76.3 |
| | | Only teacher | | 1 | 3.7 | | 2 | 6.2 | 3 | 5.1 | |
| | | Both | | 3 | 11.1 | | 3 | 9.4 | 6 | 10.2 | |
| | TR | Only child | | -- | -- | | -- | -- | | -- | -- |
| | | None | 18 | 16 | 88.9 | 18 | 17 | 94.4 | 36 | 33 | 91.7 |
| Only teacher | | | 2 | 11.1 | | 1 | 5.6 | 3 | 8.3 | | |
| Both | | | -- | -- | | -- | -- | | -- | -- | |

The usage of digital pen camera/microscope and scanner is only observed to be used in Italy and Turkey during the implementations of digital storytelling projects. Digital pen camera/microscope is used in Turkey in only one project in the 1st cycle and used only by children, and scanner is used in three projects in total throughout both cycles and used only by teachers. In Italy, on the other hand, both devices are used by more users within higher percentages.

Table 5.18. Hardwares used only by Italy: Webcam, document camera, interactive projector, digital audio recorder and microphone

| Hardware | User | 1 st Year | | | 2 nd Year | | | Total | | |
|------------------------|--------------|----------------------|----|-------|----------------------|----|-------|-------|------|------|
| | | N | f | % | N | f | % | N | f | % |
| Webcam | Only child | | -- | -- | | 5 | 15.6 | 5 | 8.5 | |
| | None | 27 | 17 | 63.0 | 32 | 26 | 81.2 | 59 | 43 | 72.9 |
| | Only teacher | | 1 | 3.7 | | -- | -- | 1 | 1.7 | |
| | Both | | 9 | 33.3 | | 1 | 3.10 | 10 | 16.9 | |
| Document Camera | Only child | | 1 | 3.7 | | -- | -- | 1 | 1.7 | |
| | None | 27 | 25 | 92.6 | 32 | 32 | 100.0 | 59 | 57 | 96.6 |
| | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | Both | | 1 | 3.7 | | -- | -- | 1 | 1.7 | |
| Interactive Projector | Only child | | -- | -- | | 1 | 3.1 | 1 | 1.7 | |
| | None | 27 | 27 | 100.0 | 32 | 31 | 96.9 | 59 | 58 | 98.3 |
| | Only teacher | | -- | -- | | -- | -- | | -- | -- |
| | Both | | -- | -- | | -- | -- | | -- | -- |
| Digital Audio Recorder | Only child | | 3 | 11.1 | | 15 | 46.9 | 18 | 30.5 | |
| | None | 27 | 16 | 59.3 | 32 | 4 | 12.5 | 59 | 20 | 33.9 |
| | Only teacher | | 3 | 11.1 | | 8 | 25.0 | 11 | 18.6 | |
| | Both | | 5 | 18.5 | | 5 | 15.6 | 10 | 16.9 | |
| Microphone | Only child | | 6 | 22.2 | | 8 | 25.0 | 14 | 23.7 | |
| | None | 27 | 12 | 44.4 | 32 | 23 | 71.9 | 59 | 35 | 59.3 |
| | Only teacher | | 3 | 11.1 | | -- | -- | 3 | 5.1 | |
| | Both | | 6 | 22.2 | | 1 | 3.1 | 7 | 11.9 | |

It is seen that; the diversity in hardwares used in Italy is more than any other partner countries. It has been determined that the devices used only in Italy are webcam, document camera, interactive projector, digital audio recorder and microphone, which are not used by the other countries for the project activities. Among these devices, digital audio recorder and microphone seem to have higher usage rates than the other devices listed in Table 5.18. At the same time, these devices were found to be used by “only children” in approximately one-third or one-fourth of the total projects implemented in Italy. In this context, it can be said that Italy has been more guiding and supportive of children in autonomous use of technological devices during project implementations than in other countries.

Table 5.19. Hardware used only by Turkey: Interactive whiteboard (smart board)

| Hardware | User | 1 st Year | | | 2 nd Year | | | Total | | |
|--------------------------------------|--------------|----------------------|----|------|----------------------|----|------|-------|----|------|
| | | N | f | % | N | f | % | N | f | % |
| Interactive Whiteboard (Smart Board) | Only child | | -- | -- | | -- | -- | | -- | -- |
| | None | 18 | 17 | 94.4 | 18 | 12 | 66.7 | 36 | 29 | 80.6 |
| | Only teacher | | 1 | 5.6 | | 6 | 33.3 | | 7 | 19.4 |
| | Both | | -- | -- | | -- | -- | | -- | -- |

Interactive whiteboard is found to be used only by Turkey and, by only teachers throughout both project years. Relevant device has also been found to be used in 19.4% of the total projects implemented in Turkey and it has been determined that the main purpose in the preference of this device is to present children basic concepts and background information related to the context of the current project.

Although children’s direct interaction with technological tools has increased in years, we can suggest that children’s autonomous use of these tools is encouraged more by the teachers. Considering the variety of technology used, it is also recommended to use more tools at projects within the facilities schools offer for their teachers and students.

Use of Software

Within the scope of the STORIES Project, the use of software is examined through two perspectives: first from the perspective of use of software by children and second from the perspective of use of software by teachers to perform any task during the project implementations. Below, the findings on software used by children and by teachers are given within Table 5.20 and Table 5.21 separately, according to each implementation year and the total of the both implementation years.

There is much software that can be used in the digital narrative process. At this point, it is necessary to underline the role of teachers. When selecting technology and media for children, teachers should not depend on unverifiable claims included in a product’s marketing material. In the selection process, program directors and teachers should consider the allocation of limited resources and cost effectiveness, including initial cost, the ongoing costs of updating and upgrading hardware and software, and other non-specified costs such as additional items needed to use the product (Radich,

2013). Within the scope of the STORIES project, it has been observed that teachers offer different software options to children.

When Table 5.20 given below is examined, it has been observed that the software used by children varies in a wide range. According to this; it has been determined that a total of 31 different software have been used for the total of two implementation years, including the software for/of storytelling applications, photo/audio/video editor, animation applications, digital book applications, computer programming and coding, i-Theatre and other. It was determined that nineteen (f=19) software was used in the 1st year, and twenty-five (f=25) were used in the 2nd year. There are thirteen (13) software applications that are used in common in both of the implementation years; these are Puppet Pals, Toontastic, PhotoShop, Camera Application, iPhone Voice Memos, Stop Motion, iMotion, Book Creator, PowerPoint, Windows Movie Maker, iMovie, i-Theatre, search engine (other). This finding has been accepted as an indicator of the increased diversity of software used by children in the 2nd year. However, not only the diversity in the type of the software, but the number of software applications in use has also increased from the 1st year to the 2nd year (f = 74 for the 1st year; f = 116 for the 2nd year). It's thought that, the increase observed both in the diversity of the software applications employed by children to create their digital stories and in the number of software-enabled activities conducted in the 2nd year depend on the development of the children's technology skills.

Table 5.20. Software used by children

| Software Used by Children | Country | 1 st Year | | 2 nd Year | | Total | |
|--|---------|----------------------|------|----------------------|------|-------|------|
| | | f | % | f | % | f | % |
| Storytelling app (stories made with software specifically intended for DST) <i>1st Year: Puppet Pals, Toontastic</i> <i>2nd Year: Puppet Pals, Toontastic, Story Jumper</i> | IT | 2 | 2.7 | -- | -- | 2 | 1.0 |
| | TR | 2 | 2.7 | 4 | 3.4 | 6 | 3.1 |
| | FI | 4 | 5.4 | 9 | 7.7 | 13 | 6.8 |
| | DE | -- | -- | 7 | 6.0 | 7 | 3.6 |
| | Total | 8 | 10.8 | 20 | 17.2 | 28 | 14.6 |
| Photo/Audio/Video editor <i>1st Year: Drawing Pad, Windows Media Player, PhotoShop, Camera Application, iPhone Video Recorder, iPad Voice Recorder, Voice Recording software, iPhone Voice Memos, Audio Recording Software.</i> <i>2nd Year: InfinitePainter, MixPad, View Play Cap, PhotoShop, FaceSwap, PicsArt, Camera Application, Photo Application on iPad, Power Director, iPhone Voice Memos, Publisher</i> | IT | -- | -- | 16 | 13.8 | 16 | 8.3 |
| | TR | 9 | 12.2 | 4 | 3.4 | 13 | 6.8 |
| | FI | 10 | 13.5 | 3 | 2.6 | 13 | 6.8 |
| | DE | 2 | 2.7 | 2 | 1.7 | 4 | 2.1 |
| | Total | 21 | 28.4 | 25 | 21.5 | 46 | 23.9 |
| Animation app (stories made with software designed for making animations) <i>1st Year: Stop Motion, iMotion</i> <i>2nd Year: Stop Motion, iMotion, QuiverVision, Chatter Pix Kids</i> | IT | -- | -- | 7 | 6.0 | 7 | 3.6 |
| | TR | -- | -- | 4 | 3.4 | 4 | 2.1 |
| | FI | 2 | 2.7 | 3 | 2.6 | 5 | 2.6 |
| | DE | 3 | 4.1 | 1 | 0.9 | 4 | 2.1 |
| | Total | 5 | 6.8 | 15 | 12.9 | 20 | 10.4 |
| Digital book app (stories made with software intended for making digital books or presentations by combining different media elements) <i>1st Year: Book Creator, PowerPoint, Windows Movie Maker, iMovie</i> <i>2nd Year: Book Creator, PowerPoint, Windows Movie Maker, iMovie</i> | IT | 6 | 8.1 | 24 | 20.6 | 30 | 15.6 |
| | TR | -- | -- | 2 | 1.7 | 2 | 1.0 |
| | FI | 12 | 16.2 | 6 | 5.2 | 18 | 9.4 |
| | DE | -- | -- | -- | -- | -- | -- |
| | Total | 18 | 24.3 | 32 | 27.5 | 50 | 26.0 |
| Computer programming and coding (Cubetto, etc.) <i>1st Year: --</i> <i>2nd Year: Cubetto</i> | IT | -- | -- | -- | -- | 0 | 0.0 |
| | TR | -- | -- | 1 | 0.9 | 1 | 0.5 |
| | FI | -- | -- | -- | -- | -- | -- |
| | DE | -- | -- | -- | -- | -- | -- |
| | Total | -- | -- | 1 | 0.9 | 1 | 0.5 |
| i-Theatre (stories made with the software of the i-Theatre device) | IT | 3 | 4.1 | 3 | 2.6 | 6 | 3.1 |
| | TR | 13 | 17.6 | 13 | 11.2 | 26 | 13.5 |
| | FI | 1 | 1.4 | 3 | 2.6 | 4 | 2.1 |
| | DE | 3 | 4.1 | -- | -- | 3 | 1.6 |
| | Total | 20 | 27.0 | 19 | 16.3 | 39 | 20.3 |
| Other <i>1st Year: Search engines</i> <i>2nd Year: Search engines</i> | IT | 2 | 2.7 | 3 | 2.6 | 5 | 2.6 |
| | TR | -- | -- | -- | -- | -- | -- |
| | FI | -- | -- | 1 | 0.9 | 1 | 0.5 |
| | DE | -- | -- | -- | -- | -- | -- |
| | Total | 2 | 2.7 | 4 | 3.4 | 6 | 3.1 |
| | TOTAL | 74 | 100 | 116 | 100 | 190 | 100 |

The most used software in the 1st year is photo/audio/video editor, while digital book applications are apparent in the 2nd year, as it can be seen from Table 5.20 given above. As a matter of fact, Camera Application, which is photo/audio/video editor software, is one of the most frequently used software applications in the 1st year, whereas Windows Movie Maker, which is a more complicated application, comes to the fore in the 2nd year. This is also a sign that, children's ages and the development of motor skills, as well as the DST activities they have participated in consecutively, have supported the development of media literacy and technology skills. Regarding the total percentages of both years, on the other hand, digital book applications take the first order, followed by photo/audio/video editor software. In their study, Beshorner & Hutchinson (2013) emphasizes the use of digital books in the most common applications in kindergartens and indicates that, this software enhances communication between children.

The software, for which the highest increase in usage is observed, is found to be storytelling applications. There are an increasing number of Web sites which provide on-line story creation. One of the more recent developments in this area has been the emergence of storytelling authoring apps for tablets, especially for the iPad (Beschoner & Hutchison, 2013; Jones, 2012). As a matter of fact, Puppet Pals (1-2-HD), which is included in these, became the most used software application by children in both of the implementation years. The increase in the number of storytelling applications and the ease with which these applications can be accessed through tablets can be attributed to the increase in the number of uses of this software.

When country-specific findings are taken into consideration, the most widely used software have come to the foreground in terms of digital books applications for Italy and Finland, of storytelling applications for Germany, and of iTheatre for Turkey. Digital book and storytelling applications are software that acts on a similar logic. While digital books applications do the storytelling through preparation of a written book with appropriate visual and audio texts, animation is more involved in storytelling applications and the stories are narrated within separate stages/scenes. However, iTheater is quite different from these two applications. In the iTheater software, children's own drawings are used and children create stories by moving the characters themselves. In this respect, it is remarkable to observe that a more space is given to iTheater applications in Turkey. The main reason here could be the advice given to teachers in Turkey on making at least one digital story by using iTheatre, with which Turkish children have never encountered before.

Regarding the least used programs; animation applications come into prominence. They (e.g. Stop Motion, iMotion, etc.) are more complicated than storytelling and digital book applications, and children need more guidance in using this. The reason for their less use can be found at this point.

Considering the least-used software by country; storytelling applications for Italy, digital book applications for Turkey and Germany, and animation applications for Finland have attracted attention. In addition, computer programming and coding software is found to be used only in one project in Turkey, and search engines were prominent in the software partaking under "other" category. Coding (or programming) is a basic language of the digital age. Early coding, or pre-coding, offers children experiences that integrate communication, thinking, and problem solving. These are 21st century skills that are valuable for children's future success in our digital world (McLennan, 2017). The use of coding software in digital narrative is an important way to contribute

to the development of children's media literacy. From this point of view, it could be expected to be more preferred. The use of this software in only one country can be attributed to the absence of this software and materials in other project schools or the lack of knowledge of the subject by teachers.

In summary, ensuring that children have encountered such a large number of software applications with different functions and features is considered as an attempt that contributes to the development of media literacy skills in children. At this point, the software to be selected or adapted for early childhood education settings needs to be developmentally appropriate and to be integrated in the classroom with appropriate pedagogic approaches (Nikolopoulou, 2007).

When software used by teachers, presented below within Table 5.21, is examined, it has been observed that teachers used 36 different software, including storytelling applications, photo/audio/video editor applications, animation applications, digital book applications, computer programming and coding applications, i-Theatre and other. In this context, the first thing that attracted attention was that the teachers used similar software that the children used. This situation was evaluated as a finding that the teacher was guiding children when the software was being used. However, some of the differences between software used by teachers and children are also striking. For instance, search engines, drawing pads, infinite painter applications, photo application on iPad and iPad voice recorder used by children, have not been used by the teachers. This can be seen as proof that the child is using the mentioned software autonomously. In addition, it has been determined that teachers also used software such as Instagram Stories, Pacemaker, Photo editor, Microsoft Photo Story, video cutting software, Sony Vegas Pro, Audacity, Publisher and QuickTime Player, which are not used by children, to make final edits in children's digital stories, to develop their own digital stories, or to prepare visual materials for children.

For both project years, the most used software by the teachers have appeared as digital books applications, while the least used software were storytelling applications and iTheatre. It is thought that teachers are using the same software to guide children, when digital books applications are considered to be the most used software also by children. Less use of storytelling applications and the iTheatre by teachers may be due to the fact that children do not need teacher guidance because they can use relevant software autonomously.

In the literature, it is emphasized that the role of the teacher is essential in the process of transforming the stories into the digital form, because, for example, they will select the appropriate for their class software, design appropriate learning activities, organize their class and intervene when needed. Sustained teacher training and substantial long-term training programs will facilitate the whole process of integrating ICTs into early childhood settings. Appropriate training for all teachers/practitioners involved in working with young children in the use of ICTs in support of learning is recommended. The computer is only a tool that has the potential to support the teaching and learning process, so even the best software needs to be used wisely (Nikolopoulou, 2007). STORIES Project is one of the steps taken to develop teachers' competences in this direction, and the fact that teachers have included various numbers of software applications in the learning-teaching process seems to be an significant effort for the development of children's media literacy skills and for the teacher to be a role model as a technology user.

Table 5.21. Software used by teachers

| Software Used by Teachers | Country | 1 st Year | | 2 nd Year | | Total | |
|---|---------|----------------------|-------|----------------------|-------|-------|-------|
| | | f | % | f | % | f | % |
| Storytelling app (stories made with software specifically intended for DST) <i>1st Year: Puppet Pals, Toontastic</i> <i>2nd Year: Puppet Pals, Toontastic, Story Jumper</i> | IT | 1 | 1.0 | -- | -- | 1 | 0.5 |
| | TR | -- | -- | 2 | 1.8 | 2 | 1.0 |
| | FI | 2 | 2.1 | 6 | 5.5 | 8 | 3.8 |
| | DE | -- | -- | 7 | 6.4 | 7 | 3.4 |
| | Total | 3 | 3.1 | 15 | 13.7 | 18 | 8.6 |
| Photo/Audio/Video editor <i>1st Year: Pacemaker, Audacity, Quick Time Player, PhotoShop, Photo Editor, Camera Application, iPhone Video Recorder, Video Cutting Software, Video Editing Software, Voice/Audio Recording Software, Publisher, Instagram Stories, Voice Effects</i> <i>2nd Year: MixPad, View Play Cap, Windows Media Player, PhotoShop, FaceSwap, PicsArt, Camera Application, PowerDirector, Video Cutting Software, iPhone Voice Memos, Publisher</i> | IT | 7 | 7.2 | 14 | 12.7 | 21 | 10.1 |
| | TR | 3 | 3.1 | 2 | 1.8 | 5 | 2.4 |
| | FI | 10 | 10.3 | 5 | 4.6 | 15 | 7.2 |
| | DE | 11 | 11.3 | 5 | 4.6 | 16 | 7.7 |
| | Total | 31 | 31.9 | 26 | 23.7 | 57 | 27.4 |
| Animation app (stories made with software designed for making animations) <i>1st Year: Stop Motion, iMotion</i> <i>2nd Year: Stop Motion, iMotion, QuiverVision, Chatter Pix Kids</i> | IT | -- | -- | 5 | 4.6 | 5 | 2.4 |
| | TR | -- | -- | 4 | 3.6 | 4 | 1.9 |
| | FI | 1 | 1.0 | 3 | 2.7 | 4 | 1.9 |
| | DE | 2 | 2.1 | -- | -- | 2 | 1.0 |
| | Total | 3 | 3.1 | 12 | 10.9 | 15 | 7.2 |
| Digital book app (stories made with software intended for making digital books or presentations by combining different media elements) <i>1st Year: Book Creator, PhotoStory, PowerPoint, Windows Movie Maker, iMovie, Sony Vegas Pro</i> <i>2nd Year: Book Creator, PowerPoint, Windows Movie Maker, iMovie, Sony Vegas Pro</i> | IT | 21 | 21.6 | 25 | 22.8 | 46 | 22.1 |
| | TR | 20 | 20.6 | 10 | 9.1 | 30 | 14.4 |
| | FI | 15 | 15.5 | 13 | 11.8 | 28 | 13.4 |
| | DE | -- | -- | -- | -- | -- | -- |
| | Total | 56 | 57.7 | 48 | 43.7 | 104 | 49.9 |
| Computer programming and coding (Cubetto, etc.) <i>1st Year: --</i> <i>2nd Year: Cubetto</i> | IT | -- | -- | -- | -- | -- | -- |
| | TR | -- | -- | 1 | 0.9 | 1 | 0.5 |
| | FI | -- | -- | -- | -- | -- | -- |
| | DE | -- | -- | -- | -- | -- | -- |
| | Total | -- | -- | 1 | 0.9 | 1 | 0.5 |
| i-Theatre (stories made with the software of the i-Theatre device) | IT | 3 | 3.1 | 3 | 2.7 | 6 | 2.9 |
| | TR | -- | -- | -- | -- | -- | -- |
| | FI | 1 | 1.0 | 3 | 2.7 | 4 | 1.9 |
| | DE | -- | -- | -- | -- | -- | -- |
| | Total | 4 | 4.1 | 6 | 5.5 | 10 | 4.8 |
| Other <i>First Year: --</i> <i>Second Year: Youtube</i> | IT | -- | -- | -- | -- | -- | -- |
| | TR | -- | -- | -- | -- | -- | -- |
| | FI | -- | -- | 1 | 0.9 | 1 | 0.5 |
| | DE | -- | -- | -- | -- | -- | -- |
| | Total | -- | -- | 1 | 0.9 | 1 | 0.5 |
| | TOTAL | 97 | 100.0 | 109 | 100.0 | 206 | 100.0 |

3) Project Evaluation

Teachers from partner countries were also asked to report their suggestions on changes and improvements in case of having an opportunity to implement the projects again. The suggestions reported were analyzed through several categories and the findings are presented below Table 5.22.

Table 5.22. Teacher suggestions on changes and improvements in case of opportunity to implement the project again

| Suggestions | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|--|---------|----------------------|----|------|----------------------|----|------|-------|----|------|
| | | N | f | % | N | f | % | N | f | % |
| Providing more possibilities for children to use technology | IT | 27 | 12 | 44.4 | 32 | 22 | 68.8 | 59 | 34 | 57.6 |
| | TR | 18 | 6 | 33.3 | 18 | 1 | 5.6 | 36 | 7 | 19.4 |
| | FI | 18 | 1 | 5.6 | 19 | 7 | 36.8 | 37 | 8 | 21.6 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | - | - |
| | Total | 69 | 19 | 27.5 | 77 | 30 | 39.0 | 146 | 49 | 33.6 |
| Using the phase of visual-verbal-technology to develop the project instead of other alternatives | IT | 27 | -- | -- | 32 | 5 | 15.6 | 59 | 5 | 8.5 |
| | TR | 18 | 6 | 33.3 | 18 | -- | -- | 36 | 6 | 16.7 |
| | FI | 18 | -- | -- | 19 | 1 | 5.3 | 37 | 1 | 2.7 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 6 | 8.7 | 77 | 6 | 7.8 | 146 | 12 | 8.2 |
| Providing more appropriate technological tools for children's psycho-motor development | IT | 27 | 5 | 18.5 | 32 | 2 | 6.2 | 59 | 7 | 11.9 |
| | TR | 18 | 3 | 16.7 | 18 | 3 | 16.7 | 36 | 6 | 16.7 |
| | FI | 18 | -- | -- | 19 | 2 | 10.5 | 37 | 2 | 5.4 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 8 | 11.6 | 77 | 7 | 9.1 | 146 | 15 | 10.3 |
| Providing more experience for children in narration | IT | 27 | 4 | 14.8 | 32 | 3 | 9.4 | 59 | 7 | 11.9 |
| | TR | 18 | -- | -- | 18 | 4 | 22.2 | 36 | 4 | 11.1 |
| | FI | 18 | -- | -- | 19 | 3 | 15.8 | 37 | 3 | 8.1 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 4 | 5.8 | 77 | 10 | 13.0 | 146 | 14 | 9.6 |
| Arranging the experience space more effectively and creatively | IT | 27 | 3 | 11.1 | 32 | 1 | 3.1 | 59 | 4 | 6.8 |
| | TR | 18 | -- | -- | 18 | 2 | 11.1 | 36 | 2 | 5.6 |
| | FI | 18 | 4 | 22.2 | 19 | 3 | 15.8 | 37 | 7 | 18.9 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 7 | 10.1 | 77 | 6 | 7.8 | 146 | 13 | 8.9 |
| Providing more materials for children | IT | 27 | -- | -- | 32 | -- | -- | 59 | -- | -- |
| | TR | 18 | -- | -- | 18 | 2 | 11.1 | 36 | 2 | 5.6 |
| | FI | 18 | -- | -- | 19 | -- | -- | 37 | -- | -- |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | -- | -- | 77 | 2 | 2.6 | 146 | 2 | 1.4 |
| Giving variety to the introductory activities | IT | 27 | -- | -- | 32 | 5 | 15.6 | 59 | 5 | 8.5 |
| | TR | 18 | -- | -- | 18 | -- | -- | 36 | -- | -- |
| | FI | 18 | 2 | 11.1 | 19 | -- | -- | 37 | 2 | 5.4 |
| | DE | 6 | -- | -- | 8 | -- | -- | 14 | -- | -- |
| | Total | 69 | 2 | 2.9 | 77 | 5 | 6.5 | 146 | 7 | 4.8 |

Findings obtained through teachers' reporting their suggestions on possible changes and improvements in the case of having the opportunity to re-implement the projects have revealed that, the prominent suggestion reported in one-third of the entire projects (33.6%) is "providing more possibilities for children to use technology" in both years. This is found to be followed by "providing more appropriate technological tools for children's psycho-motor development"

(10.3%), “providing more experience for children in narration” (9.6%), “arranging the experience space more effectively and creatively” (8.9%), and “using the phase of visual-verbal-technology to develop the project instead of other alternatives” (8.2%). “Giving variety to the introductory activities” was another suggestion reported in a few project sheets (4.8%) in both years, whereas “providing more materials for children” has appeared as a suggestion presented by only two teachers in the 2nd year (1.4% in total). Apart from these; “more time for the project activities” and “experimenting with the technology more beforehand” was the suggestions mostly mentioned under the “other” category by the teachers, and some of the other remarkable suggestions reported under “other” category for both of the implementation years can be presented as “finishing the project within a shorter time, focusing only on it”, “producing all material on the same device”, “enhancing children agency”, “reflecting on the project more afterwards with the child”, and “work with less children so that every child can participate actively in making the film”.

5.1.4 Conclusion

Within the scope of the STORIES Project, 146 project sheets in total, 69 of which were produced during the 1st project cycle (f=27 by IT; f=18 by TR; f=18 by FI, and f=6 by DE) and 77 during the 2nd cycle (f=32 by IT; f=18 by TR; f=19 by FI, and f=8 by DE) are analyzed.

The results regarding the *descriptive information* have revealed that:

- When both the years of implementation and all countries are evaluated together, it is found that mostly two teachers performed the projects within classes or groups.
- Approximately one half of the participant children’s ages are between 48-60 months for the 1st implementation year and two-thirds of them are between 60-72 months in the 2nd academic year. Some of the partner countries have also stated that there were project implementations involving age groups other than the defined categories; such as 18-37 month, 24-72 month, 27-50 month, 30-39 month, 34-50 month, 48-84 month olds; however the percentages of “other” age groups, participating at the projects are small.
- When both the years of implementation and all countries are taken together, projects were found to be carried out mostly with one small group consisting of 3-8 children.
- The duration of the projects is found to vary between 1 week and 6 months for both of the years. Teachers dedicated mostly 9-12 sessions to the project activities in the 1st year and 5-6 sessions in the 2nd year. Average duration of the sessions was 40-60 minutes in both years.
- The prominent aim reported in the majority of the total projects is “to promote narrative skills” in both years. It is also seen that teachers found out the opportunities that DST projects offer to promote social skills and technological competences of children, and to reach the objectives of the educational program throughout the project years.

The results regarding the details of *planning process of the DST activities*, which is examined within the perspectives of “*Educational Context Analysis*” and “*Project Description*”, have revealed that:

- Regarding the *educational context analysis*, when the selection criteria used in the process of constituting small working groups of children (*project group makeup*) is examined, it is found that teachers preferred “age” as criterion at most, which is an important factor in constituting coherent groups in terms of similar learning and developmental characteristics; followed by “interests”, which can be seen as a significant contributor to the motivation of the children and the strengthening of the learning process; and “social skills”, which is an important component of the media-literacy skills, aimed to be enhanced in children within STORIES Project. On the other hand, when *contextualization of the projects* again with regards to *educational context analysis* is examined, it is found that the majority of participant children have previous experience and familiarity to narration in both years. On the other hand, number of children who have experience and familiarity to technologies and digital storytelling in the 1st year found to increase considerably in the 2nd year.
- Regarding the *project description*, when *experience spaces* are examined, it is determined that DST activities took place mostly in the “classroom” in two-thirds of the total projects both in each year, and across all countries for the total projects implemented throughout both years. Teachers are also found to make use of digital facilities that schools offer them throughout the DST projects, based on the results that the use of digital laboratories are improved dramatically from the 1st year to the 2nd year. For all partner countries, we can conclude that there is evidence that teachers began to consider about the learning spaces, where they can integrate technology to their projects more easily. We can also suggest having a more variety in educational spaces, based on the low percentages of other spaces such as school garden or out of school venues.
- When *other resources and materials used beyond digital devices* with regards to *project description* are examined, it has been observed that the STORIES Project practices included different materials for children to play, communicate, learn and express themselves in accordance with the relevant literature, which emphasizes the importance of use of materials in early childhood. The physical environment needs to be wide ranging, both indoor and outdoor, with natural and manufactured objects (Bruce, 2011). Also, as young children work with different materials, they come to learn about and appreciate their affordances. Each material invites and offers possibilities that orient children in certain directions when they use it (Edwards & Willis, 2000). Especially drawing and painting materials and activities, in this context, have an important place for this age group. Because, as stated by Brooks (2009), Bruce (2011), and Pacini-Ketchabaw, Kind, and Kocher (2016), the changes in children's thinking become visible through their drawings and drawing and painting activities are among those that need to be done every day in early childhood. These materials are also important means of improving children's creativity (Edwards & Wright, 1995). Another advantage of these materials is that they are among the easiest materials to be reached economically. In line with the literature, it has been observed that the most frequently used materials in at least two-thirds of the 1st and 2nd year’s projects and in total are "drawing and painting materials". A wide range of resources and materials, which play a crucial role in triggering the thinking process in building a narrative, of photos/images, structured or non-structured articles from the physical environment, concrete play objects,

books, real world objects, objects from nature, musical instruments, 3D models and materials for experiential activities, and additional instructional materials, such as note taking tools, worksheets, lotto, memory cards, colored cards, mind maps, song cards, and/or story cards were also found to be used in the projects. It can be said that, within the activities of STORIES Project, children are offered a large variety of materials effective in triggering their thinking processes and supporting their understanding of the content.

- When *teaching methods and educational strategies* with regards to *project description* are examined, it is seen that the teachers try to plan the process in order to promote deep learning and student participation and try to provide the method and strategy variety to attract each child into the learning process. It has been determined that, in vast majority of the total projects, DST appears to be the most commonly used teaching method. Barrett (2006) refers to the DST's goal of deep learning and student participation. Achieving this goal requires the use of child-centered teaching methods and techniques in the DST process. On the other hand, questioning and discussion methods are also found to be commonly and frequently used in all countries. As a matter of fact, as mentioned by Bay and Hartman (2015), and Mac Naughton and Williams (2009), questioning is a method frequently used in early childhood learning activities to enable children to learn, think and interact; while the discussion method allows the pupils to attend the lessons and teachers to constantly check children's understanding of the relevant concepts (Samuelsson, 2010). Brooks and Brooks (1999) also emphasize the structure of the child-centered learning environments that gives opportunity to high-level thinking skills, discussions, questions, and dialogues. In some of the partner countries, the implementation of DST practices in a project-based learning context can also be considered as a reason to interpret this finding. This is because the starting point in project-based learning activities is the "driving questions" that guide teaching and trigger children's thinking processes, and the debates that arise from answers to these questions (Krajcik & Blumenfeld, 2006); such a structure also supports the use of questioning and discussion methods. Frequent use of these methods within STORIES Project implementations can be accepted as an indicator of attaching importance to the use of methods which effectively promote active learning throughout the projects implemented. In addition, another finding obtained on the use of the brainstorming in the 2nd year more than in the 1st year could be interpreted by the fact that in the 2nd project year, teachers gave more space to the activities that would bring the children's creative thinking process to the foreground. It has also been observed that, during the project implementations throughout the project years; gallery walk, experiment, site visit, and problem solving methods are the least-used methods. All those methods mentioned require an attentive preparation process. Less use of these methods may be due to the fact that teachers have not been able to allocate enough time for the preliminary processes because of their out-of-project workloads. Specifying of teaching methods is influenced by many factors such as the characteristics of the group of children, the project theme, the content of the learning process, the objectives of the activities, the characteristics of the learning environment and teachers' competencies. For this reason, it is important to evaluate the selected teaching methods within the teaching context and to choose the most appropriate method for the current conditions. As noted by Baviskar, Hartle, and Whitney (2009), child-centered constructivist learning contents have

no standard rules and steps. What is important is that the teacher takes care of the individual differences in the class, designing an environment where ideas and questions are clearly expressed, and planning appropriate learning activities (Brooks & Brooks, 1999). The diversity seen in the methods used in the projects can be regarded in this perspective. However, it is possible to say that there are no big differences in the 1st and 2nd years in terms of the methods used, and that a child-centered approach is observed in the selected methods.

The results regarding the details of *activity report*, which is examined within the perspectives of “*Incipit*”, “*Use of Technologies during Activities*” and “*Project Evaluation*”, have revealed that:

- Regarding the *activity report*, when *incipit*, which comprises the initiating chance/prompt of the storytelling activity, in other words, the elements that triggered the stories is examined, it is seen that, within the scope of the STORIES project, a variety of paths of presenting children elements that trigger the stories mentioned in the literature are effectively utilized in the story development process. The elements that trigger a story may vary according to the context because of the subjective structure of the story building process. Therefore, the stories created in the learning-teaching process stem from the intersection of the three basic elements of the process -the children, the teacher and the environment. It is addressed in the literature that (Cao, Lindley, Helmes, & Sellen, 2010; Robin & McNeil, 2012; Sharples, 2002) children can take their story characters from many different sources; from books, films, internet, toys, or objects in the house, and that the starting point for the story can be from the toys they play, from the books they read, or from a point in real life. Sometimes asking questions to children and building up discussions on the basic elements of the narrative can also be used to form the starting point of the story; or a task for which the teacher specifies the basic frame can initiate the story making process. In this context, in both of the implementation years, circle time (open ended questions, discussion, analogy. etc.) activities have been appeared to act as the main element that triggered the stories in more than half of the projects. This can be considered as an expected result in early childhood. This is because it is mentioned in the literature that circle time activities involve an important part of an early childhood program so that it gives young children an opportunity to learn how to be a part of a group, develop listening skills, experience music and movement, and play games. Circle time also can be a time for introducing new concepts and practicing language, math, and science skills that will be the building blocks for their future learning (Bittinger, 2004). Mosley (2005) also states that, when engaged in circle time activities, children make developmental strides that can be difficult to achieve in more formal settings. Thus, it can be said that the teachers of all partner countries have benefited from the positive contributions of circle time activities during the project implementation processes. Presenting children critical/background/initial information (e.g. technological expertise, theme-content-core information, i.e. history of dinosaurs, etc.), presenting children visual (photos, pictures, cartoon, documentary, movie, etc.) or auditory elements (songs, sound effects, i.e. animal sound, etc.), drawing & painting activities, telling stories, and 2D/3D material production with children have also come to the forefront as remarkable

triggers throughout the entire implemented projects. Relevant literature (Robson, 2006) also suggests that children's own narratives or written/oral narratives presented to children may be a starting point for developing conceptual understanding of children; through drawing, painting and other 2- and 3-dimensional representations, young children can express their ideas, thoughts and theories visually.

- Regarding the *use of technologies during activities*, when *the use of hardware by only children* is examined, in the 1st year, it was seen that the most used device by only children is iTheatre, which was also among the most commonly used devices in the 2nd year of implementation, and in terms of the total. The device which is used most autonomously by the children in the 2nd year and in total of the both years is tablet. It has been observed that the most increase in terms of the devices used by only children is in terms of digital audio recorder. Another noteworthy result is that while the autonomous use of smartphones, cameras, webcams and interactive devices by only children was never seen during the 1st year of implementation, these devices were reported to be used by children, even in low percentages, during the 2nd year of implementation. Especially the smartphone has been used by children for voice recording, video recording and taking photos. In the sense of that, of course, the development of psychomotor and cognitive skills along with children's ages is also important. On the other hand, document cameras, slide/overhead projectors and printers were found to be used autonomously by children only during the 1st year of implementation; while the interactive whiteboards (smartboards), motion sensing input devices, and drawing pads were not used by children, either autonomously or with teachers, in any of the projects throughout the two years of implementation.
- Regarding the *use of technologies during activities*, when *the use of hardware by only teacher* is examined, and when both the 2nd year of implementation and the sum of both years were taken into account, computer and slide/overhead projectors emerged as the devices with the highest percentages used by only teachers. Throughout project implementations, it has been determined that teachers have used the computers mostly in process activities with the purposes of presenting children examples of digital stories, introducing children the use of first-encountered devices (e.g. iTheatre), presenting children complementary/supportive media (pictures, photos, cartoon, documentary, movie, PowerPoint presentations) and/or creating educational content. On the other hand, it has been observed that teachers also used computers for the purposes of searching content (sound effect, visuals) and combining separate scenes of children's digital stories in order to support children's product development processes. During both implementation years, iTheatre, document camera, and digital pen camera/microscope have never been used by only teachers. Among the devices used by only teacher, the largest increase in the 2nd year has come out in the use of interactive whiteboard (smartboard). On the other hand, the interactive projectors, motion sensing input devices, and drawing pads were found to have never been used by teachers, either alone or with children, to perform any task during the project years.

- Regarding the *use of technologies during activities*, when *the use of hardware by both teacher and children* is examined, the most commonly used device by both teacher and children is tablet in the sum of both years, to perform any task within the scope of project implementations. Teachers often use this device for presenting children media elements (sound effects, mood music) and combining separate scenes of children's digital stories to support children's final products; and children often use it for voice recording and taking photos. Computer, slide/overhead projector and camera were also found to be among the devices frequently used by both teachers and children in projects of two years duration. Teachers have stated that they often use the camera for documentation purposes, especially during the process activities. In terms of devices used by both teachers and children, the highest increase observed from the 1st year to the 2nd year was again in terms of the use of slide/overhead projector. It is also determined that teachers lead the way in the use of this device, and the activities regarding the use of this device are mostly; presenting children examples of digital stories, presenting children complementary/supportive media elements (pictures, photos, cartoon, documentary, movie), presenting children educational content, and introducing children first-encountered devices (such as i-theatre), which are carried out during the process activities of the projects.

Although children's direct interaction with technological tools has increased in years, we can suggest that children's autonomous use of these tools is encouraged more by the teachers. Considering the variety of technology used, it is also recommended to use more tools at projects within the facilities schools offer for their teachers and students.

- Regarding the *use of technologies during activities*, when *the use of software by children* is examined, it has been determined that a total of 31 different software have been used for the total of two implementation years, including the software for/of storytelling applications, photo/audio/video editor, animation applications, digital book applications, computer programming and coding, i-Theatre and other. It was determined that type of software used in the 1st year increased in the 2nd year. However, not only the diversity in the type of the software, but the number of software applications in use has also increased from the 1st year to the 2nd year. It's thought that, this increase depends on the development of the children's technology skills. The most used software in the 1st year is photo/audio/video editor, while more complicated digital book applications are apparent in the 2nd year. This is a sign that, children's ages and the development of motor skills, as well as the DST activities they have participated in consecutively, have supported the development of media literacy and technology skills. In their study, Beshorner and Hutchinson (2013) emphasize the use of digital books in the most common applications in kindergartens and indicate that, this software enhances communication between children. The software, for which the highest increase in usage is observed, is found to be storytelling applications. Beschorner and Hutchison (2013), and Jones (2012) state that there are an increasing number of Web sites which provide on-line story creation. One of the more recent developments in this area has been the emergence of storytelling authoring apps for tablets, especially for the iPad. The increase in the number of storytelling applications and the ease with which these applications can be accessed through tablets can be attributed to the increase in the number of uses of this software. In summary, ensuring that children have encountered such a large

number of software applications with different functions and features is considered as an attempt that contributes to the development of media literacy skills in children. At this point, the software to be selected or adapted for early childhood education settings needs to be developmentally appropriate and to be integrated in the classroom with appropriate pedagogic approaches (Nikolopoulou, 2007). Here, it is necessary to underline the role of teachers. When selecting technology and media for children, teachers should not depend on unverifiable claims included in a product's marketing material. In the selection process, program directors and teachers should consider the allocation of limited resources and cost effectiveness, including initial cost, the ongoing costs of updating and upgrading hardware and software, and other non-specified costs such as additional items needed to use the product (Radich, 2013). Within the scope of the STORIES project, it has been observed that teachers offer different software options to children.

- Regarding the *use of technologies during activities*, when *the use of software by teachers* is examined, it has been observed that teachers used similar software that the children used; for both project years, the most used software by the teachers have appeared as digital books applications, which is the most used software also by children. This situation was evaluated as a finding that the teacher was guiding children when the software was being used. However, some of the differences between software used by teachers and children are also striking. For instance, search engines, drawing pads, infinite painter applications, photo application on iPad and iPad voice recorder used by children, have not been used by the teachers. This can be seen as proof that the child is using the mentioned software autonomously. In addition, it has been determined that teachers also used software, which are not used by children, to make final edits in children's digital stories, to develop their own digital stories, or to prepare visual materials for children. In the literature, it is emphasized that the role of the teacher is essential in the process of transforming the stories into the digital form, because, for example, they will select the appropriate for their class software, design appropriate learning activities, organize their class and intervene when needed. Nikolopoulou, (2007) suggests that sustained teacher training and substantial long-term training programs will facilitate the whole process of integrating ICTs into early childhood settings. STORIES Project can be seen as one of the steps taken to develop teachers' competences in this direction, and the fact that teachers have included various numbers of software applications in the learning-teaching process seems to be an significant effort for the development of children's media literacy skills and for the teacher to be a role model as a technology user.
- Regarding *project evaluation*, teachers' reporting their suggestions on possible changes and improvements in the case of having the opportunity to re-implement the projects have revealed that, the prominent suggestion reported in one-third of the entire projects is "providing more possibilities for children to use technology" in both years, followed by "providing more appropriate technological tools for children's psycho-motor development", "providing more experience for children in narration", "arranging the experience space more effectively and creatively", and "using the phase of visual-verbal-technology to develop the project instead of other alternatives". "Giving variety to the introductory activities" was

another suggestion reported in a few project sheets in both years, whereas “providing more materials for children” has appeared as a suggestion presented by only two teachers in the 2nd year. Apart from these; “more time for the project activities” and “experimenting with the technology more beforehand” was the suggestions mostly mentioned under the “other” category by the teachers, and some of the other remarkable suggestions reported for both of the implementation years can be presented as “finishing the project within a shorter time, focusing only on it”, “producing all material on the same device”, “enhancing children agency”, “reflecting on the project more afterwards with the child”, and “work with less children so that every child can participate actively in making the film”.

It can be concluded that, within the two consecutive academic years of implementations, children have the opportunity to encounter stimuli that can help development in their media-literacy skills and to take advantage of these initiatives in a positive way. On the other hand, it has been seen that, teachers also have the opportunity to develop their competencies based on experiencing the best methods, techniques and tools that can be used to improve these skills in children.

5.2 Findings Based on the Yearly Project Summaries

In the scope of the STORIES Project’s implementations, teachers from partner countries (IT, TR, FI, and DE) were asked to provide a yearly summary, that is, a brief summary of their activities after each project year. The total number of yearly project summaries produced within the STORIES lifetime was; 53, 28 of which were produced during the 1st project cycle (f=8 by IT; f=6 by TR; f=11 by FI, and f=3 by DE) and 25 during the 2nd cycle (f=8 by IT; f=6 by TR; f=7 by FI, and f=4 by DE). The purpose of the yearly project summaries was to *reflect on the whole process in a holistic way*, and they serve as the main source of data for RQ2. The holistic reflections of the process in the yearly project summaries provided supporting data also for RQ3, highlighting *areas where the teachers feel their competences have enhanced*. Based on the nature of the process-related data obtained from this tool; quantitative descriptive analysis based on frequencies and percentages was used to describe the data obtained from close-ended items, and categorical content analysis was used to define the data obtained from open-ended items. Key findings have been presented below, within separate headings.

5.2.1 Findings on Descriptive Information

The first focus under this heading is the number of groups, which also represents the number of yearly project summary forms filled in each partner country for two project years. Table 5.23 presents the findings.

Table 5.23. Participant groups/fulfilled yearly project summary forms in each partner country

| Country | Number of Groups | |
|---------|----------------------|----------------------|
| | 1 st Year | 2 nd Year |
| IT | 8 | 8 |
| TR | 6 | 6 |
| FI | 11 | 7 |
| DE | 3 | 4 |

The duration of the projects and amount of sessions (number of dedicated lessons) are the other variables examined under this heading. Findings are presented in Table 5.24.

| Country | Total Duration (min-max) | | Amount of Sessions (min-max) | |
|---------|--------------------------|----------------------|------------------------------|----------------------|
| | 1 st Year | 2 nd Year | 1 st Year | 2 nd Year |
| IT | 4 - 5 months | 4 - 6 months | 14 - 55 sessions | 13 - 40 sessions |
| TR | 5 months | 4 - 5 months | 15 - 32 sessions | 14 - 23 sessions |
| FI | 1 session-5 months | 1 - 7 months | 1 - 25 sessions | 5 - 84 sessions |
| DE | 1 - 6 months | 1 - 5 months | 8 - 29 sessions | 8 - 25 sessions |

Regarding the total duration, the range is between 1 session-7 months, while regarding the sessions that the project activities were held, the range is between 1-84 sessions.

5.2.2 Findings on Media Literacy Skills Evaluation

In media literacy skills evaluation section, firstly we asked teachers to report what children have learned throughout the DST projects, and to list the benefits in terms of children's media literacy skills development.

When the frequencies and percentages of pre-specified categories on the benefits teachers reported in yearly project summary forms are examined (see Table 5.25), it is found that, , children developed themselves in the “use of technological devices and applications competently” across the countries in terms of media literacy skills This skill has the highest percentage in both project years (71.4% for the 1st year; 72.0% for the 2nd year) and also in total projects (71.7% in total). “Development in critical and diverse thinking skills”, on the other hand, has the lowest percentage in both project years (10.7% for the 1st year; 16.0% for the 2nd year) and also in total projects (13.2% in total).

The country specific results based on the total number of projects implemented in both project years showed that, children from Italy demonstrated development “in awareness of using media positively” (75.0% for the 1st year; 87.5% for the 2nd year) besides the “use of technological devices and applications competently”. For Turkey, “use of voice” comes forth with the use of technology (50.0% in total). It can be said for Turkey that, teachers gave special importance to encourage children speak in appropriate pitch and with suitable words when they do voice recordings, therefore it is possible that teachers from Turkey emphasized use of voice category in their reports. For Finland, “increase in production skills/original product creation” is another area that children showed development according to teachers reports (66.7% in total). The same item also comes second after use of technology for Germany (57.1% in total).

Comparing two project years, it can be observed that across all countries, the most improvement occurred in “development in narrative skills” item, moving from 17.9% for the 1st year to 40.0% for the 2nd year. Regarding the country specific results, most improvement is observed in “development in creativity, imagination and presenting novel ideas” and “self-expression by the use of technology” for Italy. Children from Turkey, on the other hand, showed most improvement in “development in critical and diverse thinking skills”. The reason that teachers reported improvement in critical and diverse thinking skills for Turkey can be found in the aspect that DST projects allowed children to think about their stories, come up with different ideas and evaluate their products. For Finland, most improvement is observed in “development in narrative skills”. These comparative results indicate that, although the highest percentages are in the use of technology for both years across all countries, children also found opportunities to develop their various skills such as creativity, narrative skills and critical and diverse thinking skills. From another perspective, it can be inferred that, the focus was on technology use as expected, however, teachers also managed to create learning opportunities for children to develop their skills in aforementioned areas.

