

Research Paper

“When I’m writing a story, I am really good” Exploring the use of digital storytelling technology at home

Sara Kalantari^a, Elisa Rubegni^b, Laura Benton^a, Asimina Vasalou^{a,*}

^a UCL Knowledge Lab, IOE, UCL’s Faculty of Education and Society, 23-29 Emerald St, London, WC1N 3QS, UK

^b Department of Computing and Communications, Lancaster University, Lancaster, LA1 4YW, UK



1. Introduction

A prominent theme in Child-Computer Interaction (CCI) has been concerned with how existing, and emerging, digital technologies offer the potential to bring together parent and child in a shared experience (Christensen et al., 2019) (Zhang et al., 2022). In this paper, we consider *digital storytelling* used in the home as one such opportunity. Stories have been proposed, more broadly, as a human meaning-making tool. They play a critical role in young children’s development enabling them to make sense of their lives through the expression and elaboration of their emotions, values, beliefs, knowledge and experiences (Bruner, 2003) (Pahl, 2011). The importance of storytelling has underpinned the development of new interactive technologies that include digital multimodal production tools children use to author, share, and perform their stories (Göttel, 2011) hereafter ‘DST’ (digital storytelling technologies). A ripe area of CCI research (Giannakos et al., 2020), digital storytelling for children has been predominantly researched in the context of formal education where stories have been oriented toward supporting curriculum learning goals. With a few exceptions (e.g. WallbaumSwamy et al., 2017), less attention has been given to DST designed for families and even less has been set in the home context to understand the role this technology might play in the family. Oral stories are a vital way for families to negotiate and construct a shared identity (Koenig Kellas, 2005) (Pahl, 2011) (Vasalou et al., 2020a). Highlighting the communicative and transformative nature of storytelling in the family, Kellas explains (Koenig Kellas, 2005) (pg. 366) “*family stories affect and reflect family culture by communicating who a family is, its norms, its values, its goals, its identity.*” Moreover, past research on DSTs has together shown the importance of *collaborative* and *negotiated* meaning making that children engage in whilst crafting stories with their peers [e.g., (Rubegni & Landoni, 2014) (Rutta et al., 2020) (Di Blas et al., 2010)]. The important role of stories in “making family” on the one hand, and the collaborative opportunities of making stories with others using DST

on the other, motivates the focus of this work on DST and the family. Our research aims to **examine what stories children and their parents create, what purpose these stories serve in the family, and how the pair collaborates to co-create the story.**

With regards to parent-child collaboration, past research has found that the way families interpret and enact their interactions around digital technology can vary based on a range of factors, including most notably the interaction design features available within the technology (e.g. (Drew & Piper, 2017) (Hiniker et al., 2018)),. For example, a study by Yen et al. (Yen et al., 2018) showed that parents from the U.S. participated actively as ‘teammates’ when children played an exploratory digital game designed to be more open-ended. In contrast, when the game played was instructional and supported discrete learning aims, parents took the role of the ‘spectator’ scaffolding their child’s interactions with the game on the side. This interaction pattern was reverse in Taiwanese and Chinese families. Interaction designers have often incorporated two interaction design features in DSTs: (i) *scaffolds to support narrative thinking and plot coherence* (e.g., story templates) and (ii) *scaffolds to promote the use of visual literacy* (e.g., image libraries). While past research in the context of schools has shown that DST incorporating these scaffolds can foster collaborative storytelling between children (e.g. (Rubegni & Landoni, 2014)), little is known on how each of these features are interpreted by parents and children, or how they contribute to shaping family interaction. Thus, a further aim of our work is to investigate child-parent collaboration through the prism of these design features. We seek to **understand how the co-creation of digital stories by the child and parent dyad is shaped by these two interaction design scaffolds.**

Addressing these aims, we report on an exploratory qualitative user study with children (aged 6–7) and their parents using a DST application called Kids Story Builder. On a weekly basis, the pair participated in three distinct storytelling tasks using this app. Two of the tasks involved the use of interaction design scaffolds embedded in the DST to support

* Corresponding author.

E-mail addresses: s.kalantari@ucl.ac.uk (S. Kalantari), e.rubegni@lancaster.ac.uk (E. Rubegni), l.benton@ucl.ac.uk (L. Benton), a.vasalou@ucl.ac.uk (A. Vasalou).

narrative thinking and visual literacy respectively, whereas the third task involved using the DST without the scaffolds serving as a baseline. This research design allowed us to explore the types of stories the pair created, how the parent-child pair engaged across the three tasks, and what specific interaction dynamics were introduced due to the scaffolds. Our paper makes three contributions informing the design and use of DST in the family context. *First*, contrasting with our original intentions, we find that digital storytelling in the home is primarily driven by the child and is a core family value. Despite this, children used stories to express and relive shared positive experiences with their family, i.e., by creating family-centric stories. Our study shows that this child-led approach can be effectively supported with visual literacy scaffolds which children were able to independently use. *Second*, children's approaches to digital storytelling are diverse, depending on their existing narrative thinking skills and cognitive flexibility in using technology. This, we argue, calls for new approaches to DST designed to foster children's appropriation. *Third*, our research highlights critical tensions between child agency and the parent's involvement, with the narrative thinking scaffold creating the opportunity for relational disturbances. Inspired from children's family-centric stories, yet recognizing the turbulent dynamics introduced in this creative task, we propose a new call to action for future interaction design research to explore how to foster shared experiences in the family with DST.