Table 5.25. What children have learned and benefits in terms of children’s media literacy skills development

| Benefits in terms of children’s media literacy skills development | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|---|---------|----------------------|----|-------|----------------------|----|-------|-------|----|-------|
| | | N | f | % | N | f | % | N | f | % |
| Development in creativity, imagination and presenting novel ideas | IT | 8 | -- | -- | 8 | 3 | 37.5 | 16 | 3 | 18.8 |
| | TR | 6 | 3 | 50.0 | 6 | 1 | 16.7 | 12 | 4 | 33.3 |
| | FI | 11 | 3 | 27.3 | 7 | 1 | 14.3 | 18 | 4 | 22.2 |
| | DE | 3 | -- | -- | 4 | 1 | 25.0 | 7 | 1 | 14.3 |
| | Total | 28 | 6 | 21.4 | 25 | 6 | 24.0 | 53 | 12 | 22.6 |
| Increase in production skills/ original product creation | IT | 8 | 3 | 37.5 | 8 | -- | -- | 16 | 3 | 18.8 |
| | TR | 6 | 4 | 66.7 | 6 | 1 | 16.7 | 12 | 5 | 41.7 |
| | FI | 11 | 8 | 72.7 | 7 | 4 | 57.1 | 18 | 12 | 66.7 |
| | DE | 3 | 1 | 33.3 | 4 | 3 | 75.0 | 7 | 4 | 57.1 |
| | Total | 28 | 16 | 57.1 | 25 | 8 | 32.0 | 53 | 24 | 45.3 |
| Self-expression by the use of technology | IT | 8 | 1 | 12.5 | 8 | 4 | 50.0 | 16 | 5 | 31.3 |
| | TR | 6 | -- | -- | 6 | -- | -- | 12 | -- | -- |
| | FI | 11 | 6 | 54.5 | 7 | 2 | 28.6 | 18 | 8 | 44.4 |
| | DE | 3 | 1 | 33.3 | 4 | 1 | 25.0 | 7 | 2 | 28.6 |
| | Total | 28 | 8 | 28.6 | 25 | 7 | 28.0 | 53 | 15 | 28.3 |
| Use of voice correctly and effectively | IT | 8 | -- | -- | 8 | -- | -- | 16 | -- | -- |
| | TR | 6 | 4 | 66.7 | 6 | 2 | 33.3 | 12 | 6 | 50.0 |
| | FI | 11 | 2 | 18.2 | 7 | -- | -- | 18 | 2 | 11.1 |
| | DE | 3 | 1 | 33.3 | 4 | -- | -- | 7 | 1 | 14.3 |
| | Total | 28 | 7 | 25.0 | 25 | 2 | 8.0 | 53 | 9 | 17.0 |
| Use of technological devices and applications competently | IT | 8 | 8 | 100.0 | 8 | 5 | 62.5 | 16 | 13 | 81.3 |
| | TR | 6 | 3 | 50.0 | 6 | 3 | 50.0 | 12 | 6 | 50.0 |
| | FI | 11 | 6 | 54.5 | 7 | 6 | 85.7 | 18 | 12 | 66.7 |
| | DE | 3 | 3 | 100.0 | 4 | 4 | 100.0 | 7 | 7 | 100.0 |
| | Total | 28 | 20 | 71.4 | 25 | 18 | 72.0 | 53 | 38 | 71.7 |
| Development in use of language | IT | 8 | -- | -- | 8 | 1 | 12.5 | 16 | 1 | 6.3 |
| | TR | 6 | 3 | 50.0 | 6 | 2 | 33.3 | 12 | 5 | 41.7 |
| | FI | 11 | -- | -- | 7 | -- | -- | 18 | -- | -- |
| | DE | 3 | 1 | 33.3 | 4 | 2 | 50.0 | 7 | 3 | 42.9 |
| | Total | 28 | 4 | 14.3 | 25 | 5 | 20.0 | 53 | 9 | 17.0 |
| Development in narrative skills | IT | 8 | 1 | 12.5 | 8 | 2 | 25.0 | 16 | 3 | 18.8 |
| | TR | 6 | 2 | 33.3 | 6 | 2 | 33.3 | 12 | 4 | 33.3 |
| | FI | 11 | 2 | 18.2 | 7 | 3 | 42.9 | 18 | 5 | 27.8 |
| | DE | 3 | -- | -- | 4 | 3 | 75.0 | 7 | 3 | 42.9 |
| | Total | 28 | 5 | 17.9 | 25 | 10 | 40.0 | 53 | 15 | 28.3 |
| Development in critical and diverse thinking skills | IT | 8 | 1 | 12.5 | 8 | -- | -- | 16 | 1 | 6.3 |
| | TR | 6 | -- | -- | 6 | 2 | 33.3 | 12 | 2 | 16.7 |
| | FI | 11 | 2 | 18.2 | 7 | 2 | 28.6 | 18 | 4 | 22.2 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 3 | 10.7 | 25 | 4 | 16.0 | 53 | 7 | 13.2 |
| Development in awareness of using media positively | IT | 8 | 6 | 75.0 | 8 | 7 | 87.5 | 16 | 13 | 81.3 |
| | TR | 6 | -- | -- | 6 | 1 | 16.7 | 12 | 1 | 8.3 |
| | FI | 11 | 2 | 18.2 | 7 | 1 | 14.3 | 18 | 3 | 16.7 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 8 | 28.6 | 25 | 9 | 36.0 | 53 | 17 | 32.1 |

Teachers also reported their observations of children’s media literacy knowledge, skills and understanding developed in DST activity within the sub-dimensions of: (1) technical skills, (2) visual skills, (3) art skills, (4) narrative skills, (5) understanding of multimodality, (6) pre-writing skills, (7) understanding of the foundations of audio-visual language, (8) critical skills, and (9) awareness of audience. They filled out the form according to children’s observed skills based on the number of children who demonstrated the relevant skill. Separately for each sub-dimension, we first present the findings regarding all partner countries data, followed by country-specific results. We also analyzed the development, comparing results of two project years by considering the frequencies and percentages at “*most of the children*” and “*all children*” levels for both years. The comparative results were presented for all partner countries except for Germany, since Germany carried out each project with different groups of children throughout both years.

1) “Technical Skills” Sub-Dimension of Media Literacy Knowledge, Skills and Understanding Developed in DST Activity

When the total findings relevant to technical skills sub-dimension are examined (see Table 5.26), the overall highest percentage regarding all projects conducted in both years is found in “use touch screen tapping or click button to select and drag” for technical skills sub-dimension (82.2% for the 1st year; 88.0% for the 2nd year), considering the sum of percentages reported within “most children” and “all children” categories. “Use photo/video editing functions appropriately” (timeline, stop/replay buttons, adding sounds, etc.) item, on the other hand, has the overall lowest percentage (21.4% for the 1st year; 40.0% for the 2nd year). Most improvement across all countries is found to occur in “find appropriate way for taking photograph/video”, moving from 64.3% for the 1st year to 100.0% for the 2nd year.

On the other hand, regarding the country-specific findings in technical skills sub-dimension (see Table 5.27) teachers from Italy reported that children showed most competency in “use touch screen tapping or click button to select and drag” and “find appropriate way for taking photograph/video” items. Children in Turkey, on the other hand, demonstrated competency in “find appropriate way for taking photograph/video” item. For Finland, the highest percentage is observed in “use touch screen tapping or click button to select and drag” item. For Germany, on the other hand, the highest percentages are observed in “find appropriate way for taking photograph/video” and “use touch screen tapping or click button to select and drag” items. Apart from the pre-defined skills, one teacher from Turkey reported “take voice recordings and make sound effects” as a demonstrated skill throughout the activities.

Comparing two project years for technical skills sub-dimension, most improvement occurred in “use touch screen tapping or click button to select and drag” and “find appropriate way for taking photograph/video” items in Italy. In Turkey, children have mostly developed in “use photo/video editing functions appropriately (timeline, stop/replay buttons, adding sounds, etc.)”. Participant children from Finland also demonstrated most development in “find appropriate way for taking photograph/video” item.

Considering the overall findings, the prominent items in technical skills sub-dimension are “use touch screen tapping or click button to select and drag” and “find appropriate way for taking photograph/ video”.

Table 5.26. Technical skills (action: directly interacting with a device or application): Findings on total data

| Technical Skills | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|---|-----|-----------------------------|------|------|------|------|------|-----|-----------------------------|------|------|------|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Move cursor to desired space | f | 7 | 1 | 2 | 1 | 10 | 7 | -- | 4 | -- | 3 | -- | 7 | 11 | -- |
| | % | 25.0 | 3.6 | 7.1 | 3.6 | 35.7 | 25.0 | -- | 16.0 | -- | 12.0 | -- | 28.0 | 44.0 | -- |
| Use touch screen tapping or click button to select and drag | f | -- | -- | 3 | 2 | 8 | 15 | -- | -- | -- | 1 | 2 | 6 | 16 | -- |
| | % | -- | -- | 10.7 | 7.1 | 28.6 | 53.6 | -- | -- | - | 4.0 | 8.0 | 24.0 | 64.0 | -- |
| Find appropriate way for taking photograph/ video | f | 3 | -- | 2 | 5 | 10 | 8 | -- | -- | -- | -- | -- | 11 | 14 | -- |
| | % | 10.7 | -- | 7.1 | 17.9 | 35.7 | 28.6 | -- | -- | -- | -- | -- | 44.0 | 56.0 | -- |
| Use image editing functions to draw/ color/crop pictures | f | 6 | 4 | 6 | 3 | 5 | 3 | 1 | 1 | 1 | 6 | 5 | 6 | 6 | -- |
| | % | 21.4 | 14.3 | 21.4 | 10.7 | 17.9 | 10.7 | 3.6 | 4.0 | 4.0 | 24.0 | 20.0 | 24.0 | 24.0 | -- |
| Use photo/video editing functions appropriately | f | 6 | 4 | 5 | 6 | 4 | 2 | 1 | 1 | 3 | 6 | 5 | 4 | 6 | -- |
| | % | 21.4 | 14.3 | 17.9 | 21.4 | 14.3 | 7.1 | 3.6 | 4.0 | 12.0 | 24.0 | 20.0 | 16.0 | 24.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.27. Technical skills (action: directly interacting with a device or application): Country-specific findings

| Technical Skills | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|---|---------|----------------------|--------|-----------|-----------|-----------|-----------|-----------|-----------|----|----------------------|--------|-----------|----------|-----------|-----------|-----------|------------|----|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Move cursor to desired space | IT | 8 | f % | 2 25.0 | 1 12.5 | 1 12.5 | 1 12.5 | 2 25.0 | 2 25.0 | -- | 8 | f % | 1 12.5 | -- | 1 12.5 | -- | 4 50.0 | 2 25.0 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 4 66.7 | 1 16.7 | -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | 2 33.4 | 4 66.7 | -- |
| | FI | 11 | f % | 4 36.4 | -- -- | 1 9.1 | -- -- | 4 36.4 | 2 18.2 | -- | 7 | f % | 1 14.3 | -- -- | 2 28.6 | -- -- | - - | 4 57.1 | -- |
| | DE | 3 | f % | 1 33.3 | -- -- | -- -- | -- -- | -- -- | 2 66.7 | -- | 4 | f % | 2 50.0 | -- -- | -- -- | -- -- | 1 25.0 | 1 25.0 | -- |
| Use touch screen tapping or click button to select and drag | IT | 8 | f % | -- -- | -- -- | 2 25.0 | 1 12.5 | 2 25.0 | 3 37.5 | -- | 8 | f % | -- -- | -- -- | -- -- | -- -- | 5 62.5 | 3 37.5 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 2 33.3 | 3 50.0 | -- | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 1 16.7 | 4 66.7 | -- |
| | FI | 11 | f % | -- -- | -- -- | 1 9.1 | -- -- | 3 27.3 | 7 63.6 | -- | 7 | f % | -- -- | -- -- | 1 14.3 | 1 14.3 | -- -- | 5 71.4 | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | -- -- | 1 33.3 | 2 66.7 | -- | 4 | f % | -- -- | -- -- | -- -- | -- -- | -- -- | 4 100.0 | -- |

| | | | | | | | | | | | | | | | | | | | |
|--|----|----|---|------|------|------|------|------|------|-----|---|---|------|------|------|------|------|-------|----|
| Find appropriate way for taking photograph/video | IT | 8 | f | -- | -- | 1 | 2 | 1 | 4 | -- | 8 | f | -- | -- | -- | -- | 4 | 4 | -- |
| | | | % | -- | -- | 12.5 | 25.0 | 12.5 | 50.0 | -- | 8 | % | -- | -- | -- | -- | 50.0 | 50.0 | -- |
| | TR | 6 | f | -- | -- | -- | -- | 1 | 5 | -- | 6 | f | -- | -- | -- | -- | 2 | 4 | -- |
| | | | % | -- | -- | -- | -- | 16.7 | 83.3 | -- | 6 | % | -- | -- | -- | -- | 33.3 | 66.7 | -- |
| | FI | 11 | f | -- | -- | 3 | 1 | 2 | 3 | -- | 7 | f | -- | -- | -- | -- | 5 | 2 | -- |
| | | | % | -- | -- | 27.3 | 9.1 | 18.2 | 27.3 | -- | 7 | % | -- | -- | -- | -- | 71.4 | 28.6 | -- |
| | DE | 3 | f | -- | -- | -- | -- | 2 | 1 | -- | 4 | f | -- | -- | -- | -- | -- | 4 | -- |
| | | | % | -- | -- | -- | -- | 66.7 | 33.3 | -- | 4 | % | -- | -- | -- | -- | -- | 100.0 | -- |
| Use image editing functions to draw/color/crop pictures | IT | 8 | f | -- | 1 | 4 | -- | 2 | 1 | -- | 8 | f | -- | -- | 3 | 2 | 3 | -- | -- |
| | | | % | -- | 12.5 | 50.0 | -- | 25.0 | 12.5 | -- | 8 | % | -- | -- | 37.5 | 25.0 | 37.5 | -- | -- |
| | TR | 6 | f | -- | -- | -- | 1 | 3 | 2 | -- | 6 | f | -- | -- | -- | 2 | -- | 4 | -- |
| | | | % | -- | -- | -- | 16.7 | 50.0 | 33.3 | -- | 6 | % | -- | -- | -- | 33.3 | -- | 66.7 | -- |
| | FI | 11 | f | 5 | 1 | 2 | 2 | -- | -- | 1 | 7 | f | 1 | -- | 3 | 1 | 1 | 1 | -- |
| | | | % | 45.5 | 9.1 | 18.2 | 18.2 | -- | -- | 9.1 | 7 | % | 14.3 | -- | 42.9 | 14.3 | 14.3 | 14.3 | -- |
| | DE | 3 | f | 1 | 2 | -- | -- | -- | -- | -- | 4 | f | -- | 1 | -- | -- | 2 | 1 | -- |
| | | | % | 33.3 | 66.7 | -- | -- | -- | -- | -- | 4 | % | -- | 25.0 | -- | -- | 50.0 | 25.0 | -- |
| Use photo/video editing functions appropriately (timeline, stop/replay buttons, adding sounds, etc.) | IT | 8 | f | 1 | 1 | 4 | 1 | -- | 1 | -- | 8 | f | -- | -- | 2 | 4 | 1 | 1 | -- |
| | | | % | 12.5 | 12.5 | 50.0 | 12.5 | -- | 12.5 | -- | 8 | % | -- | -- | 25.0 | 50.0 | 12.5 | 12.5 | -- |
| | TR | 6 | f | -- | -- | -- | 3 | 3 | -- | -- | 6 | f | -- | -- | -- | 1 | 2 | 3 | -- |
| | | | % | -- | -- | -- | 50.0 | 50.0 | -- | -- | 6 | % | -- | -- | -- | 16.7 | 33.3 | 50.0 | -- |
| | FI | 11 | f | 4 | 1 | 1 | 2 | 1 | 1 | 1 | 7 | f | -- | 1 | 4 | -- | 1 | 1 | -- |
| | | | % | 36.4 | 9.1 | 9.1 | 18.2 | 9.1 | 9.1 | 9.1 | 7 | % | -- | 14.3 | 57.1 | -- | 14.3 | 14.3 | -- |
| | DE | 3 | f | 1 | 2 | -- | -- | -- | -- | -- | 4 | f | 1 | 2 | -- | -- | -- | 1 | -- |
| | | | % | 33.3 | 66.7 | -- | -- | -- | -- | -- | 4 | % | 25.0 | 50.0 | -- | -- | -- | 25.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

2) “Visual Skills” Sub-Dimension of Media Literacy Knowledge, Skills and Understanding Developed in DST Activity

For visual skills sub-dimension, we focused on framing shots action. When the findings relevant to visual skills sub-dimension, regarding all partner countries data, is examined (see Table 5.28), the overall highest percentage in this action across all countries in both years appears in terms of “move and position characters and artefacts appropriately” item (71.5% for the 1st year; 88.0% for the 2nd year), with respect to the sum of percentages within “most children” and “all children” categories. “Use different camera shots/angles/movement” item, on the other hand, has the overall lowest percentage (21.4% for the 1st year; 32.0% for the 2nd year). Most improvement across all countries occurred in “move and position characters and artefacts appropriately” item. On the other hand, when country specific findings in visual skills sub-dimension is examined (see Table 5.29); for this action, participant children in Italy, Turkey and Finland have been found to develop most in the skill of “move and position characters and artifacts appropriately”.

3) “Art Skills” Sub-Dimension of Media Literacy Knowledge, Skills and Understanding Developed in DST Activity

The main focus for the art skills sub-dimension was on the action of creating foreground/background elements. There was only one item in this sub-dimension, namely, “use paint, crayons, scissors, and other art tools to draw scenery/characters”. In 60.7% of the yearly project summaries, most or all children were reported to demonstrate art skills in the 1st year, whereas in the 2nd year this percent increased to 84.0% (see Table 5.30). Country-specific findings showed that participant children from all partner countries either progressed or remained at the same level in terms of art skills. In groups, where children remained at the same level, already had a high frequency of demonstration of the relevant skill. For Germany, all participant children were reported as competent in art skills for both project years (see Table 5.31).

4) “Narrative Skills” Sub-Dimension of Media Literacy Knowledge, Skills and Understanding Developed in DST Activity

For narrative skills sub-dimension, we focused on creating stories action. When the overall findings across all countries for this sub-dimension are examined (see Table 5.32), the overall highest percentage in this action regarding all projects conducted in both years is in “create a story with one or more characters” item (85.7% for the 1st year; 88.0% for the 2nd year), considering the sum of percentages observed within “most children” and “all children” categories. “Presence of a problem or surprise action” item, on the other hand, has the overall lowest percentage (53.5% for the 1st year; 52.0% for the 2nd year). Most improvement across all countries occurred in “create a setting” item, moving from 53.5% to 84.0% through the implementation years. Regarding the country specific results (see Table 5.33), teachers from

Italy and Turkey reported that children showed most competencies in “create a story with one or more characters” and “create a setting” items. For Finland and Germany, the highest percentage is “create a story with one or more characters” item. Comparing two project years, for narrative skills sub-dimension, participant children from Italy remained at the same level in “create a story with one or more characters”, “create a setting” and “unfolding the story (plot)” items. In Turkey, on the other hand, most development occurred in “resolution/conclusion” item. For Finland, the development is most obvious in “create a setting” skill.

Table 5.28. Visual skills (action: framing shots): Findings on total data

| Visual Skills | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|--|-----|-----------------------------|------|------|------|------|------|-----|-----------------------------|------|------|------|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Move and position characters | f | -- | -- | 3 | 4 | 8 | 12 | 1 | -- | -- | 1 | 2 | 12 | 10 | -- |
| and artefacts appropriately | % | -- | -- | 10.7 | 14.3 | 28.6 | 42.9 | 3.6 | -- | -- | 4.0 | 8.0 | 48.0 | 40.0 | -- |
| Use different camera shots/ angles/movement | f | 9 | 3 | 2 | 1 | 7 | 4 | 2 | 5 | 3 | 5 | 4 | 6 | 2 | -- |
| | % | 32.1 | 10.7 | 7.1 | 3.6 | 25.0 | 14.3 | 7.1 | 20.0 | 12.0 | 20.0 | 16.0 | 24.0 | 8.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.29. Visual skills (action: framing shots): Country-specific findings

| Visual Skills | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|--|---------|----------------------|-----|------|------|------|------|------|------|------|----------------------|-----|------|------|------|------|------|------|----|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Move and position characters and artefacts appropriately | IT | 8 | f | -- | -- | 1 | 1 | 2 | 4 | -- | 8 | f | -- | -- | -- | 1 | 5 | 2 | -- |
| | | | % | -- | -- | 12.5 | 12.5 | 25.0 | 50.0 | -- | | % | -- | -- | -- | 12.5 | 62.5 | 25.0 | -- |
| | TR | 6 | f | -- | -- | -- | 1 | 2 | 3 | -- | 6 | f | -- | -- | -- | -- | 3 | 3 | -- |
| | | | % | -- | -- | -- | 16.7 | 33.3 | 50.0 | -- | | % | -- | -- | -- | -- | 50.0 | 50.0 | -- |
| | FI | 11 | f | -- | -- | 2 | 2 | 3 | 3 | 1 | 7 | f | -- | -- | 1 | 1 | 3 | 2 | -- |
| | | | % | -- | -- | 18.2 | 18.2 | 27.3 | 27.3 | 9.1 | | % | -- | -- | 14.3 | 14.3 | 42.9 | 28.6 | -- |
| | DE | 3 | f | -- | -- | -- | -- | 1 | 2 | -- | 4 | f | -- | -- | -- | -- | 1 | 3 | -- |
| | | | % | -- | -- | -- | -- | 33.3 | 66.7 | -- | | % | -- | -- | -- | -- | 25.0 | 75.0 | -- |
| Use different camera shots/angles/movement | IT | 8 | f | 2 | 1 | 1 | -- | 3 | 1 | -- | 8 | f | 2 | 1 | 1 | 2 | 2 | -- | -- |
| | | | % | 25.0 | 12.5 | 12.5 | -- | 37.5 | 12.5 | -- | | % | 25.0 | 12.5 | 12.5 | 25.0 | 25.0 | -- | -- |
| | TR | 6 | f | -- | -- | 1 | -- | 3 | 2 | -- | 6 | f | -- | -- | -- | 1 | 3 | 2 | -- |
| | | | % | -- | -- | 16.7 | -- | 50.0 | 33.3 | -- | | % | -- | -- | -- | 16.7 | 50.0 | 33.3 | -- |
| | FI | 11 | f | 6 | -- | -- | 1 | 1 | 1 | 2 | 7 | f | 2 | 1 | 2 | 1 | 1 | -- | -- |
| | | | % | 54.5 | -- | -- | 9.1 | 9.1 | 9.1 | 18.2 | | % | 28.6 | 14.3 | 28.6 | 14.3 | 14.3 | -- | -- |
| | DE | 3 | f | 1 | 2 | -- | -- | -- | -- | -- | 4 | f | 1 | 1 | 2 | -- | -- | -- | -- |
| | | | % | 33.3 | 66.7 | -- | -- | -- | -- | -- | | % | 25.0 | 25.0 | 50.0 | -- | -- | -- | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.30. Art skills (action: creating foreground/backdrop elements): Findings on total data

| Art Skills | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|---|-----|-----------------------------|-----|-----|-----|-----|------|-----|-----------------------------|-----|----|-----|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Use paint, crayons, scissors, and other art tools to draw the scenery/ characters | f | 6 | 1 | 1 | 2 | 2 | 15 | 1 | 2 | 1 | -- | 1 | 3 | 18 | -- |
| | % | 21.4 | 3.6 | 3.6 | 7.1 | 7.1 | 53.6 | 3.6 | 8.0 | 4.0 | -- | 4.0 | 12.0 | 72.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.31. Art skills (action: creating foreground/backdrop elements): Country-specific findings

| Art Skills | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|---|---------|----------------------|-----|------|------|-----|------|------|-------|-----|----------------------|-----|------|------|----|------|------|-------|----|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Use paint, crayons, scissors, and other art tools to draw the scenery/ characters | IT | 8 | f | -- | 1 | -- | 1 | -- | 6 | -- | 8 | f | -- | -- | -- | -- | 2 | 6 | -- |
| | | | % | -- | 12.5 | -- | 12.5 | -- | 75.0 | -- | | % | -- | -- | -- | -- | 25.0 | 75.0 | -- |
| | TR | 6 | f | -- | -- | -- | -- | -- | 6 | -- | 6 | f | -- | -- | -- | -- | -- | 6 | -- |
| | | | % | -- | -- | -- | -- | -- | 100.0 | -- | | % | -- | -- | -- | -- | -- | 100.0 | -- |
| | FI | 11 | f | 6 | -- | 1 | 1 | 2 | - | 1 | 7 | f | 2 | 1 | -- | 1 | 1 | 2 | -- |
| | | | % | 54.5 | -- | 9.1 | 9.1 | 18.2 | - | 9.1 | | % | 28.6 | 14.3 | -- | 14.3 | 14.3 | 28.6 | -- |
| | DE | 3 | f | -- | -- | -- | -- | -- | 3 | -- | 4 | f | -- | -- | -- | -- | -- | 4 | -- |
| | | | % | -- | -- | -- | -- | -- | 100.0 | -- | | % | -- | -- | -- | -- | -- | 100.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.32. Narrative skills (action: creating stories): Findings on total data

| Narrative Skills | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|---|-----|-----------------------------|-----|------|------|------|------|-----|-----------------------------|----|------|------|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Create a story with one or more characters | f | -- | -- | 1 | 1 | 8 | 16 | 2 | 1 | -- | -- | 2 | 8 | 14 | -- |
| | % | -- | -- | 3.6 | 3.6 | 28.6 | 57.1 | 7.1 | 4.0 | -- | -- | 8.0 | 32.0 | 56.0 | -- |
| Create a setting | f | 2 | -- | 2 | 2 | 7 | 13 | 2 | 1 | -- | 1 | 2 | 10 | 11 | -- |
| | % | 7.1 | -- | 7.1 | 7.1 | 25.0 | 46.4 | 7.1 | 4.0 | -- | 4.0 | 8.0 | 40.0 | 44.0 | -- |
| Presence of a problem or surprise action (initiating event) | f | 1 | -- | 6 | 5 | 9 | 6 | 1 | 1 | -- | 5 | 6 | 4 | 9 | -- |
| | % | 3.6 | -- | 21.4 | 17.9 | 32.1 | 21.4 | 3.6 | 4.0 | -- | 20.0 | 24.0 | 16.0 | 36.0 | -- |
| Unfolding of the story (plot) | f | -- | 1 | 2 | 6 | 11 | 6 | 2 | 1 | -- | 2 | 6 | 7 | 9 | -- |
| | % | -- | 3.6 | 7.1 | 21.4 | 39.3 | 21.4 | 7.1 | 4.0 | -- | 8.0 | 24.0 | 28.0 | 36.0 | -- |
| Resolution/conclusion | f | -- | 1 | 3 | 7 | 9 | 6 | 2 | 1 | -- | 1 | 7 | 7 | 9 | -- |
| | % | -- | 3.6 | 10.7 | 25.0 | 32.1 | 21.4 | 7.1 | 4.0 | -- | 4.0 | 28.0 | 28.0 | 36.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.33. Narrative skills (action: creating stories): Country-specific findings

| Narrative Skills | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|--|---------|----------------------|--------|-----------|----------|-----------|-----------|-------------|-----------|-----------|----------------------|--------|-----------|----------|-----------|-----------|-----------|-----------|----|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Create a story with one or more characters | IT | 8 | f % | -- -- | -- -- | -- -- | -- -- | 5 62.5 | 3 37.5 | -- | 8 | f % | -- -- | -- -- | -- -- | 4 50.0 | 4 50.0 | -- | |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | -- 100.0 | 6 -- | -- | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 5 83.3 | -- | |
| | FI | 11 | f % | -- -- | -- -- | 1 9.2 | 1 9.1 | 2 18.2 | 5 45.5 | 2 18.2 | 7 | f % | 1 14.3 | -- -- | -- -- | 1 14.3 | 2 28.6 | 3 42.9 | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | -- -- | 1 33.3 | 2 66.7 | -- | 4 | f % | -- -- | -- -- | -- -- | 1 25.0 | 1 25.0 | 2 50.0 | -- |
| Create a setting | IT | 8 | f % | -- -- | -- -- | -- -- | -- -- | 5 62.5 | 3 37.5 | -- | 8 | f % | -- -- | -- -- | -- -- | 5 62.5 | 3 37.5 | -- | |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | -- 100.0 | 6 -- | -- | 6 | f % | -- -- | -- -- | -- -- | 2 33.3 | 4 66.7 | -- | |
| | FI | 11 | f % | 2 18.2 | -- -- | 1 9.1 | 2 18.2 | 1 9.1 | 3 27.3 | 1 9.1 | 7 | f % | 1 14.3 | -- -- | -- -- | 1 14.3 | 2 28.6 | 3 42.9 | -- |
| | DE | 3 | f % | -- -- | -- -- | 1 33.3 | -- -- | 1 33.3 | 1 33.3 | -- | 4 | f % | -- -- | -- -- | 1 25.0 | 1 25.0 | 1 25.0 | 1 25.0 | -- |

| | | | | | | | | | | | | | | | | | | | |
|---|----|----|---|-----|-----|------|------|------|------|------|---|---|------|----|------|------|------|------|------|
| Presence of a problem or surprise action (initiating event) | IT | 8 | f | -- | -- | 2 | 1 | 4 | 1 | -- | 8 | f | -- | -- | 2 | 2 | 1 | 3 | -- |
| | | | % | -- | -- | 25.0 | 12.5 | 50.0 | 12.5 | -- | 8 | % | -- | -- | 25.0 | 25.0 | 12.5 | 37.5 | -- |
| | TR | 6 | f | -- | -- | - | 1 | 1 | 4 | -- | 6 | f | -- | -- | -- | 2 | 2 | 2 | -- |
| | | | % | -- | -- | - | 16.7 | 16.7 | 66.7 | -- | 6 | % | -- | -- | -- | 33.3 | 33.3 | 33.3 | -- |
| | FI | 11 | f | 1 | -- | 4 | 3 | 2 | -- | 1 | 7 | f | 1 | -- | 2 | 1 | -- | 3 | -- |
| | | | % | 9.1 | -- | 36.4 | 27.3 | 18.2 | -- | 9.1 | 7 | % | 14.3 | -- | 28.6 | 14.3 | -- | 42.9 | -- |
| | DE | 3 | f | -- | -- | -- | -- | 2 | 1 | -- | 4 | f | -- | -- | 1 | 1 | 1 | 1 | -- |
| | | | % | -- | -- | -- | -- | 66.7 | 33.3 | -- | 4 | % | -- | -- | 25.0 | 25.0 | 25.0 | 25.0 | -- |
| Unfolding of the story (plot) | IT | 8 | f | -- | -- | -- | 3 | 3 | 2 | -- | 8 | f | -- | -- | -- | 3 | 2 | 3 | -- |
| | | | % | -- | -- | -- | 37.5 | 37.5 | 25.0 | -- | 8 | % | -- | -- | -- | 37.5 | 25.0 | 37.5 | -- |
| | TR | 6 | f | -- | -- | -- | 1 | 3 | 2 | -- | 6 | f | -- | -- | -- | 1 | 2 | 3 | -- |
| | | | % | -- | -- | -- | 16.7 | 50.0 | 33.3 | -- | 6 | % | -- | -- | -- | 16.7 | 33.3 | 50.0 | -- |
| | FI | 11 | f | -- | 1 | 2 | 2 | 3 | 1 | 2 | 7 | f | 1 | -- | 1 | 1 | 2 | 2 | -- |
| | | | % | -- | 9.1 | 18.2 | 18.2 | 27.3 | 9.1 | 18.2 | 7 | % | 14.3 | -- | 14.3 | 14.3 | 28.6 | 28.6 | -- |
| | DE | 3 | f | -- | -- | -- | -- | 2 | 1 | -- | 4 | f | -- | -- | 1 | 1 | 1 | 1 | -- |
| | | | % | -- | -- | -- | -- | 66.7 | 33.3 | -- | 4 | % | -- | -- | 25.0 | 25.0 | 25.0 | 25.0 | -- |
| Resolution/conclusion | IT | 8 | f | -- | -- | 1 | 2 | 3 | 2 | -- | 8 | f | -- | -- | -- | 4 | 1 | 3 | -- |
| | | | % | -- | -- | 12.5 | 25.0 | 37.5 | 25.0 | -- | 8 | % | -- | -- | -- | 50.0 | 12.5 | 37.5 | -- |
| | TR | 6 | f | -- | -- | -- | 2 | 2 | 2 | -- | 6 | f | -- | -- | -- | -- | 4 | 2 | -- |
| | | | % | -- | -- | -- | 33.3 | 33.3 | 33.3 | -- | 6 | % | -- | -- | -- | -- | 66.7 | 33.3 | -- |
| | FI | 11 | f | -- | 1 | 2 | 3 | 2 | 1 | 2 | 7 | f | 1 | -- | -- | 3 | 1 | 2 | -- |
| | | | % | -- | 9.1 | 18.2 | 27.3 | 18.2 | 9.1 | 18.2 | 7 | % | 14.3 | -- | -- | 42.9 | 14.3 | 28.6 | -- |
| | DE | 3 | f | -- | -- | -- | 1 | -- | 2 | -- | 4 | f | -- | -- | -- | -- | -- | 3 | 1 |
| | | | % | -- | -- | -- | 33.3 | -- | 66.7 | -- | 4 | % | -- | -- | -- | -- | -- | 75.0 | 25.0 |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

5) “Understanding of Multimodality” Sub-Dimension of Media Literacy Knowledge, Skills and Understanding Developed in DST Activity

The overall findings across all countries are presented in Table 5.34 for understanding of multimodality sub-dimension. For this sub-dimension, we focused on using different communicative modes action. The overall highest percentage in this action across all countries regarding all projects conducted in both years is in “understand the properties that the different modes offer” item (53.6% for the 1st year; 68.0% for the 2nd year), when the percentages of “most children” and “all children” categories are taken into consideration. “Understand the processes involved in transposition and adaptation between different ways/Understand passages from one mode to another” item, on the other hand, has the overall lowest percentage (35.8% for the 1st year; 36.0 for the 2nd year). Most improvement across all countries occurred in “be aware of the differences between the properties that the different modes offer” item, moving from 35.8% for the 1st year to 52.0% for the 2nd year.

Regarding the country specific results in the understanding of multimodality sub-dimension (see Table 5.35), teachers from Italy, Turkey and Finland reported that children showed most competencies in “understand the properties that the different modes offer” item. For Germany, the highest percentage is observed on the “be aware of differences between the properties that different modes (e.g. verbal, visual, sound, tactile) offer” item.

Comparing two project years, for the same dimension, most improvement occurred in “be aware of differences between the properties that different modes (e.g. verbal, visual, sound, tactile) offer” item for Italy and Finland. For Italy, in “understand the properties that the different modes offer” skill, children also show most improvement. For Turkey, most improvement is observed in “understand the properties that the different modes offer” item.

6) “Pre-Writing Skills” Sub-Dimension of Media Literacy Knowledge, Skills and Understanding Developed in DST Activity

For pre-writing skills sub-dimension, the focus was on storyboard planning action. This sub-dimension has one item, namely, “use sequenced drawings/sketches/pictures for planning”. An improvement has been observed in terms of this skill from the 1st year to the 2nd year; it is reported by the teachers in the 51.5% of the yearly project summaries that most or all children demonstrated relevant skill, while this percent has increased to 56.0% in the 2nd year reports of the teachers (see Table 5.36).

Regarding the country-specific findings, on the other hand (see Table 5.37), participant children from Italy, Turkey and Finland have been found to improve in this skill. For Germany, more than two thirds of children showed competency in the relevant skill for both project years. Therefore, we can infer that children found opportunities to demonstrate and develop pre-writing skills in DST projects.

Table 5.34. Understanding of multimodality (action: using different communicative modes; e.g. verbal, visual, sound, tactical): Findings on total data

| Understanding of Multimodality | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|--|-----|-----------------------------|-----|------|------|------|------|-----|-----------------------------|-----|------|------|------|------|-----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Understand the properties that the different modes offer | f | 3 | -- | 5 | 4 | 7 | 8 | 1 | 1 | 1 | 4 | 1 | 11 | 6 | 1 |
| | % | 10.7 | -- | 17.9 | 14.3 | 25.0 | 28.6 | 3.6 | 4.0 | 4.0 | 16.0 | 4.0 | 44.0 | 24.0 | 4.0 |
| Be aware of the differences between the properties that the different modes offer | f | 4 | -- | 8 | 4 | 5 | 5 | 2 | 1 | 1 | 5 | 4 | 5 | 8 | 1 |
| | % | 14.3 | -- | 28.6 | 14.3 | 17.9 | 17.9 | 7.1 | 4.0 | 4.0 | 20.0 | 16.0 | 20.0 | 32.0 | 4.0 |
| Understand the processes involved in transposition and adaptation between different ways/ understand passages from one mode to another | f | 6 | 1 | 5 | 4 | 5 | 5 | 2 | 2 | 2 | 7 | 4 | 4 | 5 | 1 |
| | % | 21.4 | 3.6 | 17.9 | 14.3 | 17.9 | 17.9 | 7.1 | 8.0 | 8.0 | 28.0 | 16.0 | 16.0 | 20.0 | 4.0 |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.35. Understanding of multimodality (action: using different communicative modes; e.g. verbal, visual, sound, tactical): Country-specific findings

| Understanding of Multimodality | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|---|---------|----------------------|--------|-----------|----------|------------|-----------|-----------|-----------|-----------|----------------------|--------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Understand the properties that the different modes offer | IT | 8 | f % | -- -- | -- -- | 1 12.5 | 2 25.0 | 2 25.0 | 3 37.5 | -- -- | 8 | f % | -- -- | -- -- | 1 12.5 | 1 12.5 | 5 62.5 | 1 12.5 | -- -- |
| | TR | 6 | f % | -- -- | -- -- | 1 16.7 | -- -- | 3 50.0 | 2 33.3 | -- -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | 4 66.7 | 2 33.3 | -- -- |
| | FI | 11 | f % | 3 27.3 | -- -- | 3 27.3 | 1 9.1 | 1 9.1 | 2 18.2 | 1 9.1 | 7 | f % | 1 14.3 | 1 14.3 | 3 42.9 | -- -- | 1 14.3 | 1 14.3 | -- -- |
| | DE | 3 | f % | -- -- | -- -- | - - | 1 33.3 | 1 33.3 | 1 33.3 | -- -- | 4 | f % | -- -- | -- -- | -- -- | -- -- | 1 25.0 | 2 50.0 | 1 25.0 |
| Be aware of the differences between the properties that the different modes offer | IT | 8 | f % | -- -- | -- -- | 3 37.05 | 3 37.5 | 2 25.0 | -- -- | -- -- | 8 | f % | -- -- | -- -- | 2 25.0 | 3 37.5 | 2 25.0 | 1 12.5 | -- -- |
| | TR | 6 | f % | -- -- | -- -- | 1 16.7 | -- -- | 3 50.0 | 2 33.3 | -- -- | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 3 50.0 | 2 33.3 | -- -- |
| | FI | 11 | f % | 4 36.4 | -- -- | 4 36.4 | -- -- | -- -- | 1 9.1 | 1 9.1 | 7 | f % | 1 14.3 | 1 14.3 | 3 42.9 | -- -- | -- -- | 2 28.6 | -- -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | 1 33.3 | -- -- | 2 66.7 | -- -- | 4 | f % | -- -- | -- -- | -- -- | -- -- | -- -- | 3 75.0 | 1 25.0 |
| Understand the processes involved in transposition and adaptation between different ways/understand passages from one mode to another | IT | 8 | f % | 1 12.5 | -- -- | 2 25.0 | 2 25.0 | 2 25.0 | 1 12.5 | -- -- | 8 | f % | -- -- | -- -- | 5 62.5 | -- -- | 2 25.0 | 1 12.5 | -- -- |
| | TR | 6 | f % | -- -- | -- -- | 1 16.7 | -- -- | 3 50.0 | 2 33.3 | -- -- | 6 | f % | -- -- | -- -- | -- -- | 2 33.3 | 2 33.3 | 2 33.3 | -- -- |
| | FI | 11 | f % | 4 36.4 | 1 9.1 | 2 18.2 | 1 18.2 | -- -- | 1 9.1 | 2 18.2 | 7 | f % | 1 14.3 | 2 28.6 | 2 28.6 | 1 14.3 | -- -- | 1 14.3 | -- -- |
| | DE | 3 | f % | 1 33.3 | -- -- | -- -- | 1 33.3 | -- -- | 1 33.3 | -- -- | 4 | f % | 1 25.0 | -- -- | -- -- | 1 25.0 | 1 25.0 | -- -- | 1 25.0 |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.36. Pre-writing skills (action: creating foreground/backdrop elements): Findings on total data

| Pre-Writing Skills | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|--|-----|-----------------------------|-----|------|------|-----|------|-----|-----------------------------|------|----|------|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Use paint, crayons, scissors, and other art tools to draw the scenery/characters | f | 6 | 2 | 6 | 3 | 2 | 8 | 1 | 5 | 3 | -- | 3 | 4 | 10 | -- |
| | % | 21.4 | 7.1 | 21.4 | 10.7 | 7.1 | 44.4 | 3.6 | 20.0 | 12.0 | -- | 12.0 | 16.0 | 40.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.37. Pre-writing skills (action: creating foreground/backdrop elements): Country-specific findings

| Pre-Writing Skills | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|---|---------|----------------------|-----|------|------|------|------|------|------|---|----------------------|-----|------|------|---|------|------|------|---|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Use sequenced drawings/sketches/pictures for planning | IT | 8 | f | 2 | 1 | 2 | 1 | - | 2 | - | 8 | f | 2 | - | - | 2 | 2 | 2 | - |
| | | | % | 25.0 | 12.5 | 25.0 | 12.5 | - | 25.0 | - | | % | 25.0 | - | - | 25.0 | 25.0 | 25.0 | - |
| | TR | 6 | f | - | - | - | - | 2 | 4 | - | 6 | f | - | - | - | - | 1 | 5 | - |
| | | | % | - | - | - | - | 33.3 | 66.7 | - | | % | - | - | - | - | 16.7 | 83.3 | - |
| | FI | 11 | f | 4 | 1 | 3 | 2 | - | - | - | 7 | f | 3 | 2 | - | 1 | - | 1 | - |
| | | | % | 36.4 | 9.1 | 27.3 | 18.2 | - | - | - | | % | 42.9 | 28.6 | - | 14.3 | - | 14.3 | - |
| | DE | 3 | f | - | - | 1 | - | - | 2 | - | 4 | f | - | 1 | - | - | 1 | 2 | - |
| | | | % | - | - | 33.3 | - | - | 66.7 | - | | % | - | 25.0 | - | - | 25.0 | 50.0 | - |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

7) “Understanding of the Foundations of Audio-Visual Language” Sub-Dimension of Media Literacy Knowledge, Skills and Understanding Developed in DST Activity

For audio-visual language sub-dimension, we focused on the action of creating a digital story in various product types such as photo story, animation or movie. When the overall findings across all countries are examined (see Table 5.38), the overall highest percentage in this action in the 1st year is observed in “recognize the two fundamental components of audio-visual language” item (64.3% in total for the sum of percentages of “most children” and “all children” categories), whereas “understand the most important principles of product type” item, which is a field to be compiled according to the projects carried out, has the highest percentage for the 2nd year (72.0% in total for the sum of percentages of “most children” and “all children” categories) . Most improvement across all countries occurred in “understand the most important principles of product type” item.

Regarding the country specific results in the audio-visual language sub-dimension (see Table 5.39); the percentages of competent children are the same in both items for Italy. Teachers from Turkey and Germany reported that children showed most competency in “understand the most important principles of product type: field to be compiled according to the projects carried out.” item. For Finland, the highest percentage is “recognize the two fundamental components of audio-visual language” item.

Comparing two project years in this sub-dimension, participant children from Turkey and Finland developed most in “recognize the two fundamental components of audio-visual language” item. For Italy, on the other hand, most improvement occurred in “understand the most important principles of product type” item.

8) “Critical Skills” Sub-Dimension of Media Literacy Knowledge, Skills and Understanding Developed in DST Activity

For critical skills sub-dimension, we focused on reflecting on product; making changes where necessary action. The overall highest percentage in this action across all countries regarding all projects conducted in the 1st year is observed in “identify aspects of the work which needed changing, e.g. in a stop motion project: shots which included children’s own hands” item (35.7% in total for the sum of percentages of “most children” and “all children” categories). “Identify features which were particularly successful in meeting audience’s needs and repeating these, e.g. sound effects” item, on the other hand, has the highest percentage in the 2nd year (52.0%) in terms of the sum of percentages of “most children” and “all children” categories; also an improvement is observed in total in terms of both item across the countries (see Table 5.40).

Regarding the country specific results in the critical skills sub-dimension (see Table 5.41), teachers from Italy, Finland and Germany reported that children showed most competency in “identify aspects of the work which needed changing, e.g. in a stop motion project: shots

which included children's own hands" item. For Turkey, the highest percentage is "identify features which were particularly successful in meeting audience's needs and repeating these, e.g. sound effects" item.

Comparing two project years in this sub-dimension, for Italy, Turkey and Finland, children developed most in the item of "identify features which were particularly successful in meeting audience's needs and repeating these".

Table 5.38. Understanding of the foundations of audio-visual language (action: creating a digital story in various product types such as photo story, animation or movie): Findings on total data

| Understanding of the foundations of audio-visual language | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|---|-----|-----------------------------|-----|------|------|------|------|----|-----------------------------|-----|-----|------|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Recognize the two fundamental components of audio-visual language | f | 3 | 2 | 2 | 3 | 6 | 12 | -- | -- | 1 | 2 | 5 | 6 | 11 | -- |
| | % | 10.7 | 7.1 | 7.1 | 10.7 | 21.4 | 42.9 | -- | -- | 4.0 | 8.0 | 20.0 | 24.0 | 44.0 | -- |
| Understand the most important principles of product type | f | 4 | 2 | 4 | 2 | 11 | 5 | -- | 2 | -- | 2 | 3 | 2 | 16 | -- |
| | % | 14.3 | 7.1 | 14.3 | 7.1 | 39.3 | 17.9 | -- | 8.0 | -- | 8.0 | 12.0 | 8.0 | 64.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.39. Understanding of the foundations of audio-visual language (action: creating a digital story in various product types such as photo story, animation or movie):
Country-specific findings

| Understanding of the foundations of audio-visual language | Country | n | f/% | 1 st Year | | | | | | | 2 nd Year | | | | | | | | |
|---|---------|----|--------|----------------------|-----------|-----------|-----------|------------|------------|----------|----------------------|--------|-----------|-----------|-----------|-----------|-----------|------------|----------|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Recognize the two fundamental components of audio-visual language | IT | 8 | f % | 1 12.5 | 1 12.5 | -- -- | 1 12.5 | 3 37.5 | 2 25.0 | -- -- | 8 | f % | -- -- | -- -- | 1 12.5 | 4 50.0 | 1 12.5 | 2 25.0 | -- -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 2 33.3 | 3 50.0 | -- -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | 3 50.0 | 3 50.0 | -- -- |
| | FI | 11 | f % | 2 18.2 | 1 9.1 | 2 18.2 | 1 9.1 | 1 9.1 | 4 36.4 | -- -- | 7 | f % | -- -- | 1 14.3 | 1 14.3 | 1 14.3 | 1 14.3 | 3 42.9 | -- -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | -- -- | -- -- | 3 100.0 | -- -- | 4 | f % | -- -- | -- -- | -- -- | -- -- | 1 25.0 | 3 75.0 | -- -- |
| Understand the most important principles of product type: field to be compiled according to the projects carried out. | IT | 8 | f % | 2 25.0 | -- -- | 2 25.0 | -- -- | 3 37.5 | 1 12.5 | -- -- | 8 | f % | -- -- | -- -- | -- -- | 2 25.0 | 2 25.0 | 4 50.0 | -- -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 6 100.0 | - - | -- -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | -- -- | 6 100.0 | -- -- |
| | FI | 11 | f % | 2 18.2 | 2 18.2 | 2 18.2 | 1 9.1 | 2 18.2 | 2 18.2 | -- -- | 7 | f % | 1 14.3 | -- -- | 2 28.6 | 1 14.3 | -- -- | 3 42.9 | -- -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | 1 33.3 | -- -- | 2 66.7 | -- -- | 4 | f % | 1 25.0 | -- -- | -- -- | -- -- | -- -- | 3 75.0 | -- -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.40. Critical skills (action: reflecting on product; making changes where necessary): Findings on total data

| Critical Skills | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|--|-----|-----------------------------|------|------|------|------|------|----|-----------------------------|------|------|------|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Identify aspects of the work which needed changing, e.g. in a stop motion project: | f | 6 | 3 | 4 | 5 | 6 | 4 | -- | 1 | -- | 4 | 8 | 8 | 4 | -- |
| shots which included children's own hands | % | 21.4 | 10.7 | 14.3 | 17.9 | 21.4 | 14.3 | -- | 4.0 | -- | 16.0 | 32.0 | 32.0 | 16.0 | -- |
| Identify features which were particularly successful in meeting audience's needs and repeating these, e.g. sound effects | f | 7 | 4 | 4 | 7 | 5 | 1 | -- | 4 | 3 | 3 | 2 | 9 | 4 | -- |
| | % | 25.0 | 14.3 | 14.3 | 25.0 | 17.9 | 3.6 | -- | 16.0 | 12.0 | 12.0 | 8.0 | 36.0 | 16.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.41. Critical skills (action: reflecting on product; making changes where necessary): Country-specific findings

| Critical Skills | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|---|---------|----------------------|-----|------|------|------|------|------|------|----|----------------------|-----|------|------|------|------|------|------|----|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Identify aspects of the work which needed changing, e.g. in a stop motion project: shots which included children's own hands | IT | 8 | f | -- | 1 | 2 | 1 | 1 | 3 | -- | 8 | f | -- | -- | 1 | 2 | 4 | 1 | -- |
| | | | % | -- | 12.5 | 25.0 | 12.5 | 12.5 | 37.5 | -- | | % | -- | -- | 12.5 | 25.0 | 50.0 | 12.5 | -- |
| | TR | 6 | f | -- | -- | 1 | 3 | 2 | -- | -- | 6 | f | -- | -- | -- | 3 | 2 | 1 | -- |
| | | | % | -- | -- | 16.7 | 50.0 | 33.3 | -- | -- | | % | -- | -- | -- | 50.0 | 33.3 | 16.7 | -- |
| | FI | 11 | f | 5 | 2 | 1 | 1 | 2 | -- | -- | 7 | f | 1 | -- | 3 | 2 | -- | 1 | -- |
| | | | % | 45.5 | 18.2 | 9.1 | 9.1 | 18.2 | -- | -- | | % | 14.3 | -- | 42.9 | 28.6 | -- | 14.3 | -- |
| | DE | 3 | f | 1 | -- | -- | -- | 1 | 1 | -- | 4 | f | -- | -- | -- | 1 | 2 | 1 | -- |
| | | | % | 33.3 | -- | -- | -- | 33.3 | 33.3 | -- | | % | -- | -- | -- | 25.0 | 50.0 | 25.0 | -- |
| Identify features which were particularly successful in meeting audience's needs and repeating these, e.g. sound effects | IT | 8 | f | 1 | 2 | 3 | 1 | -- | 1 | -- | 8 | f | 2 | -- | -- | 1 | 4 | 1 | -- |
| | | | % | 12.5 | 25.0 | 37.5 | 12.5 | -- | 12.5 | -- | | % | 25.0 | -- | -- | 12.5 | 50.0 | 12.5 | -- |
| | TR | 6 | f | -- | -- | -- | 3 | 3 | -- | -- | 6 | f | -- | -- | -- | 1 | 4 | 1 | -- |
| | | | % | -- | -- | -- | 50.0 | 50.0 | -- | -- | | % | -- | -- | -- | 16.7 | 66.7 | 16.7 | -- |
| | FI | 11 | f | 4 | 2 | 1 | 3 | 1 | -- | -- | 7 | f | 1 | 2 | 3 | -- | -- | 1 | -- |
| | | | % | 36.4 | 18.2 | 9.1 | 27.3 | 9.1 | -- | -- | | % | 14.3 | 28.6 | 42.9 | -- | -- | 14.3 | -- |
| | DE | 3 | f | 2 | -- | -- | -- | 1 | -- | -- | 4 | f | 1 | 1 | -- | -- | 1 | 1 | -- |
| | | | % | 66.7 | -- | -- | -- | 33.3 | -- | -- | | % | 25.0 | 25.0 | -- | -- | 25.0 | 25.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

9) “Awareness of Audience” Sub-Dimension of Media Literacy Knowledge, Skills and Understanding Developed in DST Activity

For awareness of audience sub-dimension, we focused on the action of creating films which reflected interests of peers. The both items in this action have an almost equal percentage around 20.0%. No improvement is observed in these items, as we compare the two project years’ findings (see Table 5.42).

Regarding the country-specific results in the awareness of audience sub-dimension (see Table 5.43), teachers from Turkey reported that children showed most competency in “identify themes which will interest the audience (family, play, jungles)” item. For Germany, the highest percentage is “identify props and soundtracks which will attract the audience” item. The percentage of competent children is the same for Finland in both items, whereas teachers from Italy did not report competency in “most of the children” and “all” levels for this sub-dimension.

Comparing two project years in this sub-dimension, in Turkey children progressed in both items of “identify themes which will interest the audience” and “identify props and soundtracks which will attract the audience”. In Italy and Finland, however, children did not demonstrated improvement regarding the items under this action. For Germany, the percentages of competent children at both skills are lower than half for both project years.

Table 5.42. Awareness of audience (action: creating films which reflected interests of peers): Findings on total data

| Awareness of Audience | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|---|-----|-----------------------------|------|------|------|------|-----|-----|-----------------------------|------|------|------|------|-----|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Identify themes which will interest the audience (family, play, jungles) | f | 6 | 7 | 4 | 4 | 4 | 2 | 1 | 7 | 4 | 4 | 5 | 4 | 1 | -- |
| | % | 21.4 | 25.0 | 14.3 | 14.3 | 14.3 | 7.1 | 3.6 | 28.0 | 16.0 | 16.0 | 20.0 | 16.0 | 4.0 | -- |
| Identify props and soundtracks which will attract the audience | f | 7 | 5 | 6 | 3 | 6 | -- | 1 | 7 | 3 | 6 | 5 | 3 | 1 | -- |
| | % | 25.0 | 17.9 | 21.4 | 10.7 | 21.4 | -- | 3.6 | 28.0 | 12.0 | 24.0 | 20.0 | 12.0 | 4.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.43. Awareness of audience (action: creating films which reflected interests of peers): Country-specific findings

| Awareness of Audience | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|--|---------|----------------------|-----|------|------|------|------|------|------|-----|----------------------|-----|------|------|------|------|------|------|----|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Identify themes which will interest the audience (family, play, jungles) | IT | 8 | f | 2 | 4 | 2 | -- | -- | -- | -- | 8 | f | 3 | -- | 3 | 2 | -- | -- | -- |
| | | | % | 25.0 | 50.0 | 25.0 | -- | -- | -- | -- | | % | 37.5 | -- | 37.5 | 25.0 | -- | -- | -- |
| | TR | 6 | f | -- | -- | -- | 2 | 2 | 2 | -- | 6 | f | -- | -- | -- | 1 | 4 | 1 | -- |
| | | | % | -- | -- | -- | 33.3 | 33.3 | 33.3 | -- | | % | -- | -- | -- | 16.7 | 66.7 | 16.7 | -- |
| | FI | 11 | f | 3 | 2 | 2 | 1 | 2 | -- | 1 | 7 | f | 3 | 2 | 1 | 1 | -- | -- | -- |
| | | | % | 27.3 | 18.2 | 18.2 | 9.1 | 18.2 | -- | 9.1 | | % | 42.9 | 28.6 | 14.3 | 14.3 | -- | -- | -- |
| | DE | 3 | f | 1 | 1 | -- | 1 | -- | -- | -- | 4 | f | 1 | 2 | -- | 1 | -- | -- | -- |
| | | | % | 33.3 | 33.3 | -- | 33.3 | -- | -- | -- | | % | 25.0 | 50.0 | -- | 25.0 | -- | -- | -- |
| Identify props and soundtracks which will attract the audience | IT | 8 | f | 2 | 3 | 3 | -- | -- | -- | 8 | f | 3 | -- | 4 | 1 | -- | -- | -- | |
| | | | % | 25.0 | 37.5 | 37.5 | -- | -- | -- | -- | | % | 37.5 | -- | 50.0 | 12.5 | -- | -- | -- |
| | TR | 6 | f | -- | -- | -- | 3 | 3 | -- | -- | 6 | f | -- | -- | -- | 2 | 3 | 1 | -- |
| | | | % | -- | -- | -- | 50.0 | 50.0 | -- | -- | | % | -- | -- | -- | 33.3 | 50.0 | 16.7 | -- |
| | FI | 11 | f | 3 | 2 | 3 | -- | 2 | -- | 1 | 7 | f | 3 | 1 | 2 | 1 | -- | -- | -- |
| | | | % | 27.3 | 18.2 | 27.3 | -- | 18.2 | -- | 9.1 | | % | 42.9 | 14.3 | 28.6 | 14.3 | -- | -- | -- |
| | DE | 3 | f | 2 | -- | -- | -- | 1 | -- | -- | 4 | f | 1 | 2 | -- | 1 | -- | -- | -- |
| | | | % | 66.7 | -- | -- | -- | 33.3 | -- | -- | | % | 25.0 | 50.0 | -- | 25.0 | -- | -- | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

5.2.3 Findings on Social Skills Evaluation

In social skills evaluation section, first we asked teachers to report what children have learned throughout the DST projects, and to list the benefits in terms of children's social skills development.

When the benefits in terms of social skills across the countries are examined based on the total frequencies and percentages of pre-specified categories (see Table 5.45), it is found that children developed in the "cooperation" item at most both for each year (82.1% for the 1st year; 68.0% for the 2nd year) and the total of two implementation years (75.5%). "Respect to other" also comes forth with 68.0% for the total projects of the 2nd year. "Motivation", on the other hand, has the lowest percentage in the total of both project years (9.4%) and also for each of the implementation years (10.7% for the 1st year; 8.0% for the 2nd year).

The country-specific results based on total number of projects implemented in both project years have revealed that children from Italy and Finland showed "respect to others" besides "cooperation". For Turkey and Germany, "effective communication" comes second after "cooperation", indicating that children worked efficiently in groups; they shared ideas and materials during their projects throughout the project years.

Comparing two project years, it can be observed that across all countries the most improvement occurred in "respect to others" item, moving from 35.7% to 68.0% through the project years. Regarding the country specific results, most improvement is observed in "respect to others" for Italy, Turkey and Finland. In addition to this category, children also demonstrated development in "attention and concentration" and "motivation" categories in Turkey. Other than the categories found in the table, teachers from Finland reported that children also learned "finding strengths in oneself and others", "making compromises" and "showing consideration for all group members". Flexibility, perseverance and trust are among the other categories emerged in teachers' reports. These comparative results indicate that, cooperation, effective communication and respect to others are prominent categories that DST projects have an effect on, according to teachers' observations.

Table 5.45. What children have learned and benefits in terms of children’s social skills development

| Benefits in terms of Social Skills Development | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|--|---------|----------------------|----|-------|----------------------|----|-------|-------|----|-------|
| | | N | f | % | N | f | % | N | f | % |
| Cooperation | IT | 8 | 6 | 75.0 | 8 | 3 | 37.5 | 16 | 9 | 56.3 |
| | TR | 6 | 5 | 83.3 | 6 | 3 | 50.0 | 12 | 8 | 66.7 |
| | FI | 11 | 9 | 81.8 | 7 | 7 | 100.0 | 18 | 16 | 88.9 |
| | DE | 3 | 3 | 100.0 | 4 | 4 | 100.0 | 7 | 7 | 100.0 |
| | Total | 28 | 23 | 82.1 | 25 | 17 | 68.0 | 53 | 40 | 75.5 |
| Effective communication | IT | 8 | 4 | 50.0 | 8 | 1 | 12.5 | 16 | 5 | 31.3 |
| | TR | 6 | 4 | 66.7 | 6 | 2 | 33.3 | 12 | 6 | 50.0 |
| | FI | 11 | 3 | 27.3 | 7 | 5 | 71.4 | 18 | 8 | 44.4 |
| | DE | 3 | 3 | 100.0 | 4 | 3 | 75.0 | 7 | 6 | 85.7 |
| | Total | 28 | 14 | 50.0 | 25 | 11 | 44.0 | 53 | 25 | 47.2 |
| Transfer of information | IT | 8 | 2 | 25.0 | 8 | 1 | 12.5 | 16 | 3 | 18.8 |
| | TR | 6 | 3 | 50.0 | 6 | -- | -- | 12 | 3 | 25.0 |
| | FI | 11 | 3 | 37.5 | 7 | 2 | 28.6 | 18 | 5 | 27.8 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 8 | 28.6 | 25 | 3 | 12.0 | 53 | 11 | 20.8 |
| Self-confidence | IT | 8 | 1 | 12.5 | 8 | -- | -- | 16 | 1 | 6.3 |
| | TR | 6 | 3 | 50.0 | 6 | -- | -- | 12 | 3 | 25.0 |
| | FI | 11 | 2 | 18.2 | 7 | -- | -- | 18 | 2 | 11.1 |
| | DE | 3 | 1 | 33.3 | 4 | 3 | 75.0 | 7 | 4 | 57.1 |
| | Total | 28 | 7 | 25.0 | 25 | 3 | 12.0 | 53 | 10 | 18.9 |
| Responsibility | IT | 8 | -- | -- | 8 | 3 | 37.5 | 16 | 3 | 18.8 |
| | TR | 6 | 1 | 16.7 | 6 | -- | -- | 12 | 1 | 8.3 |
| | FI | 11 | 1 | 9.1 | 7 | 1 | 14.3 | 18 | 2 | 11.1 |
| | DE | 3 | 2 | 66.7 | 4 | 3 | 75.0 | 7 | 5 | 71.4 |
| | Total | 28 | 4 | 14.3 | 25 | 7 | 28.8 | 53 | 11 | 20.8 |
| Decision-making | IT | 8 | 1 | 12.5 | 8 | 4 | 50.0 | 16 | 5 | 31.3 |
| | TR | 6 | 1 | 16.7 | 6 | -- | -- | 12 | 1 | 8.3 |
| | FI | 11 | 4 | 36.4 | 7 | 3 | 42.9 | 18 | 7 | 38.9 |
| | DE | 3 | 1 | 33.3 | 4 | 3 | 75.0 | 7 | 4 | 57.1 |
| | Total | 28 | 7 | 25.0 | 25 | 10 | 40.0 | 53 | 17 | 32.1 |
| Respect to others | IT | 8 | 3 | 37.5 | 8 | 6 | 75.0 | 16 | 9 | 56.3 |
| | TR | 6 | -- | -- | 6 | 1 | 16.7 | 12 | 1 | 8.3 |
| | FI | 11 | 6 | 54.5 | 7 | 7 | 100.0 | 18 | 13 | 72.2 |
| | DE | 3 | 1 | 33.3 | 4 | 3 | 75.0 | 7 | 4 | 57.1 |
| | Total | 28 | 10 | 35.7 | 25 | 17 | 68.0 | 53 | 27 | 50.9 |
| Attention and concentration | IT | 8 | 3 | 37.5 | 8 | 1 | 12.5 | 16 | 4 | 25.0 |
| | TR | 6 | -- | -- | 6 | 1 | 16.7 | 12 | 1 | 8.3 |
| | FI | 11 | 5 | 45.5 | 7 | 2 | 28.6 | 18 | 7 | 38.9 |
| | DE | 3 | 1 | 33.3 | 4 | 2 | 50.0 | 7 | 3 | 42.9 |
| | Total | 28 | 9 | 32.1 | 25 | 6 | 24.0 | 53 | 15 | 28.3 |
| Motivation | IT | 8 | 1 | 12.5 | 8 | 1 | 12.5 | 16 | 2 | 12.5 |
| | TR | 6 | -- | -- | 6 | 1 | 16.7 | 12 | 1 | 8.3 |
| | FI | 11 | 1 | 9.1 | 7 | -- | -- | 18 | 1 | 5.6 |
| | DE | 3 | 1 | 33.3 | 4 | -- | -- | 7 | 1 | 14.3 |
| | Total | 28 | 3 | 10.7 | 25 | 2 | 8.0 | 53 | 5 | 9.4 |

Teachers also reported their observations of children’s social knowledge, skills and understanding developed in DST activity within the sub-dimensions of: (1) relationships, (2) communication, (3) cognitive skills, and (4) play disconnection/disruption. They filled out the form according to children’s observed skills based on the number of children who demonstrated the relevant skill. Separately for each sub-dimension, we first present the

findings regarding all partner countries data, followed by country-specific results. We also analyzed the development, comparing results of two project years by considering the frequencies and percentages at “*most of the children*” and “*all children*” levels for both years. The comparative results were presented for all partner countries except for Germany, since Germany carried out each project with different groups of children throughout both years.

1) “Relationships” Sub-Dimension of Social Knowledge, Skills and Understanding Developed in DST Activity

For relationships sub-dimension, the overall highest percentage across all countries regarding all projects conducted in both years (82.1% for the 1st year; 84.9% for the 2nd year, when the sum of percentages observed for “most children” and “all children” categories are considered) is in the item of “shows positive emotions during play/use humor smiles, laughs, claps approvingly, attentive” (see Table 5.46). “Express verbal statements in the first-person plural” (e.g. “We can do this.” or “Let’s do this”) item, on the other hand, has the overall lowest percentage in the 2nd year, whereas “encourage others to join play welcomes, invites activity partners” item has the overall lowest percentage in the 1st year. Most improvement across all countries occurred in “encourage others to join play welcomes, invites activity partners” item, moving from 53.6% to 68.0% through the project years.

Regarding the country specific results in the relationships sub-dimension (see Table 5.47), the percentages of competent children is highest in “show positive emotions during play/use humor smiles, laughs, claps approvingly, attentive” for Italy, Finland and Germany. Teachers from Turkey reported that children showed most competency in both “show positive emotions during play/use humor smiles, laughs, claps approvingly, attentive” and “encourage others to join play welcomes, invites activity partners” items.

For the same sub-dimension, it is found that participant children showed most improvement in “express verbal statements in the first-person plural” item in Italy. Participant children from Turkey, on the other hand, remained at the same high level in “show positive emotions during play/use humor, smiles, laughs, claps approvingly, attentive” and “encourage others to join play welcomes, invites activity partners” items. For Finland, most improvement occurred in “encourage others to join play welcomes, invites activity partners” item.

2) “Communication” Sub-Dimension of Social Knowledge, Skills and Understanding Developed in DST Activity

For communication sub-dimension, the overall highest percentage in this action across all countries regarding all projects conducted in both years is in “engage in dialogues” item (78.6% for the 1st year; 92.0% for the 2nd year, when the sum of percentages observed for “most children” and “all children” are considered) (see Table 5.48). “Ask questions to the group” item, on the other hand, has the overall lowest percentage (35.7% for the 1st year; 56.0% for the 2nd year), however the most improvement across all countries also occurred in the same item.

Regarding the country specific findings in this sub-dimension (see Table 5.49), the percentages of competent children is the highest in “engage in dialogues” item for all partner countries. In addition to this item, teachers from Turkey also reported that children showed most competencies in “comment on other children’s ideas or theories, respond to peers’ thoughts and ideas” and “ask questions to the group” items.

For this sub-dimension, participant children showed most improvement in “listen to the ideas of others attentive while others are speaking” item in Italy. Participant children from Turkey, on the other hand, remained at the same high level in “comment on other children’s ideas or theories, respond to peers’ thoughts and ideas”, “ask questions to the group” and “engage in dialogues” items. For Finland, most improvement occurred in “ask questions to the group” item.

Table 5.46. Relationships: Findings on total data

| Relationships | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|---|-----|-----------------------------|-----|------|------|------|------|-----|-----------------------------|-----|------|------|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Expresses verbal statements in the first-person plural | f | 1 | 2 | 3 | 3 | 6 | 11 | 2 | 1 | 1 | 4 | 4 | 8 | 7 | -- |
| | % | 3.6 | 7.1 | 10.7 | 10.7 | 21.4 | 39.3 | 7.1 | 4.0 | 4.0 | 16.0 | 16.0 | 32.0 | 28.0 | -- |
| Shows positive emotions during play/use humor smiles, laughs, claps approvingly, attentive | f | -- | -- | 1 | 3 | 6 | 17 | 1 | -- | -- | 1 | 3 | 7 | 14 | -- |
| | % | -- | -- | 3.6 | 10.7 | 21.4 | 60.7 | 3.6 | -- | -- | 4.0 | 12.0 | 28.0 | 56.0 | -- |
| Encourages others to join play welcomes, invites activity partners | f | -- | 2 | 3 | 7 | 8 | 7 | 1 | -- | -- | 2 | 6 | 6 | 11 | -- |
| | % | -- | 7.1 | 10.7 | 25.0 | 28.6 | 25.0 | 3.6 | -- | -- | 8.0 | 24.0 | 24.0 | 44.0 | -- |
| Helps other children | f | -- | -- | 3 | 4 | 9 | 11 | 1 | -- | -- | 1 | 5 | 10 | 9 | -- |
| | % | -- | -- | 10.7 | 14.3 | 32.1 | 39.3 | 3.6 | -- | -- | 4.0 | 20.0 | 40.0 | 36.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.47. Relationships: Country-specific findings

| Relationships | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|---|---------|----------------------|--------|-----------|-----------|-----------|-----------|------------|-----------|-----------|----------------------|--------|-----------|-----------|-----------|-----------|-----------|-----------|----|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Expresses verbal statements in the first-person plural e.g., We can do this. Let's do this. | IT | 8 | f % | -- -- | -- -- | 2 25.0 | 1 12.5 | 1 12.5 | 4 50.0 | -- | 8 | f % | -- -- | -- -- | 1 12.5 | -- -- | 4 50.0 | 3 37.5 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 1 16.7 | 5 83.3 | -- | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 3 50.0 | 2 33.3 | -- |
| | FI | 11 | f % | -- -- | 2 18.2 | 1 9.1 | 2 18.2 | 3 27.3 | 1 9.1 | 2 18.2 | 7 | f % | -- -- | 1 14.3 | 2 28.6 | 1 14.3 | 1 14.3 | 2 28.6 | -- |
| | DE | 3 | f % | 1 33.3 | -- -- | -- -- | -- -- | 1 33.3 | 1 33.3 | -- | 4 | f % | 1 25.0 | -- -- | 1 25.0 | 2 50.0 | -- -- | -- -- | -- |
| Shows positive emotions during play/use humor smiles, laughs, claps approvingly, attentive | IT | 8 | f % | -- -- | -- -- | 1 12.5 | -- -- | 2 25.0 | 5 62.5 | -- | 8 | f % | -- -- | -- -- | 1 12.5 | -- -- | 4 50.0 | 3 37.5 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 1 16.7 | 5 83.3 | -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | 1 16.7 | 5 83.3 | -- |
| | FI | 11 | f % | -- -- | -- -- | -- -- | 1 9.1 | 2 18.2 | 7 63.6 | 1 9.1 | 7 | f % | -- -- | -- -- | -- -- | 1 14.3 | 1 14.3 | 5 71.4 | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | 2 66.7 | 1 33.3 | -- -- | -- | 4 | f % | -- -- | -- -- | -- -- | 2 50.0 | 1 25.0 | 1 25.0 | -- |
| Encourages others to join play welcomes, invites activity partners | IT | 8 | f % | -- -- | 1 12.5 | 1 12.5 | 1 12.5 | 3 37.5 | 2 25.0 | -- | 8 | f % | -- -- | -- -- | 1 12.5 | 1 12.5 | 4 50.0 | 2 25.0 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 1 16.7 | 5 83.3 | -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | 1 16.7 | 5 83.3 | -- |
| | FI | 11 | f % | -- -- | 1 9.1 | 2 18.2 | 4 36.4 | 3 27.3 | -- -- | 1 9.1 | 7 | f % | -- -- | -- -- | -- -- | 2 28.6 | 1 14.3 | 4 57.1 | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | 2 66.7 | 1 33.3 | -- -- | -- | 4 | f % | -- -- | 1 25.0 | -- -- | 3 75.0 | -- -- | -- -- | -- |
| Helps other children | IT | 8 | f % | -- -- | -- -- | 1 12.5 | 1 12.5 | 2 25.0 | 4 50.0 | -- | 8 | f % | -- -- | -- -- | -- -- | 3 37.5 | 4 50.0 | 1 12.5 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 1 16.7 | 5 83.3 | -- | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 2 33.3 | 3 50.0 | -- |
| | FI | 11 | f % | -- -- | -- -- | 2 18.2 | 3 27.3 | 3 27.3 | 2 18.2 | 1 9.1 | 7 | f % | -- -- | -- -- | -- -- | 5 71.4 | 2 28.6 | -- -- | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | -- -- | 3 100.0 | -- -- | -- | 4 | f % | -- -- | -- -- | 1 25.0 | 1 25.0 | 2 50.0 | -- -- | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.48. Communication: Findings on total data

| Communication | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|---|-----|-----------------------------|-----|------|------|------|------|-----|-----------------------------|----|------|------|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Listen to the ideas of others attentive while others are speaking | f | -- | -- | 4 | 9 | 10 | 4 | 1 | -- | -- | -- | 10 | 9 | 6 | -- |
| | % | -- | -- | 14.3 | 32.1 | 35.7 | 14.3 | 3.6 | -- | -- | -- | 40.0 | 36.0 | 24.0 | -- |
| Comment on other children's ideas or theories, respond to peers' thoughts and ideas | f | -- | -- | 4 | 10 | 6 | 7 | 1 | -- | -- | 2 | 7 | 10 | 6 | -- |
| | % | -- | -- | 14.3 | 35.7 | 21.4 | 25.0 | 3.6 | -- | -- | 8.0 | 28.0 | 40.0 | 24.0 | -- |
| Ask questions to the group | f | 1 | 2 | 6 | 8 | 6 | 4 | 1 | -- | -- | 8 | 3 | 6 | 8 | -- |
| | % | 3.6 | 7.1 | 21.4 | 28.6 | 21.4 | 14.3 | 3.6 | -- | -- | 32.0 | 12.0 | 24.0 | 32.0 | -- |
| Engage in dialogues | f | -- | -- | 2 | 3 | 14 | 8 | 1 | -- | -- | -- | 2 | 13 | 10 | -- |
| | % | -- | -- | 7.1 | 10.7 | 50.0 | 28.6 | 3.6 | -- | -- | -- | 8.0 | 52.0 | 40.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.49. Communication: County-specific findings

| Communication | Country | 1 st Year | | | | | | | | | 2 nd Year | | | | | | | | |
|---|---------|----------------------|--------|----------|-----------|-----------|-----------|-----------|-----------|----------|----------------------|--------|----------|----------|-----------|-----------|------------|-----------|----|
| | | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Listen to the ideas of others attentive while others are speaking | IT | 8 | f % | -- -- | -- -- | 2 25.0 | 4 50.0 | 1 12.5 | 1 12.5 | -- | 8 | f % | -- -- | -- -- | -- -- | 3 37.5 | 4 50.0 | 1 12.5 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 4 66.7 | 2 33.3 | -- | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 2 33.3 | 3 50.0 | -- |
| | FI | 11 | f % | -- -- | -- -- | 2 18.2 | 4 36.4 | 3 27.3 | 1 9.1 | 1 9.1 | 7 | f % | -- -- | -- -- | -- -- | 5 71.4 | 2 28.6 | - - | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | 1 33.3 | 2 66.7 | -- -- | -- -- | 4 | f % | -- -- | -- -- | -- -- | 1 25.0 | 1 25.0 | 2 50.0 | -- |
| Comment on other children's ideas or theories, respond to peers' thoughts and ideas | IT | 8 | f % | -- -- | -- -- | 1 12.5 | 4 50.0 | 2 25.0 | 1 12.5 | -- | 8 | f % | -- -- | -- -- | 1 12.5 | 3 37.5 | 2 25.0 | 2 25.0 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 2 33.3 | 4 66.7 | -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | 2 33.3 | 4 66.7 | -- |
| | FI | 11 | f % | -- -- | -- -- | 2 18.7 | 6 54.5 | -- -- | 2 18.2 | 1 9.1 | 7 | f % | -- -- | -- -- | -- -- | 3 42.9 | 4 57.1 | -- -- | -- |
| | DE | 3 | f % | -- -- | -- -- | 1 33.3 | -- -- | 2 66.7 | -- -- | -- -- | 4 | f % | -- -- | -- -- | 1 25.0 | 1 25.0 | 2 50.0 | -- -- | -- |
| Ask questions to the group | IT | 8 | f % | -- -- | -- -- | 2 25.0 | 3 37.5 | 3 37.5 | -- -- | -- | 8 | f % | -- -- | -- -- | 2 25.0 | 3 37.5 | 1 12.5 | 2 25.0 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 2 33.3 | 4 66.7 | -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | 3 50.0 | 3 50.0 | -- |
| | FI | 11 | f % | 1 9.1 | 2 18.2 | 3 27.3 | 4 36.4 | -- -- | -- -- | 1 9.1 | 7 | f % | -- -- | -- -- | 4 57.1 | -- -- | -- -- | 3 42.9 | -- |
| | DE | 3 | f % | -- -- | -- -- | 1 33.3 | 1 33.3 | 1 33.3 | -- -- | -- -- | 4 | f % | -- -- | -- -- | 2 50.0 | -- -- | 2 50.0 | -- -- | -- |
| Engage in dialogues | IT | 8 | f % | -- -- | -- -- | -- -- | 3 37.5 | 4 50.0 | 1 12.5 | -- | 8 | f % | -- -- | -- -- | -- -- | 2 25.0 | 4 50.0 | 2 25.0 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 2 33.3 | 4 66.7 | -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | 3 50.0 | 3 50.0 | -- |
| | FI | 11 | f % | -- -- | -- -- | 2 18.2 | -- -- | 6 54.5 | 2 18.2 | 1 9.1 | 7 | f % | -- -- | -- -- | -- -- | -- -- | 2 28.6 | 5 71.4 | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | -- -- | 2 66.7 | 1 33.3 | -- | 4 | f % | -- -- | -- -- | -- -- | -- -- | 4 100.0 | -- -- | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

3) “Cognitive Skills” Sub-Dimension of Social Knowledge, Skills and Understanding Developed in DST Activity

For cognitive skills sub-dimension, the overall highest percentage and the most improvement in this action across all countries and regarding all projects conducted in both years (67.9% for the 1st year; 84.0% for the 2nd year) is in “express their own theories/ideas verbally/graphically/physically explain thoughts” item, when the sum of percentages observed for “most children” and “all children” categories are considered (see Table 5.50). “Build on ideas that come from any individual or group” item, on the other hand, has the overall lowest percentage for the 1st year, when the total percentage for “most children” and “all children” categories is considered, whereas “use problem solving skill to figure out solutions with others” item appears to have the overall lowest percentage in the 2nd year.

Regarding the country specific results in the cognitive skills sub-dimension (see Table 5.51), the percentages of competent children is the highest in “express their own theories/ideas verbally/graphically/physically explain thoughts” item for Italy and Germany. Teachers from Turkey reported that children showed most competencies in “introduce new topics/ideas verbally, share ideas”, “use problem solving skill to figure out solutions with others” and “the group work determines the quality of work/projects” items. For Finland the highest percentage is observed in “the group work determines the quality of work/projects” item.

For the cognitive skills sub-dimension, participant children showed most improvement in “introduce new topics/ideas verbally, share ideas” item in Italy. Participant children from Turkey, on the other hand, showed most improvement in “build on ideas that come from any individual or group”, item. For Finland, most improvement occurred in “express their own theories/ideas verbally/graphically/physically explain thoughts” item.

4) “Play Disconnection/Disruption” Sub-Dimension of Social Knowledge, Skills and Understanding Developed in DST Activity

Regarding the play disconnection/disruption sub-dimension, findings show that, very little percentages of children in all partner countries showed disconnected or disruptive behavior throughout project’s activities (see Table 5.52 and Table 5.53).

In the 1st year, the item with the highest percentage across all the countries has appeared in terms of “withdraws from the activity” action, which is observed in 67.9% of the total yearly project summary reports within the category of “some children”, followed by “do not engage in purposeful activity/plan” action, which is observed in 53.6% of the yearly project summary reports again within “some children” category. In 60.7% of the total yearly project summary forms, on the other hand, it is reported by the teachers that the behaviors of “refuses to engage when invited” and “is disruptive during the activity and interactions seeks negative attention (e.g. yells, removes toys, interferes with the flow children’s activity)” have not been demonstrated by any of the children. In the 2nd year, the item with the highest percentage

across all the countries has appeared again in terms of “withdraws from the activity” action within the category of “some children”, demonstrating a descending percentage when compared with the 1st year (observed in 48.0% of total reports of the 2nd year). On the other hand, approximately in half or more than half percent of the yearly summaries of the 2nd year, it is reported that none of the children demonstrated play disconnection/disruption behaviors.

Table 5.50. Cognitive skills: Findings on total data

| Cognitive Skills | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|---|-----|-----------------------------|-----|------|------|------|------|-----|-----------------------------|----|------|------|------|------|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Express their own theories/ideas verbally/ graphically/physically explain thoughts | f | 2 | -- | 2 | 4 | 7 | 12 | 1 | -- | -- | -- | 4 | 8 | 13 | -- |
| | % | 7.1 | -- | 7.1 | 14.3 | 25.0 | 42.9 | 3.6 | -- | -- | -- | 16.0 | 32.0 | 52.0 | -- |
| Make modifications to their theory give an update to ideas | f | 2 | 2 | 2 | 5 | 14 | 2 | 1 | -- | -- | 1 | 10 | 7 | 7 | -- |
| | % | 7.1 | 7.1 | 7.1 | 17.9 | 50.0 | 7.1 | 3.6 | -- | -- | 4.0 | 40.0 | 28.0 | 28.0 | -- |
| Introduce new topics/ ideas verbally, share ideas | f | 2 | -- | 6 | 3 | 15 | 1 | 1 | -- | -- | 1 | 7 | 9 | 8 | -- |
| | % | 7.1 | -- | 21.4 | 10.7 | 53.6 | 3.6 | 3.6 | -- | -- | 4.0 | 28.0 | 36.0 | 32.0 | -- |
| Build on ideas that come from any individual or group | f | 2 | 1 | 4 | 8 | 10 | 3 | -- | -- | -- | 4 | 6 | 13 | 2 | -- |
| | % | 7.1 | 3.6 | 14.3 | 28.6 | 35.7 | 10.7 | -- | -- | -- | 16.0 | 24.0 | 52.0 | 8.0 | -- |
| Use problem solving skill to figure out solutions with others | f | 3 | -- | 7 | 3 | 12 | 3 | -- | -- | -- | 5 | 7 | 9 | 4 | -- |
| | % | 10.7 | -- | 25.0 | 10.7 | 42.9 | 10.7 | -- | -- | -- | 20.0 | 28.0 | 36.0 | 16.0 | -- |
| The group work determines the quality of work/projects | f | 3 | 1 | 6 | 2 | 11 | 5 | -- | -- | -- | 3 | 6 | 8 | 8 | -- |
| | % | 10.7 | 3.6 | 21.4 | 7.1 | 39.3 | 17.9 | -- | -- | -- | 12.0 | 24.0 | 32.0 | 32.0 | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.51. Cognitive Skills: Country-specific findings

| Cognitive Skills | Country | n | f/% | 1 st Year | | | | | | 2 nd Year | | | | | | | | | |
|---|---------|----|--------|----------------------|-----------|-----------|-----------|------------|------------|----------------------|---|--------|----------|----------|-----------|-----------|-----------|------------|----|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/% | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Express their own theories/ideas verbally/graphically/physically explain thoughts | IT | 8 | f % | -- -- | -- -- | -- -- | 1 12.5 | 2 25.0 | 5 62.5 | -- | 8 | f % | -- -- | -- -- | -- -- | 2 25.0 | 4 50.0 | 2 25.0 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 3 50.0 | 3 50.0 | -- | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 1 16.7 | 4 66.7 | -- |
| | FI | 11 | f % | 2 18.2 | -- | 2 18.2 | 3 27.3 | 2 18.2 | 1 9.1 | 1 9.1 | 7 | f % | -- -- | -- -- | -- -- | 1 14.3 | 3 42.9 | 3 42.9 | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | -- -- | -- -- | 3 100.0 | -- | 4 | f % | -- -- | -- -- | -- -- | -- -- | -- -- | 4 100.0 | -- |
| Make modifications to their theory give an update to ideas | IT | 8 | f % | -- -- | -- -- | -- -- | 4 50.0 | 2 25.0 | 2 25.0 | -- | 8 | f % | -- -- | -- -- | -- -- | 4 50.0 | 2 25.0 | 2 25.0 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 6 100.0 | -- | -- | 6 | f % | -- -- | -- -- | -- -- | 1 16.7 | 3 50.0 | 2 33.3 | -- |
| | FI | 11 | f % | 2 18.2 | 2 18.2 | 2 18.2 | 1 9.1 | 3 27.3 | -- | 1 9.1 | 7 | f % | -- -- | -- -- | 1 14.3 | 3 42.9 | 1 14.3 | 2 28.6 | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | -- -- | 3 100.0 | -- | -- | 4 | f % | -- -- | -- -- | -- -- | 2 50.0 | 1 25.0 | 1 25.0 | -- |
| Introduce new topics/ ideas verbally, share ideas | IT | 8 | f % | -- -- | -- -- | 2 25.0 | 3 37.5 | 2 25.0 | 1 12.5 | -- | 8 | f % | -- -- | -- -- | -- -- | 3 37.5 | 3 37.5 | 2 25.0 | -- |
| | TR | 6 | f % | -- -- | -- -- | -- -- | -- -- | 6 100.0 | -- | -- | 6 | f % | -- -- | -- -- | -- -- | -- -- | 3 50.0 | 3 50.0 | -- |
| | FI | 11 | f % | 2 18.2 | -- | 4 36.4 | -- | 4 36.4 | -- | 1 9.1 | 7 | f % | -- -- | -- -- | 1 14.3 | 2 28.6 | 2 28.6 | 2 28.6 | -- |
| | DE | 3 | f % | -- -- | -- -- | -- -- | -- -- | 3 100.0 | -- | -- | 4 | f % | -- -- | -- -- | -- -- | 2 50.0 | 1 25.0 | 1 25.0 | -- |

| | | | | | | | | | | | | | | | | | | | |
|---|----|----|---|------|-----|------|------|-------|------|----|---|---|----|----|------|------|-------|------|----|
| Build on ideas that come from any individual or group | IT | 8 | f | -- | -- | 3 | 1 | 3 | 1 | -- | 8 | f | -- | -- | 3 | 2 | 2 | 1 | -- |
| | | | % | -- | -- | 37.5 | 12.5 | 37.5 | 12.5 | -- | | % | -- | -- | 37.5 | 25.0 | 25.0 | 12.5 | -- |
| | TR | 6 | f | -- | -- | -- | 1 | 5 | -- | -- | 6 | f | -- | -- | -- | -- | 6 | -- | -- |
| | | | % | -- | -- | -- | 16.7 | 83.3 | -- | -- | | % | -- | -- | -- | -- | 100.0 | -- | -- |
| | FI | 11 | f | 2 | 1 | 1 | 4 | 1 | 2 | -- | 7 | f | -- | -- | -- | 2 | 4 | 1 | -- |
| | | | % | 18.2 | 9.1 | 9.1 | 36.4 | 9.1 | 18.2 | -- | | % | -- | -- | -- | 28.6 | 57.1 | 14.3 | -- |
| | DE | 3 | f | -- | -- | -- | 2 | 1 | -- | -- | 4 | f | -- | -- | 1 | 2 | 1 | -- | -- |
| | | | % | -- | -- | -- | 66.7 | 33.3 | -- | -- | | % | -- | -- | 25.0 | 50.0 | 25.0 | -- | -- |
| Use problem solving skill to figure out solutions with others | IT | 8 | f | -- | -- | 3 | 1 | 2 | 2 | -- | 8 | f | -- | -- | 1 | 3 | 2 | 2 | - |
| | | | % | -- | -- | 37.5 | 12.5 | 35.0 | 25.0 | -- | | % | -- | -- | 12.5 | 37.5 | 25.0 | 25.0 | - |
| | TR | 6 | f | -- | -- | -- | -- | 6 | -- | -- | 6 | f | -- | -- | - | - | 4 | 2 | - |
| | | | % | -- | -- | -- | -- | 100.0 | -- | -- | | % | -- | -- | - | - | 66.7 | 33.3 | - |
| | FI | 11 | f | 3 | -- | 3 | 2 | 2 | 1 | -- | 7 | f | -- | -- | 2 | 2 | 3 | -- | -- |
| | | | % | 27.3 | -- | 27.3 | 18.2 | 18.2 | 9.1 | -- | | % | -- | -- | 28.6 | 28.6 | 42.9 | -- | -- |
| | DE | 3 | f | -- | -- | 1 | -- | 2 | -- | -- | 4 | f | -- | -- | 2 | 2 | -- | -- | -- |
| | | | % | -- | -- | 33.3 | -- | 66.7 | -- | -- | | % | -- | -- | 50.0 | 50.0 | -- | -- | -- |
| The group work determines the quality of work/projects | IT | 8 | f | -- | -- | 4 | -- | -- | 4 | -- | 8 | f | -- | -- | 3 | 2 | 1 | 2 | -- |
| | | | % | -- | -- | 50.0 | -- | -- | 50.0 | -- | | % | -- | -- | 37.5 | 25.0 | 12.5 | 25.0 | -- |
| | TR | 6 | f | -- | -- | -- | -- | 6 | -- | -- | 6 | f | -- | -- | -- | -- | 1 | 5 | -- |
| | | | % | -- | -- | -- | -- | 100.0 | -- | -- | | % | -- | -- | -- | -- | 16.7 | 83.3 | -- |
| | FI | 11 | f | 2 | 1 | 2 | 1 | 4 | 1 | -- | 7 | f | -- | -- | -- | 2 | 4 | 1 | -- |
| | | | % | 18.2 | 9.1 | 18.2 | 9.1 | 36.4 | 9.1 | -- | | % | -- | -- | -- | 28.6 | 57.1 | 14.3 | -- |
| | DE | 3 | f | 1 | -- | -- | 1 | 1 | -- | -- | 4 | f | -- | -- | -- | 2 | 2 | -- | -- |
| | | | % | 33.3 | -- | -- | 33.3 | 33.3 | -- | -- | | % | -- | -- | -- | 50.0 | 50.0 | -- | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.52. Play disconnection/disruption: Findings on total data

| Play Disconnection/Disruption | f/% | 1 st Year (n=28) | | | | | | | 2 nd Year (n=25) | | | | | | |
|--|-----|-----------------------------|------|------|-----|-----|----|----|-----------------------------|------|------|-----|----|----|----|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Do not engage in a purposeful activity/play | f | 1 | 10 | 15 | 1 | 1 | -- | -- | 1 | 14 | 9 | 1 | -- | -- | -- |
| | % | 3.6 | 35.7 | 53.6 | 3.6 | 3.6 | -- | -- | 4.0 | 56.0 | 36.0 | 4.0 | -- | -- | -- |
| Withdraws from the activity | f | 1 | 8 | 19 | -- | -- | -- | -- | 1 | 12 | 12 | -- | -- | -- | -- |
| | % | 3.6 | 28.6 | 67.9 | -- | -- | -- | -- | 4.0 | 48.0 | 48.0 | -- | -- | -- | -- |
| Refuses to engage when invited | f | 1 | 17 | 9 | -- | 1 | -- | -- | 2 | 14 | 9 | -- | -- | -- | -- |
| | % | 3.6 | 60.7 | 32.1 | -- | 3.6 | -- | -- | 8.0 | 56.0 | 36.0 | -- | -- | -- | -- |
| Is disruptive during the activity and interactions seeks negative attention (e.g. yells, removes toys, interferes with the flow children's activity) | f | 1 | 17 | 9 | 1 | -- | -- | -- | 3 | 14 | 7 | 1 | -- | -- | -- |
| | % | 3.6 | 60.7 | 32.1 | 3.6 | -- | -- | -- | 12.0 | 56.0 | 28.0 | 4.0 | -- | -- | -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

Table 5.53. Play disconnection/disruption: Country-specific findings

| Play Disconnection/ Disruption | Country | n | f/ % | 1 st Year | | | | | | | 2 nd Year | | | | | | | | |
|---|---------|----|---------|----------------------|------------|------------|-----------|----------|----------|----------|----------------------|-----------|------------|-----------|-----------|----------|----------|----------|----------|
| | | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | n | f/ % | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Do not engage in a purposeful activity/play | IT | 8 | f % | -- -- | 3 37.5 | 4 50.0 | 1 12.5 | -- -- | -- -- | -- -- | 8 | f % | 1 12.5 | 3 37.5 | 4 50.0 | -- -- | -- -- | -- -- | -- -- |
| | TR | 6 | f % | -- -- | -- -- | 6 100.0 | -- -- | -- -- | -- -- | 6 | f % | -- -- | 6 100.0 | -- -- | -- -- | -- -- | -- -- | -- -- | -- -- |
| | FI | 11 | f % | 1 9.1 | 6 54.5 | 3 27.3 | -- -- | 1 9.1 | -- -- | 7 | f % | -- -- | 2 28.6 | 4 57.1 | 1 14.3 | -- -- | -- -- | -- -- | -- -- |
| | DE | 3 | f % | -- -- | 1 33.3 | 2 66.7 | -- -- | -- -- | -- -- | 4 | f % | 3 75.0 | 1 25.0 | -- -- | -- -- | -- -- | -- -- | -- -- | -- -- |
| Withdraws from the activity | IT | 8 | f % | -- -- | 3 37.5 | 5 62.5 | -- -- | -- -- | -- -- | 8 | f % | 1 12.5 | 3 37.5 | 4 50.0 | -- -- | -- -- | -- -- | -- -- | -- -- |
| | TR | 6 | f % | -- -- | 1 16.7 | 5 83.3 | -- -- | -- -- | -- -- | 6 | f % | -- -- | 6 100.0 | -- -- | -- -- | -- -- | -- -- | -- -- | -- -- |
| | FI | 11 | f % | 1 9.1 | 4 36.4 | 6 54.5 | -- -- | -- -- | -- -- | 7 | f % | -- -- | 1 14.3 | 6 85.7 | -- -- | -- -- | -- -- | -- -- | -- -- |
| | DE | 3 | f % | -- -- | -- -- | 3 100.0 | -- -- | -- -- | -- -- | 4 | f % | -- -- | 2 50.0 | 2 50.0 | -- -- | -- -- | -- -- | -- -- | -- -- |
| Refuses to engage when invited | IT | 8 | f % | -- -- | 5 62.5 | 3 37.5 | -- -- | -- -- | -- -- | 8 | f % | 2 25.0 | 4 50.0 | 2 25.0 | -- -- | -- -- | -- -- | -- -- | -- -- |
| | TR | 6 | f % | -- -- | 3 50.0 | 3 50.0 | -- -- | -- -- | -- -- | 6 | f % | -- -- | 5 83.3 | 1 16.7 | -- -- | -- -- | -- -- | -- -- | -- -- |
| | FI | 11 | f % | 1 9.1 | 6 54.5 | 3 27.3 | -- -- | 1 9.1 | -- -- | 7 | f % | -- -- | 2 28.6 | 5 71.4 | -- -- | -- -- | -- -- | -- -- | -- -- |
| | DE | 3 | f % | -- -- | 3 100.0 | -- -- | -- -- | -- -- | -- -- | 4 | f % | 3 75.0 | 1 25.0 | -- -- | -- -- | -- -- | -- -- | -- -- | -- -- |
| Is disruptive during the activity and interactions seeks negative attention (e.g. yells, removes toys, interferes with the flow children's activity) | IT | 8 | f % | -- -- | 6 75.0 | 2 25.0 | -- -- | -- -- | -- -- | 8 | f % | 2 25.0 | 5 62.5 | 1 12.5 | -- -- | -- -- | -- -- | -- -- | -- -- |
| | TR | 6 | f % | -- -- | 3 50.0 | 3 50.0 | -- -- | -- -- | -- -- | 6 | f % | -- -- | 4 66.7 | 2 33.3 | -- -- | -- -- | -- -- | -- -- | -- -- |
| | FI | 11 | f % | 1 9.1 | 6 54.5 | 3 27.3 | 1 9.1 | -- -- | -- -- | 7 | f % | 1 14.3 | 3 42.9 | 2 28.6 | 1 14.3 | -- -- | -- -- | -- -- | -- -- |
| | DE | 3 | f % | -- -- | 2 66.7 | 1 33.3 | -- -- | -- -- | -- -- | 4 | f % | -- -- | 2 50.0 | 2 50.0 | -- -- | -- -- | -- -- | -- -- | -- -- |

0: not applicable, 1: none, 2: some, 3: approximately half as much, 4: most children, 5: all, 6: not mentioned

5.2.4 Findings on Implementation of Projects

Under this heading, we focused on the implementation of the projects. Teachers were asked about the (1) problems they encountered, (2) the impact of the project on their personal and professional development, and (3) children's overall response to project's activities. Table 5.54 presents frequencies and percentages of pre-specified categories regarding the problems teachers reported in yearly project summary forms.

Table 5.54. Problems encountered when implementing projects throughout the academic year

| Problems Encountered | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|--|---------|----------------------|----|-------|----------------------|----|-------|-------|----|------|
| | | N | f | % | N | f | % | N | f | % |
| Teachers' having insufficient technology skills | IT | 8 | 4 | 50.0 | 8 | 3 | 37.5 | 16 | 7 | 43.8 |
| | TR | 6 | 1 | 16.7 | 6 | -- | -- | 12 | 1 | 8.3 |
| | FI | 11 | 1 | 9.1 | 7 | -- | -- | 18 | 1 | 5.6 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 6 | 21.4 | 25 | 3 | 12.0 | 53 | 9 | 17.0 |
| Children's not being autonomous in technology use | IT | 8 | 4 | 50.0 | 8 | -- | -- | 16 | 4 | 25.0 |
| | TR | 6 | 1 | 16.7 | 6 | -- | -- | 12 | 1 | 8.3 |
| | FI | 11 | 5 | 45.5 | 7 | 2 | 28.6 | 18 | 7 | 38.9 |
| | DE | 3 | 1 | 33.3 | 4 | -- | -- | 7 | 1 | 14.3 |
| | Total | 28 | 11 | 39.3 | 25 | 2 | 8.0 | 53 | 13 | 24.5 |
| Limited technological facilities | IT | 8 | 2 | 25.0 | 8 | 2 | 25.0 | 16 | 4 | 25.0 |
| | TR | 6 | 1 | 16.7 | 6 | -- | -- | 12 | 1 | 8.3 |
| | FI | 11 | 2 | 18.2 | 7 | -- | -- | 18 | 2 | 11.1 |
| | DE | 3 | 3 | 100.0 | 4 | 2 | 50.0 | 7 | 5 | 71.4 |
| | Total | 28 | 8 | 28.6 | 25 | 4 | 16.0 | 53 | 12 | 22.6 |
| Need of a longer and continuous time to implement the projects | IT | 8 | 2 | 25.0 | 8 | 4 | 50.0 | 16 | 6 | 37.5 |
| | TR | 6 | 3 | 50.0 | 6 | 2 | 33.3 | 12 | 5 | 41.7 |
| | FI | 11 | 4 | 36.4 | 7 | 4 | 57.1 | 18 | 8 | 44.4 |
| | DE | 3 | 1 | 33.3 | 4 | 4 | 100.0 | 7 | 5 | 71.4 |
| | Total | 28 | 10 | 35.7 | 25 | 14 | 56.0 | 53 | 24 | 45.3 |
| Difficulties in organization of small group work | IT | 8 | 1 | 12.5 | 8 | 1 | 12.5 | 16 | 2 | 12.5 |
| | TR | 6 | -- | -- | 6 | 2 | 33.3 | 12 | 2 | 16.7 |
| | FI | 11 | 3 | 27.3 | 7 | 5 | 71.4 | 18 | 8 | 44.4 |
| | DE | 3 | 2 | 66.7 | 4 | 4 | 100.0 | 7 | 6 | 85.7 |
| | Total | 28 | 6 | 21.4 | 25 | 12 | 48.0 | 53 | 18 | 34.0 |
| Absence/insufficient continuity of children | IT | 8 | -- | -- | 8 | -- | -- | 16 | -- | -- |
| | TR | 6 | 3 | 50.0 | 6 | -- | -- | 12 | 3 | 25.0 |
| | FI | 11 | 1 | 9.1 | 7 | 2 | 28.6 | 18 | 3 | 16.7 |
| | DE | 3 | -- | -- | 4 | 3 | 75.0 | 7 | 3 | 42.9 |
| | Total | 28 | 4 | 14.3 | 25 | 5 | 20.0 | 53 | 9 | 17.0 |

Regarding the *problems encountered during the project's activities*, teachers mostly pointed out the "need of a longer and continuous time to implement the projects" for the 2nd project year (56.0%) with an increasing percent through the implementation years and for the total of the both implementation years (45.35). Since time was a major issue by implementing the projects for teachers of all partner countries, this finding can be due to the point that teachers experienced difficulties in integrating project's activities with their curriculum. For the 1st year, on the other hand, the highest percentage is observed in "children's not being

autonomous in technology use” category (39.3%), however the percentage is found to decrease dramatically in the 2nd year (8.0%).

“Absence/insufficient continuity of children”, was the least reported problem in 1st year (14.3%) and in total projects (17.0%), however an increase is observed in terms of this problem through the project years. In terms of total projects of both implementation years, “teachers’ having insufficient technology skills” is also another problem observed with the same least percentage (17.0%). Although “difficulties in organization of small group work” is reported only in 21.4% of the total yearly project summaries, this problem become more evident in the 2nd implementation year; therefore becomes the second important problem throughout the project years after “need of a longer and continuous time to implement the projects”.

Regarding the country-specific results based on total number of projects implemented in both years, teachers from Italy indicated that they encountered “teachers’ having insufficient technology skills” problem most (43.8% in total). For Turkey, the major problem was “need of a longer and continuous time to implement the projects” (41.7% in total). For Finland, “difficulties in organization of small group work” (44.4% in total) is another major area that teachers reported besides the “need of a longer and continuous time to implement the projects” (again; 44.4% in total). For the teachers in Germany, on the other hand, “difficulties in organization of small group work” has appeared as a major concern for the total of both years (85.7%). Among the “other” categories that were underlined as problems were children’s short attention span, lack of concentration and motivation.

Comparing two project years, it can be observed that across all countries problems related with technology use and technological facilities decreased in 2nd year. However, percentages of problems regarding organization and time increased. The percentage of “difficulties in organization of small group work” increased most among these problems. Regarding the country specific results, the highest increase is observed in “need of a longer and continuous time to implement the projects” category for Italy and Finland. For teachers from Turkey, on the other hand, the problem of “difficulties in organization of small group work” increased most in the 2nd year. Based on Turkish teachers’ detailed reports, it is determined that teachers had difficulties in finding appropriate timing and space to implement the projects of the 2nd year in their schools. They stated that the classes attended the projects of the 1st year have been mixed in the 2nd year, because of this, they had to make an extra effort to keep the children same for both years.

Table 5.55 presents frequencies and percentages obtained for the pre-specified categories about the impact of the projects teachers reported in yearly project summaries.

Table 5.55. The impact of the projects that the teachers' implemented on teachers' personal and professional development

| The Impact of the Projects | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|--|---------|----------------------|----|------|----------------------|----|-------|-------|----|------|
| | | N | f | % | N | f | % | N | f | % |
| Gaining competence in preparing digital stories | IT | 8 | 4 | 50.0 | 8 | 5 | 62.5 | 16 | 9 | 56.3 |
| | TR | 6 | 2 | 33.3 | 6 | 3 | 50.0 | 12 | 5 | 41.7 |
| | FI | 11 | 2 | 18.2 | 7 | -- | -- | 18 | 2 | 11.1 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 8 | 28.6 | 25 | 8 | 32.0 | 53 | 16 | 30.2 |
| Development in technology use | IT | 8 | 4 | 50.0 | 8 | 7 | 87.5 | 16 | 11 | 68.8 |
| | TR | 6 | 3 | 50.0 | 6 | 3 | 50.0 | 12 | 6 | 50.0 |
| | FI | 11 | 4 | 36.4 | 7 | 4 | 57.1 | 18 | 8 | 44.4 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 11 | 39.3 | 25 | 14 | 56.0 | 53 | 25 | 47.2 |
| Increase in imaginary skills | IT | 8 | 1 | 12.5 | 8 | 1 | 12.5 | 16 | 2 | 12.5 |
| | TR | 6 | 2 | 33.3 | 6 | -- | -- | 12 | 2 | 16.7 |
| | FI | 11 | -- | -- | 7 | -- | -- | 18 | -- | -- |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 3 | 10.7 | 25 | 1 | 4.0 | 53 | 4 | 7.5 |
| Experience in different pedagogical practices | IT | 8 | 1 | 12.5 | 8 | 5 | 62.5 | 16 | 6 | 37.5 |
| | TR | 6 | 2 | 33.3 | 6 | 3 | 50.0 | 12 | 5 | 41.7 |
| | FI | 11 | 5 | 45.5 | 7 | 5 | 71.4 | 18 | 10 | 55.6 |
| | DE | 3 | 1 | 33.3 | 4 | 4 | 100.0 | 7 | 5 | 71.4 |
| | Total | 28 | 9 | 32.1 | 25 | 17 | 68.0 | 53 | 26 | 49.1 |
| Having deep knowledge about children's development | IT | 8 | 1 | 12.5 | 8 | 1 | 12.5 | 16 | 2 | 12.5 |
| | TR | 6 | -- | -- | 6 | 1 | 16.7 | 12 | 1 | 8.3 |
| | FI | 11 | 3 | 27.3 | 7 | 1 | 14.3 | 18 | 4 | 22.2 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 4 | 14.3 | 25 | 3 | 12.0 | 53 | 7 | 13.2 |
| Inspiration for further projects | IT | 8 | 1 | 12.5 | 8 | 2 | 25.0 | 16 | 3 | 18.8 |
| | TR | 6 | 1 | 16.7 | 6 | 1 | 16.7 | 12 | 2 | 16.7 |
| | FI | 11 | 2 | 18.2 | 7 | 1 | 14.3 | 18 | 3 | 16.7 |
| | DE | 3 | 2 | 66.7 | 4 | 3 | 75.0 | 7 | 5 | 71.4 |
| | Total | 28 | 6 | 21.4 | 25 | 7 | 28.0 | 53 | 13 | 24.5 |

Regarding the *impact of the projects that the teachers' implemented on teachers' personal and professional development*, teachers mostly pointed out that they developed their “experiences in different pedagogical practices” throughout the project years (49.1% in total). This impact has also the highest percentage in 2nd year (68.0%), while for the first year, the highest percentage is observed in “development in technology use” category (39.3%). “Increase in imaginary skills”, on the other hand, was the least reported impact in each of the implementation years (10.7% for the 1st year; 4.0% for the 2nd year) and in total projects (7.5%).

The country-specific findings based on total number of projects implemented in both project years have revealed that teachers from Italy (68.8% in total) and Turkey (50.0% in total) experienced “development in technology use” most. For Finland, “experience in different pedagogical practices” has the highest percentage (55.6% in total). The same item is also prominent for teachers in Germany (71.4% in total) as well as the item of “inspiration for further projects” (again; 71.4% in total). Among the “other” categories emerged for this section, “collaboration with colleagues” and “problem solving” were prominent.

Comparing two project years, the highest increase is observed in “experience in different pedagogical practices” category for Italy and Finland. For Turkey, “gaining competence in preparing digital stories” is another major development area that teachers reported besides “experience in different pedagogical practices”. Since most of the teachers in Turkey have not had any experience about DST projects before; the impact of gaining competence in preparing digital stories can be seen as significant from the perspective Turkey-specific findings. Teachers from Turkey also regarded DST approach as a valuable teaching method to enrich their pedagogical practices.

Table 5.56 below presents frequencies and percentages obtained for the pre-specified categories regarding the children’s response to project’s activities.

Table 5.56. Children’s response

| Children’s Response | Country | 1 st Year | | | 2 nd Year | | | Total | | |
|---------------------------|---------|----------------------|----|-------|----------------------|----|------|-------|----|------|
| | | N | f | % | N | f | % | N | f | % |
| Excitement | IT | 8 | 4 | 50.0 | 8 | 6 | 75.0 | 16 | 10 | 62.5 |
| | TR | 6 | 4 | 66.7 | 6 | 1 | 16.7 | 12 | 5 | 41.7 |
| | FI | 11 | 9 | 81.8 | 7 | 5 | 71.4 | 18 | 14 | 77.8 |
| | DE | 3 | -- | -- | 4 | 2 | 50.0 | 7 | 2 | 28.6 |
| | Total | 28 | 17 | 60.7 | 25 | 14 | 56.0 | 53 | 31 | 58.5 |
| Pleasure | IT | 8 | 5 | 62.5 | 8 | 4 | 50.0 | 16 | 9 | 56.3 |
| | TR | 6 | 6 | 100.0 | 6 | 2 | 33.3 | 12 | 8 | 66.7 |
| | FI | 11 | 7 | 63.6 | 7 | 2 | 28.6 | 18 | 9 | 50.0 |
| | DE | 3 | -- | -- | 4 | 2 | 50.0 | 7 | 2 | 28.6 |
| | Total | 28 | 18 | 64.3 | 25 | 10 | 40.0 | 53 | 28 | 52.8 |
| Curiosity | IT | 8 | 6 | 75.0 | 8 | 7 | 87.5 | 16 | 13 | 81.3 |
| | TR | 6 | 3 | 50.0 | 6 | -- | -- | 12 | 3 | 25.0 |
| | FI | 11 | 5 | 45.5 | 7 | 1 | 14.3 | 18 | 6 | 33.3 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 14 | 50.0 | 25 | 8 | 32.0 | 53 | 22 | 41.5 |
| Self-confidence | IT | 8 | -- | -- | 8 | -- | -- | 16 | -- | -- |
| | TR | 6 | 3 | 50.0 | 6 | 2 | 33.3 | 12 | 5 | 41.7 |
| | FI | 11 | 2 | 18.2 | 7 | 2 | 28.6 | 18 | 4 | 22.2 |
| | DE | 3 | -- | -- | 4 | 1 | 25.0 | 7 | 1 | 14.3 |
| | Total | 28 | 5 | 17.9 | 25 | 5 | 20.0 | 53 | 10 | 18.9 |
| Motivation | IT | 8 | 3 | 37.5 | 8 | 6 | 75.0 | 16 | 9 | 56.3 |
| | TR | 6 | 3 | 50.0 | 6 | 3 | 50.0 | 12 | 6 | 50.0 |
| | FI | 11 | 5 | 45.5 | 7 | 3 | 42.9 | 18 | 8 | 44.4 |
| | DE | 3 | -- | -- | 4 | 2 | 50.0 | 7 | 2 | 28.6 |
| | Total | 28 | 11 | 39.3 | 25 | 14 | 56.0 | 53 | 25 | 47.2 |
| Decision-making | IT | 8 | 1 | 12.5 | 8 | 1 | 12.5 | 16 | 2 | 12.5 |
| | TR | 6 | 2 | 33.3 | 6 | -- | -- | 12 | 2 | 16.7 |
| | FI | 11 | 1 | 9.1 | 7 | -- | -- | 18 | 1 | 5.6 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 4 | 14.3 | 25 | 1 | 4.0 | 53 | 5 | 9.4 |
| Positive inter-dependence | IT | 8 | 3 | 37.5 | 8 | 3 | 37.5 | 16 | 6 | 37.5 |
| | TR | 6 | 4 | 66.7 | 6 | 1 | 16.7 | 12 | 5 | 41.7 |
| | FI | 11 | 3 | 27.3 | 7 | 1 | 14.3 | 18 | 4 | 22.2 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 10 | 35.7 | 25 | 5 | 20.0 | 53 | 15 | 28.3 |
| Effective communication | IT | 8 | 1 | 12.5 | 8 | 2 | 25.0 | 16 | 3 | 18.8 |
| | TR | 6 | 4 | 66.7 | 6 | -- | -- | 12 | 4 | 33.3 |
| | FI | 11 | 1 | 9.1 | 7 | -- | -- | 18 | 1 | 5.6 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 6 | 21.4 | 25 | 2 | 8.0 | 53 | 8 | 15.1 |
| Self-expression | IT | 8 | -- | -- | 8 | 3 | 37.5 | 16 | 3 | 18.8 |
| | TR | 6 | 2 | 33.3 | 6 | 2 | 33.3 | 12 | 4 | 33.3 |
| | FI | 11 | 4 | 36.4 | 7 | 1 | 14.3 | 18 | 5 | 27.8 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 6 | 21.4 | 25 | 6 | 24.0 | 53 | 12 | 22.6 |
| Imagination | IT | 8 | -- | -- | 8 | 3 | 37.5 | 16 | 3 | 18.8 |
| | TR | 6 | 2 | 33.3 | 6 | 1 | 16.7 | 12 | 3 | 25.0 |
| | FI | 11 | -- | -- | 7 | -- | -- | 18 | -- | -- |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 2 | 7.1 | 25 | 4 | 16.0 | 53 | 6 | 11.3 |
| Cooperation | IT | 8 | 3 | 37.5 | 8 | 4 | 50.0 | 16 | 7 | 43.8 |
| | TR | 6 | 6 | 100.0 | 6 | 2 | 33.3 | 12 | 8 | 66.7 |
| | FI | 11 | 2 | 18.2 | 7 | -- | -- | 18 | 2 | 11.1 |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 11 | 39.3 | 25 | 6 | 24.0 | 53 | 17 | 32.1 |
| Meaningful learning | IT | 8 | 1 | 12.5 | 8 | 5 | 62.5 | 16 | 6 | 37.5 |
| | TR | 6 | 2 | 33.3 | 6 | -- | -- | 12 | 2 | 16.7 |
| | FI | 11 | -- | -- | 7 | -- | -- | 18 | -- | -- |
| | DE | 3 | -- | -- | 4 | -- | -- | 7 | -- | -- |
| | Total | 28 | 3 | 10.7 | 25 | 5 | 20.0 | 53 | 8 | 15.1 |

Regarding the *children’s response*, teachers mostly pointed out that children demonstrated the behavior of “excitement” during project’s activities (58.5% in total). This response has also the highest percentage in the 2nd year (56.0%) together with “motivation”, which also displays

the most increase through the project years, moving from 39.3% for the 1st year to 56.0% for the 2nd year. For the 1st year the highest percentage was in “pleasure” category (64.3%). “Decision making”, on the other hand, was the least reported response in total projects (9.4%).

The country-specific results based on total number of projects implemented in both project years showed that teachers from Italy reported “curiosity” response most (81.3% in total). For Turkey, “pleasure” and “cooperation” have the highest percentage (66.7% for each behavior, respectively). “Excitement” was the most reported response by the teachers in Finland (77.8%). Finally, for Germany, “pleasure”, “excitement” and “motivation” categories were prominent (28.6% for each behavior, respectively). Among “other” children’s responses emerged, “understanding the importance of everyone’s input for a collective outcome” and “courage to try new things” come forth. Teachers also reported some negative responses such as “impatience”, “lack of concentration” and “becoming tired”.

Comparing two project years, the highest increase is observed in “meaningful learning” for Italy. For Turkey, “motivation” and “self-expression” categories remained at the same level. For Finland, on the other hand, most improvement is observed in “self-confidence” category.

5.2.5 Conclusion

Yearly project summaries indicate that children had found opportunities to develop and exhibit their various media literacy and social skills. According the results on benefits in terms of media literacy skills, it is observed that children showed most competency in using technological devices and applications. This finding is valid for both total and country-specific results. As two years of the project implementations is compared, improvement is observed in skills such as “narrative skills”, “creativity” and “self-expression”. From this perspective, it can be concluded that, although the emphasis is on using technology in terms of benefits, there is an evidence of awareness in integrating use of technology with other skills. Research focusing on media literacy skills also underlines the point that, apart from becoming competent in the use of technology, media literacy activities should also focus on cognitive and social aspects. For example, Buckingham (2007), points out that even in most children’s leisure-time experiences, computers are much more than devices for information retrieval: they convey images and fantasies, provide opportunities for imaginative self-expression and play, and serve as a medium through which personal relationships are conducted. These skills, such as imagination, self-expression and mutual communication need critical analysis and creative production to be developed. From this point on, DST projects offer a variety of experiences for children, for a holistic development in media-literacy, rather than merely becoming fluent in the use of technological tools.

Regarding detailed findings for media literacy knowledge, skills and understanding children developed in DST activities, it can be observed through the findings in technical skills sub-dimension that children mostly demonstrated basic technical skills such as using touch screen and taking photos when interacting with a device or application. Findings in visual skills sub-

dimension point out that children had a chance to practice and develop their skills of move and position artifacts to take photos. For the art and pre-writing skills sub-dimensions, it can be observed that children already possessed these skills and found opportunities to exhibit and develop them at DST activities. From the results of narrative skills sub-dimension, which was a prominent objective of STORIES project, it is possible to infer that although children show competency in integrating characters into a story and create a setting, however, there is a room for development in other elements of stories such as plot and presence of a problem or a surprise action. As a matter of fact, presence of a problem or surprise action has the lowest percentage in total projects. Children showed development in some of these elements across countries, however, a need for a holistic comprehension and development in terms of story elements is evident. Supporting this aspect, studies on children's story production skills show that the structural complexity of narratives (personal or fictional) increases with age as they start to incorporate more episodic components (Hudson&Shapiro, 1991; Peterson & McCabe, 1983).

At understanding multimodality sub-dimension, findings indicate that children can both understand the properties and show awareness how to use them in a DST project. Considering audio-visual language sub-dimension, children first recognized the components of audio-visual language and then showed evidence of understanding of how to apply this knowledge by creating a DST using various applications. This means that digital story creating process throughout the project occurred in a natural order in terms of cognitive functions. The importance of developing audio-visual language skills is also underlined in the relevant literature. For example, Thoman and Jolls (2004) indicates that, "although mediated messages appear to be self-evident, in truth, they use a complex audio/visual language that has its own rules (grammar), and that can be used to express many-layered concepts and ideas about the world. If our children are to be able to navigate their lives through this multimedia culture, they need to be fluent in reading and writing the language of images and sounds just as we have always taught them to read and write the language of printed communications."

Findings from critical skills sub-dimension indicate that children became competent in critical skills in the scope of DST projects. They can evaluate their products and make changes or repeat some aspects based on their evaluations. Along with critical skills, creating products taking peers' interests into consideration, in other words, awareness of audience can be evaluated as a higher-level skill. These skills involve analysis, evaluation and critical reflection (Buckingham, 2007). From this point on we can conclude that, to observe development in this skill by project's age group, more practice and experience is required.

According to teachers' views on benefits in terms of social skills we can infer that in addition to having experience on working together to create a mutual product, children also learned to respect others at this process throughout the project years. Project's activities, in other words, gave children opportunities to respectfully interact with their friends. From these results we can infer that, DST projects offer teachers a natural way to encourage children to practice and develop their social skills. Existing research has underlined the importance of children's learning-related social skills for school success and school adjustment. For example, a study

by Ladd, Birch and Buhs (1999) found that children's classroom participation and their cooperative skills in kindergarten is an important predictor of early school achievement.

For the social knowledge, skills and understanding children developed in DST activities, it can be observed that children, in line with the benefits teachers reported, mostly show positive attitudes and actions regarding the relationships with their friends. Children in all partner countries demonstrated competency in engaging dialogues under the communication dimension. Although, asking questions was a major area of improvement, it has the lowest percentage compared to other items. Therefore, we can assert that there is more room for development in asking questions skill. Along with this skill, "commenting on other students' ideas" comes forth as another area open for improvement. These results point out the importance of integrating social skills with cognitive dimension to be able to engage in rich dialogues. According to Lloyd and Howe (2003), in this vein, becoming socially competent cannot be judged merely based on the level of social interaction without considering the cognitive aspects. Based on the results in play disconnection/disruption sub-dimension, it can be inferred that, almost all children engaged in activities willingly.

From the encountered problems teachers reported in two project years, we can observe that problems related with teachers and children mostly diminished in the 2nd year. Teachers and children were more engaged and could adopt themselves to the project's activities more competently in the 2nd year.

For the impacts on their professional development, in the 1st year teachers mostly focused on skills having more technical aspects, in the 2nd year, on the other hand, they started to consider how to integrate and implement their skills to guide children throughout the DST process. Because one of the prominent goals of the STORIES project was to enhance teachers' pedagogical competencies in the context of DST activities, this finding can be evaluated as highly positive.

In terms of children's response to project's activities, "excitement" and "pleasure" become prominent as a common theme across the countries. From this point on, we can infer that children engaged themselves willingly to the project's activities.

6 Results: Teachers' Competences in the DST Process (RQ3)

This section presents the findings related to RQ3 (What are the teachers' **competences** in ECE DST on an **individual** and a **collective** level?). In Section 6.1, we provide an overview of the teachers' competences and views related to DST based on the baseline answers (both quantitative and qualitative) collected when they were beginning to implement their DST projects. In Section 6.2, we compare the quantitative answers collected at the beginning of the DST process to those collected at the end of the process in order to find whether the participation in the STORIES activities developed the teachers' competences. Section 6.2 also includes results from partner-specific activities that help us shed more light on the development of the teachers' competences during the project: teacher interviews from Finland, focus groups from Italy, and the analysis of teachers' digital stories from Turkey.

6.1 Baseline (All Benchmark Answers)

This analysis has been conducted to a specific subgroup of Teacher Questionnaire answers, that is, those filled in at the beginning of the first project cycle (i.e. the baseline).

6.1.1 Demographic Data and Basic Background Information

Country, Age, and Gender

The data included baseline answers from 66 teachers, out of whom 28 were from Turkey, 22 from Italy, and 8 from Finland and Germany each (Table 6.1). Due to the uneven distribution between countries, we will only provide the descriptive data based on the whole sample, not by country.

Table 6.1. Baseline answers by country

| | Frequency | Percent |
|---------|-----------|---------|
| TURKEY | 28 | 42.4 |
| ITALY | 22 | 33.3 |
| FINLAND | 8 | 12.1 |
| GERMANY | 8 | 12.1 |
| Total | 66 | 100.0 |

As Table 6.2 shows, the clear majority of the teachers (72.7%) were under 40 years of age, with only 9.1% being older than 50. Only three teachers in the sample were male, and all the others (95.5%) were female.

Table 6.2. Age and gender

| | | Frequency | Percent | Cumulative Percent |
|--------|---------------------|-----------|---------|--------------------|
| Age | 20-30 years | 24 | 36.4 | 36.4 |
| | 30-40 years | 24 | 36.4 | 72.7 |
| | 40-50 years | 12 | 18.2 | 90.9 |
| | Older than 50 years | 6 | 9.1 | 100.0 |
| Gender | MALE | 3 | 4.5 | |
| | FEMALE | 63 | 95.5 | |

Education, Work Experience, and Currently Taught Groups

As many of the teachers were rather young, more than half of them (57.8%) had up to ten years of work experience, with 21.9% having less than five years (Table 6.3). Only 14.1% had more than 20 years of experience.

Table 6.3. Work experience in years

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---------|---------------|-----------|---------|---------------|--------------------|
| Valid | Under 5 years | 14 | 21.2 | 21.9 | 21.9 |
| | 5-10 years | 23 | 34.8 | 35.9 | 57.8 |
| | 11-20 years | 18 | 27.3 | 28.1 | 85.9 |
| | 21-30 years | 6 | 9.1 | 9.4 | 95.3 |
| | 31-40 years | 3 | 4.5 | 4.7 | 100.0 |
| | Total | 64 | 97.0 | 100.0 | |
| Missing | System | 2 | 3.0 | | |
| Total | | 66 | 100.0 | | |

As to their education, 43.9% of the teachers had a vocational degree, 40.9% had a college or Bachelor's degree, and 15.2% had a Master's degree (Table 6.4).

Table 6.4. Education

| | Frequency | Percent |
|---------------------------------------|-----------|---------|
| VOCATIONAL SCHOOL | 29 | 43.9 |
| COLLEGE GRADUATE OR BACHELOR'S DEGREE | 27 | 40.9 |
| MASTER'S DEGREE | 10 | 15.2 |
| Total | 66 | 100.0 |

As Table 6.5 shows, more than 60% of the teachers were currently teaching either only 4-year-old (30.3%) or 4-and-5-year-old children (31.8%).

Table 6.5. Currently taught age group

| | Frequency | Percent |
|----------------------------|-----------|---------|
| 12-36 months (1-2 years) | 1 | 1.5 |
| 36-48 months (3 years) | 4 | 6.1 |
| 36-60 months (3-4 years) | 4 | 6.1 |
| 36-72 months (3-4-5 years) | 9 | 13.6 |
| 48-60 months (4 years) | 20 | 30.3 |
| 48-72 months (4-5 years) | 21 | 31.8 |
| 72+ months (5-6 years) | 7 | 10.6 |
| Total | 66 | 100.0 |

6.1.2 The Use of Digital Devices and DST

Availability of Devices

When asked about the availability of digital devices, computer (100% of all who answered this item), projector (92.1%), camera (74.6%), and webcam (56.5%) were reported by more than half of the teachers as being available in their kindergarten or school. Tablet devices were available for 43.1% of the respondents, smartphones for 27.9%, smartboard for 20.6% and the i-Theatre device for 12.7%. Many teachers also mentioned other technologies that were not listed in the options, such as GoPro, AppleTV, document camera, drawing pad, audio recorder, digital microscope, digital pen camera, light board, and interactive projector. In addition to the currently available technologies, some teachers reported that their schools or kindergartens were expecting to get certain devices (mainly tablets or smartboards) in the near future.

Table 6.6. Devices available to the respondents

| | AVAILABLE | | | NOT AVAILABLE | | | EXPECTED | | |
|------------|-----------|-----------|-----------------|---------------|-----------|-----------------|----------|-----------|-----------------|
| | Count | Table N % | Table Total N % | Count | Table N % | Table Total N % | Count | Table N % | Table Total N % |
| Computer | 65 | 100.0 | 98.5 | 0 | 0.0 | 0.0 | 0 | 0.0 | 0.0 |
| Tablet | 28 | 43.1 | 42.4 | 29 | 44.6 | 43.9 | 8 | 12.3 | 12.1 |
| Smartboard | 13 | 20.6 | 19.7 | 44 | 69.8 | 66.7 | 6 | 9.5 | 9.1 |
| Smartphone | 17 | 27.9 | 25.8 | 44 | 72.1 | 66.7 | 0 | 0.0 | 0.0 |
| Camera | 47 | 74.6 | 71.2 | 16 | 25.4 | 24.2 | 0 | 0.0 | 0.0 |
| Webcam | 35 | 56.5 | 53.0 | 25 | 40.3 | 37.9 | 2 | 3.2 | 3.0 |
| Projector | 58 | 92.1 | 87.9 | 5 | 7.9 | 7.6 | 0 | 0.0 | 0.0 |
| i-Theatre | 8 | 12.7 | 12.1 | 55 | 87.3 | 83.3 | 0 | 0.0 | 0.0 |
| Other | 16 | 35.6 | 24.2 | 29 | 64.4 | 43.9 | 0 | 0.0 | 0.0 |

NB. When looking at the results related to available devices, it should be noted that in many cases, the question was answered by more than one teacher from the same kindergarten or school. This means that the results do not directly refer to the percentage of schools having these devices available.

Use of Devices

In line with the results related to available devices, computers and cameras were also the most frequently used digital devices in pedagogical activities with children (Table 6.7): computers were used weekly by 68.8% of the teachers who answered the item, and cameras by 56.5%. Many teachers also used smartphones (47.4%) and projectors (43.8%) in pedagogical activities on a weekly basis. Smartboards (76.7%) and i-Theatre (77.4%) were mentioned most frequently as devices that the teachers had no experience of using.

Table 6.7. Devices used by the respondents in pedagogical activities

| | WEEKLY | | | MONTHLY | | | ONCE OR TWICE | | | NEVER (OR WOULD IF I HAD IT) | | |
|------------|-----------|-------------|-----------------|---------|-----------|-----------------|---------------|-----------|-----------------|------------------------------|-------------|-----------------|
| | Count | Table N % | Table Total N % | Count | Table N % | Table Total N % | Count | Table N % | Table Total N % | Count | Table N % | Table Total N % |
| Computer | 44 | 68.8 | 66.7 | 6 | 9.4 | 9.1 | 7 | 10.9 | 10.6 | 7 | 10.9 | 10.6 |
| Tablet | 19 | 30.6 | 28.8 | 8 | 12.9 | 12.1 | 6 | 9.7 | 9.1 | 29 | 46.8 | 43.9 |
| Smartboard | 6 | 10.0 | 9.1 | 3 | 5.0 | 4.5 | 5 | 8.3 | 7.6 | 46 | 76.7 | 69.7 |
| Smartphone | 27 | 47.4 | 40.9 | 1 | 1.8 | 1.5 | 7 | 12.3 | 10.6 | 22 | 38.6 | 33.3 |
| Camera | 35 | 56.5 | 53.0 | 9 | 14.5 | 13.6 | 8 | 12.9 | 12.1 | 10 | 16.1 | 15.2 |
| Webcam | 7 | 11.9 | 10.6 | 5 | 8.5 | 7.6 | 11 | 18.6 | 16.7 | 36 | 61.0 | 54.5 |
| Projector | 28 | 43.8 | 42.4 | 15 | 23.4 | 22.7 | 16 | 25.0 | 24.2 | 5 | 7.8 | 7.6 |
| i-Theatre | 3 | 4.8 | 4.5 | 3 | 4.8 | 4.5 | 8 | 12.9 | 12.1 | 48 | 77.4 | 72.7 |
| Other | 3 | 30.0 | 4.5 | 3 | 30.0 | 4.5 | 3 | 30.0 | 4.5 | 1 | 10.0 | 1.5 |

Purposes of Use

Regarding the purposes of using technology in pedagogical activities (Table 6.8), it appeared that digital technology was mainly used for supporting, illustrating or demonstrating topics being discussed or worked on. More than 60% of the teachers used technology weekly for drawing children's attention to the topic (67.7% of those who answered the item), for searching for educational content or possible activities online (65.6%), or for giving children examples related to the topic at hand (60.3%). Another frequent purpose of use was documentation (67.2%). The use of digital technology for purposes such as making children practice something with digital tools, creating or producing something, playing or games, or using existing multimedia content was adopted by fewer teachers on a weekly basis. Many reported doing these activities at least monthly, but 20-30% had never used technology for these purposes.

Table 6.8. Purposes of using technology in pedagogical activities

| | WEEKLY | | | MONTHLY | | | ONCE OR TWICE | | | NEVER (OR WOULD IF I HAD IT) | | |
|-------------------------------------|--------|-----------|-----------------|---------|-----------|-----------------|---------------|-----------|-----------------|------------------------------|-----------|-----------------|
| | Count | Table N % | Table Total N % | Count | Table N % | Table Total N % | Count | Table N % | Table Total N % | Count | Table N % | Table Total N % |
| Searching for content or activities | 42 | 65.6 | 63.6 | 13 | 20.3 | 19.7 | 6 | 9.4 | 9.1 | 3 | 4.7 | 4.5 |
| Drawing attention to topic at hand | 42 | 67.7 | 63.6 | 8 | 12.9 | 12.1 | 6 | 9.7 | 9.1 | 6 | 9.7 | 9.1 |
| Giving examples | 38 | 60.3 | 57.6 | 9 | 14.3 | 13.6 | 8 | 12.7 | 12.1 | 8 | 12.7 | 12.1 |
| Making children practice | 23 | 37.7 | 34.8 | 16 | 26.2 | 24.2 | 6 | 9.8 | 9.1 | 16 | 26.2 | 24.2 |
| Creation or production | 22 | 34.9 | 33.3 | 16 | 25.4 | 24.2 | 11 | 17.5 | 16.7 | 14 | 22.2 | 21.2 |
| Using existing multimedia content | 19 | 30.6 | 28.8 | 19 | 30.6 | 28.8 | 11 | 17.7 | 16.7 | 13 | 21.0 | 19.7 |
| Playing or games | 22 | 35.5 | 33.3 | 15 | 24.2 | 22.7 | 7 | 11.3 | 10.6 | 18 | 29.0 | 27.3 |
| Documentation | 43 | 67.2 | 65.2 | 15 | 23.4 | 22.7 | 5 | 7.8 | 7.6 | 1 | 1.6 | 1.5 |
| Other | 6 | 75.0 | 9.1 | 1 | 12.5 | 1.5 | 0 | 0.0 | 0.0 | 1 | 12.5 | 1.5 |

Experience with DST

In addition to their general use of digital technologies in pedagogical activities, the teachers were also specifically asked about their previous experience with digital storytelling (Table 6.9). The use of DST was a regular practice (i.e., used on a monthly or weekly basis) only for 13.7% of the teachers. Slightly fewer than a third of them (30.3%) had tried implementing DST once or twice, while more than half (56.1%) had never tried it.

Table 6.9. Previous experience with DST

| | Frequency | Percent |
|---------------|-----------|---------|
| NEVER | 37 | 56.1 |
| ONCE OR TWICE | 20 | 30.3 |
| MONTHLY | 5 | 7.6 |
| WEEKLY | 4 | 6.1 |
| Total | 66 | 100.0 |

To summarise the teachers' previous experience with digital tools and DST, we can say that most of them were familiar with using basic digital devices such as computers and digital cameras regularly in pedagogical activities. However, the emphasis was mainly on using them to search for content and to demonstrate different topics, rather than applying them as tools for production or play. This observation was supported also by their lack of previous experience in implementing DST. Thus, based on these results, we can consider the scope of the STORIES activities to have been something novel to most of the teachers participating in the project.

6.1.3 *The Role of Technology for Professional Development*

In addition to exploring the teachers' previous experience with digital pedagogical activities, the questionnaire also tapped into their subjective views on the significance of technology in terms of their professional development and practice.

Potential of Technology for Professional Development

First, they were asked how they saw the potential of technology for their professional development. The question included four-point Likert items asking them to specify to which extent technology played a role in a specific aspects of professional development (1 = not at all, 2 = fairly little, 3= fairly much, 4 = very much).

Table 6.10 shows that technology was considered 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. It was somewhat less important in terms of reducing anxiety regarding the use of media and advising parents about the pedagogical uses of media. However, it should be noted that the item related to reducing anxiety appeared to be somewhat ambiguous: one respondent, for example, added a comment pointing out that she did not consider the item relevant because she did not experience any anxiety regarding media in the first place.

Table 6.10. Potential of technology for professional development

| | Valid N | Missing N | Mean | Std. Dev. |
|--|------------|--------------|------|--------------|
| Reducing anxiety regarding the use of media | 63 | 3 | 2.68 | .895 |
| Keeping up to date with new media developments in my field | 65 | 1 | 3.54 | .614 |
| Discovering new aspects of teaching methods | 66 | 0 | 3.55 | .661 |
| Advising parents about the pedagogical uses of media | 65 | 1 | 2.77 | .844 |
| Becoming familiar with children's media culture and use of media | 63 | 3 | 3.25 | .695 |
| Other | 5 | 61 | 3.00 | 1.225 |

Potential of Technology for Professional Activity

The other question was related to the potential of technology on the teachers' professional activity in practice (Table 6.11). On a similar four-point Likert scale, they were asked to what extent specific aspects applied to their use of technology. Their views about the potential of technology were positive in terms of all items. Some items that scored particularly high included enriching pedagogical activities in general as well as promoting the development and dissemination of novel and creative ideas.

Table 6.11. Potential of technology for professional activity

| | Valid N | Missing N | Mean | Std. Dev. |
|--|---------|-----------|------|-----------|
| Promotes developing novel and creative ideas | 66 | 0 | 3.42 | .786 |
| Enables disseminating novel and creative ideas | 66 | 0 | 3.45 | .727 |
| Supports the problem solving process | 64 | 2 | 3.08 | .762 |
| Supports effective and collaborative working | 65 | 1 | 3.18 | .705 |
| Improves motivation | 66 | 0 | 3.26 | .686 |
| Enriches pedagogical activities | 66 | 0 | 3.48 | .614 |
| Other | 5 | 61 | 2.80 | 1.095 |

Thus, in summary, the teachers viewed the potential of technology for their professional development and activity positively. There were some aspects about which they were slightly more uncertain than about others, namely advising parents and reducing anxiety relating to media.

6.1.4 Teachers' Perceived Competences

The final section of the teacher questionnaire examined the teachers' perceived competences in the content areas of the STORIES project. The section was built in such a way that its underlying structure followed the modules of the STORIES Training Framework, in addition to which two items addressing the collective dimension (i.e., school culture) were added. Table 6.12 illustrates the main constructs (competence dimensions), the corresponding training modules, and the questionnaire items included in each of the construct.

Table 6.12. Competence constructs with corresponding training modules and questionnaire item

| Construct | Training module | Questionnaire items |
|---|--|---|
| MEDIA LITERACY (Media literacy and media education competence) | Module 1A | 1. I understand what is meant by media literacy and media education. 2. I am aware of the ways in which young children use media. 3. I am aware of the potential impacts of media contents on children. 4. I am aware of the policies in my country related to media education in ECEC. 5. I am able to reflect critically on the use of media in ECEC. 6. I am able to apply media education in my work with children. 7. I believe that media education is important in ECEC. |
| DST (Digital storytelling competence) | Module 1B | 8. I am familiar with the general structure and features of stories. 9. I know the specific characteristics of digital storytelling. 10. I know the basic steps for planning a digital storytelling process. 11. I know techniques and methods for planning and implementing a digital storytelling process 12. I see benefits in implementing digital storytelling in ECEC. 13. I can mention several purposes for which to implement digital storytelling in ECEC institutions. |
| TECHNICAL (Individual technical DST competence) | Modules 2 and 3 | 14. I know several tools and technologies for implementing digital storytelling projects. 15. I can use at least one technology for implementing digital storytelling projects. 16. I feel confident using the technologies that are required for producing digital stories. 17. I am able to create a media product based on the digital storytelling approach. |
| PRACTICAL (Competence to apply DST in practice) | Module 4 and items related to school culture | 18. I can plan and implement digital storytelling projects with children. 19. I can apply my knowledge on digital storytelling when guiding children's digital storytelling. 20. I can integrate digital storytelling in the pedagogical programmes in my workplace. 21. I believe digital storytelling could become a permanent collective practice in my workplace. 22. I have the capacity to discuss digital storytelling with parents. |

The items were answered on a four-point Likert scale (1 = Totally disagree, 2 = Disagree to some extent, 3 = Agree to some extent, 4 = Totally agree). For analysing the competence dimensions, we created an aggregated score for each construct (i.e., the raw sum score of all the items in the construct divided by the number of items included) and checked their internal consistency.

As Table 6.13 shows, all the constructs were found to be internally consistent ($\alpha > .70$): media literacy (seven items; $\alpha = .78$), DST (six items; $\alpha = .89$), technical (four items; $\alpha = .87$), and practical (five items; $\alpha = .84$). The DST construct would have had a higher Cronbach's alpha value ($\alpha = .92$) if Item 8 had been deleted. However, we chose not to delete the item as 1) the alpha was already very high, and 2) we considered it relevant to keep the item due to its content (general story structure).

Table 6.13. Internal consistency of the constructs

| | Mean | Minimum | Maximum | Range | Maximum / Minimum | Variance | N of Items | Cronbach's alpha |
|----------------|-------|---------|---------|-------|-------------------|----------|------------|------------------|
| MEDIA LITERACY | 3.110 | 2.600 | 3.338 | .738 | 1.284 | .069 | 7 | 0.782 |
| DST | 3.167 | 3.045 | 3.409 | .364 | 1.119 | .017 | 6 | 0.893 |
| TECHNICAL | 3.231 | 3.121 | 3.485 | .364 | 1.117 | .029 | 4 | 0.865 |
| PRACTICAL | 3.212 | 3.138 | 3.292 | .154 | 1.049 | .003 | 5 | 0.838 |

We further explored the data also by running exploratory factor analysis (EFA) and principal component analysis (PCA) with different rotation methods, with the aim of finding out whether the existing constructs would be challenged by alternative solutions emerging from the data. These explorative analyses produced solutions that were quite close to the original constructs, with some individual items distributed differently between the components/factors. However, even though some solutions were somewhat promising, we chose not to adopt them to replace the underlying structure. This was mainly due to the factor structures not being satisfactorily clear and there being many complex variables that loaded on more than one factor (cf. Thurstone, 1947). We can assume that this is related to the nature of the topic; the different DST competence dimensions are so closely interrelated that it is difficult to extract highly distinct factors.

Running the Shapiro-Wilk test of normality revealed that only the first construct (media literacy) was normally distributed (Table 6.14). Therefore, non-parametric tests were used in the following steps of the analysis.

Table 6.14. Test of normality

| | Shapiro-Wilk | | |
|----------------|--------------|----|------|
| | Statistic | df | Sig. |
| MEDIA LITERACY | .974 | 65 | .187 |
| DST | .933 | 66 | .001 |
| TECHNICAL | .902 | 66 | .000 |
| PRACTICAL | .929 | 65 | .001 |

Background Factors and Perceived Competence

First we examined whether there were differences in perceived competences between different background factors such as age group, years of experience, and education.

In terms of **age groups**, a Kruskal-Wallis test showed a significant difference ($H(3) = 9.013$, $p = .029$) in the DST competence dimension. Pairwise comparisons revealed that the DST competence in the group of over 50-year-old teachers (mean rank = 11.50) differed significantly from the group of 20-to-30-year-olds (mean rank = 37.08) and from the group of 30-to-40-year-olds (mean rank = 34.67). There were no significant differences in the other competence dimensions.

Also in terms of **education**, a Kruskal-Wallis test found a significant difference in DST competence ($H(2) = 9.276$, $p = .010$) but not in any of the other competence dimensions. Pairwise comparisons indicated a significant difference between the group of teachers with a college or a bachelor's degree (mean rank = 41.46) and those with a vocational training (mean rank = 25.95).

Similarly, a significant difference between **countries** was found only in terms of DST competence ($H(3) = 10.587$, $p = .014$; Kruskal-Wallis test), and not in any others. Pairwise tests showed a significant difference between Italy (mean rank = 23.32) and Turkey (mean rank = 40.93).

In terms of seniority (i.e., **years of experience**), a Kruskal-Wallis test found no significant differences in any of the four competence dimensions.

Previous Experience with DST

Next, we examined whether the teachers' **previous experience with DST** was related to their perceived competences. First, we ran a Kruskal-Wallis test to examine whether there were any significant differences in the teachers' perceived competences between different groups based on their previous use of DST ("never", "once or twice", "monthly", "weekly"). This analysis revealed no significant differences in any of the competence dimensions.

There were very few teachers who had used DST as frequently as weekly ($N = 4$) or monthly ($N = 5$). From a practical point of view, it might be more relevant to examine whether the teachers had ANY previous experience with DST to build upon. Thus, we decided to recode the variable into a dichotomous one where the value "never" remained as it was while the values "weekly", "monthly" and "once or twice" were recoded as "at least tried". Using the recoded variable, we ran a Mann-Whitney U test, which showed that the perceived DST competence was significantly greater for those who had at least some past experience with DST (median = 3.33; $Q1 = 3.0$ – $Q3 = 3.67$) than for those who had never even tried it (median = 3.17; $Q1 = 2.83$ – $Q3 = 3.33$), $U = 688$, $p = .049$). In the other three competence dimensions, there were no significant differences between the two groups.

6.1.5 Qualitative Data (Open-ended Answers)

In this section, we will enrich and complement the quantitative results with findings based on teachers' answers to open-ended questions presented to them in the questionnaire. We will examine the qualitative data from the following perspectives:

- 1) Views on the challenges and contributions of **technology** in ECEC, based on the following open-ended questions:
 - a) *What kind of problems/obstacles do you face while using technology in pedagogical activities and how do you develop solutions in such cases?*
 - b) *Please specify in what aspects the use of technology may contribute to children's learning.*
- 2) Pedagogical aspects of **digital storytelling**, based on the following questions:
 - a) *How would you assess the effect (both positive and negative) of digital storytelling on the educational/pedagogical process?*
 - b) *What kind of skills do you think digital storytelling approach fosters in children? Please explain.*
- 3) Conceptions about **media literacy**, based on the following prompt:
 - a) *For me, media literacy in ECEC means...*

The sample of teachers included in this analysis consisted of all the teachers who answered a baseline questionnaire at the beginning of the STORIES activities (N=66)

1a) Technology in ECEC: Problems, Obstacles, and Solutions

The first question pertaining to the challenges and contributions of technology in ECEC dealt with the problems and obstacles related to technology. The teachers' answers highlighted four main themes: technology-originated problems, the teachers' personal technological competence, issues related to children's use of technology, and aspects related to pedagogical opportunities of technology.

Technology-Originated Problems

Non-functioning hardware or software was the main cause of technology-originated problems. These issues were usually solved by contacting the technical staff of the organisation.

Of technical nature (devices not always working). We solved the problems by getting in touch with the technicians.

Another aspect was related to connectivity issues: the Internet connection was unreliable and/or slow. Also here, the teachers received support from the technical staff, but sometimes –

if it was not possible to fix the problem quickly enough – they resorted to alternative plans such as using their own personal devices instead.

Internet connection problems, access limitations from ministry of education, having one PC available, etc. I use my personal smartphone to solve those problems.

Third, the teachers encountered organisational policy issues with the use of technology. For example, there were different limitations established by the school or determined on a higher level (such as region, municipality, or Ministry of Education) that could not be bypassed and that caused inflexibility in the daily activities. Often in these cases, the teachers came up with alternative solutions (e.g., using their own devices) or modified the activity if necessary.

Our school set some limitations for using internet, for accessing some websites such as YouTube and for downloading applications. These limitations prevent us to use technology effectively. When I need to watch video for educational purposes for children, I download video or other digital content from my home computer or smartphone.

Too few devices, the children's tablet devices are remotely controlled and that irritates me. Luckily I can install apps by myself to teacher's iPads.

Perhaps somewhat surprisingly, lack of devices was mentioned only by a small number of teachers compared to the other aspects presented above. It seemed that at least in these schools or kindergartens it was not experienced as one of the key concerns in terms of technology-related obstacles.

Competence-Related Issues

In addition to the technology-originated problems, another main theme that emerged was the teachers' perceived lack of technological competence. Most teachers mentioned this point quite generally, merely stating that they had limited skills in using technology, while a few elaborated it more specifically (for example, referring to the use of a specific tool such as tablets).

Sometimes I can't properly use the technological instruments.

Educators don't have much competence in using tablets.

The competence-related issues were solved principally by acquiring additional training, which could refer to organised training sessions or self-study. Some teachers especially emphasised the need for concrete practice with the technologies.

Other obstacles are connected to a non-complete knowledge of the instrument: the teacher must first practice: this way it's possible to comprehend how devices can be used.

Software difficult to use – more hours of training or self training.

Seeking help from colleagues and solving problems together was mentioned as another strategy in enhancing one's technological competence. In general, an active, collaborative, and motivated stance was seen as conducive for improving these competences.

Learning to use the devices takes time. It is often hard to find time. Being active is important in learning to use the devices, e.g. testing new apps on your free time. The support and advices from colleagues help to cope with many problems. Collective minds remember and know better.

Issues Related to Children's Use of Technology

The teachers also highlighted challenges related to managing and supporting children's use of technology. Mainly, this was related to negotiating about the ways of using technology by establishing terms and rules of use and by organising a way in which the children take turns using the devices. It was emphasised that these rules should be discussed and decided on together with the children.

Negotiation between children on the use of the device (e.g. photo camera). The solution we propose is to establish turns or to ask to other members of the group things to photograph.

Negotiation on the use of the device. Appropriate use of technologies. Solutions: rules and access modalities must be discussed together with the children.

Some teachers mentioned concrete examples of the need to guide children away from or towards certain behaviours related to technology use.

As of my discipline we use technology actively. The most frequent problem is that children want to use computer only to play games, we can only create some products by gamification. Although this process is usual for the age group, it can be challenging for the teacher.

Children sometimes want to watch projected material from a close distance. We can solve this problem by explaining how harmful this can be for them.

Furthermore, children's technology skills were also mentioned as a challenge by some teachers. As exemplified in the following excerpts, supporting children's technological competence is closely intertwined with the teachers' own competences and they may need to seek further support for the task.

Children make up stories very spontaneously, but they have problems representing them through digital technologies: this is way we try to help them with advice and suggestions

For in-class activities children have to be competent in using technology. I get support from computer and instructional technologies teacher for that.

Issues Related to Pedagogical Opportunities

The final theme that emerged was that related to possible limitations of technology from the perspective of the pedagogical opportunities it offers. Some teachers reported that the overall use of technologies in schools was not very common or versatile, and this caused both practical and pedagogical challenges.

Apart from a use aimed at documenting, there haven't been many occasions to use technologies during the educational activities.

It takes a long time to set the educational context – the use of technologies is not very common in schools.

Furthermore, finding and preparing pedagogically appropriate content was experienced as difficult by some teachers and caused them extra work, such as searching for safer content, in preparing their educational activities.

When using content from internet, I have hard time dealing with advertisements and age inappropriate content. I worry about this content by using internet and try to use safer websites as a solution

Child-appropriate educational content is not easily accessible. Educational content and/or games suitable for preschool age group and appropriate to use in the classroom is insufficient and irrelevant to preschool objectives.

Solutions

Finally, we will summarise the main solutions that were applied by the teachers in order to overcome different obstacles related to technology.

In strictly technical problems, the main strategy was to consult technical staff or colleagues or friends with more technical experience. In addition, many teachers attempted to solve these problems by themselves by searching relevant online resources for instructions.

I face some technical problems. If i don't have the information to solve the problem i consult to a friend or search for solutions from the internet.

In the case of sudden problems (e.g., network connection failures during the activity) or situations where the technical problem could not be solved in an adequate way (e.g., school-level access restrictions or inability to install necessary applications on the devices being used), they had to flexibly devise a “Plan B” for carrying out the intended activity. This meant, for example, using their own personal devices or doing some additional preparations in their personal time.

Our school set some limitations for using internet, for accessing some websites such as YouTube and for downloading applications. These limitations prevent us to use technology

effectively. When I need to watch video for educational purposes for children, I download video or other digital content from my home computer or smartphone.

Furthermore, the teachers emphasised the need to build their own competence and confidence by experimenting with the technologies and familiarising themselves with them adequately and more efficiently before taking them into use with children. Also, they deemed it important to consider the children's preferences and interests, in order to ensure the meaningfulness of the technology-supported activities.

The solution is obviously better time management from my part and building a basic skill level by using the app first by myself.

There is a need to integrate computer activities with preschool curriculum in order to make children more active in computer activities. When using computers, children's interests and developments must be considered.

1b) Technology in ECEC: Role in Children's Learning

In addition to being asked about the problems and obstacles, the teachers were asked to describe their views on the potential benefits of technology for children's learning. Their answers elicited a very wide set of different learning contributions of technology, and in this section we will highlight some key perspectives that emerged.

General Views and Comments on Technology and Learning

In general, teachers saw that technology had the potential of making learning more efficient, versatile, experiential, and permanent.

Because technological tools attract more attention to children, learning processes using technology are becoming more permanent for children.

It provides permanent learning and experiential learning in the child. It helps to transfer detailed information more comfortably.

The roles of consumer and producer were both very prominently present in the teachers' answers: technology was seen to play a significant role both in the meaningful use of existing content and in supporting children to create their own products.

It provides quick and easy access to information. I think it is useful in terms of having fun and learning skills and research skills.

They should together with adults work and use iPads to do something else than just playing games and watching videos. It fosters creativity, curiosity, problem solving and so much more.

However, the role of the teacher was seen as significant; it is their responsibility to take care that the use of technology is relevant.

The child, through technology, can have access to any kind of information in a quick way. This characteristic of technology has a double face: the teacher must sustain the children in using it, discuss with the children and handle the technological resources.

When used appropriately with children i think it is very beneficial. It is important, when and how long we use technology.

Technology and 21st-Century Skills

When analysing the answers, it became apparent that one principal high-level theme was the role of technology for different transversal, 21st-century skills. Hence, we used the categories of the 21st-century skills framework (see Binkley et al., 2012) – ways of thinking, ways of working, tools for working, and living in the world – as a thematic structure for examining this dimension.

Ways of Thinking

Many of the teachers emphasised the potential of technology for **creativity**, which is one of the skill areas under the “ways of thinking” category. Technology was seen to stimulate children’s fantasy and to support their imagination. The development of skills related to **critical thinking, problem solving, and decision making** were also mentioned in many answers: using technology to reach specific goals necessitates decision-making, and in many cases technology can illustrate cause-and-effect relationships immediately and concretely, which can help children’s problem-solving processes. There were also some references to **learning to learn** and **metacognition**: technology can be useful for becoming aware of and reflecting on their thinking skills in general and for helping them understand relationships between different areas of knowledge. Memory and information processing skills were also mentioned, as well as transfer of information.

I think that it contributes to the development of children's creativity.

Technology stimulates their fantasy and their curiosity, their sense of observation and it sharpens their problem solving skill.

I think it develops our children's imagination, fast thinking and decision making skills, enables them to discover their different thinking skills and supports them create unique products.

It can create connections between different areas of knowledge. It can help to predispose an educational context rich of opportunities – together with other spaces, materials and instruments.

Ways of Working

This category entails skills related to **collaboration** and **communication**. These aspects were not as prominently present as the ways of thinking, but in particular, the need for

communication and negotiation when working towards specific goals was highlighted. This is closely related to the decision-making skills within the previous category.

Technology has an attractive power; this power can be used to involve more children, allowing an interactive and social interchange.

Tools for Working

This category encompasses **information literacy** and **ICT literacy**, both of which emerged from the teachers' answers. One aspect mentioned very frequently was the role of technology in enabling access to information and content. Technology was also seen as more than merely a source of information: in addition to the consumer perspective, the teachers brought up the perspective of children as producers of their own content and emphasised the benefits of a versatile use of technology.

Technologies allow researching in a quicker way. They give access to new information/they sustain curiosity/sustain learning processes.

Technology is a part of everyday life at children's homes, so I see that the kindergarten's mission is to show the parents the opportunities that technology can bring to children's learning. It is possible to do more with iPads than e.g. to sit the child down to watch cartoons.

Living in the World

Issues specifically belonging in this main category (citizenship, life and career, and personal & social responsibility) emerged in somewhat fewer answers. However, many aspects are closely intertwined with the previous categories, such as learning to take responsibility through working together with others. With respect to this set of skills, there were some mentions about the notion that technology facilitates becoming **familiar with other cultures** and that it allows children to get experiences of being **active participants**.

Getting familiar with other cultures.

Learning experience – experiences of multiculturalism.

Multiple Languages and Literacies

In addition to 21st-century skills, another main lens through which to examine the role of technology was that of new languages and multiple literacies. This theme strongly emerged from the teachers' answers. The teachers emphasised how the multimodality associated with digital tools allowed the children to express themselves in ways that went beyond written and spoken language. In particular, the visual element was seen as particularly relevant in the case of digital tools.

Technology represents a further “language” that children can use to communicate, create relations, research. A language connected to the traditional ones – aimed at exploring new possibilities.

Technology can be another language used by children.

It helps improve the visual perceptions of children. Provides a multi-learning environment.

It was also mentioned how these different languages could make the process of self-expression more inclusive, and how they could help the children make connections between different forms of expression and understand the affordances of different modalities for delivering a specific message.

Technologies are proposed to children as a language in dialogue with other expressive languages, dialogically, and in a non-exclusive way.

Technology is particularly useful to show the children how their stories can be realized in different forms.

However, technology was seen to play a role also in the development of traditional literacy skills, for example, by providing early experiences with writing.

First experiences with writing activities.

Supporting children’s memory skills and getting them closer to the written language.

Technology as a Facilitator for Children’s Active Role

The role of technology for supporting children’s agency, participation, and engagement was a third major theme that arose from the open-ended answers. As touched upon above, the teachers felt that technologies can allow more child-driven practices, enhance children’s role as active agents in their learning, provide them with opportunities to be producers instead of only consumers. This can also support their self-confidence.

Technological devices, in didactic practices, allow to delineate new conceptual sceneries; these sceneries can be useful to rethink learning and teaching processes in a more participate, more equal and less notionistic and trasnmissive dimension.

Children research, share, use new instruments and enrich making changes.

As children are engaged in technology, it contributes to their self-confidence. It also increases the effectiveness of activities by providing learning by doing experiences.

One aspect that is closely related to engagement and participation is the motivational potential of digital tools, which was very strongly present in the teachers’ answers.

Technology is increasing the interest of pre-school children towards the subject.

It adds more excitement to preschool when you utilize opportunities and always find new ideas.

In particular, the experiential potential of technology was seen as a key point in why technology engages children.

The technology can bring diversity in learning methods. Many new kind of experiences can be brought to children with technology, for example a trip to an art exhibition without leaving the kindergarten.

2a) DST in ECEC: Effect on the Pedagogical Process

The first question that was related to the pedagogical aspects of digital storytelling in ECEC dealt with the positive or negative effects of DST on the pedagogical process. Overall, the teachers' views of the effect of DST were positive: their comments either only consisted of positive aspects or included both positive and critical points. Additionally, some of them pointed out the complexity of the DST approach and felt that they were not yet familiar enough with it to be able to assess its effects.

A very valid approach, but complicated: we are discovering it step by step with children.

I have no idea since I have never used it.

There's a lack of experience: it still has not been used enough to evaluate the positive aspects. We are approaching this experience with the children and we are discovering it together.

The positive aspects that emerged related to DST in the pedagogical process were very similar to those mentioned in relation to the pedagogical potential of technology in general (see previous section): DST was seen to support various thinking skills and competences in children as well as their engagement and motivation; the aspect of new languages and new tools for expression was emphasised; and the role of teachers in meaningful implementation of DST was highlighted. The negative aspects were related to the risks of technology diminishing children's interest in non-digital activities; the management of the process with children; and problems with material and time resources.

Positive Aspects: Children's Competences

In terms of thinking skills, the teachers emphasised skills such as creativity, critical thinking, and collaborative problem solving.

The most important of its positive features is its contribution to creativity and the development of imagination.

Positive effect: Positive contribution to children's creativity, problem solving skills, self confidence and social development.

The narrative potential, enhanced by a variety of media, to generate interpretative processes and significative conceptual correlations. Through digital devices, some significative messages are vehiculated. Furthermore, a story generates stories, fostering a collaborative exchange of knowledge, dialogical comparison, critical skills and the research of new interpretations and points of view on a problem or a theme.

Helps children to develop their cognitive skills, it's as if digital were some sort a problem solving process faced together by children.

There were also some answers that referred to DST being beneficial to the development of children's skills and competences but did not specify these competences in more detail. Moreover, some cross-disciplinary aspects were also mentioned, such as the potential of DST for early STE(A)M learning.

I think it has positive effects on the development of children's competences

I think that it is an example for early STEM activities, because it integrates technology with arts, engineering and even science.

Positive Aspects: Engagement and Motivation

Similarly as the teachers considered the use of digital technology in general to be motivating for children and to support their active role, the same applied also more specifically to DST. In addition, the narrative dimension of DST provided another engaging factor.

It increases the level of interest and enthusiasm for children's activities. The conversion of their products into a digital form makes them very happy to watch / read / listen all together. Your children are increasing their motivation to art and production.

Digital storytelling offers an easier access to complex and abstract concepts. It helps obtaining a good involvement and a consequent reinforcement of motivational factors and of the engagement offered by the narrative element.

Children were interested in this activity, it offered them a fun experience. They were actively participated and had concrete experiences. It contributed to their development in technology use.

Positive Aspects: New Languages and a New Medium for Expression

Again, in line with the overall positive effects of technology, DST was seen to be important because it provides a multimodal context that supports children's understanding of new expressive languages.

One more tool to create stories, both singularly and collectively.

Children can reach out to their dream stories and describe themselves and their lives.

Positive effect. Awareness of the device. Awareness of new expressive languages.

Teacher's Role in Ensuring the Positive Aspects

While the teachers saw many positive aspects in DST, they strongly emphasised the significant role of the teacher in making sure that the activities are pedagogically meaningful and, consequently, provide positive effects and experiences for the children.

It's positive if the teacher has enough competences to offer children complex learning context, in which the children can satisfy their curiosities and see their research supported.

The main point that emerged was careful planning and a relevant combination with other methods and activities.

Positive if used together with other educational experiences, by mixing analogical and digital tools.

DST produces pedagogical documentation automatically and in a natural way. It engages children. As a teacher it requires planning in every part of the process to make the activity high quality.

I think it increases motivation and interest in the activity. When used integrated with the subject and theme of the program, it has a positive effect on introductory and practice activities.

This was seen to require understanding of the different ways in which children learn and use technology. This understanding was also expected to improve in the course of DST activities with children.

I think it's important to discover how children learn and how they interact with technologies and the teachers' possibilities to support such learning processes.

It gives more tools to work with and you discover more with children (e.g. what the children go through) that you wouldn't otherwise come to think of. You have to think in a different way.

My expectations tend to be positive. I expect to gain more acquaintance and familiarity with new technologies.

Negative or Critical Aspects

As one of the potentially negative aspects of DST, the teachers mentioned the concern that it might negatively affect children's interest in and attention towards non-digital activities and objects (for example, non-digital stories in books).

The downside of technology is that children are removed from the book. [...] Other activities may be boring from the point of view of children if DST is applied frequently, and attention span can be negatively affected.

Negatively, the digital storytelling approach can reduce children's desire to read books, listen to books, touch the library, and examine them.

However, DST can further increase the relevance of electronic devices.

Carrying out the DST process in practice and organising the children's work was seen as challenging by some teachers. This included issues such as working with big groups; estimating the children's abilities and dealing with possible gaps in them; and keeping the children's focus on the process.

Big child groups don't support DST. It is better to create the stories with smaller groups and it's often hard to organize because of the big number of children in one group.

It was harder than I thought. I had thought that children could do more independently. Before we could begin we had to learn about taking photos, recording sound etc. It took much more time than I had estimated but it was very interesting and exciting. I think the outcome wasn't as I had planned.

Negative: risk to lose the activated processes if children are too focused on the final product.

On a related note, another potential difficulty was related to managing non-human resources: DST activities were considered time-consuming, and there were also problems related to technology such as technical problems and difficulties with finding relevant applications to use.

Negatively, it was time consuming to make video and camera recordings.

Negative effect: It is hard to find or access programs and methods for children to use confidently and with fun.

2b) DST in ECEC: Fostering Children's Skills

The other DST-related open-ended question was related to what kind of skills the teachers thought DST could foster in children. As we can see above, many teachers mentioned these issues already in the question that dealt with the pedagogical process. When identifying the main themes emerging from the answers, we found that they were very similar to those related to the role of technology in general for children's learning. The same main themes – 21st century skills, multiple languages, and children's active role – were discovered, in addition to which narrative competences and language development arose as significant dimensions specifically in the DST context.

DST and 21st-Century Skills

Similarly as with the learning contributions of technology, we used the 21st-century skills framework (see Binkley et al., 2012) as an analytical framework.

Ways of Thinking

Within this category, especially **creativity** was strongly emphasised – even more in now in the DST context than with technology in general. In fact, in the last excerpt below, a teacher critically reflects on the added value of the device itself; it appears that the creative potential of DST was associated more with the overall method than with the use of technology.

It has a major contribution to children's development of creative skills. It also helps children develop their imagination as they create their own stories. Moreover, they also learned to adjust their voices by vocalizing their stories according to the character.

It contributes children's development in areas such as creativity, discovering new knowledge, curiosity, attention, comprehension, focusing, reasoning, building cause and effect relationships, creating stories, organizing events according to the timeline and using their voices.

It is an effective method, to enable children create stories using their creativity and imagination. However, I do not think completing this product with the help of computer and i-theatre has an additional positive effect on children's development besides children having fun.

Another frequently mentioned skills in this category was **problem solving**. Whereas in the more general technological context it mainly referred to the ability of technology to concretely demonstrate the outcomes of decisions, here it pertained especially to the storytelling aspect of DST.

Digital storytelling allows children, in the process of making up a story, to face a “problem solving” situation. A kid asks himself questions and makes trials in order to reach a solution.

I think it develops analytical thinking, problem solving, creativity and cooperative skills, because by the DST process they use all of these skills.

Other thinking skills related to DST included, for example, metacognitive skills, logical thinking, strategy development, and forecasting skills. Also here, the narrative dimension was emphasised, and some teachers mentioned that the use of technology should be kept moderate.

Ways of Working

Skills related to **collaboration** and **communication** were in a greater role in the answers related to the DST context than they were in the answers to the more general technology-related question: it seems that the social aspect was associated especially with the combination of digital activities and storytelling.

It sustains collaboration between children, finding ways to create shared stories, narrative competencies and imaginative skills.

Social competencies: people think that “digital” means disconnection; in reality, it unifies children since they have to find a solution to a problem.

Concentration, taking turns and cooperation.

Tools for Working

In this category, especially **ICT literacy** was emphasised in the DST context. The DST process was seen to familiarise children with digital devices, which can be useful for them both in the short term (to facilitate their immediate learning processes) and long term (to develop their readiness to take advantage of technology and to use it competently in the future). There were also some mentions of fine motor skills and hand-eye coordination, which are necessary skills to have when using different digital devices.

Familiarity with technological device that allow to facilitate immediate and innovative learning processes.

I think it prepares children for future, by developing their technology skills relevant to the century.

Living in the World

As in the question related to technology in general, skills belonging in this category received fewer mentions also in the DST context. Children having the opportunity to explore and reflect on their talents – and this experience potentially transferring to other contexts later – was mentioned by some teachers.

Children discovered their innate talents and skills and that made them happy. For example they found out they are competent at drawing pictures or vocalizing characters. In short, they discovered themselves.

Multiple Languages and Literacies in the DST Context

In terms of new languages and multiple literacies, similar points emerged from the DST-related answers as from those related to technology in general: DST was seen to enable expression with multiple modalities. There was particular focus on visual and graphical representation of ideas and messages through DST.

Digital storytelling makes use of many languages and I think this component to be important. Verbal language is then connected with the digital one: using videos exalts metaphorical components of narrative. Through narrative experiences, values, concepts and ideas can be communicated. That's why digital storytelling has a strong cognitive and educative impact.

I think, besides the skills that classical story telling approach contributes to, DST triggers different learning areas by offering multimedia experiences for children.

Getting familiar with new expressive "languages" and other "languages" like: graphical, narrative and documentative ones, to be integrated with those the children are already aware of.

Overall, the role of traditional literacy and language skills was more strongly present in the DST context than in the general technology context. This is understandable due to the specific focus on narration, which lends itself to practicing several different areas of language competence. Besides narrative competences as such, the teachers mentioned grammatical and phonological skills, expressing opinions, as well as linguistic skills and language development in general, without specifying them in more detail

It has major contribution in areas such as listening and verbal expression skills, thinking skills, telling stories with creative methods and problem solving skills.

The capacity to create narrative through many different languages.

Moreover, they also learned to adjust their voices by vocalizing their stories according to the character.

Linguistic development, expressing opinions and own things.

DST as a Facilitator for Children's Active Role

Finally, children's active participation emerged as a main theme also in the DST context. The producer/consumer dimension came up in many teachers' answers again.

Furthermore, through a Digital storytelling activity children can experience the pleasure to be both creator and spectator of a story.

Besides, I think that it has an effect on the sense of production.

However, one point that was particularly emphasised within this theme was the development of confidence and self-esteem. We can conclude that active production and children's ability to create independently are seen as conducive to confidence development.

I think their confidence increases when they create their own stories.

It supports the creativity of children. Their self-esteem increases when they come up with a story of their own.

3) Teachers' Conceptions of Media Literacy

The final open-ended question prompted the teachers to provide their personal definition of media literacy. Most teachers responded from the perspective children's media literacy but there were also a few answers where they referred to a teacher's media literacy. We found that their answers consisted of elements that went under the following two points of view: what kind of skills does media literacy **include** and what are the **aims and goals** of media literacy. In the following, we will provide an overview of their media literacy conceptions by examining the content of each aforementioned point of view in more detail.

What Skills Does Media Literacy Include?

Most teachers approached the prompt in their answers by specifying particular skills or competences of which they considered media literacy to consist. Their answers pertained to skills related to both content and tools.

One of the main perspectives emerging from the answers can be labelled as **critical use of media and content**, which included knowing how to access relevant information and content, having the skills to critically evaluate and interpret messages, and being able to use this content in a relevant way.

With the help of developing technology, media is transferred to digital platforms and usage of digital tools became a common behaviour. With this development, accessing information became easier, whereas, on the other hand, accessing right resources and real knowledge and filtering the information becomes harder. To reach appropriate knowledge and use it in appropriate areas in appropriate ways can be defined as media-literacy.

The ability to correctly perceive, evaluate and communicate various visual or written media messages.

To be able to use media according to our need and purposes. More specifically, it means being able to reach the needed information easily, to filter a mass amount of information from distinct media resources according to our needs, to analyze the credibility of this information from different resources, to evaluate the appropriateness of the resources and to synthesize information relevant to our purposes.

Another theme was related to **digital competence**, referring to familiarity with new media and the skills to use digital technology in a meaningful way.

Making children more aware of the instruments they use, using them in a constructive and creative way to support children's learning and increase their competencies.

Sustain children in getting familiar with new digital tools, showing them their potentialities, so that they can use them properly to build their own vision of the world.

The ability to use basic media tools at a good level.

A third, but somewhat less explicit theme emerging from the definitions was being able to **assume an active role**. In terms of the consumption/production dimension, the focus was somewhat more on the use of media but several teachers brought up aspects related to communication and production as well.

Giving to children instruments in order to favour an active and creative approach and not a passive one to technologies (e.g. tablets, computers).

Help children to be aware users of technologies and not to be passive consumers.

Finally, several answers mentioned **understanding of and expression in multimodal languages**. The idea of competences related to new languages has come up in many of the previous questions, and it was present also in the teachers' views on media literacy.

It's a further "language" to support experiences.

Allow children to approach digital technologies more actively: giving them the opportunity to integrate them with other "languages" and to choose which one is more appropriate in different situations.

Other aspects that were mentioned by individual teachers included, for example, the development of media literacy as a continuous process, enjoyment of using media, and moderation of technology used.

[...] Media literacy has to be developed constantly in a permanent learning process. Technology can be used as a tool to involve children and to help them learn in a different way; spread concepts and contents in a different way and experiment new approaches.

I try to keep up with developments in technology, in order not to stay behind. Media can be beautiful platform for people to get information, communicate and have fun. However, I disapprove using media in such a way, it takes control over our lives. I also disagree that people perceive social media tools as a necessity. I think that especially children should spend less time using tools such as tablets and computers.

What Are the Aims and Goals of Media Literacy?

Some teachers also reflected on the aims and purposes of media literacy, either in terms of the immediate benefits of having good media literacy skills or from a longer-term, future-oriented perspective.

Immediate goals

These aims can be defined to entail the role of media literacy for specific directly observable skills in children (e.g., cognitive, social, emotional) as well as the immediate development of their abilities to use technology, which, in turn, can support their learning or creative opportunities.

Stimulate and develop children's cognitive and social skills.

Children can experience an autonomous use of technologies and other instruments to support the learning processes.

Developing skills to use media in critical way, aware of the potentialities and trying to sustain children's creativity. (e.g with a tablet they can watch cartoons but also create a story).

Using media in contexts where they are required, in an adequate way. Developing technical and manual skills, developing cognitive and emotional skills. I think promoting media literacy does

not develop only basic competencies, but also technical ones; critical skills and problem solving skills.

Furthermore, perhaps because the prompt specifically asked them to define media literacy in ECEC, some of the teachers associated the aims of media literacy especially with educational activities.

Multipurpose use of technology in education and use of media to create new educational products.

It is to ensure that the media has educational support and benefit.

Broader, long-term objectives

The broader objectives included aspects that are related to skills required for being an active member of society and coping with the needs of the future.

Helping children to become competent in using new media, so that they can assume an active and critical role within a society more and more digital.

Be contemporary and capable to read the “signs of time” and new generations’ tendencies.

It is very important that we know how to teach the children what they really are going to need in the future.

6.2 Before-After Comparison

The comparative analysis has been conducted to a specific subgroup of Teacher Questionnaire answers, that is, those teachers from whom there is both a “before” and “after” answer (N = 50). Some of the “after” answers have been given after one cycle (for those teacher who participated only for one project year) and some of them have been given after two cycles (for those who participated for both project years). Due to the small number of participants we have not separated the “after” answers into one-year and two-year groups. If a teacher has given an answer both after one year and after two years, we have only included the latter one. Table 6.15 illustrates the criteria for the cases included in the sample.

Table 6.15. Cases included in the sample used in the comparison

| Answer(s) from a specific teacher | | | Teacher included in the sample or not |
|-----------------------------------|----------------|-----------------|---------------------------------------|
| Baseline | After one year | After two years | |
| x | - | - | Not included |
| X | X | - | Included (baseline + after one year) |
| X | - | X | Included (baseline + after two years) |
| X | x | X | Included (baseline + after two years) |
| - | x | x | Not included |
| - | x | - | Not included |
| - | - | x | Not included |

We can see that 64% of the post-implementation answers have been given after one implementation cycle, whereas 36% have been given based on participation in two project years (Table 6.16).

Table 6.16. Sample cases by the number of implementation cycles

| | Frequency | Percent |
|---------------|-----------|---------|
| After 1 year | 32 | 64.0 |
| After 2 years | 18 | 36.0 |
| Total | 50 | 100.0 |

6.2.1 Description of the Sample

Altogether, the sample consists of 50 teachers (that is, 16 teachers fewer than the baseline sample), out of whom 56% are from Turkey, 34% from Italy and 10% from Finland (see

Table 6.17). As there were no post-implementation answers from Germany, the German teachers are excluded from the comparative analysis.

Table 6.17. Number of answers by country

| | Frequency | Percent |
|---------|-----------|---------|
| ITALY | 17 | 34.0 |
| TURKEY | 28 | 56.0 |
| FINLAND | 5 | 10.0 |
| Total | 50 | 100.0 |

The distributions of age, gender, work experience, and education are very close to those in the baseline sample (see Table 6.18).

Table 6.18. Age, gender, experience, and education

| | | Frequency | Percent | Cumulative Percent |
|------------|------------------------------|-----------|---------|--------------------|
| Age | 20-30 years | 17 | 34.0 | 34.0 |
| | 30-40 years | 18 | 36.0 | 70.0 |
| | 40-50 years | 11 | 22.0 | 92.0 |
| | Older than 50 years | 4 | 8.0 | 100.0 |
| Gender | MALE | 1 | 2.0 | |
| | FEMALE | 49 | 98.0 | |
| Experience | Under 5 years | 9 | 18.0 | 18.0 |
| | 5-10 years | 18 | 36.0 | 54.0 |
| | 11-20 years | 15 | 30.0 | 84.0 |
| | 21-30 years | 6 | 12.0 | 96.0 |
| | 31-40 years | 2 | 4.0 | 100.0 |
| Education | VOCATIONAL SCHOOL | 25 | 50.0 | 50.0 |
| | COLLEGE GRADUATE OR BACHELOR | 18 | 36.0 | 86.0 |
| | MASTER'S DEGREE | 7 | 14.0 | 100.0 |

6.2.2 Pre/Post Comparison of the Competences

Possible differences in the teachers' competences between the beginning and the end of the project activities were examined with the same four main constructs (i.e., competence dimensions) that were used in the analysis of the baseline situation.

Although the internal consistency of the constructs had been checked for the whole baseline sample, we checked it separately also for this subsample. The results are presented in Table 6.19. All the constructs were found to be internally consistent ($\alpha > .70$): media literacy (seven items; $\alpha = .77$), DST (six items; $\alpha = .83$), technical (four items; $\alpha = .80$), and practical (five items; $\alpha = .81$). Similarly as in the baseline sample, the DST construct would have had a higher Cronbach's alpha value ($\alpha = .89$) if Item 8 had been deleted, but this item was kept.

Table 6.19. Internal consistency of the constructs

| | Mean | Minimum | Maximum | Range | Maximum / Minimum | Variance | N of Items | Cronbach's alpha |
|----------------|-------|---------|---------|-------|-------------------|----------|------------|------------------|
| MEDIA LITERACY | 3.126 | 2.620 | 3.400 | .780 | 1.298 | .073 | 7 | 0.765 |
| DST | 3.190 | 3.080 | 3.440 | .360 | 1.117 | .016 | 6 | 0.831 |
| TECHNICAL | 3.300 | 3.160 | 3.540 | .380 | 1.120 | .029 | 4 | 0.800 |
| PRACTICAL | 3.304 | 3.200 | 3.380 | .180 | 1.056 | .006 | 5 | 0.809 |

Furthermore, we ran normality tests both for the “before” and “after” scores. Shapiro-Wilk test of normality (see Table 6.20) revealed that the media literacy and DST constructs were normally distributed in the “before” condition, while none of them was normally distributed in the “after” condition. Because the assumption for a normal distribution was not met, non-parametric tests were used to compare the scores before and after DST activities.

Table 6.20. Tests of normality

| | Shapiro-Wilk (BEFORE) | | | Shapiro-Wilk (AFTER) | | |
|----------------|-----------------------|----|------|----------------------|----|------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| MEDIA LITERACY | .972 | 50 | .274 | .934 | 50 | .008 |
| DST | .964 | 50 | .135 | .885 | 50 | .000 |
| TECHNICAL | .916 | 50 | .002 | .820 | 50 | .000 |
| PRACTICAL | .946 | 50 | .022 | .855 | 50 | .000 |

Differences in Competences

From the following table (Table 6.21), we can already notice that the mean score of each of the competence constructs is higher in the “after” condition.

Table 6.21. Mean score of each competence construct

| | MEDIA LITERACY | | DST | | TECHNICAL | | PRACTICAL | |
|-----------|----------------|-------|--------|-------|-----------|-------|-----------|-------|
| | Before | After | Before | After | Before | After | Before | After |
| N | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Mean | 3.13 | 3.31 | 3.19 | 3.57 | 3.30 | 3.53 | 3.30 | 3.54 |
| Std. Dev. | .401 | .436 | .467 | .418 | .497 | .465 | .475 | .426 |

We examined the significance of the difference between the variable pairs with a Wilcoxon signed-rank test. The test showed a statistically significant increase in perceived competences in all four dimensions: media literacy ($Z = 493$, $p = 0.001$), DST ($Z = 524$, $p < 0.001$), technical ($Z = 324.5$, $p < 0.001$), and practical ($Z = 410$, $p < 0.001$) competences. Thus we can conclude that participation in the STORIES activities enhanced the teachers' competences both in theoretical and practice-oriented aspects related to digital storytelling.

6.2.3 Teachers' Reflections on the Process (Interviews and Focus Group)

Teacher Interviews (Finland)

Total of 13 kindergarten teachers from two day care centers were interviewed during the two academic years. First year there were eleven teachers participating and eight on the second year. Only six of the teachers participated on both years. The interviews were part of a Master's thesis project (Merjovaara, in progress) that will be completed in late 2018.

The interviews were conducted as group interviews three times during the two academic years. The groups consisted of the teachers in each participating child group. First round of interviews was conducted after the initial training modules before the first story projects were started. The second time in the spring of the first academic year and the third and the last round of interviews in the end of the second school year when child groups had finished all the DST activities.

Kindergarten teachers who were interviewed, saw that DST can be used to promote learning in many different areas and topics. Interaction while working in groups and using spoken language created opportunities for the development of language skills. One teacher told that while observing children working on DST projects, she made surprising observations of individual children's language skills and vocabulary. So DST proved to be an efficient way of assessing the linguistic development of individual children.

So that, it is a different way of using language. It is foremost, if for example there is a narrator, you don't speak about your own stuff but tell what is going to happen, what will happen and the speech changes to a different kind.

Quite interesting observations through that (DST). And in for example producing speech, you realize what you're accustomed to. When you hear a lot of individual child's speech you get used to it and don't even realize that for example the grammar might be off.

Kindergarten teachers also pointed out that dst projects integrated arts through children's drawings and other products. DST also acted as a platform to highlight/respect children's culture and bring it visible to adults. As a whole DST was seen as a versatile activity that gave opportunities to work on many fields of arts and culture.

...it brings to mind teaching arts, music creativity. We are going to make own music and create sound effects

...They got to play instruments and sing, so it was a very versatile thing

Interaction and co-operation was a vital part of dst projects. Working in small groups while creating digital stories gave good opportunities for practicing co-operation and learning how to communicate with each other. Children learned that to make a successful project, they had to co-operate with each other and had to learn how to make compromises.

And I realized that at least in our group, it really enhanced co-operation skills and there couldn't be one (child) who would say that next is going to happen this. They had to listen what others said and will others accept your proposition. So it was kind of conversation skills too

Learning to identify and control feelings and emotions is one important part of early childhood education. In the interviews kindergarten teachers brought out ideas how they could utilize DST by creating different example stories of interaction situations either by themselves or with children. Those stories could be used in learning sessions.

...when learning about emotions and feelings. We can go through different situations and drama. We have made different end results (to situations) for example. We have acted those situations or drawn them and in that it works really well

DST was seen as a great tool for pedagogical documentation. Kindergarten teachers said that the stories were documentation as themselves. The stories gave an unique opportunity for the teachers to assess the developmental phase of individual children. Through the digital stories it was also possible for children to display important things to them and the children's culture. This required an approach from the teacher that allowed the story to originate from children's own ideas.

...when parents would come to a parents' night, we would have compiled a photo compilation of "our day with the children". I think it would show also what things are important to children and to different individuals and it wouldn't be only the adult's perspective of how the day had gone by.

But we have also used it in assessment. One teacher have filmed some child in a gymnastics session for example and then we have watched it together to see how well the child's motoric skills have developed.

In addition to benefits, the interviewed kindergarten teachers felt that DST also brings along certain requirements for the staff and the learning environment. ICT competence was one fundamental aspect that was brought up by teachers. They felt that one of the main issues concerning ICT competence and acquiring it was attitude towards ICT. Teachers felt that they were stepping out of their comfort zone when utilizing ICT in their work. The participating teachers acknowledged their attitudes and most of them had a positive strive to improve their competence through STORIES project and felt that they can learn together with children.

I think it is mostly about the technical difficulties. There is this barrier, that I wish we could overcome and see the opportunities and how fun it can be. If one could just get there, where she would feel that she can do it. Because it requires that...

But together with children. It is the adults' problem, feeling that if you cannot master it completely, you cannot do it with the children. You can learn together with the children and don't have to be the first to know how to do something. As children, you can practice too.

Concerning the competence of children, the teachers felt that children's ICT competence was better than theirs. Even though children were quite capable to using tablet computers and i-Theatre, teachers realized that it was hard for children, especially the younger ones to grasp the big picture of the projects they were working on. For children aged six to seven, it was easier to understand what different phases belong to the process. It was also sometimes hard to plan the activity, because some children could concentrate longer and wanted to work longer at a time. Short session time was emphasized with child group that consisted of children aged one to three.

Well maybe here comes the age to play, that what can you expect from a child in a certain age. The reality came clear that a three year old cannot yet understand what the story structure is.

And maybe the younger the children are, harder it is for them to understand what they are doing. What kind of activity they're part of. Now that I am myself working with preschoolers, they usually know what we are trying to achieve and what is the idea behind doing some story or fairytale. But when the children are younger, they don't have that same vision

Time was the main resource that was seen as insufficient. Teachers felt that they were obliged to use their free time to learn how to use the devices and applications. There was some variation in how teachers felt about it. Some older staff were really strictly against using their free time to learn to use the devices and applications.

if there was enough time, we would have already mastered the use. But I have to admit that it's not just that how enthusiastic you are to use them on your free time, but where you draw the line. I am old enough that I have made a clear divide between work time and free time and I intend to keep it that way. Of course if I was more flexible and would study these things at home, which seems to be the only option for us...

In the two day care centers where interviews were conducted, every teacher had a personal iPad and additional devices were available for the use of child groups. So there was not really an issue with the sufficiency of the devices and only one teacher mentioned that there could be more iPads available for them to use.

Focus Groups (Italy)

The Italian research Unit, on June 18 2018, at the Reggio Emilia Department of Education and Human Sciences held a focus group discussion with 14 Italian practitioners involved in the Project. Of the 14 people involved, 12 were either teachers or pedagogistas, and 2 were atelierists. The focus group has been conducted by the researchers involved, and has resulted in discussion aimed at gathering the practitioners' perspective on the main outcomes of the project.

1) Question asked: What is the general outcome of the experience?

Main outcomes: Importance of the teachers training phase, importance of a long period of time dedicated to the activities.

The teachers training has been very interesting, particularly for the process of the stories' construction process. We were not experts in terms of digital skills, so we had to try first: we made some interesting discoveries. During the second year we felt already more expert.

During the first year we tried to start directly from the digital experience, but this second year, after a common evaluation, we decided to begin with the storytelling, to then integrate it with the digital component.

The fact that the project did last two years has been a positive factor, given how during the entire project the children kept developing their competencies: with the time they have become more autonomous in the use of the devices.

2) Question asked: Think of a digital story creation process that went particularly well. What were the most important elements?

Main outcomes: Forms of exchange among children, usability of the software, interconnection of physical and digital elements.

There is a story whose characters have been invented the previous year by a first group of children, and this year have been further developed by another group: I think this form of exchange has been particularly interesting and positive.

We liked particularly some stories created with softwares very easy to use, aspect that made children very autonomous in the creation and digitalization of the story.

We liked a story in particular, given the interest of the theme chosen and the fact that the video projection of the story was intertwined with some physical elements created by the children.

3) Question asked: *If a new colleague were to start an activity of DST, what advices would you give her/him?*

Main outcomes: understand potentialities and limits of the devices, focus more on the digital dimension.

Before proposing the activity to the children, he/she should try them more than once, as to understand potentialities and limits of the devices.

To start reflecting on the meaning that has for the children the process of creation and digitalization of a story. Furthermore, to think of some possible direction the projects might take.

To take some distance from the dimension of the story creation process and focus more on the digital possibilities.

4) Question asked: *When the storytelling gets developed through digital devices, what changes?*

Main outcomes: new processes are made visible, it makes the storytelling more concrete.

Maybe we have used the digital dimension mainly to make visible to construction of the story.

The digital dimension makes the storytelling more concrete, it creates some sort of a synthesis.

The digital dimension has been used to emphasize the interweaving of different expressive languages.

5) Question asked: *What elements could become part of the guidelines?*

Main outcomes: importance of the pedagogical documentation, importance of the learning spaces, importance of a shared interpretation of how digital and narrative dimensions should be connected.

Some suggestions regarding the fact that each laboratorial phase should be preceded by an exploration of the adults involved in the project. That a good laboratorial practice needs to be based on shared interpretation of what narrative means, how we interpret the digital dimension, what is our approach to the design of the educational activities and how to co-create them together.

I think that the part of the documentation is very important to reflect, to reconsider the steps and underline the level of awareness showed by the children involved.

The importance of the learning spaces we offer to the children and how we organize them.

6.2.4 Teachers' Digital Stories (Turkey)

Within the scope of the STORIES project, teachers of four different schools from Turkey created their own digital stories to use in their project activities during the implementation process. Those digital stories created by Turkish teachers were used as research data to gain better understanding of the teachers' digital competences and preferences. The teachers at each school created three digital stories throughout the project: one during the teacher's training program, which focuses on integrating DST in preschool educational settings that was conducted before the implementation of digital storytelling projects at schools (a total of 4 stories from 4 schools), another for one of the projects implemented in the first cycle of 2016-2017 academic years (a total of 4 stories from 4 schools), and a third one for one of the projects implemented in the second cycle of 2017-2018 academic years (a total of 4 stories from 4 schools). To evaluate those 12 digital stories created by the participant teachers, "Evaluation Form for Teachers' Digital Stories" was used.

Data obtained by four of five sections [(1) Narrative elements (3) Story grammar, (4) Media elements and (5) Technology elements] included in "Evaluation Form for Teachers' Digital Stories" were analyzed based on descriptive techniques. The indicators of the qualities of teachers' digital stories under those four sections are described by frequencies and percentages. On the other hand, data from the second section of the evaluation form, entitled (2) Digital Story Elements and which covers eleven performance criteria within a rubric were analyzed based on total scores. One-way ANOVA for Repeated Measures was used to determine whether teachers' competences to create digital stories has significantly changed or developed over time, in terms of digital elements in the stories. Below, the findings are presented within two separate titles, namely, (1) *Investigation of Teachers' Digital Competencies, in terms of Narrative Elements, Story Grammar, Media Elements and Technology Elements Employed in Their Digital Stories* and (2) *Investigation of Teachers' Digital Competencies, in terms of Digital Story Elements Employed in Their Digital Stories*, respectively.

Investigation of Teachers' Digital Competencies, in terms of Narrative Elements, Story Grammar, Media Elements and Technology Elements Employed in Their Digital Stories

Under this title, the initial focus was on the *narrative elements* and when the features observed in the entire first-, second- and third-group of digital stories created by the teachers are focused; the script was appeared to be the narrative type in all the stories. When these scripts are examined, it is seen that six of these stories are narrated on the theme of nature, whereas two of them are on helping each other/cooperation, another two are on health, one of them is on environmental control, and one of them is on curiosity. Despite the fact that all of

the stories are narrated as scripts, the common feature of all the stories is that they are aimed at giving instructional messages suitable for both the theme of the implemented project and the teaching content. Within the scope of the STORIES Project, the teachers used the digital stories they prepared to raise awareness among children and to attract children's attention to the related objectives within the learning process. This is the main reason why all the digital stories prepared by the teachers are informative/ instructional. Thus, in the literature, it is also emphasized that the digital storytelling can be used to ensure that students construct their own sense, understanding or experience of a particular content (Yüksel & Robin & McNeil, 2011) and draw attention to it (Wang & Zhan, 2010); and it is underlined that “stories that instruct” is a title that is often used by teachers in the process of creating educational digital stories (Şeker, 2016).

Table 6.22 and Table 6.23 presented below demonstrate the features of the digital stories in terms of story grammar.

Table 6.22. Story grammar

| Story Grammar | 1 st Digital | 2 nd Digital | 3 rd Digital |
|---|-------------------------|-------------------------|-------------------------|
| | Stories | Stories | Stories |
| | f | f | f |
| Is a setting given? | 4 | 4 | 4 |
| Are the characters described? | 4 | 4 | 4 |
| Are the events presented sequentially? | 4 | 4 | 4 |
| Is there a causal relationship between events? | 4 | 4 | 3 |
| Is there an initiating event? | 4 | 4 | 3 |
| Is an internal response present? | 4 | 4 | 3 |
| Is a goal present? | 4 | 4 | 2 |
| Is there an attempt to attain the goal? | 4 | 4 | 2 |
| Is there a consequence? | 4 | 4 | 3 |
| Are multiple plans used to meet the goal? | 1 | -- | -- |
| Is a partial/complete episode embedded in the episode? | 1 | -- | -- |
| Are there two characters with separate goals and actions that influence the actions of the other? | 1 | -- | -- |

Table 6.23. Level of story grammar development

| Story Structure | Level of Story Grammar Development | 1 st Digital | 2 nd Digital | 3 rd Digital |
|-----------------------------|------------------------------------|-------------------------|-------------------------|-------------------------|
| | | Stories | Stories | Stories |
| | | f | f | f |
| No-structure sequence | Unrelated statements | -- | -- | -- |
| Descriptive-action sequence | Descriptive sequence | -- | -- | -- |
| | Action sequence | -- | -- | 1 |
| Reactive sequence | Reactive sequence | -- | -- | 1 |
| | Abbreviated Sequence | -- | -- | -- |
| Goal-directed sequence | Complete Episode | 3 | 4 | 2 |
| | Complex Episode | -- | -- | -- |
| | Interactive Episode | 1 | -- | -- |

When the digital stories are evaluated in terms of *story grammar*, the setting and the characters are appeared to be defined in all of the stories and it appears that the events in these stories are presented sequentially. It was found out that there was only one digital story

without a causal relationship between events, an initiating event, an internal response and a consequence, whereas there were two digital stories without a goal and an attempt to attain the goal. Those mentioned stories were all found to be included in the third-group of stories that were created in the 2nd cycle of the project implementation year. Use of multiple plans to meet the goal, a partial or complete event embedded in the episode, and presence of two characters with separate goals and actions that influence the actions of the other were observed in only one digital story which is one of the first-group of digital stories created by the teachers during the teacher training process. Based on these findings, it is seen that importance is attached to the creation of a solid structure in the sense of the presence of a setting, the description of characters and the sequential presentation of events, which can be accepted as the basic elements of a narrative. In this scope; it should also be emphasized that the narrative dimension is also important beyond the technology dimension of digital stories and the digital stories have the potential to be used as a means of engaging teachers in critical reading and writing experiences. This is also supported by the results of a study conducted with pre-service teachers by Husband (2014) by the fact that the vast majority of the sample identified the story development process as the most challenging part of developing a digital story.

In addition, as Table 6.23 indicates, it was found out that there is only one digital story which fits the level of action sequence, again there is only one story which fits the level of reactive sequence. Those mentioned stories were found to be included in the third-group of stories that were created in the 2nd cycle of the project implementation year. There are nine stories which fit the level of complete episode and there is one story which fits the level of interactive episode.

Complete episodes, as a part of goal-directed story structure, which are observed in the majority of the stories, include aims and plans of a character; may reflect evidence of planning in the attempts of a character to reach the goal; have at minimum an initiating event, an attempt, and a consequence (Glenn and Stein, 1980; Hedberg and Wesby, 1993; Liles, 1987; Peterson and McCabe, 1983). In this context, it can be also said that the teachers' digital stories have a complex structure in terms of developmental taxonomy for the acquisition of story grammar.

Table 6.24 presented below demonstrates the features of the digital stories in terms of media elements.

Table 6.24. Media elements

| Media Elements | 1st Digital Stories | 2nd Digital Stories | 3rd Digital Stories |
|---|---------------------------------------|---------------------------------------|---------------------------------------|
| Product Type | f | f | f |
| Still-image sequence | 4 | 4 | 3 |
| Animated slideshow | -- | -- | -- |
| Animation | -- | -- | 1 |
| Movie | -- | -- | -- |
| Mixed | -- | -- | -- |
| Visual Elements: Drawings/Pictures | f | f | f |
| Embedded by hand | -- | 1 | 1 |
| Embedded by digital tools | 3 | 3 | 3 |
| Embedded by both hand and digital tools | 1 | -- | -- |
| Not embedded | -- | -- | -- |
| Visual Elements: Written Text | f | f | f |
| Integrates voicing | 1 | 1 | 1 |
| Substitutes voicing | 1 | 1 | -- |
| Not displayed | 2 | 2 | 3 |
| Voicing | f | f | f |
| Narrating voice | 3 | 3 | 4 |
| Dialogue | 1 | 1 | 3 |
| Voicing: Speech Clarity | f | f | f |
| Not understandable at all | -- | -- | -- |
| Hardly understandable | -- | -- | -- |
| Sufficiently understandable | -- | 1 | -- |
| Clearly understandable | 3 | 2 | 4 |
| There is no speech | 1 | 1 | - |
| Soundtrack | f | f | f |
| Mood Music (Non-diegetic) | 2 | 3 | 1 |
| Music (Diegetic) | -- | -- | -- |
| Sound effects | 2 | 2 | 3 |

When the types of the products are examined in terms of *media elements*; it is determined based on Table 6.24 that one of the third-group of stories created in the 2nd cycle of the project implementation year is an animation and all the other stories are in the *product type* of still-images. This structure can be interpreted as the fact that the teachers want to present children a clear and simple story structure that they are familiar with, far from the complexity. This simple structure seen throughout the first-, second- and third-group of digital stories created by the teachers can be seen as an effort to connect with children's lives in the context of the principle of “learning through experience”.

As digital storytelling is narrating visually, the stories have also been examined in terms of *visual elements*, since images play an essential role in representing the stories. It can be seen from Table 6.24 that drawings/pictures are embedded in the whole of the digital stories.

A total of nine stories, including three stories from each of the first-, second- and third-group of stories were produced by using digital tools. Drawings/paintings were produced by hand in two stories; one from the second-group of stories and one from the third-group of stories, whereas one of the first-group of stories was produced by using both ways together.

While digital stories are being created, there can be many ways to get visuals. In the process of creating digital stories, teachers can use visuals suggested by the software in use; can find relevant visuals on the internet, as suggested by Robin (2016); or can use their own drawings when there is no matching character images on digital media, as suggested by Şeker (2016). As a matter of fact, in our study it was determined that teachers benefited from all these three different ways; for example, Story Jumper software is used for one of the digital stories and the images are selected from those found in the catalog of the software. Another digital story was prepared using Windows Movie Maker software and in the story, visuals from the internet are included. There are also examples of digital stories that the teacher has photographed his own drawings and transferred it to the Sony Vegas Pro software to create the digital story. It has been also determined that the images used in teachers' digital stories were qualified and compatible with the plotline, characters and emotional mode; the same images were used for the repeating characters, and no significant difference was observed between the first-, second- and third- group of stories in this dimension.

In addition, no *written texts* have been found to be displayed in seven of the digital stories; two of them were in the first-group of stories, another two were in the second-group of stories, and three were in the third-group of stories. It is natural that there is no written text in the majority of the digital stories because the target audience is pre-school children who have not yet learned to read and write. Written text of a total of three stories, one for each group of stories, were found to be integrating voicing. On the other hand, written texts which substitute voicing were observed for one story from the first- and one from the second-group of stories. This is thought to be due to the fact that digital stories are evocative of "e-book" applications as emphasized by Uslupehlivan ve Erden (2016). The story from the first-group with the written text which substitutes voicing was prepared during teacher training. In the course of the training, when teachers were asked why there was no voicing element in the story, teachers stated that they could not add this element due to their lack of technology. In relation to the story in the second-group, teachers reported that they added the audio file to the story but that it was not possible to reach the related file due to a technological problem. In accordance with both cases mentioned, it can be said that the competences that teachers have at the lowest level, or that they perceive, are related to the use of new technologies, as supported by the results of the research conducted by Bağ & Ay (2017), Ekinçi & Kaya (2016) and Karataş (2002).

When the stories are examined in terms of voicing properties, a *narrating voice* was observed in ten of the stories. The narrator's voice was found to be used in three of the digital stories from the first-group, another three of the digital stories from the second-group, and all throughout the third-group. In addition, there was a *dialogue* in only five of the digital stories; one of those five stories was from the first-group, one of them was from the second-group and three of them were from the third-group. From the point of view of the *speech clarity*, only one digital story within the second-group was considered sufficiently understandable, whereas speech was found to be clearly understandable in the rest of the stories with speech.

In terms of *soundtrack*, two of the first-group of stories, three of the second-group of stories and one of the third-group of stories were found to have *mood music*. Seven of the stories are observed to have *sound effects*. The number of digital stories which includes sound effects was higher in the third-group of stories, when compared with the first- and second-groups. In digital stories with mood music, it has been observed that the music can reflect the general emotional mode and is used throughout the story; but it is rather weak in meeting the changing mode of emotions in the story. On the other hand, sound effects were seen to be used only in very specific situations, not used in all situations where necessary. In a study conducted by Şeker (2016), where the digital stories of teacher candidates' are examined, it was found that the lowest performance scores were obtained on the criteria of "Quality of Audio Narration; ease of hearing, if any, volume of the added music and its relevancy to the content of project". In a similar vein, it is also observed in our study that the music and sound effects are not used effectively in the stories as a whole. This may be due to the technological inadequacies of teachers in adding music and sound effects. Another reason for this situation may be the fact that the teachers have taken the visual elements in the focal point in digital stories and did not give enough importance to the sound elements. However, the music and ambient sounds also work alongside the voice to set the tone and the mood of what is told (Nguyen, 2011). From this point of view, it would not be wrong to say that teacher's stories need to be improved in terms of music and sound effects.

Based on the findings mentioned above, in the context of *media elements*, no apparent tendency difference has been observed between the first-, second- and third-group of stories. This suggests that the voicing properties and visual elements in the stories are related to the purpose of the story, fictional structure and technological opportunities and competences, rather than the stories' being a part of the first-, second- or third-group of stories.

Table 6.25 presented below demonstrates the features of the digital stories in terms of technology elements.

Table 6.25. Technology elements

| Technology Elements | 1st Digital Stories | 2nd Digital Stories | 3rd Digital Stories |
|----------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| User Interface | f | f | f |
| Graphical user interface | 4 | 4 | 4 |
| Touch user interface | -- | -- | -- |
| Tangible user interface | -- | -- | -- |
| Software Used | f | f | f |
| iMovie | 1 | -- | -- |
| Photo Story | 1 | 1 | -- |
| Power Point | 1 | -- | 1 |
| Powtoon | -- | -- | 1 |
| Quick Time Movie | -- | 1 | -- |
| Sony Vegas Pro | -- | 1 | -- |
| Story Jumper | -- | 1 | -- |
| Windows Movie Maker | 1 | -- | 2 |

The findings obtained through examining *technology elements* have shown that within the scope of each project, the software used in the digital story building process varies in terms of the first-, second- and third-group of digital stories. These software used for the digital stories are iMovie, Photo Story, Power Point, Powtoon, Quick Time Movie, Sony Vegas Pro, Story Jumper, and Windows Movie Maker. Thus, Robin & Pierson (2005) also included Photo Story, Windows Movie Maker, and iMovie as the software that can be used to start creating digital stories; whereas Harriman (2011) also indicated internet based applications such as Storybird or Animoto as easy-to-use software for the teachers. Therefore, it can be said that the software used by teachers in storytelling process varies as stated in the literature.

Besides, although Robin (2016) states that the process of creating a digital story, previously confined to desktop computers or laptops, is now possible with less expensive and easier to use mobile devices and web-based tools; in our study, the kind of user interface method employed by teachers has appeared to be graphical user interface for all of the digital stories created. This can be thought of as two main reasons. One is the lack of technological equipment at schools in Turkey as emphasized by Doğan (2012). It is not always possible to reach touch user interfaces, i.e. tablets, in most of our project implementation schools; however, in all schools there is a computer free for teacher's use. The other reason can be attributed to the fact that the teachers have prepared stories along with a team work. While the teachers work simultaneously in cooperation, they may prefer the graphical user interface, which can be used with a wider-screen computer, rather than the devices with a smaller screen and touch user interface.

Investigation of Teachers' Digital Competencies, in terms of Digital Story Elements Employed in Their Digital Stories

Besides findings mentioned above, teacher digital stories were also examined through eleven performance criteria within a rubric in the context of *Digital Story Elements*. Three performance levels –*insufficient, moderate, and sufficient*– are defined for each criterion included. Table 6.26 presented below demonstrates the observed frequency of each performance level on digital story elements included in the teachers' digital stories.

Table 6.26. Criteria for elements of digital stories

| Criteria | Performance Levels | | | | | | | | | | | |
|---------------------------|---------------------------------|--------------|----------|------------|---------------------------------|--------------|----------|------------|---------------------------------|--------------|----------|------------|
| | 1 st Digital Stories | | | | 2 nd Digital Stories | | | | 3 rd Digital Stories | | | |
| | n/a | Insufficient | Moderate | Sufficient | n/a | Insufficient | Moderate | Sufficient | n/a | Insufficient | Moderate | Sufficient |
| Purpose | -- | -- | -- | 4 | -- | -- | 1 | 3 | -- | 1 | -- | 3 |
| Dramatic Question/Problem | -- | -- | -- | 4 | -- | 1 | -- | 3 | 1 | 1 | -- | 2 |
| Content | -- | -- | -- | 4 | -- | -- | -- | 4 | -- | -- | 1 | 3 |
| Voice of Narrator | 1 | -- | -- | 3 | 1 | -- | 2 | 1 | -- | -- | -- | 4 |
| Power of the Soundtrack | 2 | -- | -- | 2 | 1 | 1 | 1 | 1 | 3 | -- | -- | 1 |
| Visual Elements | -- | -- | 2 | 2 | -- | -- | 2 | 2 | -- | -- | -- | 4 |
| Economy | -- | -- | 1 | 3 | -- | -- | - | 4 | -- | -- | 1 | 3 |
| Language | -- | -- | -- | 4 | -- | -- | - | 4 | -- | -- | 1 | 3 |
| Pacing | -- | -- | 2 | 2 | -- | -- | 3 | 1 | -- | -- | 2 | 2 |
| Contribution of Message | -- | -- | 1 | 3 | -- | -- | 1 | 3 | -- | -- | 1 | 3 |
| Clarity of Message | -- | -- | 1 | 3 | -- | -- | 1 | 3 | -- | -- | 1 | 3 |

n/a: Not Available

Through the findings, it is observed that the majority of the digital stories are at a sufficient level in terms of digital story elements. It was seen that none of the digital story elements existing in the stories of the first-group are evaluated as insufficient, while one story from the second-group was found to be insufficient in terms of “a dramatic question/problem” and “the power of the soundtrack”, and one story from the third-group was found to be insufficient in terms of “purpose” and “a dramatic question/problem”.

The observed mean scores and standard deviation values for each criterion within the first-, second- and third-group of digital stories were also examined as another indicator of the performance observed in teachers’ products. The findings on descriptive statistics are presented in Table 6.27.

Table 6.27. Descriptive statistics for elements of digital stories

| Criteria | 1 st Digital Stories | | 2 nd Digital Stories | | 3 rd Digital Stories | | Total | |
|---------------------------|---------------------------------|-------|---------------------------------|-------|---------------------------------|-------|-----------|-------|
| | \bar{X} | S_x | \bar{X} | S_x | \bar{X} | S_x | \bar{X} | S_x |
| Purpose | 3.00 | .00 | 2.75 | .25 | 2.50 | .50 | 2.75 | .17 |
| Dramatic Question/Problem | 3.00 | .00 | 2.50 | .50 | 1.75 | .75 | 2.42 | .31 |
| Content | 3.00 | .00 | 3.00 | .00 | 2.75 | .25 | 2.92 | .08 |
| Voice of Narrator | 2.25 | .75 | 1.75 | .62 | 3.00 | .00 | 2.33 | .33 |
| Power of the Soundtrack | 1.50 | .86 | 1.50 | .64 | .75 | .75 | 1.25 | .41 |
| Visual Elements | 2.50 | .28 | 2.50 | .28 | 3.00 | .00 | 2.67 | .14 |
| Economy | 2.75 | .25 | 3.00 | .00 | 2.75 | .25 | 2.83 | .11 |
| Language | 3.00 | .00 | 3.00 | .00 | 2.75 | .25 | 2.92 | .08 |
| Pacing | 2.50 | .28 | 2.25 | .25 | 2.50 | .28 | 2.42 | .14 |
| Contribution of Message | 2.75 | .25 | 2.75 | .25 | 2.75 | .25 | 2.75 | .13 |
| Clarity of Message | 2.75 | .25 | 2.75 | .25 | 2.75 | .25 | 2.75 | .13 |
| Total Scale | 2.63 | 3.16 | 2.52 | 3.86 | 2.47 | 3.09 | 2.54 | 3.16 |

When Table 6.27 is examined, it is observed that there are mean point differences between the first-, second- and third-group of digital stories in terms of considered criteria except two of them: the contribution of message to children's development and clarity of message criterion. In terms of the contribution of message to children's development and clarity of message criteria, the performance level observed in teachers' products in each three story group is quiet close to the highest level of performance ($\bar{X}=3.00$) with $\bar{X}=2.75$ average value.

In terms of the purpose, dramatic question/problem, content, power of soundtrack and language criteria; the second- or third-group of stories appeared to have a lower average than the first-group of stories. Especially the low average values observed for "a dramatic question/problem value" in the third-group of stories can be explained by the fact that these stories include more informative messages and accordingly, does not have a triggering factor/a noticeable problem. In one of the stories with the theme of nature, repeating the features of the seasons several times or in another story with the theme of environmental control, emphasizing the actions to be taken one by one for recycling can be given as examples of above mentioned situation.

On the other hand, in terms of voice of narrator and visual elements criteria, it was determined that the third-group of stories had a higher average than the first- or second-group of stories. Especially in the second-group of stories; that the voice of narrator criterion has appeared to have a lower average value than both the first- and third-group of stories can be attributed to the lack of a narrating voice in one of the stories in this group and the insufficiency observed in the coherence of the pace and emotion of narrating voice with the relevant parts in two of the stories. The average point increase which is observed in terms of the third-group of stories, on the other hand, can be seen as a sign that teachers are beginning to use their voices more accurately and use visuals more competently as they experience the digital story development process repeatedly.

Besides, it is seen that; the digital story element, on which teachers demonstrate the lowest performance, is power of the soundtrack. While the performance levels observed in teachers' products were between "moderate" and "sufficient" in terms of all other criteria, teachers were found to be able to exhibit relatively low performances ranging between "insufficient" and "moderate" in terms of soundtrack usage or power of the soundtrack, which indicates that soundtrack is not completely coherent with emotional content of the story's respective parts and has a disruptive effect on the voice of the narrator. On the other hand, the criteria of content ($\bar{X}=2.92$), which indicates a consistency between introduction, development and conclusion parts of the story, and these parts' direct relation with the purpose of the story; language ($\bar{X}=2.92$), which indicates that the language used is appropriate in terms of content and grammar, is simple and clear; and economy ($\bar{X}=2.83$), which indicates that the story is economic in terms of visual and verbal elements and the duration of the presentation is appropriate, are confronted as digital story elements that are found to be displayed most competently in the teachers' digital stories.

To determine whether those above-mentioned relative mean point differences between the first-, second- and third-group of digital stories created by teachers were statistically significant, One-way ANOVA for Repeated Measures was used. Prior to the analysis, the basic assumption of sphericity, which indicates the condition where the variances of the differences between all combinations of related groups (levels) are equal, was checked by using Mauchly's Test of Sphericity. The results of this test showed that sphericity has not been violated ($p>.05$) and the results reached by One-way ANOVA for Repeated Measures are presented in Table 6.28.

Table 6.28. Results of One-way ANOVA for Repeated Measures

| Source of Variance | Sum of Squares | df | Mean Square | F | p |
|---------------------------|-----------------------|-----------|--------------------|----------|----------|
| Between-Subjects | 14.67 | 3 | 4.89 | | |
| Measure | 6.50 | 2 | 3.25 | 0.22 | .809 |
| Error | 88.83 | 6 | 14.81 | | |
| Total | 110.00 | 11 | | | |

The results of the One-way ANOVA for Repeated Measures, which was used to determine whether teachers' competences to create digital stories has significantly changed or developed over time in terms of digital elements in the stories, have revealed that the difference between the scores of the first-, second- and third-group of teacher digital stories is not statistically significant ($F_{(2,6)}=.22$, $p>.05$). However, it was seen that the average score obtained from the first-group of stories was higher than the others. This may be due to the development of the first-group of stories during the teacher training process, regarding that in the process of teacher training, teachers acted as a professional learning community and supported each other by giving feedback to their stories. The fact that teachers have not been able to create a similar supportive environment in their school environment can be considered as the reason for the first-group of digital stories to have more desirable characteristics in terms of digital story elements.

Conclusion

The findings obtained through the analysis of 12 digital stories developed by the Turkish pre-school teachers within the scope of the STORIES Project have been presented above through comparison of the first-, second- and third-group of stories. In this context, the strengths and weaknesses of these digital stories is discussed. In this way, it is particularly aimed to contribute to the field of educational sciences in Turkey, by adding a new research to the relevant literature which consists of a limited number of researches, as stated by Şimşek, Usluel, Sarıca & Tekeli (2018), that focus on the qualities of the digital stories performed by teachers or the digital competencies of pre-school teachers. On the other hand, with the emphasis on the shortcomings in this area, it is also intended to support the findings of various researches (Bağ & Ay, 2017; Ekinçi & Kaya, 2016; Karataş, 2002) that underline the need to improve the technology competencies of preschool teachers.

The overall results have revealed that; when the first-, second- and third-group of stories developed within the scope of the STORIES Project were evaluated in terms of dimensions included in the “Evaluation Form for Teachers’ Digital Stories”, no significant difference was observed. This result shows that teachers need continuous training and counseling on digital/technological competencies to be able to see the potential of the technology, use it effectively in the classroom environment, prepare more qualified digital stories in a progressive basis (Zavenbergen, 2007), make digital technology a part of children's natural learning environment, and achieve the positive impact of digital technology on learning by using the right pedagogical frameworks (Khoo, Merry, Nguyen, Bennett & MacMillan, 2015).

On the other hand, training to be provided to the teachers for the development of technology-related competencies would also give opportunity to reach the “Indicators of Teachers’ Technological and Technology-Based Material Preparation Skills” (i.e. “Prepares instructional materials according to the objectives.”, “Uses information and communication technologies effectively in teaching and learning process.”, and “Uses relevant tools, instruments and materials effectively in teaching and learning process.”) involved within the “General Competencies of Teaching Profession” prepared by Ministry of National Education of Turkey (2017).

The fact remains that; preferences for digital story creation are influenced by various factors such as purpose, objectives, characteristics of the learners, technological opportunities of schools, technological competencies of teachers, as well as the current conditions. However, in addition to the need for the above-mentioned trainings, it is thought that it is also necessary to make more use of the digital storytelling approach in teaching environments, to make more digital story creation practices, to make the schools more technologically equipped, and to prepare professional learning communities where teachers can discuss with each other and learn from each other in order to create more qualified digital stories so that teachers can be the true leader of this process.

7 Results: Children’s Agency in the DST Process (RQ4)

In this section, we will present initial findings related to children’s agency in the context of digital storytelling, which is one of our additional, country-specific research questions (RQ4).

To answer RQ4, we will examine what kind of elements of the DST process contribute to children’s agency. We are interested in the affordances offered by the digital tools as well as non-digital materials, the use and ownership of spaces, and the interaction between the participants involved in the storytelling. Our data, collected during both project cycles, consists of children's digital stories, kindergarten teachers’ documentation of the DST activities, and Finnish teachers’ and children’s interviews. Furthermore, findings from other partner countries (especially Turkish researchers’ observations of the DST process in Turkey) have been incorporated to complement and corroborate the findings. The analysis of the data focuses on the digital and non-digital tools and materials used in the stories, the physical spaces in which the stories were created, time-related aspects, the children’s and adults’ roles in the DST processes, and the children’s experience of their agency in the process.

The content of this section is principally based on a conference paper entitled *Children’s agency in digital storytelling: The role of material environments* (Nousiainen, Turja, Merjovaara, & Isotalo, 2018), presented in *Childhood and Materiality – the VIII Conference on Childhood Studies* in Jyväskylä, Finland, on May 7–9, 2018. Additionally, RQ4 pertains to a Master’s thesis project (Isotalo, in progress) that is expected to be completed during the academic year 2018-2019. The thesis is based on the children’s interviews, and the findings presented in this section that stem from children’s interviews (Section 7.5) are based on preliminary analysis of this data. The final results will be available in the thesis.

7.1 Affordances of Digital Resources

One of the perspectives regarding the conditions for children’s agency is related to the affordances of the digital resources used in the DST process. Figure 7.1 illustrates the main observations on the aspects that emerged regarding this theme.

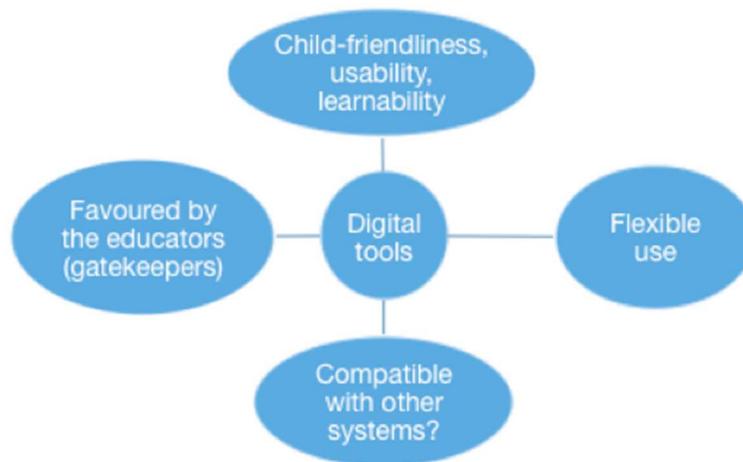


Figure 7.1. Aspects related to the affordances of digital tools

Issues related to usability and learnability were highlighted in the data; in other words, the *child-friendliness* of the tools was seen as important for children’s agency. Tools that were so intuitive and attractive that the children immediately learned how to use them independently were considered conducive to their agency as these tools allowed them to not rely on the help of adults in realising their ideas and completing their stories. These included especially such applications (e.g., Puppet Pals with its puppet play metaphor) and devices (i-Theatre with its tangible interface) that were specifically designed as storytelling tools for children.

In contrast, however, another key aspect emerging from the data was the *flexibility* of the digital tools. Interestingly, the tools that were initially considered very attractive and child-friendly were experienced as somewhat inflexible in the long run, after their novelty wore off. For example, while the i-Theatre was seen as a very child-friendly tool, its functionality was naturally more limited than that of tablet devices with their nearly unlimited supply of different apps. The portability of tablet devices was another major factor in why they were considered particularly flexible in terms of children’s creative possibilities: the children were able to bring tablets to different spaces both inside and outside the kindergarten and easily take pictures and video clips to be used as material in their stories.

After making [stories] with tablets, it felt like [tablets] had more unlimited possibilities for everything, because you could record sounds separately and like, bit by bit. And [with the i-Theatre] you had to have the whole thing prepared and save it at once, so the sounds and pictures and movements had to succeed at the same time. That was probably not so motivating. And then you couldn’t add anything [afterwards], and that was it. [Teacher interview, Finland]

From a more technical perspective, the *compatibility of devices* was also an issue that played a role in terms of how technology supported children’s agency. Being able to do every necessary step of the process on the same device was seen to support children’s active agency. When they were working on a specific tool (i-Theatre or a tablet device), the children were able to work independently and self-directedly as long as they could do all desired activities on that particular device. However, if they needed to transfer pictures, videos, or other

material between devices (in order to add something to their stories that was not possible with the device they were using), they immediately became dependent on the teacher's help. Sometimes not even the teacher was able to help them realise their ideas if it would have required, for example, bringing a story made with the i-Theatre into a video editing app on an iPad to finalise it. It was seen as challenging to introduce tools that cannot easily be combined with the use of other devices, even if they are well-designed and child-friendly as such.

This leads us to the final point, which is the *teachers' user experience*. Ultimately, the degree to which children can be active agents in the use of digital devices is determined to a large extent by what technologies are available in the kindergarten and to what extent they are used. Here we refer to teachers as "gatekeepers" who are responsible for providing tools for the children to use. Their decisions are informed by their observations of the children's interests and skills, but also by their own experiences with different tools.

7.2 Spaces and Non-digital Materials

Next, we will present aspects that manifested regarding the use of physical spaces and non-digital materials from the perspective of children's agency. The main issues are illustrated in Figure 7.2.

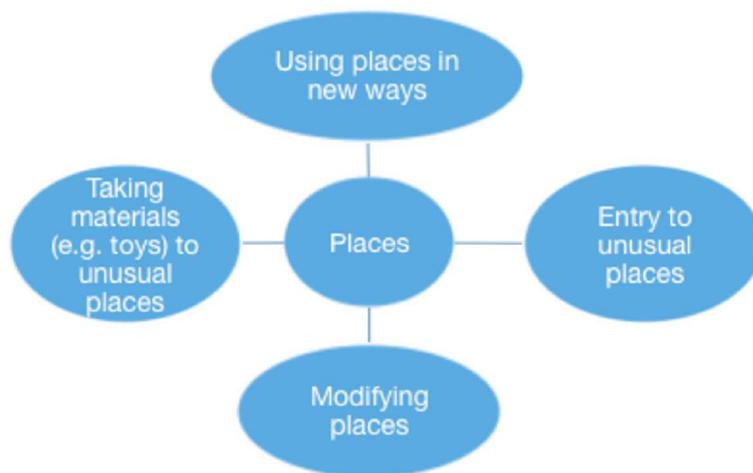


Figure 7.2. Aspects related to spaces and non-digital materials

In the case of many DST projects, the DST activities offered the children *more control over the spaces that were used*. This manifested, for example, as new ways of using places, accessing spaces that were normally used only by adults, being able to modify spaces in different ways, and bringing toys and other non-digital materials to spaces where they were typically not used. The broader ways of using spaces were based on two distinct reasons: content-related and process-related. By *content-related* reasons, we mean that the content of the story required specific settings. For example, the story may have entailed scenes where toy characters are having an adventure outdoors, or the furniture of a staff meeting room were used for building a location that was needed for the story.

The *process-related* reasons were associated with requirements set by the activity itself. In practice, many projects utilised spaces such as the staff coffee room, office, or meeting room in order to respond to the need of having a quiet space for recording sounds or a place for uninterrupted work with a small group of children. This was another way in which the children gained access to spaces they did not normally enter.

The use of *non-digital materials* is closely related to the use of spaces in terms of agency: as described above, many stories entailed using non-digital materials in non-typical locations. Additionally, DST introduced a digital dimension to non-digital play, making it possible for the children to extend their existing non-digital play worlds into a digital format and to document their non-digital play in the form of a digital story. This is important for agency especially as it provides an opportunity to share the events of ephemeral non-digital play world to a wider audience and makes it possible to get back to it afterwards – when that particular non-digital play world might not exist anymore. For example, a group that was not officially participating in the project was inspired by other groups’ DST activities and made a story based on the settings and characters of a LEGO city built by the children. This LEGO world was very important for the children at the time, and by making a digital story, they had a way of documenting it permanently, signifying that their play was valued.

7.3 Aspects Related to Time

As stated in Section 2.1.7, in addition to materials, spaces, and human participants, aspects related to time are also important as children build their agency on earlier experiences (cf. Giddens, 1979). In our results, the time dimension manifested in several different ways (see Figure 7.3).

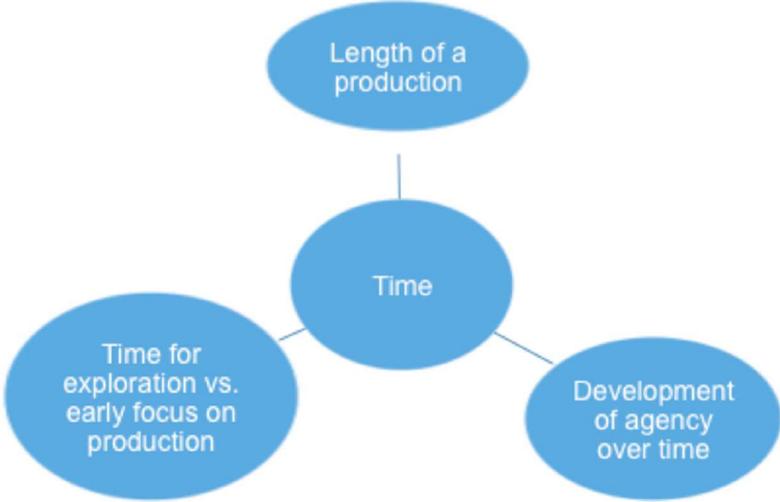


Figure 7.3. Aspects related to time

One key challenge concerning children’s experience of their agency was the *length of the story-making process*, which could lead to children’s lack of ownership of the project. Even if the project structure was designed with the intention of supporting each child’s active

participation in different ways, but if the overall plan was too complex and the process too long, the children had difficulties in understanding it and focusing on the big picture. In the following interview excerpt, two Finnish teachers reflect on their broadest and most ambitious project that included many different steps entailing individual and group work, use of different tools, and creation of digital and non-digital artefacts, with the aid of creating one joint story as the final outcome.

T1: And [it's important to] remember that children want it to happen immediately. They don't have... they don't have patience.

T2: And not to draw [the process] out for too long either.

T1: Yeah, that's what we did. [...] You should rather make several smaller projects than such a mega project. Then you can maybe put them together into a bigger one later [...] and to proceed, like, step by step. [Teacher interview, Finland]

While the length of the story process itself caused challenges for children's experience of agency, it was seen as important that *plenty of time be reserved for the children to playfully explore the digital tools* and familiarise themselves with them before embarking on the more goal-oriented story-creation activities. The following excerpt illustrates the significance of self-directed exploration of a previously unfamiliar tool.

Children discovered the technology for creating a digital story with trial and error. For example, in I-theatre activities, being totally unfamiliar with the device, they examined and tried to understand the function of the cards by placing them on the device, just because they were interested. Children also discovered that I-Theatre had a touch screen by themselves. They tried to find out the functions of the buttons with examination. Children also discovered the working principle of a tablet application, namely Drawing Pad, by themselves. [Observation diary, Turkey]

This is also related to the *development of agency over time*, that is, how children's earlier (digital) experiences – positive or negative – are reflected in later activities. In the following quote, a Finnish teacher discusses the experience of working with children on the i-Theatre, which was not a familiar device to the children from earlier, and reflects on why some children appeared unmotivated by the activity.

Yes, maybe they should have been given even more time to play and experiment beforehand. We started [the DST project] right away, so it might have been helpful if they had had a chance to do all that exploring over a longer period of time. [Teacher interview, Finland]

7.4 Adults' Roles in Terms of Children's Agency

While the principal focus in each of the previous sections has been on the role of non-human resources in children's agency in DST, we have seen that the effect of human resources is inherently present in these aspects. As formulated by Giddens (1979), authoritative (human) resources are used for managing allocative (non-human) resources (see Section 2.1.7). In the

last two sections, we focus more closely on the human participants' perspectives and examine, respectively, adults' roles in terms of children's agency and children's own subjective experiences of their own agency.

In Section 7.1, we referred to teachers as *gatekeepers*, which is related to how they manage non-human resources in DST. Another role – which is more related to interacting with human participants – can be characterised as that of a *balance-seeker*.

As discussed above, as gatekeepers, teachers have the responsibility to provide the children with opportunities for agency. There are many factors involved in this. First of all, it relates to ensuring that there is a relevant and varied selection of tools available for the children to use. Here, past experiences with specific tools play a role. On the one hand, these can be related to the educators' own digital agency and their experiences and views regarding what they consider useful, pedagogically meaningful, and user friendly from their own perspective. On the other hand, this also pertains to their observations on the children's preferences: which tools and materials the children have found interesting and motivating.

In addition to tools and materials, the gatekeeper role is also related to managing the time resources: as pointed out above, it emerged as important to allocate an adequate amount of time for the children to playfully explore the tools before initiating DST activities that aim to achieve certain specified objectives. This way the children gain more experience from the tools and thus become more capable to act as active agents in DST activities.

The children mainly wanted to play with the app [Puppet Pals 2] instead of receiving instructions. Perhaps it could go more smoothly if they had a chance to “play around” more (for more sessions). The free play with the app was mostly about adding one character after another instead of developing the story of some characters. [Project sheet, Finland]

By the balance seeker role we refer to how the teachers seek the optimal way of designing and supporting the DST process in light of children's agency. When designing the process, this is related to the level of ambition: as discussed above, a process that spans over a very long period of time or is otherwise very complex may not be conducive to children understanding their agency in the process as a whole.

During the process, balance seeking occurs between supporting the children's own expression and directing their activities too closely; in other words, the degree to which the outcome is a product of the child, facilitated by the adult, or of the adult, with some input from the child. Some examples of this in practice entail using triggering questions, scaffolding children's decision-making about the elements of the stories, preparing activities for supporting every child's active participation, supporting the children's self-expression and ideas, and promoting peer-assessment and reflection. In the first excerpt below, a teacher reflects on balance-seeking in general. The latter two excerpts present concrete examples of supporting children's agency by adjusting the story in line with children's changing ideas and individual requests and by encouraging the children to have a say.

And then finding that right balance that... when you should go away, when you can butt in, and when... how much you can... but so that it's still their project. But nothing comes of it if you don't... like, you have to guide. [Teacher interview, Finland]

C. wanted to draw something which goes beyond the story characters and plot, that is, she drew a policeman and a slide. Another child insisted on drawing a shark. After the drawing activity finished, teachers collected the drawings. Children sat down together in a line. Teacher showed them their drawings one by one and the child who drew it explained what s/he drew. As they observed different settings and characters, they decided to make changes/revisions in the story based on these drawings. [Observation diary, Turkey]

In the story-building process, children often tended to repeat each other's ideas. Teachers frequently warned each child to tell their own ideas. [Observation diary, Turkey]

Working with different age groups made this balancing task even more challenging, as the degree of adult involvement had to be adjusted accordingly. While older children's agency may have been supported through working as independently as possible, younger children on the other hand needed more adult support in order for their agency to be actualised.

T1: It was even more difficult with the little ones.

T2: It was more difficult, yeah. Yeah. But then... when [a third teacher]... she also learned a lot, that's what she said, and that you kind of adjust what you do to the age of the children [you were teaching]. And then rethink it a little. Just like us. [Teacher interview, Finland]

Finally, we can look at the adults' role through the lens of a process where different contexts influence one another, as illustrated in Figure 7.4.

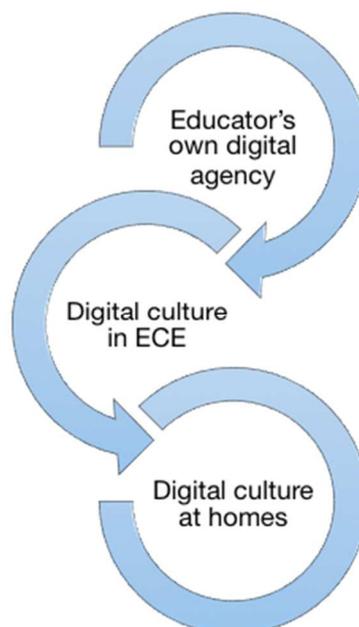


Figure 7.4. Adults' roles as a process

One dimension in Figure 7.4 is the educator's own digital agency; that is, the extent to which and the ways in which s/he personally uses digital technology. The educator's digital agency contributes to – and is influenced by – the digital culture of the kindergarten. Individual teachers' positive experiences from using digital tools will spread within the institution and further broaden the scope of its digital approaches. The digital culture of the kindergarten, in turn, is intertwined with the digital culture in the children's homes. On the one hand, the attitudes and preconceptions of parents can encourage or discourage the use of digital tools in the kindergarten, and thereby either facilitate or restrict the opportunities for children's digital agency in the kindergarten. On the other hand, the digital culture of the kindergarten can influence that of homes. For example, when parents have seen the children use different apps in the role of active producers of content in the kindergarten, they have downloaded the same apps onto their own devices as well, providing their child an opportunity to take this role at home as well.

7.5 Children's Subjective Experience of their Agency

The section on children's subjective experience of their agency is based on a Master's thesis project (Isotalo, in progress). The thesis examines 1) how the children experienced the use of a digital device, 2) how they experienced their own agency in the process of DST, and 3) what they experienced having learned through DST.

According to initial findings, the children were familiar with the use of tablet devices, as many of them had played with a tablet or a smartphone at home. In general, the children reported experiencing active participation in the making and planning of the story. In particular, the design and creation of character was mentioned as an aspect where the children felt they had a say.

At the same time, the creation of characters or moving them around during the storytelling was seen as the most challenging aspect by many children – whether the characters were made completely digitally or as physical objects (by drawing, sewing, cutting etc.). In the first quote below, a child explains some challenges with a digital character, while the child in the latter quote describes struggling with making a physical character for a story.

And sometimes I couldn't turn my fox around, like, to the side, kind of not standing straight. It should be like this [gestures horizontally] and not like this [gestures vertically].

I thought it was a little annoying because you had to sew so much... you had to sew so much.
[Children's interview, Finland]

The adults' role as initiators of the DST process was also highlighted in the children's interviews, as illustrated by the following quote.

Well, it was the adults who had the idea that we will make a story with a tablet but we got to come up with the story. [Children's interview, Finland]

The children also reported agency related to the planning and execution of the story itself, either together with an adult or independently, depending on the age of the child. The story was planned either individually or, as the following excerpt illustrates, in a group.

C1: We planned the script together...

C2: ...because we did it, like, so that one suggests, and then when something's ok with everybody, so [we choose] that. [Children's interview, Finland]

When it comes to learning from the process, the children mentioned story-creation skills such as storytelling, the use of imagination, and story planning. Additionally, skills related to the use of particular devices were highlighted, such as transferring characters on the device, as well as moving and cutting characters (especially on the i-Theatre and tablet apps such as Puppet Pals). In the following quote, a child explains how one cuts a character with the i-Theatre.

When you put it in the trash, so... there appears a black blob, and [you put] it there and the paper scraps... the paper scraps disappear. [Children's interview, Finland]

One aspect that was often mentioned with relation to agency was rules. Some of the rules were related to using the devices, such as what was forbidden while using the tools. Others were more general ones, pertaining to the interaction and the DST process in general. One example of this was how to behave when making a digital story, exemplified by the following quote.

"[...] that... that you shouldn't talk out of turn, when... if somebody else is saying something in the story." [Children's interview, Finland]

In conclusion, the initial findings regarding the children's perspective on their agency suggest that they were able to participate actively, and they principally described their participation in very concrete terms. Moreover, the process was an opportunity to learn collaborative skills.

8 Results: Role of DST in Developing Children's Creativity (RQ5)

8.1 Children's Metaphors Enactment in Digital Storytelling Activities

A particular kind of early active engagement with metaphors happens when children enact them through their actions, in a process where the relevant substitution occurs primarily on a gestural plane (Winner, 1979). In this sense, enacting metaphors means acting them through an embodied process (Gallagher and Lindgren, 2015), an argument supported by Lakoff and Johnson's idea that metaphor can be instantiated through nonlinguistic modalities such as gestures and images, being metaphors primarily not a figure of speech, but a mode of thought (Lakoff, 1979). According to the Conceptual Metaphor Theory (CMT), metaphorical thoughts have their roots within the broad bodily interactions with the environments experienced: such interactions contribute to create those embodied structures, also referred to as image-schemata, which enable the metaphorical thought processes and, at least in part, abstract reasoning (Lakoff, 1990). Leveraging this line of interpretation/building on this epistemological basis, we can reinterpret one of the earliest informal learning contexts experienced by children: pretend play. Traditionally defined as symbolic play, it has been outlined as a form of playful behavior that involves nonliteral action, meaning that the acts directed towards the object do not have a real effect on it (Weisberg, 2015). Recent scientific research supports the idea that the concept of enactive metaphor can provide a better understanding of pretend play (Rucinska, 2014). In particular, building on the premise that seeing an object as something else requires a decentering process, a shift of perspectives in representational terms (Currie, 2004), we can reconsider symbolic play as an enactive process based on the capacity to perceive different affordances in objects. Such hypothesis finds support in/is consistent with the enactive account of social cognition carried out through an extension of/by extending the sense-making concept to the social domain (De Jaegher, 2007). By referring to constructionists' theory of narrative as a meaning making act (Bruner, 1991), through **digital storytelling activities** realized in several Reggio Emilia's Preschool ateliers and miniateliers, children aged 3 to 6 years old have been provided an ideal context to find new affordances and metaphorize daily unstructured objects by actively exploring and including them within a visual narrative structure.

8.1.1 Metaphors, Enactivism and Social Cognition

Within the enactive theoretical framework, cognition is considered as an embodied action (Hutto, 2017). Therefore, experience is believed to be intertwined with enacting processes of meaning making and to play a central role in all cognitive processes. A participatory sense-

making process can be defined as the coordination of intentional interactive activities where new domains of social sense-making are generated (De Jaegher, 2007). By referring to this framework and to the sensorimotor theory of perception (SMTP), based on the idea that perception is intimately linked with action (Noë, 2001), we can achieve a better understanding of symbolic play by reinterpreting it, along more enactive lines, as the children's capacity to point out new affordances. A decentering process, intended as the capacity to view the world from a different perspective, is required to make possible a primary 'as-if' response to the environment, base of any symbolic play activity (Rucinska, 2014). The notion of perceptual capacity, intended as the ability to detect new affordances, fosters the understanding of symbolic play as an activity directed at things that are not perceptually present through an active action of *seeing-in* (Currie, 2004). Such hypothesis finds support in phenomenological accounts of perception as a meaning making act, intended as a process where meaningful perceivable elements allow for new possibilities to be perceived. Applying enactive metaphors in education means offering children a context where they actively explore a context and act out their understanding. A bodily involvement in didactic activities can accompany higher levels of understanding: gestures can add relevant information to children's learning processes, not available in a solely verbal-representational format (Cole et al. 2002). Educative interventions, especially those designed to foster learning through metaphorical processes, have in fact shown positive effects in terms of didactic results (Gentner, 2000). Furthermore, contexts where children can explore perceptual similarity at the level of color, shape, texture and orientation between the source and the target, has been shown to facilitate metaphorical comprehension and foster creative interpretation (Indurkha, 2013).

8.1.2 Enactive Metaphors in Digital Learning Environments

Emergent technologies show significant potential in relation to the possibility of combining children's perceptions with immersive imageries, as to allow a more extensive interaction with the contexts explored by children (Gallagher, 2015). If we consider perception to be active and based on a set of interaction possibilities (Gibson, 2013), digital technology can then be reinterpreted as a tool that contributes to predispose those peculiar contexts defined by Kirsh as *enactive landscapes*, meaning structures that offer chances to find new affordances based on the involved subjects' current interests (Kirsh, 2013). By affordances we mean not only objects' properties, but also relational qualities: even though many properties are absent in unstructured objects, the shape of a peculiar object can suggest new affordances when explored and manipulated. When children act on props, their actions can be considered as "guided" by the affordances perceived. Acting affordances can therefore explain the process allowing children to perceive something different than what is present in terms of perception. Within learning contexts offering access both to non-structured materials and the possibility to explore it through digital technologies, so to create a visual narrative structure, children have been offered the possibility to augment their metaphorical imageries, by not being limited to see a single possibility of interaction with objects. It appears, moreover, how the inherent meaning of an object is not what defines it. Instead, the social and communicative elements appear to be central: what affects the object, more than an individual instance, is in

large part the fact that it is acted within intersubjective engagements. As claimed by enactivist accounts of meaning making processes, new meanings can be established within an intersubjective space by leveraging on social affordances and mutual understanding (Hutto, 2012).

An object can afford different actions in the context of symbolic play. Yet, importantly, to consider such domains transfer as metaphorical activities, certain limitations need to be set. Drawing on Winner's instance, we can consider children's instances of metaphor (both verbal and visual) to be genuine if the new meaning-making process appears adequately grounded in resemblance (Winner, 1979) – even though, by comparing them with the metaphors made by adults, we usually notice a minor metalinguistic awareness of the formers.

8.1.3 Instances of Metaphor in the DST Stories' Creation Process

During the creation of the story “A worm and a bird find new friends”, a small group of 4 years old children decides that a scene should be set in swamp, where some characters live.

Nicolò, in a dialogue recorded and transcribed by the teachers, argues “swamps are black”, and “they're always dark”. Matilde agrees, arguing that in order to represent a swamp they could use a black mat (Figure 8.1).



Figure 8.1. Representing the black swamp.

In this process we can identify some propaedeutic elements of metaphorical processes: nevertheless, it represents a process centered on the research of resemblances, without implying a genuine productual metaphors, such as those about to be discussed.

During the creation of the digital story “The consommé's city”, for example, a group of 5 years old children decided to use a yellow balloon falling from a bottled water dispenser to narrate a scene where a spaceship throws a bomb of broth on a colored word (Figure 8.2).



Figure 8.2. Representing the spaceship.

As underlined in the scientific literature, young children tend to focus on perceptual or surface-level similarities, such as color, 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 colors, but in order to understand the scene the visual code must inevitably be connected to the verbal code. As suggested by Roland Barthes' "Rhetoric of images", the written message has an anchoring role: it reduces 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, Marisol – a 5 years old child – proposes to us a piece of yellow wool, and to throw it from a table while she's filmed (Figure 8.3). Before taking such decision, the group has discussed with the teacher other possible solutions:

"We could render the broth with some yellow temperas", says Marisol.

"We could also find a circular shaped object, like a ballon", answers Luca.



Figure 8.3. Representing the broth.

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 and reported by the teachers, we observe how the children involved possessed the literal names of the objects in question; allowing us to consider the discussed processes as genuine instances of metaphor.

9 Results: Role of DST in Children’s Social-Emotional Development (RQ6)

As a part of STORIES Project, we focused on examining the change of social-emotional behaviors of children exhibited both individually and during verbal and nonverbal group interactions in various stages of the story building process. In this context, relevant research data were obtained through practice teachers' systematically observing the social-emotional learning behaviors of 44 children aged between 48-72 months during each three projects implemented through 2016-2017 and 2017-2018 academic years of STORIES Project (six projects in total) and recording their observations using a specific observation grid. This grid was formed 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”. At the end of each digital storytelling project, teachers were asked to record their observations on children’s interaction in story creation process for each child using the grid within three categories: (1) *Child does not demonstrate the behavior*, (2) *Child’s behavior is in progress* and, (3) *Child demonstrates the behavior regularly*. Data were analyzed based on descriptive and graphical techniques. Below, the findings are presented within two separate titles, namely, (1) *Findings Related to the Observation Units in which Behavioral Change is Observed* and (2) *Findings Related to the Direction of the Behavioral Change*, respectively.

9.1 Findings Related to the Observation Units in which Behavioral Change is Observed

In this section, which focuses on examining the change of social-emotional behaviors of children in the digital storytelling process, we first tried to determine how many of the 44 children who participated in all the DST projects implemented through both of the project years exhibited changing behaviors in terms of observation units related to social-emotional learning. Findings are presented in Table 9.1, according to each academic year of project implementation.

Table 9.1. Change observed in the social-emotional learning behaviors of children in the digital storytelling process

| Observation Units | Children (n=44) | | | | |
|---|---|----|----------------------|----|-------|
| | 1 st Year | | 2 nd Year | | |
| | f | % | f | % | |
| 1st Part: Children's Verbal and Non-Verbal Interactions in Story Creation Process | 1. Working autonomously/independently | 9 | 20.45 | 8 | 18.18 |
| | 2. Working cooperatively (Being motivated to take part in group activities) | 7 | 15.91 | 5 | 11.36 |
| | 3. Taking responsibility in the group | 8 | 18.18 | 5 | 11.36 |
| | 4. Perseverance | 16 | 36.36 | 6 | 13.64 |
| | 5. Following instructions | 5 | 11.36 | 3 | 6.82 |
| | 6. Focusing on purpose | 17 | 38.64 | 1 | 2.27 |
| | 7. Contributing to defining the problem | 12 | 27.27 | 7 | 15.91 |
| | 8. Contributing to problem solving process | 15 | 34.09 | 7 | 15.91 |
| | 9. Working through a plan (organization and repetition) | 26 | 59.09 | 3 | 6.82 |
| | 10. Establishing effective relationships/communication in the group | 12 | 27.27 | 2 | 4.55 |
| | 11. Helping friends who have difficulties by completing their tasks | 12 | 27.27 | 6 | 13.64 |
| | 12. Showing positive inter-dependence to the group members | 12 | 27.27 | 5 | 11.36 |
| | 13. Thinking flexibly | 23 | 52.27 | 7 | 15.91 |
| | 14. Adapting to different contexts and study groups | 26 | 59.09 | 6 | 13.64 |
| | 15. Showing respect (waiting turns at talking, right to vote/elect) | 9 | 20.45 | 5 | 11.36 |
| | 16. Expressing her/his emotions choosing relevant wording | 10 | 22.73 | 9 | 20.45 |
| | 17. Explaining what s/he knows and where s/he has challenges | 8 | 18.18 | 6 | 13.64 |
| 2nd Part: Narrative Elements in Story Creation Process | 18. Telling a story verbally (with help) | 6 | 13.64 | 11 | 25.00 |
| | 19. Presenting ideas which reflect personal interests and preferences during story creation | 13 | 29.55 | 7 | 15.91 |
| | 20. Demonstrating critical thinking skills during story creation | 26 | 59.09 | 9 | 20.45 |
| | 21. Defining story characters and expressing them visually | 3 | 6.82 | 4 | 9.09 |
| | 22. Understanding time-place, cause-effect relationships during creating story | 10 | 22.73 | 4 | 9.09 |
| | 23. Predicting/imagining end of a story | 5 | 11.36 | 8 | 18.18 |
| | 24. Understanding and taking interest in basic visual-audial narratives | 13 | 29.55 | 3 | 6.82 |
| | 25. Discovering effective/expressionist opportunities (verbal, based on handcraft skills, body, musical and visual/audial language) offered by digital storytelling process | 9 | 20.45 | 4 | 9.09 |

When the included parts in the observation grid entitled “Children’s Verbal and Non-Verbal Group Interactions in Story Creation Process” and “Narrative Elements Exhibited Individually in Story Creation Process” were examined separately; approximately two-thirds of the children (n=26, 59.09%) were observed to exhibit a change in terms of “working through a plan (organization and repetition)” and “adapting to different contexts and study groups” behaviors in the 1st implementation year of STORIES Project within the 1st part. When these behaviors were examined in detail, change in behaviors of 25 of those 26 children is found to result in a steady improvement, moving from the category of demonstrating the behavior "in progress" to demonstrating the same behavior on a "regular basis". This can be interpreted as the fact that 1st year’s project implementations has contributed positively to children's social emotional development in terms of helping children stay organized to accomplish a set of goals and processes through a plan and adapt to different contexts and study groups, as an indicator of children’s verbal and non-verbal group interactions in story creation process. Only one child, on the other hand, was observed to exhibit these behaviors on a “regular basis” during the 1st and the 2nd projects, while the same behaviors were reported to be demonstrated in the category of "in progress” during the 3rd project. The fact that this child has experienced a change in his study group during the 1st year of implementation, as mentioned in the anecdotes of the teachers, has emerged as the reason of this observed situation and it has been determined that the child may have experienced adaptation problem with the new study group in the 3rd project. The least change in the 1st implementation year within the 1st part, on the other hand, was found to come in view in terms of “following instructions” behavior, exhibited by only five children (11.36%). However, these five children were found to exhibit the relevant behavior in a developmental pattern, moving from demonstrating the behavior "in progress” to demonstrating the same behavior "regularly".

Besides, the children, who exhibited no change in terms of considered behaviors, have been found to demonstrate these behaviors consistently on a regular basis throughout all three projects of the 1st implementation year. This suggests that the digital storytelling projects have implemented positive effects on helping children exhibiting social-emotional learning behaviors regularly.

Results from a similar review in terms of 2nd part, namely, “Narrative Elements Exhibited Individually in Story Creation Process”, showed that a change in behavior has emerged in terms of "demonstrating critical thinking skills during story creation" behavior at most (n=26, 59.09%). When the change exhibited in terms of this behavior was examined, it was determined that children’s behaviors of demonstrating critical thinking skills during story creation, other than the three children, was “in progress” in the initial projects of the 1st implementation year, however changed in the way of demonstrating the same behavior on a “regular basis” in the following projects. When examining the content of the relevant behavior, it is also apparent that the presentation of critical thinking skills during story making is directly related to not only higher-order cognitive skills, but also the ability to correctly assess one's strengths and limitations, with a well-grounded sense of confidence, optimism, and a “growth mindset” (CASEL, 2016); this is at the heart of the "self-awareness" dimension

of the socio-emotional learning domain. This suggests that those three children, who cannot exhibit a developmental change in relevant behavior, may be inadequate in terms of higher-order thinking skills and/or self-awareness. Another reason may be that these children are not adequately supported by their peers and teachers in story making process. However, the fact that the number of children who show progressive and consistent behaviors regularly presents signs that the digital storytelling projects develop children's both cognitive skills and social-emotional learning behaviors in terms of self-awareness.

On the other hand, change in behavior has emerged in terms of "defining story characters and expressing them visually" at least (n=3, 6.82%) within the 2nd part in the 1st implementation year of STORIES Project. Moreover, "defining story characters and expressing them visually" behavior has appeared as the unit in which the least change is determined both in this part and all through the observations related to the considered field of social-emotional learning. When the pattern of this behavioral change is examined in detail, it is seen that these children's relevant behavior was "in progress" in the 1st digital storytelling projects and they begin to "regularly" exhibit the same behavior in the subsequent projects. In other words, there has been a positive/developmental change in children's behavior. However, when observations on children with no behavioral change were examined, it was determined that all these children exhibited the relevant behavior "regularly" in all three projects. In this case, it can be said that the behavior of defining story characters and presenting them visually, which is related with identifying emotions, organizational skills and reflecting sub-dimensions of social-emotional learning, is acquired by all children.

When the 2nd implementation year is taken into consideration, it has been determined that the behavioral change with the highest percentage (n=9, 20.45%) under 1st part, namely "Children's Verbal and Non-Verbal Group Interactions in Story Creation Process", was exhibited in terms of "expressing her/his emotions choosing relevant wording" behavior. It has been observed that all of these nine children have exhibited a behavioral change from the stage of "in progress" to the stage of demonstrating the behavior "regularly". When the children who do not demonstrate any change in terms of the relevant behavior are examined, it is determined that these children "regularly" express their emotions choosing relevant wording, which is an indicator of competency in identifying their own emotions and having an accurate self-perception. The minimum change, on the other hand, was observed in terms of "focusing on purpose" behavior (n=1, 2.27%) both in this part and all through the observations related to the considered field of social-emotional learning. When examining the "focusing on purpose" behavior in detail, it is found that 17 children exhibited a developmental change, moving from demonstrating the behavior at the stage of "in progress" to demonstrating the behavior on a "regular basis" in the 1st year of STORIES Project implementation. Thus, in the 2nd implementation year, only one child has shown a change in this behavior, indicating that other children continue to exhibit the same behavior consistently and regularly all through the 2nd year. The observed change in the behaviors of this child in the 2nd year was again determined to be an improvement in the direction of demonstrating the behavior "regularly".

Under the 2nd part entitled “Narrative Elements Exhibited Individually in Story Creation Process”; "telling a story verbally (with help)" behavior is found to be the unit of observation where the most change (n=11, 25.00%) is reported both in this part and all through the observations related to the considered field of social-emotional learning. When the relevant behavior is examined in detail, except for one child, the other children have been found to exhibit the behavior of “telling a story verbally (with help)” at the category of “in progress” within the initial projects of the 2nd implementation year, whereas their relevant behavior has improved to the category of demonstrating the behavior “regularly” in the subsequent projects. For that unique child, for whom no developmental change in the relevant behavior was reported, it has been found that he exhibited the relevant behavior “regularly” in all three projects of the previous year. It is conceivable that this change observed in the 2nd year in the behavior of "telling a story verbally (with help)" may depend on the expectation of an increase in the level of performance depending on the age variable. However, it can also be considered that the child may have exhibited the behavior without help. On the other hand, when the observations on children who do not demonstrate behavioral change in terms of the relevant behavior are examined, it is determined that these children already demonstrate the behavior “regularly”.

Again, under the 2nd part entitled “Narrative Elements Exhibited Individually in Story Creation Process”; the behavior of "understanding and taking interest in basic visual-audial narratives", corresponding with both self-motivation and evaluating sub-dimensions of the field of social-emotional learning, has come to the forefront as the observation unit with the least change (n=3, 6.82%) in the 2nd implementation year. When examining the detailed findings on this observation unit, the change reported on these three children have been found to indicate an improvement from demonstrating the relevant behavior in the category of “in progress” to the category of demonstrating the behavior “regularly”. The children, for whom no behavioral change was reported, are found to “regularly” understand and take interest in basic visual-audial narratives all through the projects implemented in the 2nd year.

In addition to the above; it was determined that the behaviors of children who did not demonstrate a change in terms of observation units in both project years were consistently recorded in all three projects either within the category of "Child's behavior is in progress" or "Child demonstrates the behavior regularly".

9.2 Findings Related to the Direction of the Observed Behavioral Change

Besides the findings presented above, the direction of change in the observed behaviors was also examined. The total change in the behaviors was found to show a distribution in five different categories. Table 9.2 and Table 9.3 below present the findings on detailed observations regarding the direction of total change found in children’s social-emotional behaviors within digital storytelling activities, according to each observation unit and each implementation year.

Table 9.2. Detailed observations on direction of change of children’s social-emotional behaviors within digital storytelling activities (1st implementation year)

| Units of Observation | Direction of Observed Change | | | | | No. of children who demonstrate behavioral change (n) | |
|---|---|---|---|---|---|--|----|
| |  |  |  |  |  | | |
| 1st Part: Children’s Verbal and Non-Verbal Group Interactions in Story Creation Process | 1. Working autonomously/independently | -- | 8 | -- | 1 | -- | 9 |
| | 2. Working cooperatively (Being motivated to take part in group activities) | -- | 5 | -- | 2 | -- | 7 |
| | 3. Taking responsibility in the group | -- | 8 | -- | -- | -- | 8 |
| | 4. Perseverance | -- | 16 | -- | -- | -- | 16 |
| | 5. Following instructions | -- | 4 | -- | 1 | -- | 5 |
| | 6. Focusing on purpose | -- | 16 | -- | -- | 1 | 17 |
| | 7. Contributing to defining the problem | -- | 12 | -- | -- | - | 12 |
| | 8. Contributing to problem solving process | -- | 14 | -- | -- | 1 | 15 |
| | 9. Working through a plan (organization and repetition) | -- | 24 | -- | 2 | -- | 26 |
| | 10. Establishing effective relationships/communication in the group | -- | 8 | 1 | 3 | -- | 12 |
| | 11. Helping friends who have difficulties by completing their tasks | -- | 9 | - | 1 | 2 | 12 |
| | 12. Showing positive inter-dependence to the group members | -- | 7 | - | -- | 5 | 12 |

| | | | | | | | |
|---|---|----|----|----|----|----|----|
| | 13. Thinking flexibly | -- | 18 | 1 | 2 | 2 | 23 |
| | 14. Adapting to different contexts and study groups | -- | 23 | 1 | 2 | -- | 26 |
| | 15. Showing respect (waiting turns at talking, right to vote/elect) | -- | 9 | -- | -- | -- | 9 |
| | 16. Expressing her/his emotions choosing relevant wording | -- | 10 | -- | -- | -- | 10 |
| | 17. Explaining what s/he knows and where s/he has challenges | -- | 5 | 2 | 1 | -- | 8 |
| 2nd Part: Narrative Elements Exhibited Individually in Story Creation Process | 18. Telling a story verbally (with help) | -- | 6 | -- | -- | -- | 6 |
| | 19. Presenting ideas which reflect personal interests and preferences during story creation | -- | 12 | 1 | -- | -- | 13 |
| | 20. Demonstrating critical thinking skills during story creation | 6 | 17 | 1 | -- | 2 | 26 |
| | 21. Defining story characters and expressing them visually | -- | 3 | -- | -- | -- | 3 |
| | 22. Understanding time-place, cause-effect relationships during creating story | -- | 10 | -- | -- | -- | 10 |
| | 23. Predicting/imagining end of a story | -- | 5 | -- | -- | -- | 5 |
| | 24. Understanding and taking interest in basic visual-audial narratives | -- | 10 | -- | 3 | -- | 13 |
| | 25. Discovering effective/expressionist opportunities (verbal, based on handcraft skills, body, musical and visual/audial language) offered by digital storytelling process | -- | 8 | -- | 1 | -- | 9 |

Table 9.3. Detailed observations on direction of change of children’s social-emotional behaviors within digital storytelling activities (2nd implementation year)

| Units of Observation | | Direction of Observed Change | | | | | No. of children who demonstrate behavioral change (n) |
|---|---|---|---|---|---|---|--|
| | |  |  |  |  |  | |
| 1st Part: Children’s Verbal and Non-Verbal Group Interactions in Story Creation Process | 1. Working autonomously/independently | -- | 7 | -- | 1 | - | 8 |
| | 2. Working cooperatively (Being motivated to take part in group activities) | -- | 4 | -- | 1 | - | 5 |
| | 3. Taking responsibility in the group | -- | 4 | -- | 1 | -- | 5 |
| | 4. Perseverance | -- | 5 | 1 | - | -- | 6 |
| | 5. Following instructions | -- | 2 | -- | 1 | -- | 3 |
| | 6. Focusing on purpose | -- | 1 | -- | - | -- | 1 |
| | 7. Contributing to defining the problem | -- | 6 | -- | 1 | -- | 7 |
| | 8. Contributing to problem solving process | -- | 7 | -- | -- | -- | 7 |
| | 9. Working through a plan (organization and repetition) | -- | 3 | -- | -- | -- | 3 |
| | 10. Establishing effective relationships/communication in the group | -- | 2 | -- | -- | -- | 2 |
| | 11. Helping friends who have difficulties by completing their tasks | 1 | 5 | -- | -- | -- | 6 |
| | 12. Showing positive inter-dependence to the group members | 2 | 3 | -- | -- | -- | 5 |
| | 13. Thinking flexibly | 3 | 3 | -- | -- | 1 | 7 |

| | | | | | | | |
|---|---|----|---|----|----|----|----|
| | 14. Adapting to different contexts and study groups | -- | 6 | -- | -- | -- | 6 |
| | 15. Showing respect (waiting turns at talking, right to vote/elect) | 1 | 3 | -- | 1 | -- | 5 |
| | 16. Expressing her/his emotions choosing relevant wording | -- | 9 | -- | -- | -- | 9 |
| | 17. Explaining what s/he knows and where s/he has challenges | -- | 5 | -- | 1 | -- | 6 |
| 2nd Part: Narrative Elements Exhibited Individually in Story Creation Process | 18. Telling a story verbally (with help) | 2 | 6 | -- | 2 | 1 | 11 |
| | 19. Presenting ideas which reflect personal interests and preferences during story creation | -- | 6 | -- | -- | 1 | 7 |
| | 20. Demonstrating critical thinking skills during story creation | 1 | 6 | 1 | -- | 1 | 9 |
| | 21. Defining story characters and expressing them visually | -- | 3 | 1 | -- | -- | 4 |
| | 22. Understanding time-place, cause-effect relationships during creating story | -- | 4 | -- | -- | -- | 4 |
| | 23. Predicting/imagining end of a story | 1 | 6 | -- | 1 | -- | 8 |
| | 24. Understanding and taking interest in basic visual-audial narratives | -- | 3 | -- | -- | -- | 3 |
| | 25. Discovering effective/expressionist opportunities (verbal, based on handcraft skills, body, musical and visual/audial language) offered by digital storytelling process | -- | 4 | -- | -- | -- | 4 |

Each direction of change has also been examined in detail and findings have been presented below within Figures 9.1-9.5, which include the graphs illustrating the direction of changes observed through the both implementation years.

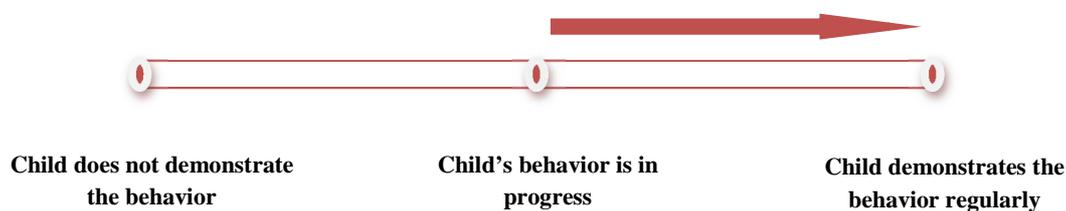


Figure 9.1. The change from “Child’s behavior is in progress” to “Child demonstrates the behavior regularly”

Within the framework of the projects implemented in the 2016-2017 academic year, 85.57% of the total change observed in the behaviors of the children was reported in the direction of starting from the category of “Child’s behavior is in progress” in the first projects and advancing to the category of “Child demonstrates the behavior regularly” for the subsequent projects of the same implementation year. A similar improvement was found to account for 80.14% of the total change observed in the 2017-2018 academic year. Findings show that the digital storytelling projects implemented contribute positively to the social-emotional development of the majority of children in both implementation years. However, since the percentage of the total change observed in the 2nd implementation year is relatively lower than that in the 1st year, it is considered that children “regularly” demonstrate the relevant behaviors consistently in the 2nd year.

In the 1st year of implementation, the changes in this category were observed on the whole of 25 behaviors related to socio-emotional learning; in terms of "working through a plan (organization and repetition)" behavior at most (n=24) and in terms of "defining story characters and expressing them visually" behavior at least (n=3). Since, these three children’s relevant behavior was found to be reported as of a positive change -from the category of “in progress” to the category of “regularly”-, it is seen that vast majority of the children exhibited progressive behavioral changes from a lower level to the highest level of exhibiting the same behavior on a regular basis, as evidenced by the findings of the first section. In this case, it can be said that children are able to develop the behavior of “defining story characters and expressing them visually”, which has a crucial role in the narrative approach in the sense of comprising both “organizational skills” and “reflecting” sub-dimensions of social-emotional learning domain, throughout the 1st project year.

When the changes in the same category were examined within the scope of the projects implemented in the 2nd academic year, the changes were again observed on the whole of 25 behaviors related to socio-emotional learning; mostly (n=9) in terms of “expressing her/his emotions choosing relevant wording” behavior and in terms of “focusing on purpose” behavior at least (n=1).

When the above-mentioned changes were examined in detail, it is determined that most of the behaviors, in which changes were observed in the relevant category in the 2nd year perspective, were reported with lower frequencies/percentages of change than the 1st year, relatively. As a matter of fact, it has been determined that the majority of children exhibiting progressive behavioral changes in the 1st year continued to exhibit the same behavior in a regular improved pattern in the 2nd year, thus resulting in decreased frequencies/percentages.

As a result, when behavioral changes in this category are addressed together with the teacher's holistic observations and anecdotes; it can be said that the problems and difficulties related to adapting to different contexts and study groups, working through a plan and towards goals, and successfully regulating and expressing his/her own emotions diminished over time within the repeated projects implemented through the two implementation years, and children have progressed positively in self-awareness, self-management, social-awareness, relationship building and responsible decision-making skills.



Figure 9.2. The circular change between “Child demonstrates the behavior regularly” and “Child’s behavior is in progress”

In 6.08% of the total change observed in the behaviors of the children in the 2016-2017 academic year; a circular change, in which the child’s behavior in the first project was reported within “Child demonstrates the behavior regularly” category, whereas the level of behavior in the second project was recorded within “Child’s behavior is in progress” category and the observed level returned to the “Child demonstrates the behavior regularly” category again in the third project, was determined. Similar circular changes were found to account for 7.09% of the total change observed in the 2017-2018 academic year.

These circular changes in the 1st implementation year were observed in terms of 11 of the total 25 observation units related to the field of social-emotional learning. The changes in this category were found to arise mostly (n=3) in terms of “establishing effective relationships/communication in the group” and “understanding and taking interest in basic visual-audial narratives” behaviors. The least change, on the other hand, was observed in terms of “working autonomously/independently”, “following instructions”, “helping friends who have difficulties by completing their tasks”, “explaining what s/he knows and where s/he has challenges” and “discovering effective/expressionist opportunities (verbal, based on handcraft skills, body, musical and visual/audial language) offered by digital storytelling process” behaviors, exhibited by only one child.

In addition, within the scope of the projects carried out during the 2nd academic year, the changes in the same circular direction have emerged according to 9 of the total 25 observation units. The changes in this category were found to arise mostly (n=2) in terms of “telling a story verbally (with help)” behavior. The least change (n=1), on the other hand, was observed in terms of “working autonomously/independently”, “working cooperatively (being motivated to take part in group activities)”, “taking responsibility in the group”, “following instructions”, “contributing to defining the problem”, “showing respect (waiting turns at talking, right to vote/elect)”, “explaining what s/he knows and where s/he has challenges” and “predicting/imagining end of a story” behaviors.

Although behavioral changes observed in this category for both years are close to each other and have low percentages, there is a tendency here to be a problem in terms of continuity of development. Additional explanations of teachers and anecdotal records have been used to determine where this imbalance of change might have originated. These records showed that the majority of these children with leading characteristics are not adequately compliant with other children in their study groups within the second projects implemented, that there are occasional conflicts, or that the children are less interested in the theme of the second projects than the other projects. Taking this into consideration, it is thought that individual problems among children and thematic problems may affect the level of exhibiting socio-emotional learning behaviors.

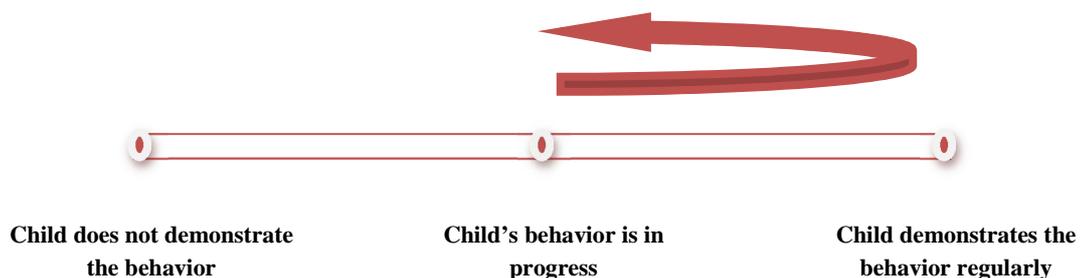


Figure 9.3. The circular change between “Child’s behavior is in progress” and “Child demonstrates the behavior regularly”

Similar to the previous category presented above, in 4.16% of the total change observed in the behaviors of the children in the 2016-2017 academic year; another type of circular change, in which the child’s behavior in the first project was reported within “Child’s behavior is in progress” category, whereas the level of behavior in the second project was recorded within “Child demonstrates the behavior regularly” category and the observed level returned to the “Child’s behavior is in progress” category again in the third project, was determined. Similar circular changes were found to account for 2.83% of the total change observed in the 2017-2018 academic year.

These circular changes in the 1st implementation year were observed in terms of 6 of the total 25 observation units related to the field of social-emotional learning. The changes in this category were found to arise mostly (n=5) in terms of “showing positive inter-dependence to

the group members” behavior. The least change, on the other hand, was observed in terms of “focusing on purpose” and “contributing to problem solving process” behaviors, exhibited by only one child.

In addition, within the scope of the projects carried out during the 2nd academic year, the changes in the same circular direction have emerged according to 4 of the total 25 observation units. The changes in this category were found in terms of “thinking flexibly”, “telling a story verbally (with help)”, “presenting ideas which reflect personal interests and preferences during story creation” and “demonstrating critical thinking skills during story creation” behaviors, exhibited by only one child.

Similar to the previous findings, there is also an imbalance here in the way children behave. But again, similar to the previous findings, it is worth noting that the number of children exhibiting these circular behavioral changes is low in both project implementation years. On the other hand, when the causes of that kind of behavior change are examined, signs are emerging that children experience problems in collaborative work and in general exhibiting high-level thinking skills. This may have been due to the developmental characteristics of this age group of children. In other respects, the possibility that teachers may have expected high performances from the children in terms of relevant behaviors can also be cited as one of the reasons for this situation.

Finally, when teachers’ additional notes and anecdotal records on these circular behavioral changes are examined, it was seen that these children easily adapted to their study groups in the second projects, contributed to product development process in cooperation with other children, and showed more interest in the theme of the second projects compared to the other projects.



Figure 9.4. The change from “Child demonstrates the behavior regularly” to “Child’s behavior is in progress”

In 2.24% of the total change observed in the behaviors of the children in the 2016-2017 academic year, it was reported by the teachers that while the children were demonstrating the behavior on a regular basis in the first two projects, the level of the same behavior was observed at “in progress” category in the third project. A similar change was found to account for 2.12% of the total change observed in the 2017-2018 academic year.

Mentioned behavioral changes in the 1st implementation year were observed in terms of 6 of the total 25 observation units related to the field of social-emotional learning. The changes in

this category were found to arise mostly (n=2) in terms of “explaining what s/he knows and where s/he has challenges” behavior. The least change, on the other hand, was observed in terms of “establishing effective relationships/communication in the group”, “thinking flexibly”, “adapting to different contexts and study groups”, “presenting ideas which reflect personal interests and preferences during story creation” and “demonstrating critical thinking skills during story creation” behaviors, exhibited by only one child.

Within the scope of the projects carried out during the 2nd academic year, the changes in the same direction have emerged according to 3 of the total 25 observation units. The changes in this category were found in terms of “perseverance”, “demonstrating critical thinking skills during story creation” and “defining story characters and expressing them visually”, exhibited by only one child.

When the direction of that kind of change is assessed, it has come to the conclusion that there might be some problems in project implementation process, resulting in children's experiencing a change in the opposite direction from the stage of demonstrating the behavior on a “regular basis” in the initial projects to the stage of demonstrating the same behavior “in progress” in the subsequent projects. For this purpose, additional explanations and anecdotal records of the teachers were examined. Teachers, in particular, have pointed out that majority of children who exhibit behavioral changes in this category are having leadership characteristics, and that these children are having difficulties in taking ideas from any group or individual and updating their ideas; for this reason, there were occasional conflicts during group work; a similar problem, on the other hand, has been observed in groups composed of withdrawn children; and in such cases it was observed that there were usually problems in the creation of the final product.



Figure 9.5. The change from “Child does not demonstrate the behavior” to “Child demonstrates the behavior regularly”

In 1.92% of the total change observed in the behaviors of the children in the 2016-2017 academic year, it was reported by the teachers that while the child was not demonstrating the behavior in the first project, the level of the same behavior was observed at “regularly” category in the second and third projects. A similar change was found to account for 7.80% of the total change observed in the 2017-2018 academic year. However, for this 2nd implementation year, teachers reported that while the child was not demonstrating the behavior in the first project, the level of the same behavior was observed at “in progress” category in the second project and at “regularly” category in the third project.

This category of change in the 1st implementation year was observed in terms of only one observation unit -“explaining what s/he knows and where s/he has challenges”-, exhibited by 6 children. From the point of the projects carried out during the 2nd academic year, the changes in the same direction have emerged according to 7 of the total 25 observation units. The changes in this category were found mostly (n=3) in terms of “thinking flexibly” behavior. The least change (n=1), on the other hand, was observed in terms of “helping friends who have difficulties by completing their tasks”, “showing respect (waiting turns at talking, right to vote/elect)”, “demonstrating critical thinking skills during story creation” and “predicting/imagining end of a story” behaviors.

This finding shows that throughout the STORIES Project implementation years, only a few children reach the stage of demonstrating social-emotional learning behaviors on a regular basis by progressing from the stage of not exhibiting the relative behaviors. Taking into consideration the overall findings, it can be said that the projects implemented have contributed positively to the social-emotional development of the majority of children, while contributing more significantly to the social-emotional development of a very few number of children by taking them from the basic level to the highest level of behavioral change. Once again, when the characteristics of the changing behaviors are examined, it is observed that high-level thinking skills are at the forefront. The fact that children exhibit a positive change in terms of mentioned skills can be interpreted as an indication that digital storytelling project implementations support children’s development in a holistic way.

9.3 Conclusion

The overall findings of the study have revealed that digital storytelling activities carried out within STORIES project through 2016-2017 and 2017-2018 academic years resulted in significant changes not only in social-emotional learning behaviors of children, exhibited both individually and during verbal and nonverbal group interactions in various stages of the story building process, but also give signs on development in cognitive skills.

When all the dimensions of observation and both implementation years are evaluated together; the changes in terms of observation units were found to arise mostly in terms of “self-management”, “self-awareness” and “relationship skills” sub-dimensions of social-emotional learning domain; within “working through a plan (organization and repetition)”, “adapting to different contexts and study groups” and “demonstrating critical thinking skills during story creation” behaviors, displaying a developmental pattern. At the same time, 87.49% of the total change observed in behaviors in the 1st year and 87.94% of the total change observed in behaviors in the 2nd year was also found to result in a steady improvement, moving from the category of demonstrating the behavior "in progress" to demonstrating the same behavior on a "regular basis", when all observation units are considered together. In this context, it can be said that the advantages of the digital storytelling approach accentuated by the relevant literature (i.e. improvement of communication, collaborative working and higher-order thinking skills) (Baki, 2015; Bozdoğan, 2012; Doğan & 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 behaviors. As a matter of fact, in parallel with these results, Yüksel, Robin, & McNeil (2011) also point out that digital storytelling activities are commonly designed and conducted within small group studies, thus promoting and enhancing cooperation within the classroom. It is also known that in such collaborative environments, children develop skills of critical thinking and creative thinking based on behaviors of communicating, adapting, organizing, managing and expressing thoughts, asking questions, sharing their work with their peers, and analyzing and synthesizing large contents (Abiola, 2014; Yüksel et al., 2011).

The least change, on the other hand, was observed in terms of “defining story characters and expressing them visually” behavior which is exhibited only by three children, showing that the direct or indirect contribution of the digital storytelling projects is minimum from the perspective of this observation unit as a whole. It can be said that the behavior of being able to define story characters and express them visually is largely based on the development of children's cognitive skills, which are related to age and learning. Teachers’ observations have also supported this finding that children's narrative skills have not yet reached the desired level and that they need teacher support in this regard. However, the fact that these three children, whose beginner levels were lower than the other children in the class, exhibited "defining story characters and expressing them visually" behavior in the category of “in progress” during the implementation of the 1st project and on a "regular basis" in the subsequent projects, has still been considered as an important finding indicating the significant contribution of digital storytelling approach to social-emotional development.

When the project implementation years are examined reciprocally, it is determined that most of the behaviors, in which changes were observed in the 2nd year perspective, were reported with lower frequencies/percentages of change than the 1st year, relatively. As a matter of fact, it has been determined that the majority of children exhibiting progressive behavioral changes in the 1st year continued to exhibit the same behavior in a regular improved pattern in the 2nd year, thus resulting in decreased frequencies/percentages. The observations and anecdotes of the teachers also show that the problems that arise in the implementation of the first projects are mostly left behind by the subsequent project implementations; children have progressed in a positive and steady manner in self-awareness, self-management, social-awareness, relationship building and responsible decision-making skills. This situation was evaluated as the project implementation supporting the child's development in a holistic way.

In addition, it is also found out that all social-emotional behaviors of the children who exhibit no change in terms of relevant observation units in both project years are consistently recorded in the categories of “child’s behavior is in progress” or "child demonstrates the behavior regularly" in all three projects. There are also a few examples of circular changes in some of the behaviors in which the child progressed from a lower level and returned to baseline in the process or eventually. Teachers explained these kinds of situations with anecdotal records that some of the children experienced temporary adaptation problems with their study groups directly related as to their age and/or developmental stages.

Based on the findings related to the focus research question, which comprises a process perspective on children's media literacy in the context of ECE, it is concluded that; 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. It is concluded that digital storytelling can be used to support the social-emotional development of preschool children, and recommended that the same approach can be used to investigate the extent to which individuals at different age and class levels influence in terms of their behaviors in different areas of learning.

10 Summary and Publications

In this section, we will briefly summarise the key research findings and describe how the publication activities will continue after the end of the STORIES project lifetime. The text in Section 10.1 has been included also in the public document *Guidelines for Digital Storytelling in Early Childhood Education*.

10.1 Conclusion

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 related 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.

10.2 Publications

During the project lifetime, individual partners have given presentations on the project on academic forums, presenting preliminary results and introducing the project process. Table 10.1 summarises the conference presentations held in each partner country.

Table 10.1. Conference presentations during the project lifetime

| Conferences attended by each partner | |
|---|--|
| DE | <ol style="list-style-type: none"> 1. Conference “Challenging Reading“ Universität Münster, Germany, March 2016 (talk) 2. Kiefer, M.(2016): STORIES. Fostering Early Childhood Literacy Competencies, Vortrag bei der 19. Grazer Tagung Deutsch als Fremd-/Zweitsprache und Sprachdidaktik. Universität Graz. 3. Kiefer, M. & Schlemmer, D.(2017): Frühe Sprach- und Medienbildung mit Digital Storytelling, Vortrag beim 4. Zukunftsforum Bildungsforschung: Frühpädagogik 2.0? Forschungsdiskurse in der Pädagogik der Kindheit. Pädagogische Hochschule Karlsruhe. |
| FI | <ol style="list-style-type: none"> 1. Nousiainen, T. & Turja, L. (2017). Digitaalista tarinankerrontaa päiväkodissa. [Digital storytelling in the kindergarten.] Poster presentation at the Interaktiivinen Tekniikka Koulutuksessa [Interactive Technology in Education] conference, April 5-7, 2017, Hämeenlinna, Finland. 2. Merjovaara, O., Nousiainen, T. & Turja, L. (2018). Digitaalinen tarinankerronta pedagogisena prosessina varhaiskasvatuksessa. [Digital storytelling as a pedagogical process in early childhood education.] Presentation at the Interaktiivinen Tekniikka Koulutuksessa [Interactive Technology in Education] conference, April 11-13, 2018, Hämeenlinna, Finland. 3. Nousiainen, T., Turja, L., Merjovaara, O. & Isotalo, S. (2018). Children’s agency in digital storytelling: The role of material environments. Presentation at Childhood and Materiality, the VIII Conference on Childhood Studies, May 7-9, 2018, Jyväskylä, Finland. |
| IT | <ol style="list-style-type: none"> 1. Conference “Digital Storytelling: media and technologies in ECEC” – MAY 2017, Reggio Emilia – Unimore University 2. 27th Eecera annual conference - AUGUST 2017, Bologna - “Fostering narrative skills through digital storytelling in ECE”. |
| TR | <ol style="list-style-type: none"> 1. Yüksel-Arslan, P. 2016. Examples on Digital Story Implementations and Mobile Application. 7th National Basic Education Symposium Proceedings, 48-56. |

Joint paper publications will be finalized and submitted after the project but some journal papers have been submitted and/or published already before the end of the project by individual partners. These are listed in Table 10.2.

Table 10.2. Papers submitted during the project lifetime

| Papers submitted | |
|-------------------------|--|
| 1 | Bertolini, C. (2017). Theory and practice of digital storytelling in preschool. <i>Form@re</i> , http://dx.doi.org/10.13128/formare-20238 |
| 2 | Gözen, G., & Cırık, İ. (2017). Impact of digital storytelling on social-emotional behaviours of preschool children (Dijital öykülemenin okul öncesi çocukların sosyal-duygusal davranışlarına etkisi). <i>Elementary Educational Online (İlköğretim Online)</i> , 16 (4), 1882–1896. |
| 3 | Kiefer, M., & Schlemmer, D. (2018): Digital Storytelling: Erzählen mit digitalen Medien in der Erst- und Zweitsprache. In: Schmörlzer-Eibinger, S., Akbulut, M. & Rotter, D. (Hrsg.): <i>Erzählen in der Zweitsprache Deutsch</i> . Stuttgart: Fillibach bei Klett, 197–208. |
| 4 | Zini, A., Bertolini C., Contini A., & Manera L. (2018). Digital storytelling in early childhood education and care: teacher training in the STORIES project. <i>Italian Journal of Educational Technology</i> , DOI: http://dx.doi.org/10.17471/2499-4324/963 |

Thus far, the submitted papers have been based on national data, and the partners have started preparing transnational paper manuscripts to be submitted to journals after the end of the project. Based on the contents of this research report and enhanced with further analyses where necessary, the consortium specified a set of joint manuscript topics and decided the partner(s) responsible for each of them. The partners decided to submit two joint paper manuscripts (and an optional third one) based on the transnational results presented in the Research Report. The themes and main responsibilities of the joint papers are presented in Table 10.3.

Table 10.3. Transnational paper manuscripts to be submitted after the end of the project

| | Paper theme | Main responsibility |
|---|--|----------------------------|
| 1 | Teacher Competences | JYU + PH-KA |
| 2 | Narrative Elements in Digital Stories | UNIMORE |
| 3 | <i>Comparison of the DST Process by Year</i> | <i>To be specified</i> |

The manuscripts are foreseen to be submitted in early 2019, and depending on the review processes, published in journals between the latter half of 2019 and the first half of 2020. In addition to the joint papers, each partner is expected to publish about results based on their national data.

11 Recommendations and Suggestions

To conclude this report, we will specify some recommendations and suggestions based on our experience on conducting this research. In Section 11.1, we present recommendations for future projects with a similar scope and approach. In Section 11.2, we suggest some themes for further research that would allow future research to build upon the findings of this project.

11.1 Recommendations for Future Projects

The following list presents some recommendations for future projects, based on the experiences obtained from the STORIES research and experimentation process. For a large part, the contents of this section are based on suggestions originally presented in the STORIES Q&E Reports.

1. The use of a cyclical **design-based research approach** was suitable for this type of project. It allowed us to reflect on the research process between the two cycles and make some corrective measures based on our experiences. We recommend a similar type of design also for future projects due to its flexibility in terms of revision and adjustments. In the case of this project, it was necessary to revise the instruments, adjust the timeline for the second cycle, and reconsider the extent to which it was possible to compare data from the two cycles. In terms of methodology, we recommend the use of **mixed methods** (i.e., exploring the same themes with both quantitative and qualitative measures) in order to ensure both breadth and depth of data and to allow triangulation.
2. It was useful to develop the **research questions** in such a way that they consisted of a few questions shared by all partners and a similar number of partner-specific questions. This allowed us to obtain a broad set of transnational data for answering the main questions while also allowing individual partners to expand the scope according to their specific research interests. The partners were able to add their own research themes (cf. Sections 7, 8 and 9 that are dedicated to partner-specific research questions) and/or collect additional data to deepen the existing themes (cf. Sections 6.2.3 and 6.2.4 that present additional national data related to teacher competences). It was also worth putting in the effort to reiterating the research questions several times at the beginning of the project, as this yielded a very meaningful final set of questions both from a theoretical and practical perspective.
3. As a guideline in terms of **data collection instruments**, it would be useful to strive for lighter documentation required from teachers in order to reduce the additional workload caused by their participation in the project. Between the two research-based design cycles, we simplified the instruments after receiving feedback from the participants that they had been very time-consuming to fill in. Furthermore, it is vital to encourage, support, and remind the teachers to plan and document the field

activities with the instruments provided by the project in order to ensure getting usable and uniform data from all participants.

4. In terms of the **continuity of participants**, it is important to foresee possible challenges as early as possible. In the case of this project, the group of participants changed more than expected between the two experimentation cycles, which meant that the comparison of the outputs from the two cycles was not as straightforward as the project plan had originally foreseen. There were changes on several levels. For example, some kindergartens or some individual teachers did not continue the activities after the first year (e.g. due to a teacher moving to another kindergarten). Moreover, some teachers had a different group of children in the second cycle (due to moving to a different group within the same kindergarten) or some children did not continue the activities for both years (due to moving to another kindergarten/group). As stated above, a design-based research approach was a good solution for anticipating and reacting to such changes.
5. It is also important to monitor the **consistency of the field activities** closely and to react quickly to possible shortcomings in terms of field documentation. The first step is to encourage the teachers to kick off the field activities as soon as possible after they have participated in the DST-related training. This is important, firstly, because the training contents are still fresh in their minds, and secondly, so that there is room for possible unexpected delays occurring during the process (such as sick leaves, shortage of staff, etc.) without the risk of running out of time with the last projects. During the activities, the researchers should be prepared to continuously guide and support the teachers – but without too much intrusion. Especially between the implementation cycles, it is important to reflect on the previous cycle together with the teachers, to share revised research instruments and implementation instructions, and to discuss their expectations, suggestions and concerns for the next cycle.

11.2 Themes for Further Research

Finally, we present some ideas and suggestions for further research topics within the general theme of DST in early childhood education as well as for additional angles for analysing the existing data from this project.

1. The existing data lends itself to further analysis from many points of view. For example, in the quantitative analysis of the affordances of different tools, we found some associations between specific multimodal elements and specific devices or applications. It would be interesting to explore **the ways of using different multimodal elements** in more detail using a qualitative approach. Such analysis could also yield practically relevant information that teachers could use when choosing which tools to use with different types of learners.

2. Another perspective for further analysis pertains to **the interpretation of national differences** observed in some results. In terms of both process and products, we discovered some aspects where there were significant differences between countries. Exploring these in more detail and finding explanations for them would shed more light on possible contextual factors that affect the implementation of DST in different countries. At the same time, this would help us localise the general recommendations we can give based on our research findings.
3. The documentation and questionnaire/interview data collected in this project revealed many important and interesting perspectives related to children's learning during the DST process. For example, we obtained indications of social and collaborative skills as well as language development. In many cases, such aspects were mentioned as anecdotes that aroused interest and called for more in-depth examination. The resources for **observational activities** during the STORIES activities were limited, and therefore one possible path for future research would be to approach some of the most interesting initial observations with a research design that focuses particularly on observation.

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Appendix 1: Project Sheet



PROJECT SHEET

First Part

| SECTION I DESCRIPTIVE INFORMATION | |
|---|--|
| Name of the School | |
| School Year and Semester | |
| Name(s) of the Teacher(s) | |
| Group, Age Level (Based on Month) | |
| Number of Children in the Group | |
| Number of Children in the Project Group | |
| Name of the Project | |
| Duration of the Project (Date Interval) | |
| Amount of Sessions (Nr. of Dedicated Lessons) | |
| Aim of the Project | |
| Theme (Nature, Art, Family, Play, Personal Experience, Magic, Everyday Life, Adventure, etc.) | |

PROJECT PLAN

TO BE FILLED-IN BEFORE BEGINNING THE ACTIVITY

| SECTION II EDUCATIONAL CONTEXT ANALYSIS |
|---|
| Project Group Makeup (selection criteria, age, mother tongues, special needs, years of school attended, etc.) |
| Contextualization of the project (connection to ongoing or recently completed learning activities, children's previous experience and familiarity to narration, technologies and digital storytelling) |

| SECTION III PROJECT DESCRIPTION | |
|--|--|
| Objectives and outcomes | |
| School spaces (and notes about their setting/arrangement) | |
| ICT Tools (PC/tablet/smartphone/iTheater; software(s)/app(s); external device(s): projector, scanner, smartboard, foto/video camera, drawing pad, printer, etc.) | |
| Other resources and materials | |
| Teaching methods, educational strategies (individual/couple/group work, cooperative learning, brainstorming, dictating, storyboarding, etc.) | |

| SECTION IV ACTIVITY PLAN |
|--|
| Introductory activities (how to trigger children’s previous knowledge, how to approach new themes and technologies, which objects and tools to make available for children’s exploration, etc.) |
| Digital story making process (activities and tasks to be performed to plan, initiate, develop, revise, finalize and review the digital story) |
| Use of digital technologies (tools & apps role in the project, expected children’s agency, skills, knowledge and understanding) |
| Evaluation and assessment (dimensions of the experience to be observed and documented – children’s skills, teaching practices effectiveness, technologies suitability, etc. – and main evaluation criteria) |
| Notes (any other relevant information, notes, etc.) |

Second Part

ACTIVITY REPORT

TO BE FILLED-IN: (V) AS SOON AS PROJECT BEGAN, (VI) DURING THE PROJECT, (VII) AFTER THE ACTIVITY END

| SECTION V INCIPIIT |
|---|
| <p>Which was the storytelling initiating chance/prompt? Eg.</p> <ul style="list-style-type: none"> - children’s oral narratives, recall of personal or shared memories, drawings, acting/role play, - teacher’s questions/prompts for initiating the thinking process, such as shared book readings, conversational procedures – ‘to tell a story to get a story’, or any way of offering a visual or oral stem – a single picture, an illustrated book, a photo album, a narrative incipit – to build upon, or a complete story to retell. <p>Please describe the elements that triggered your group’s story.</p> |

| SECTION VI ACTIVITY REPORT | | | |
|---|---------|--|------------------|
| Please report on your meetings with the children. | | | |
| Duration | Actions | Technology (Please describe by whom it was used in which way.) | Additional Notes |
| | | | |
| | | | |
| | | | |

| SECTION VII PROJECT EVALUATION | |
|---|--|
| <p>If you had the opportunity to implement the project again, what would you change or improve? Please indicate your suggestions.</p> | |

Appendix 2: Yearly Project Summary



YEARLY PROJECT SUMMARY

| SECTION I DESCRIPTIVE INFORMATION | |
|--|--|
| Name of the School | |
| School Year and Semester | |
| Name(s) of the Teacher(s) | |
| Duration of the Project (Date Interval) | |
| Amount of Sessions (Nr. of Dedicated Lessons) | |

| SECTION II MEDIA LITERACY SKILLS EVALUATION | | | |
|---|---|---|-------------|
| Please explain what children have learned and list three benefits in terms of media literacy skills development. | | | |
| What knowledge, skills and understanding are developed in DST activity? Please use numbers for marking: 0 = not applicable; 1 = none; 2 = some children; 3 = approx. half as much; 4 = most children; 5 = all. | | | |
| | <i>Actions</i> | <i>Knowledge, skills and understanding.</i> | <i>Mark</i> |
| Technical skills | Directly interacting with a device or application | move cursor to desired space | |
| | | use touch screen tapping or click button to select and drag | |
| | | find appropriate way for taking photograph/video | |
| | | use image editing functions to draw/colour/crop pictures | |
| | | use photo/video editing functions appropriately (e.g. timeline, stop/replay buttons, adding sounds) | |
| | | other: _____ | |

| | | | |
|---|--|--|--|
| Visual skills | Framing shots | move and position characters and artefacts appropriately | |
| | | use different camera shots/angles/movement | |
| | | other: _____ | |
| Art skills | Creating foreground/backdrop elements | use paint, crayons, scissors, and other art tools to draw the scenery/characters | |
| | | other: _____ | |
| Narrative skills | Creating stories | create a story with one or more characters | |
| | | create a setting | |
| | | presence of a <i>problem</i> or <i>surprise</i> action (initiating event) | |
| | | unfolding of the story (plot) | |
| | | resolution/conclusion | |
| Understanding of multimodality | Using different communicative modes (eg. verbal, visual, sound, tactile) | Understand the properties that the different modes offer | |
| | | Be aware of the differences between the properties that the different modes offer | |
| | | Understand the processes involved in transposition and adaptation between different ways ~ Understand passages from one mode to another (eg, communicate the emotion of sadness through colors, sounds, or movements...) | |
| | | other: _____ | |
| Pre-writing skills | Storyboard planning | use sequenced drawings/sketches/pictures for planning | |
| | | other: _____ | |
| Understanding of the Foundations of Audio-Visual Language | Create a Digital story (eg a photostory / animation / movie) | Recognize the two fundamental components of audio-visual language: the framing and the sound (voice, music, noises and effects) ≈ understand that the artifact | |

| | | | |
|-----------------------|---|---|--|
| | | incorporates a visual component and a verbal/sound one, overlapping in the timeline. | |
| | | <p>Understand the most important principles of product type: field to be compiled according to the projects carried out, eg:</p> <ul style="list-style-type: none"> • Illustrated album / photo album (slideshow), with sound comment / voiceover: understand that the story is represented by the sequence of still images that proceeds along the timeline, that is, along a directed line that runs from the origin to the positive direction; • animation, eg. stop motion: Understand that many still images - portraying small moving progressions - can give the movement's illusion when viewed in rapid succession; • Video shooting: here the salient element is probably the "direction": the framing of the shots and the direction of the acting, if present. | |
| | | other: _____ | |
| Critical skills | Reflecting on product; making changes where necessary | identify aspects of the work which needed changing, e.g. in a stop motion project: shots which included children's own hands | |
| | | identify features which were particularly successful in meeting audience's needs and repeating these, e.g. sound effects | |
| | | other: _____ | |
| Awareness of audience | Creating films which reflected interests of peers | identify themes which will interest the audience (family, play, jungles) | |
| | | identify props and soundtracks which will attract the audience | |
| | | other: _____ | |

**SECTION III
SOCIAL SKILLS EVALUATION**

Please explain what children have learned and list three benefits in terms of social skills development.

What knowledge, skills and understanding are developed in DST activity?

Please use numbers for marking:

0 = not applicable; 1 = none; 2 = some children; 3 = approx. half as much; 4 = most children; 5 = all.

| Dimension | <i>Knowledge, skills and understanding.</i> | <i>Mark</i> |
|----------------------------|--|-------------|
| 1. Relationships | <i>Subject of the items: GROUP</i> | |
| | 1.1. Expresses verbal statements in the first person plural e.g., We can do this. Let's do this. | |
| | 1.2. Shows positive emotions during play/use humor smiles, laughs, claps approvingly, attentive | |
| | 1.3. Encourages others to join play welcomes, invites activity partners | |
| | 1.4. Helps other children | |
| 2. Communication | <i>Subject of the items: CHILDREN</i> | |
| | 2.1. Listen to the ideas of others attentive while others are speaking | |
| | 2.2. Comment on other children's ideas or theories, respond to peers' thoughts and ideas | |
| | 2.3. Ask questions to the group | |
| | 2.4. Engage in dialogues | |
| 3. Cognitive Skills | <i>Subject of the items: CHILDREN</i> | |
| | 3.1. Express their own theories/ideas verbally/graphically/physically explains thoughts | |
| | 3.2. Make modifications to their theory give an update to ideas | |
| | 3.3. Introduce new topics/ideas verbally, share ideas | |

| | | | |
|---|---|--|--|
| | 3.4 Build on ideas that come from any individual or group | | |
| | 3.5 Use problem solving skill to figure out solutions with others | | |
| | 3.6 The group work determines the quality of work/projects | | |
| 4. Play disconnection/disruption | <i>Subject of the items: GROUP</i> | | |
| | 4.1 Do not engage in a purposeful activity/play | | |
| | 4.2 Withdraws from the activity | | |
| | 4.3 Refuses to engage when invited | | |
| | 4.4 Is disruptive during the activity and interactions seeks negative attention (e.g., yells, removes toys, interferes with the flow children's activity) | | |

| SECTION IV |
|---|
| FOCUS ON IMPLEMENTATION OF PROJECTS |
| 1. What kind of problems did you encounter when implementing projects throughout the academic year? Please specify. |
| 2. Do you think that the projects you implemented have an impact on your personal and professional development? If yes, please specify three of them that you regard most important. |
| 3. What was children's response to the project activities? Please tell what you have noticed about children's attitude, motivation, engagement, behavior, and add supportive anecdotes. |

Appendix 3: Teacher Questionnaire



QUESTIONNAIRE/SELF-REPORT FORM FOR TEACHERS

SECTION I: DESCRIPTIVE INFORMATION

| | |
|---|--|
| Name of the School/Kindergarten | |
| Name and Surname | |
| Age | |
| Gender | |
| Number of years worked as a teacher | |
| Education Status (not obligatory) | <input type="checkbox"/> Vocational School <input type="checkbox"/> College graduate/Bachelor's degree <input type="checkbox"/> Master's degree <input type="checkbox"/> PhD degree |
| Age of the children (based on months) you are currently teaching | |

SECTION II: AVAILABILITY AND USE OF TECHNOLOGY AND DIGITAL STORYTELLING

| 1. Do you have any of these technological devices in your institution? If yes, please indicate how many. | Available | Not available | Acquisition planned | Comments |
|---|-----------|---------------|---------------------|----------|
| Computer | | | | |
| Tablet device | | | | |
| Interactive whiteboard (smartboard) | | | | |
| Smartphone | | | | |
| Camera | | | | |
| Webcam | | | | |
| Slide/overhead projector | | | | |
| iTheatre | | | | |
| Other, please specify: | | | | |

| 2. Which technological devices have you used in pedagogical activities with children before the project started? | I have never used | I have used once or twice | I use on a monthly basis | I use on a weekly basis | I would use the device if we had it in our institution |
|---|-------------------|---------------------------|--------------------------|-------------------------|--|
| Computer | | | | | |
| Tablet device | | | | | |
| Interactive whiteboard (smartboard) | | | | | |
| Smartphone | | | | | |
| Camera | | | | | |
| Webcam | | | | | |
| Slide/overhead projector | | | | | |
| iTheatre | | | | | |
| Other, please specify: | | | | | |

| 3. For what purposes do you use technology in pedagogical activities? | I have never used | I have tried once or twice | I use on a monthly basis | I use on a weekly basis | I would use the device if we had it in our institution. |
|--|-------------------|----------------------------|--------------------------|-------------------------|---|
| To search for educational content and possible activities | | | | | |
| To draw attention to the topic at hand | | | | | |
| To give children examples related to the topic at hand | | | | | |
| To make children practice | | | | | |
| For creation or production | | | | | |
| For using existing multimedia content | | | | | |
| For playing or games | | | | | |
| For documentation | | | | | |
| Other, please specify: | | | | | |

4. What kind of problems/obstacles do you face while using technology in pedagogical activities and how do you develop solutions in such cases?

| 5. How do you see the potential of technology for your <i>professional development</i>? In which of the following aspects does technology play a role in your case? | Not at all | Fairly little | Fairly much | Very much |
|--|------------|---------------|-------------|-----------|
| Reducing anxiety regarding the use of media | | | | |
| Keeping up to date with new media developments in my field | | | | |
| Discovering new aspects of teaching methods | | | | |
| Advising parents about the pedagogical uses of media | | | | |
| Becoming familiar with children's media culture and children's use of media | | | | |
| Other, please specify: | | | | |

| 6. How do you see the potential of technology for your <i>professional activity</i>? Which of the following aspects apply to your use of technology? | Not at all | Fairly little | Fairly much | Very much |
|---|------------|---------------|-------------|-----------|
| Promotes developing novel and creative ideas | | | | |
| Enables disseminating novel and creative ideas | | | | |
| Supports the problem solving process | | | | |
| Supports effective and collaborative working | | | | |
| Improves motivation | | | | |
| Enriches pedagogical activities | | | | |
| Other, please specify: | | | | |

7. Please specify in what aspects the use of technology may contribute to *children's learning*.

8. Have you used the digital storytelling approach before?

- I have never used it.
- I have used it once or twice.
- I use it on a monthly basis.
- I use it on a weekly basis.

9. How would you assess the effect (both positive and negative) of digital storytelling on the educational/pedagogical process?

10. What kind of skills do you think digital storytelling approach fosters in children? Please explain.

**SECTION III:
SELF-ASSESSMENT OF MEDIA EDUCATIONAL COMPETENCES**

1. For me, media literacy in ECEC means...

| 2. To what extent do you agree with the following statements? | Totally disagree | Disagree to some extent | Agree to some extent | Totally agree |
|--|------------------|-------------------------|----------------------|---------------|
| 1) I understand what is meant by media literacy and media education. | | | | |
| 2) I am aware of the ways in which young children use media. | | | | |
| 3) I am aware of the potential impacts of media contents on children. | | | | |
| 4) I am aware of the policies in my country related to media education in ECEC. | | | | |
| 5) I am able to reflect critically on the use of media in ECEC. | | | | |
| 6) I am able to apply media education in my work with children. | | | | |
| 7) I believe that media education is important in ECEC. | | | | |
| 8) I am familiar with the general structure and features of stories. | | | | |
| 9) I know the specific characteristics of digital storytelling. | | | | |
| 10) I know the basic steps for planning a digital storytelling process. | | | | |
| 11) I know techniques and methods for planning and implementing a digital storytelling process | | | | |
| 12) I see benefits in implementing digital storytelling in ECEC. | | | | |
| 13) I can mention several purposes for which to implement digital storytelling in ECEC institutions. | | | | |
| 14) I know several tools and technologies for implementing digital storytelling projects. | | | | |
| 15) I can use at least one technology for implementing digital storytelling projects. | | | | |
| 16) I feel confident using the technologies that are required for producing digital stories. | | | | |
| 17) I am able to create a media product based on the digital storytelling approach. | | | | |
| 18) I can plan and implement digital storytelling projects with children. | | | | |
| 19) I can apply my knowledge on digital storytelling when guiding children's digital storytelling. | | | | |
| 20) I can integrate digital storytelling in the pedagogical programmes in my workplace. | | | | |
| 21) I believe digital storytelling could become a permanent collective practice in my workplace. | | | | |
| 22) I have the capacity to discuss digital storytelling with parents. | | | | |

Appendix 4: Digital Story Evaluation Form



DIGITAL STORY EVALUATION FORM

| SECTION I | | | |
|-------------------------------------|------|--------|------------|
| [VAR#1] PROJECT IDENTIFICATION CODE | | | |
| Country | Year | School | Project n. |
| | | | |

SECTION II NARRATIVE INCIPIT

| [VAR#2] STORY STARTING POINT | |
|------------------------------|-----------------------------------|
| | Children's play scripts |
| | Children's narratives |
| | Stimuli for original construction |
| | Stimuli for story retelling |

| [VAR#3] AMOUNT OF NARRATIVE STRUCTURE PROVIDED | |
|--|--|
| Estimate the amount of narrative structure provided to the storytellers (1 to 5) | |

| SECTION III NARRATIVE ELEMENTS | | | | |
|---|--------------------------|--------------------------|------------------------------|--------------------------|
| [VAR#4] Title of the Story | | | | |
| [VAR#5] Type of narrative | Script | Personal /Factual Story | Fictional /Makebelieve Story | Other |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| [VAR#6] If <i>other</i> , define (e.g. descripton, report, etc.): | | | | |
| [VAR#7] Topic (Nature, friendship, family, school, etc.) | | | | |
| [VAR#8] Brief summary | | | | |

[VAR#9-20] STORY GRAMMAR ASSESSMENT

9. YES NO IS A SETTING GIVEN?
10. YES NO ARE THE CHARACTERS DESCRIBED?
11. YES NO ARE THE EVENTS PRESENTED SEQUENTIALLY?
12. YES NO IS THERE A CAUSAL RELATIONSHIP BETWEEN EVENTS?
13. YES NO IS THERE AN INITIATING EVENT (IE)?
14. YES NO IS AN INTERNAL RESPONSE (IR) PRESENT?
15. YES NO IS A GOAL PRESENT?
16. YES NO IS THERE AN ATTEMPT TO ATTAIN THE GOAL?
17. YES NO IS THERE A CONSEQUENCE?
18. YES NO ARE MULTIPLE PLANS USED TO MEET THE GOAL?
19. YES NO IS A PARTIAL OR COMPLETE EPISODE EMBEDDED IN THE EPISODE?
20. YES NO ARE THERE TWO CHARACTERS WITH SEPARATE GOALS AND ACTIONS THAT INFLUENCE THE ACTIONS OF THE OTHER?

STORY STRUCTURE

| | |
|--|-----------------------------|
| [VAR#21] Choose the Story Structure Category that best classifies the story. | |
| <input type="checkbox"/> | No-structure sequence |
| <input type="checkbox"/> | Descriptive-action sequence |
| <input type="checkbox"/> | Reactive sequence |
| <input type="checkbox"/> | Goal-directed sequence |

| | |
|---|----------------------|
| [VAR#22] If possible, specify the fitting Level of Story Grammar Development. | |
| <input type="checkbox"/> | Unrelated statements |
| <input type="checkbox"/> | Descriptive sequence |
| <input type="checkbox"/> | Action sequence |
| <input type="checkbox"/> | Reactive sequence |
| <input type="checkbox"/> | Abbreviated sequence |
| <input type="checkbox"/> | Complete episode |
| <input type="checkbox"/> | Complex episode |
| <input type="checkbox"/> | Interactive episode |

**SECTION IV
MEDIA ELEMENTS**

Visual elements

| | | | | | |
|---|--|---|---------------------------------------|-----------------------------------|-----------------------------------|
| [VAR#23] Product type | Still-image sequence <input type="checkbox"/> | Animated slideshow <input type="checkbox"/> | Animation <input type="checkbox"/> | Movie <input type="checkbox"/> | Mixed <input type="checkbox"/> |
| [VAR#24] Are children's drawings, or pictures, or written words embedded? | <input type="checkbox"/> YES <input type="checkbox"/> NO | | | | |
| [VAR#25] If so, how were they produced? | By hand <input type="checkbox"/> | Using digital tools <input type="checkbox"/> | Both <input type="checkbox"/> | | |
| [VAR#26] Is written text displayed (e.g., screenplay, subtitles)? | <input type="checkbox"/> YES <input type="checkbox"/> NO | | | | |
| [VAR#27] If so, does it integrate or substitute voicing? | Text integrate voicing <input type="checkbox"/> | Text substitute voicing <input type="checkbox"/> | Other <input type="checkbox"/> | | |

Voicing

| | | | | |
|--|--|------------------------------------|--|-------------------------------------|
| [VAR#28] Is a narrating voice heard? | <input type="checkbox"/> YES <input type="checkbox"/> NO | | | |
| [VAR#29] Is dialogue used? | <input type="checkbox"/> YES <input type="checkbox"/> NO | | | |
| [VAR#30] If speech is present, please specify to what extent it is understandable. | Not at all <input type="checkbox"/> | Hardly <input type="checkbox"/> | Sufficiently <input type="checkbox"/> | Clearly <input type="checkbox"/> |

Soundtrack

| | |
|---|--|
| [VAR#31] Mood music (non-diegetic) | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| [VAR#32] Music (diegetic) | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| [VAR#33] If present, was music played/sung/performed by children? | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| [VAR#34] If present, was music created for the occasion? | <input type="checkbox"/> YES <input type="checkbox"/> NO |
| [VAR#35] Sound effects | <input type="checkbox"/> YES <input type="checkbox"/> NO |

**SECTION IV
TECHNOLOGY ELEMENTS**

[VAR#36-54] HARDWARE USED

Based on Project Sheet Section VI, specify by whom was each device used.

| DEVICE | USER | | | |
|---|------------|------|--------------|------|
| | Only child | None | Only teacher | Both |
| Computer (laptop/desktop; with keyboard, mouse/touchpad, and monitor as main in/output devices) | | | | |
| Tablet device | | | | |
| iTheatre | | | | |
| Smartphone | | | | |
| Camera | | | | |
| Webcam | | | | |
| Document camera | | | | |
| Digital Pen Camera/Microscope | | | | |
| Interactive whiteboard (smartboard) | | | | |
| Interactive projector (e.g. floor/wall graphics) | | | | |
| Motion sensing input device (e.g. Xbox Kinect) | | | | |
| Drawing pad | | | | |
| Digital audio recorder | | | | |
| Microphone | | | | |
| Scanner | | | | |
| Slide/overhead projector | | | | |
| Printer | | | | |
| Other | | | | |
| [VAR#54] If <i>other</i> , specify: | ----- | | | |

USER INTERFACE

[VAR#55] Define the kind of interface method between the human and the main device employed by the children.

| | |
|--|--------------------------|
| | Graphical user interface |
| | Touch user interface |
| | Tangible user interface |

[VAR#56] Define the kind of interface method between the human and the main device employed by the teacher(s).

| | |
|--|--------------------------|
| | Graphical user interface |
| | Touch user interface |
| | Tangible user interface |

SOFTWARE USED

[VAR#57] Please list off/online software applications employed by the children to perform any task related to the project.

[VAR#58] Please list off/online software applications employed by the teacher(s) to perform any task related to the project.

Appendix 5: Coding Guide for Digital Stories



DIGITAL STORY EVALUATION FORM CODING GUIDE

SECTION I PROJECT IDENTIFICATION CODE

VARIABLE 1: ID

| Country | School Year | School | Project n. |
|-------------------|--|--|--|
| IT / TR / FI / GE | 17 = S.Y. 2016-2017 18 = S.Y. 2017-2018 | Serial number that identifies the individual school, as set in the teacher's questionnaire db value-list for the "school_name" variable. | Serial number that identifies the individual project done by a particular group within the specified school. |
| E.g. IT | 17 | 6 (= "Haiku", Reggio Emilia) | 02 |

SECTION II NARRATIVE INCIPIT

VARIABLE 2. STORY STARTING POINT

| Based on Project Sheet Section V, decide if the development of the digital story started from an initial children's (1 or 2) or teachers' prompt (3 or 4). Choose just one answer. | value list |
|--|------------|
| Children's play scripts The narrative incipit has been drawn upon / extracted from children's play, e.g. <ul style="list-style-type: none"> • acting / role playing; • manipulating tangible objects and imbuing them with personalities; • free (playful) use of any kind of digital device (e.g. camera, tablet, iTheater, etc.). | 1 |
| Children's narratives The narrative incipit has been drawn upon / extracted from children's narratives, maybe spontaneous or somehow elicited, e.g. <ul style="list-style-type: none"> • personal or conversational (oral) narratives (e.g. circle time); • drawings, pictures (visual narratives). | 2 |

| | |
|---|---|
| <p>Stimuli for original construction</p> <p>The teacher provided a verbal, or visual, or tangible, or multimodal stem, introducing one/some story element/s (<i>not a complete story</i>), e.g.</p> <ul style="list-style-type: none"> • a single picture, or a set of pictures (e.g. story dice, flash cards), or a sequence of related pictures (e.g. silent book, photo album); • a verbal content stem (e.g. a starting sentence); • tangible objects (either natural or artificial: toys, dolls, puppets, bricks, figures, shapes, etc.) to be used as characters or as setting elements; • teacher's recall of shared memories (oral telling of past experiences, maybe showing pictures, e.g. a school trip); • conversational elicitation procedure (telling a story to get a story, i.e. providing a story model). | 3 |
| <p>Stimuli for story retelling</p> <p>The teacher provided a <i>complete</i> story as a starting point, e.g.</p> <ul style="list-style-type: none"> • improvising, or reciting, or reading a story; • reading and showing an illustrated book; • showing a silent book; • showing a movie, or cartoon. | 4 |

VARIABLE 3. AMOUNT OF NARRATIVE STRUCTURE PROVIDED (I.E. INHERENT IN THE STIMULUS)¹

| Definition | Value list |
|---|------------|
| No structure. The child chooses the topic and formulates a narrative. | 1 |
| The child is given a topic and is asked to tell a story. | 2 |
| Medium amount of structure. The child is given one or more potential story characters, a physical setting , and possibly an event. | 3 |
| The child is given a starting prompt containing the setting, characters, and an initiating event and is asked to complete the story. | 4 |
| High degree of structure. The child is told a story , and is asked to reformulate that story. | 5 |

SECTION III NARRATIVE ELEMENTS

VARIABLE 5. TYPE OF NARRATIVE

| | Definition (Hudson & Shapiro, 1991) ² | Value list |
|---------------------|--|------------|
| Scripts | Scripts are accounts of what usually happens. They are reported in the timeless present tense and often use the general pronoun you. | 1 |
| Personal narratives | Personal narratives are accounts of specific events that have been personally experienced. They are reported in the past tense from the perspective of a participant using personal pronouns. | 2 |
| [Fictional] Stories | The structural characteristics of stories have been formalized into various types of story grammars. Despite some variations, there is considerable agreement on the minimally acceptable characteristics of the structure for a single episode story. It must include: (a) a formal beginning (e.g., "Once upon a time") and orientation to introduce setting and characters; (b) initiating events, that is, goal-directed actions; (c) a problem or obstacle to achieving the intended goal; (d) a resolution of the problem; and (e) a formal ending device. | 3 |
| Other | | 4 |

¹ Ref. Hutson-Nechkash, P. (1990). *Storybuilding*. Eau Claire, WI: Thinking Publications: 14. Heldberg, N.L., & Stoel-Gammon, C. (1986). Narrative analysis: clinical procedures. <Topics in Language Disorders>, Vol 7(1), 58-69: 59.

² Judith A. Hudson and Lauren R. Shapiro (1991). *From Knowing to Telling: The Development of Children's Scripts, Stories, and Personal Narratives*. In Allyssa McCabe, Carole Peterson (eds.). *Developing Narrative Structure*.

STORY GRAMMAR ASSESSMENT

Theoretical framework outline. Story grammar

Stein and Glenn (1979)³ described seven **Story grammar components** in the internal structure of a story. The initial division in the story structure consists of two parts: the *Setting* category plus the *Episode*. The Episode is the basic higher-order unit of analysis in a story and contains a sequence of six different categories. Each category contains specific types of information and serves a different function in the schema (Stein and Trabasso, 1981).

SETTING

must introduce who the characters are, where the story takes place, when the story takes place (state; activity).

EPISODE

Initiating event or problem of the story (natural occurrence; action; internal event).

Internal response (affective response = emotional responses, feeling, or state-of-being). Motivates the character to formulate an

Internal plan (goal = desires/intentions; cognition = characters's thoughts);

internal plan --> plan application

Attempt --> action(s) performed to try to remediate the problem. Is there a complication (Obstacle) to the plan? If yes, this becomes a new kick-off, creating an embedded episode.

R e s o l u t i o n

Direct Consequence: outcome/result of the attempt; attainment or non-attainment of the character's goal (event, end state).

Reaction: how a character felt about the attainment of his goal or what he thought about it.

Many of Aesop's fables contain only one episode. However, most folktales contain two or more separate episodes, and many of these narratives contain what Stein and Glenn (1979) have labeled as an embedded episode.

Story components make up episodes by presenting **logical relationships**, either temporal or causal, e.g. <attempt-RESULT-resolution> or <attempt-THEN-resolution>.

VARIABLES 9 TO 20 (DICHOTOMOUS). STORY GRAMMAR ASSESSMENT

9. is a setting given?
 - *Place story takes place (e.g., grocery store).*
10. are the characters described?
 - *Reference to main and/or secondary character by name, animal, role, (e.g., any name, hippo, customer), not just "s/he"*
11. are the events presented sequentially?
12. is there a causal relationship between events?
13. is there an initiating event (IE)?
 - *Event that precipitates a response and plan (e.g., Tessie is hungry, or Tessie sees the big oranges).*
14. is an internal response (IR) present?
 - *Internal Response: Response to the initiating event (e.g., Tessie thinks they look yummy).*
 - *Internal Plan: Strategy to achieve goal (e.g., decides to buy an orange).*
15. is a goal present?
16. is there an attempt to attain the goal?
 - *(e.g., takes an orange from bin).*
17. is there a consequence?
 - *Outcome from the attempt (e.g., oranges roll on floor).*
18. are multiple plans used to meet the goal?
19. is a partial or complete episode embedded in the episode?
20. are there two characters with separate goals and actions that influence the actions of the other?

³ Stein, N. L & Glenn, C. (1979), *An analysis of story comprehension in elementary school children*, in *New directions in discourse processing*, Ed. R. O. Freedle, vol. 2, Norwood, NJ, Ablex, pp. 53-120.

STORY STRUCTURE LEVEL

Theoretical framework outline. Levels of Story Grammar Development⁴

Glenn and Stein (1980) have suggested a developmental taxonomy for the acquisition of story grammar skills. Seven different levels have been identified ranging in complexity from simplest to most complex. Each level contains all the components of the previous levels with one additional component added.

Level 1 DESCRIPTIVE SEQUENCE

This story is comprised of descriptions of characters, surroundings, and usual actions of the characters. No causal relationships or sequences of events are present.

Level 2 ACTION SEQUENCE

This story consists of events in a chronological order but no causal relationships exist.

Level 3 REACTIVE SEQUENCE

This story does contain a causal relationship in that certain changes automatically cause other changes. There is no evidence of goal-directed behavior.

Level 4 ABBREVIATED EPISODE

At this level, a goal is implied even though it may not be stated explicitly. This story contains either an event statement with a consequence or an internal response with a consequence. The actions of the characters seem to be purposeful, though not as well thought out as in successive stages.

Level 5 COMPLETE EPISODE

This story contains an entire goal-oriented behavior sequence. A consequence is required as well as two of the following three components: Initiating Event, Internal Response, Attempt.

Level 6 COMPLEX EPISODE

This level is an elaboration of the complete episode, with an additional partial or complete incident embedded in the episode. A story at this level could also contain multiple plans which are used to achieve the goal. Either one of these factors or both must be present.

Level 7 INTERACTIVE EPISODE

The interactive episode is the highest level. This story contains two characters with separate goals and actions that influence the actions of the other.

Theoretical framework outline. Story Structure Categories

In a study by Stein and Albro (1997),

Stories were grouped into four theoretically distinct categories: no-structure sequences, descriptive-action sequences, reactive sequences, and goal-directed sequences. Each category represented an increasingly prototypic and complex story through the systematic addition of temporal and causal links and the components of goal-directed action (...).⁵

We refer to the same authors for the definition of *goal*.

Defining the Goal. A *goal* was defined as a desire to be able to attain or maintain certain states of existence or a desire to be able to get out of or avoid certain states (Stein & Levine, 1987, 1989). Goals need not include explicit statements of a plan of action. Rather, goals are expressions of the *desire* to change from one state to another or to maintain or avoid an outcome when a threat to maintenance or avoidance has been perceived.⁶

⁴ Hutson-Nechkash, P. (1990): 18.

⁵ Stein & Albro, 1997: 21.

⁶ Stein & Albro, 1997: 23.

VARIABLE 21. STORY STRUCTURE CATEGORY

| Category | Level | Related Statements | Temporal Order | Causal Relations | Goal | Plan | Complications | Interaction | Value list |
|-----------------------------|----------------------|--------------------|----------------|------------------|------|------|---------------|-------------|------------|
| No-structure sequence | Unrelated statements | - | - | - | - | - | - | - | 1 |
| Descriptive-action sequence | Descriptive Sequence | + | - | - | - | - | - | - | 2 |
| | Action Sequence | + | + | - | - | - | - | - | |
| Reactive sequence | Reactive Sequence | + | + | + | - | - | - | - | 3 |
| Goal-directed sequence | Abbreviated Sequence | + | + | + | + | - | - | - | 4 |
| | Complete Episode | + | + | + | + | + | - | - | |
| | Complex Episode | + | + | + | + | + | + | - | |
| | Interactive Episode | + | + | + | + | + | + | + | |

**SECTION IV
MEDIA ELEMENTS**

VARIABLE 22. PRODUCT TYPE

| | Still-image sequence | Animation | Movie |
|--------------|---|---|--|
| Product type | Any kind of slideshow, e.g. storybook, photo/illustrated album, ppt presentation. | Both <i>cartoon</i> and <i>stop motion</i> and <i>screencast</i> , i.e. the output of ITheatre, or any kind of app running on PC/Tablet/Smartphone employed for “live” or “delayed” animation, or screen recording: e.g. Puppet Pals, Camtasia, Monkey Jam. | Motion picture (live video record, maybe edited or not). |
| Value list | 1 | 2 | 3 |

VARIABLES 26 TO 28. SOUNDTRACK (DICHOTOMOUS)

| | |
|------------------------------------|--|
| [VAR#26] Mood music (non-diegetic) | Music whose source is neither visible on the screen nor has been implied to be present in the action. |
| [VAR#27] Music (diegetic) | Music whose source is visible on the screen or whose source is implied to be present by the action of the film. Diegetic music is any music presented as originated from source within the film's world. Diegetic music can be either on screen or off screen depending on whatever its source is within the frame or outside the frame. |
| [VAR#28] Sound effects | Sounds made by objects in the story, or sound effects which is added for the dramatic effect. |

**SECTION IV
TECHNOLOGY ELEMENTS**

VARIABLE 50. USER INTERFACE

| | Value list |
|--|------------|
| Graphical user interfaces accept input via devices such as a computer keyboard and mouse and provide articulated graphical output on the computer monitor. | 1 |
| Touch user interface are graphical user interfaces using a touchpad or touchscreen display as a combined input and output device. Touchscreens are displays that accept input by touch of fingers or a stylus. | 2 |
| A tangible user interface is a user interface in which a person interacts with digital information through the physical environment. E.g. ITheatre, Xbox Kinect (motion sensing input device). | 3 |

Appendix 6: Observation Grid for Children’s Social-Emotional Behaviors



OBSERVATION GRID FOR CHILDREN’S SOCIAL-EMOTIONAL BEHAVIORS WITHIN DIGITAL STORYTELLING ACTIVITIES

| | | | | | | |
|--|-----------------|--|--|--|--|--|
| Instructions: Please record your observations on children’s interaction in story creation process for each child in the group using the grid below. Please use one of three signs described below for every behavior and child. ✓ <i>Child demonstrates the behavior regularly</i> + <i>Child’s behavior is in progress</i> X <i>Child does not demonstrate the behavior</i> | | | | | | |
| UNITS OF OBSERVATION | CHILDREN | | | | | |
| | | | | | | |
| 1ST PART: CHILDREN’S VERBAL AND NON-VERBAL GROUP INTERACTIONS IN STORY CREATION PROCESS | | | | | | |
| 1. Working autonomously/independently | | | | | | |
| 2. Working cooperatively (Being motivated to take part in group activities) | | | | | | |
| 3. Taking responsibility in the group | | | | | | |
| 4. Perseverance | | | | | | |
| 5. Following instructions | | | | | | |
| 6. Focusing on purpose | | | | | | |
| 7. Contributing to defining the problem | | | | | | |
| 8. Contributing to problem solving process | | | | | | |
| 9. Working through a plan (organization and repetition) | | | | | | |
| 10. Establishing effective relationships/communication in the group | | | | | | |
| 11. Helping friends who have difficulties by completing their tasks | | | | | | |
| 12. Showing positive inter-dependence to the group members | | | | | | |
| 13. Thinking flexibly | | | | | | |
| 14. Adapting to different contexts and study groups | | | | | | |
| 15. Showing respect (waiting turns at talking, right to vote/elect) | | | | | | |
| 16. Expressing her/his emotions choosing relevant wording | | | | | | |
| 17. Explaining what s/he knows and where s/he has challenges | | | | | | |
| 2ND PART: NARRATIVE ELEMENTS EXHIBITED INDIVIDUALLY IN STORY CREATION PROCESS | | | | | | |
| 18. Telling a story verbally (with help) | | | | | | |
| 19. Presenting ideas which reflect personal interests and preferences during story creation | | | | | | |
| 20. Demonstrating critical thinking skills during story creation | | | | | | |
| 21. Defining story characters and expressing them visually | | | | | | |
| 22. Understanding time-place, cause-effect relationships during creating story | | | | | | |
| 23. Predicting/imagining end of a story | | | | | | |
| 24. Understanding and taking interest in basic visual-audial narratives | | | | | | |
| 25. Discovering effective/expressionist opportunities (verbal, based on handcraft skills, body, musical and visual/audial language) offered by digital storytelling process | | | | | | |
| ADDITIONAL OBSERVATIONS (any other relevant information, field notes, supporting verbal/visual anecdotes, etc.): | | | | | | |

Appendix 7: Evaluation Form for Teachers' Digital Stories with Coding Guide



EVALUATION FORM FOR TEACHERS' DIGITAL STORIES WITH CODING GUIDE

PROJECT IDENTIFICATION CODE

| | | | | |
|-------|---------|---------------|-------------|-------------|
| VAR#1 | COUNTRY | ACADEMIC YEAR | SCHOOL CODE | PROJECT NO. |
| | | | | |

SECTION I: NARRATIVE ELEMENTS

| | | | | | | | |
|-------|--|---------------------|-------------------------------------|--|---|-------|--|
| VAR#2 | TITLE OF THE STORY | | | | | | |
| VAR#3 | TYPE OF NARRATIVE * | Script ¹ | Personal/Factual Story ² | Fictional/Makebelieve Story ³ | | Other | |
| | | 1 | 2 | 3 | 4 | | |
| VAR#4 | IF OTHER (please define; e.g. description, report, etc.) | | | | | | |
| VAR#5 | TOPIC (Nature, friendship, family, school, etc.) | | | | | | |
| VAR#6 | BRIEF SUMMARY | | | | | | |

* Definitions below are drawn from Hudson & Shapiro, 1991:

¹ Scripts are accounts of what usually happens. They are reported in the timeless present tense and often use the general pronoun you.

² Personal narratives are accounts of specific events that have been personally experienced. They are reported in the past tense from the perspective of a participant using personal pronouns.

³ The structural characteristics of stories have been formalized into various types of story grammars. Despite some variations, there is considerable agreement on the minimally acceptable characteristics of the structure for a single episode story. It must include: (a) a formal beginning (e.g., "Once upon a time") and orientation to introduce setting and characters; (b) initiating events, that is, goal-directed actions; (c) a problem or obstacle to achieving the intended goal; (d) a resolution of the problem; and (e) a formal ending device.

SECTION II: DIGITAL STORY ELEMENTS

| CRITERIA | | Performance Levels | | |
|---------------|------------------------------------|--|---|--|
| | | 3 (Sufficient) | 2 (Moderate) | 1 (Insufficient) |
| VAR#7 | PURPOSE | The purpose of the story is clear and maintained throughout the story. | The purpose of the story is clear but there are some elements in the story, which are not compatible with the point of view. | The purpose of the story is not clear. |
| VAR#8 | A DRAMATIC QUESTION/PROBLEM | The story begins with a dramatic/ remarkable question/problem. The events of the story are related with this question/ problem. | The story begins with a dramatic/ remarkable question/problem but the events in the story are not related with this question/ problem. | There is not any dramatic/ remarkable question/ problem in the story.. |
| VAR#9 | CONTENT | There is a consistency between introduction, development and conclusion parts of the story. These parts are related with the purpose of the story. | There is a consistency between introduction, development and conclusion parts of the story, but they are not related with the purpose of the story. | There is no consistency between introduction, development and conclusion parts of the story. These parts are not related with the purpose of the story. |
| VAR#10 | VOICE OF NARRATOR | The voice of the narrator is clear. The pace and emotion of the voice are coherent with story's respective parts. | The voice of the narrator is clear. But the pace and the emotion are not coherent with story's respective parts. | The voice of the narrator is not clear. The pace and the emotion are not coherent with story's respective parts. |
| VAR#11 | POWER OF THE SOUNDTRACK | Soundtrack is coherent with emotional content of the story's respective parts. Music creates an effective background for the voice of the narrator. | Soundtrack is coherent with emotional content of the story's respective parts, but has a disruptive effect on the voice of the narrator. | Soundtrack is not coherent with emotional content of the story's respective parts and has a disruptive effect on the voice of the narrator. |
| VAR#12 | VISUAL ELEMENTS | The chosen visual elements are coherent with the characters and emotional content of the story. The quality of visuals is high. Same visuals are used for same characters. | The chosen visual elements are not coherent with the characters and /or emotional content of the story and/or the quality of visuals is low and/or same visuals are used for same characters. | The chosen visual elements are not coherent with the characters and emotional content of the story. The quality of visuals is low. Different visuals are used for same characters. |
| VAR#13 | ECONOMY | The story is economic in terms of visual and verbal elements. The duration of the presentation is appropriate. | The story is not economic in terms of visual and verbal elements. The duration of the presentation is appropriate. | The story is not economic in terms of visual and verbal elements. The duration of the presentation is not appropriate. |
| VAR#14 | LANGUAGE | The language is appropriate in terms of content and grammar. The language is not sophisticated (is simple) and clear. | The language is appropriate in terms of content and grammar. The language is sophisticated (is not simple) and not clear. | The language is not appropriate in terms of content and grammar. The language is sophisticated (is not simple) and not clear. |

| | | | | |
|---------------|--|---|---|---|
| VAR#15 | PACING | The pacing of the story is coherent with the emotional content. Pacing is regulated according to the changes of emotions in specific parts. | The pacing of the story is coherent with the emotional content. Pacing is not regulated according to the changes of emotions in specific parts. | The pacing of the story is not coherent with the emotional content. Pacing is not regulated according to the changes of emotions in specific parts. |
| VAR#16 | CONTRIBUTION OF MESSAGE TO CHILDRENS' DEVELOPMENT | The message given with the story is favorable to cognitive development and positively contributing to social-emotional development. | The message given with the story is favorable to cognitive development or positively contributing to social-emotional development. | The message given by the story is not appropriate for the cognitive development and has a negative impact on social-emotional development. |
| VAR#17 | CLEARITY OF MESSAGE | The message to be conveyed through the story is clear, direct and understandable. | The message to be conveyed through the story is unclear, indirect; but understandable. | The message to be conveyed through the story is unclear, indirect and not understandable. |

SECTION III: STORY GRAMMAR

| STORY GRAMMAR ASSESSMENT | | Yes | No |
|---------------------------------|--|------------|-----------|
| VAR#18 | Is a setting given? (<i>Place story takes place; e.g. grocery store</i>) | 1 | 2 |
| VAR#19 | Are the characters described? (<i>Reference to main and/or secondary character by name, animal, role; e.g. any name, hippo, customer</i>), not just "s/he") | 1 | 2 |
| VAR#20 | Are the events presented sequentially? | 1 | 2 |
| VAR#21 | Is there a causal relationship between events? | 1 | 2 |
| VAR#22 | Is there an initiating event? (<i>Event that precipitates a response and plan; e.g. Tessie is hungry, or Tessie sees the big oranges</i>) | 1 | 2 |
| VAR#23 | Is an internal response present? (<i>Internal Response: Response to the initiating event; e.g. Tessie thinks they look yummy. Internal Plan: Strategy to achieve goal; e.g. decides to buy an orange.</i>) | 1 | 2 |
| VAR#24 | Is a goal present? | 1 | 2 |
| VAR#25 | Is there an attempt to attain the goal? (<i>e.g., takes an orange from bin</i>) | 1 | 2 |
| VAR#26 | Is there a consequence? (<i>Outcome from the attempt; e.g. oranges roll on floor</i>) | 1 | 2 |
| VAR#27 | Are multiple plans used to meet the goal? | 1 | 2 |
| VAR#28 | Is a partial/complete episode embedded in the episode? | 1 | 2 |
| VAR#29 | Are there two characters with separate goals and actions that influence the actions of the other? | 1 | 2 |

| VAR#30 STORY STRUCTURE | | VAR#31 LEVEL OF STORY GRAMMAR DEVELOPMENT* | |
|-------------------------------|------------------------------------|--|---|
| 1 | No-structure sequence | Unrelated statements | 1 |
| 2 | Descriptive-action sequence | Descriptive sequence (<i>This story is comprised of descriptions of characters, surroundings, and usual actions of the characters. No causal relationships or sequences of events are present.</i>) | 2 |
| | | Action sequence (<i>This story consists of events in a chronological order but no causal relationships exist.</i>) | 3 |

| | | | |
|---|-------------------------------|---|---|
| 3 | Reactive sequence | Reactive sequence (This story does contain a causal relationship in that certain changes automatically cause other changes. There is no evidence of goal-directed behavior.) | 4 |
| 4 | Goal-directed sequence | Abbreviated Sequence (At this level, a goal is implied even though it may not be stated explicitly. This story contains either an event statement with a consequence or an internal response with a consequence. The actions of the characters seem to be purposeful, though not as well thought out as in successive stages.) | 5 |
| | | Complete Episode (This story contains an entire goal-oriented behavior sequence. A consequence is required as well as two of the following three components: Initiating Event, Internal Response, Attempt.) | 6 |
| | | Complex Episode (This level is an elaboration of the complete episode, with an additional partial or complete incident embedded in the episode. A story at this level could also contain multiple plans which are used to achieve the goal. Either one of these factors or both must be present.) | 7 |
| | | Interactive Episode (The interactive episode is the highest level. This story contains two characters with separate goals and actions that influence the actions of the other.) | 8 |

*Glenn and Stein (1980) have suggested a developmental taxonomy for the acquisition of story grammar skills. Seven different levels have been identified ranging in complexity from simplest to most complex. Each level contains all the components of the previous levels with one additional component added.

SECTION IV: MEDIA ELEMENTS

| | | Still-image sequence ¹ | Animated slideshow ² | Animation ³ | Movie ⁴ | Mixed ⁵ |
|------------------------|--|--|---------------------------------|------------------------|-------------------------------|--------------------------------|
| Visual Elements | VAR#32 | Product type | 1 | 2 | 3 | 4 5 |
| | VAR#33 | Are teachers' drawings, or pictures, or written words embedded? | | | Yes | No |
| | VAR#34 | If so, how were they produced? | Not embedded | By hand | Using digital tools | By both |
| | | | 0 | 1 | 2 | 3 |
| | VAR#35 | Is written text displayed (e.g., screenplay, subtitles)? | | | Yes | No |
| | | | | | 1 | 2 |
| VAR#36 | If so, does it integrate or substitute voicing? | | | No written text | Text integrate voicing | Text substitute voicing |
| | | | | 0 | 1 | 2 |
| Voicing | VAR#37 | Is a narrating voice heard? | | | Yes | No |
| | | | | | 1 | 2 |
| | VAR#38 | Is dialogue used? | | | 1 | 2 |
| VAR#39 | If speech is present, please specify to what extent it is understandable. | No speech | Not at all | Hardly | Sufficiently | Clearly |
| | | 0 | 1 | 2 | 3 | 4 |

| | | | | | | | | |
|-------------------|---|---|--|-----------------|---|-----------|---|---|
| Soundtrack | VAR#40 | Mood music (non-diegetic) (<i>Music whose source is neither visible on the screen nor has been implied to be present in the action.</i>) | | Yes | | No | | |
| | | | | 1 | | | 2 | |
| | VAR#41 | Music (diegetic) (<i>Music whose source is visible on the screen or whose source is implied to be present by the action of the film. Diegetic music is any music presented as originated from source within the film's world. Diegetic music can be either on screen or off screen depending on whatever its source is within the frame or outside the frame.</i>) | | | 1 | | 2 | |
| | VAR#42 | If present, was music played/sung/performed by teachers? | | No music | | | | |
| | | | | | 0 | | 1 | 2 |
| | VAR#43 | If present, was music created for the occasion? | | No music | | | | |
| | | | | 0 | | 1 | 2 | |
| VAR#44 | Sound effects (<i>Sounds made by objects in the story, or sound effects which is added for the dramatic effect.</i>) | | | | 1 | | 2 | |

¹**Still-image sequence:** Any kind of slideshow - e.g. storybook, photo/illustrated album, PPT presentation – with no animations (other than transitions, e.g. fading effects)

²**Animated slideshow:** Both *cartoon* and *stop motion* and *screencast*, i.e. the output of iTheatre, or any kind of app running on PC/Tablet/Smartphone employed for “live” or “delayed” animation, or screen recording: e.g. Puppet Pals, Camtasia, Monkey Jam.

³**Animation:** E.g. animated PPT presentation.

⁴**Movie:** Motion picture (live video record, maybe edited or not).

⁵**Mixed:** Mixed formats, e.g. the output of BookCreator, embedding both still image sequences and video clips.

SECTION V: TECHNOLOGY ELEMENTS

| | | |
|---------------|---|---|
| VAR#45 | USER INTERFACE: Define the kind of interface method between the human and the main device employed by the teacher(s). | |
| | 1 | Graphical user interface (<i>These interfaces accept input via devices such as a computer keyboard and mouse and provide articulated graphical output on the computer monitor.</i>) |
| | 2 | Touch user interface (<i>These are interfaces using a touchpad or touchscreen display as a combined input and output device. Touchscreens are displays that accept input by touch of fingers or a stylus.</i>) |
| | 3 | Tangible user interface (<i>This is a user interface in which a person interacts with digital information through the physical environment. E.g. iTheatre, Xbox Kinect (motion sensing input device).</i>) |
| VAR#46 | SOFTWARE USED: Please list off/online software applications employed by the teacher(s) to perform any task related to the project. | |
| | | |

Appendix 8: Teacher Interviews

STORIES interviews (Finland)

FIRST ROUND: Winter 2017 (Expectations, competences)

1) Digital storytelling

Was DST familiar to you before the STORIES project began? If yes, in what context had you become familiar with it?

What are your general thoughts on DST?

How would you describe the applicability of DST for education in general?

What do you think are the strengths and weaknesses of DST as an educational method?

What kinds of challenges does the use of DST pose, in your opinion? (For the educator / for the environment)

2) Digital storytelling in early childhood education

What are your general thoughts on the use of DST in ECE?

How do you see the applicability of DST for working with young children?

What kinds of challenges can children's age pose for working with DST?

What are your expectations regarding DST as part of your own work?

In which ECE content areas do you think DST can be useful?

What are your expectations regarding what DST can provide for educational work?

3) Competences

How has participation in the STORIES training enhanced your own capacity to implement DST?

What do you think are the biggest challenges at this point in terms of your own competences?

What are some areas/competences that have developed during the STORIES training phase?

What is your view regarding the level of your technological competences for implementing DST?

What do you think about projects such as STORIES as means for developing professional competences?

Would you see project-based training as a good method also in other professional development contexts?

4) Additional questions

What kinds of skills do you think DST could develop in children?

What is your view regarding the role of DST in ECE in the future?

SECOND ROUND: Summer 2017 (Follow-up after the first cycle)

1) Follow-up questions

(Exact content varied in each kindergarten based on issues brought up in the first interview; e.g. content integration, pedagogical documentation, children's own interests)

2) Challenges

What kinds of challenges emerged during the projects? (From different points of view: adults / resources / children / environment)

Were there some aspects that hindered meeting the objectives you wanted to reach with the projects?

3) Benefits

What, in your experience, are the most significant benefits of DST at this point of the project?

Did some unexpected benefits emerge?

4) Self-expression

What are your thoughts on self-expression in DST activities?

5) Social aspects, interaction

What kind of interaction did the DST activities facilitate between the children?

Were there any surprises or differences?

6) Technical aspects

Have your own competences developed during the projects?

Did you have any preconceived notions going into the project?

Any comments on the hands-on support in the training phase and during the projects?

THIRD ROUND: Spring 2018 (Experiences after the whole process, competences)

1) Introductory questions

What is your general experience on the STORIES activities?

(If the interviewee has not participated in previous interviews: Was DST familiar to you before the STORIES project began? If yes, in what context had you become familiar with it?)

Based on the projects you have implemented, what are your thoughts on DST in general?

2) Applicability and benefits

How would you describe the applicability of DST for education in the ECE context?

What do you think are the strengths of DST as an educational method, or what kinds of educational goals can be reached with the aid of DST?

What kinds of skills do you think DST could develop in children?

What are some ECE content areas where you think DST could be useful?

How would you describe the benefits/possibilities of DST in the integration of ECE content areas?

How do you see the benefits/applicability of DST as a tool for pedagogical documentation?

3) Challenges

What kinds of challenges do you think the use of DST poses (for educators/environment/children)?

What did you think were the biggest challenges during the projects in terms of your own competences?

What kinds of challenges might the children's age pose for the activities?

4) Competence

In what ways has participation in the STORIES project and trainings enhanced your own capacity to implement DST?

What are some areas/competences that have developed during the STORIES training and the implementation of the projects with children?

What is your experience regarding the development of your technical skills to implement DST?

(For new interviewees: What do you think about projects such as STORIES as means for developing professional competences?)

5) Conclusion

How do you see the role of DST in ECE in the future? Will you personally implement DST projects in the future?