2. Background

2.1. Learning with digital storytelling

In combining multimodal (e.g., audio, video) and multimedia forms of communication (e.g., text, image, voice) (Agnese et al., 2020) to produce stories, digital storytelling triggers children's digital literacy skills comprising of media, visual, technology and traditional literacies (Churchill, 2016). These skills are developed in a non-linear process through "a spiral of empowerment" (Churchill, 2016; Hobbs, 2017) that allows for new competences to grow in an interdependent mode. It is through employing these skills to author and share their stories that children and, to our current interest, families, can express themselves, negotiate and gain a sense of selfhood and family identity (Bruner, 2003; Koenig Kellas, 2005; Pahl, 2011). Focusing on videos for digital storytelling, Pahl (Pahl, 2011) explains that family identity is contingent to everyday routines that are in turn expressed in digital stories. Besides their expressive role, digital stories they argue can be transformative in the family allowing parents and children to see themselves in new ways. In a workshop designed to explore new opportunities for digital storytelling in the family, Vasalou et al. (Vasalou et al., 2020a) also found that stories mediated family identity. One of their parent-participants involved invited her children to co-create stories, supporting them to learn how to handle challenging situations at home. Additionally, several parents expressed family's values and past shared experiences in their stories, with multi-cultural parents using storytelling to share their cultural heritage, a finding also reported in intergenerational storytelling workshops with immigrant families (Liaqat et al., 2021).

To our present interest, research that has empirically evaluated how DSTs specifically foster children's learning has been predominantly situated in the school context. DSTs have been shown to support valuable educational activities that promote children's cognitive and social development alongside their digital literacy (Churchill, 2016) and critical use of media (Hobbs, 2017) as argued above. Seeking to foster collaborative storytelling with DST in the school classroom, Di Blas et al. (Di Blas et al., 2010) observed that children benefited in numerous ways when making their stories together. The process of storytelling strengthened children's understanding of curricular topics, increased their engagement in the activity, and improved their communication with their peers. Children also engaged in media literacy and narrative thinking when putting together content using the DST. Motivated by the collaborative possibilities of DST, Rutta et al. (Rutta et al., 2020).

introduced a new DST making use of comics to stimulate children's sensemaking of peer conflict, and thus foster their social and emotional learning. The authors found that children preferred to create their stories collaboratively as opposed to working on their own although children struggled at times to maintain productive collaboration. Moreover, children were engaged in leading their stories (see also (Pittarello & Bertani, 2012) (Rutta et al., 2020)), and were drawn to the multimodal forms of expression available in DST promoting inclusive learning for a range of learners (see also (Bonsignore et al., 2013)). In other work, Rubegni and Landoni (Rubegni & Landoni, 2014) worked with teachers to define learning aims for the use of a DST and found that teachers specified learning in relation to the production of relevant narrative genres aligned with the curriculum, media literacy, collaboration, and creativity.

2.2. DST interaction design scaffolds

The design of DST includes bespoke features used by children to author, share, and perform their stories (Göttel, 2011). Within the story authoring phase, which is the focus of our work, DSTs have typically embedded two types of 'interaction design scaffolds', a term we use to refer to features that support a key component of storytelling. *Narrative thinking* scaffolds support children to develop their story plot and *visual literacy* scaffolds guide them to use and/or create multimodal resources. For example, "Communics" (Rutta et al., 2020) provided semi-completed sentence prompts designed to guide children in developing aspects of their story plot whilst presenting pre-existing visual resources children used, namely photographic images and illustrated characters. When using "1010 stories" children were given topics/subtopics to select from and converge on their story plot, followed by multimedia content they chose as they made their plot selections (Di Blas et al., 2010). In "Fiabot!" (Rubegni & Landoni, 2014) and "Castor" (Pittarello & Bertani, 2012) children developed story plot elements using pre-given story spines corresponding to different story genres followed by a phase where children could select existing multimodal resources, or create their own. Similarly, Novelette provided story templates and a customisable library of images (Agnese et al., 2020) (Agnese et al., 2021).

As detailed in the previous section, DSTs, incorporating these features, can support children to understand focal learning topics and to develop different types of literacies (Robin, 2008). However, despite being evaluated for their usability (e.g. (Pittarello & Bertani, 2012) (Bonsignore et al., 2013) (Agnese et al., 2021)), it has not been yet explored whether and how *each of these features* engage children and their parents in the storytelling processes they were designed to support, a question our research seeks to address. Furthermore, some of the DSTs reviewed above have presented the two interaction design scaffolds in a linear workflow that required children to first use the narrative thinking scaffolds before taking up the visual literacy scaffolds (e.g. Fiabot! Castor). In contrast, others have been designed by taking a more flexible approach that recognises the non-linear process involved in digital literacy allowing children to choose which scaffolds to use first and how to use them together (e.g. Commics, 1010 stories). Shedding light into how each of these interaction design features supports the storytelling process can offer new insight into the future design of DST for the home context, particularly informing the design of their workflows.

2.3. The role of the adult during DST and digital storytelling

Previous empirical research on the use of DST has primarily taken place in the classroom showing that the teacher's role is vital to support the children's learning process during their interaction with this technology. Teachers orchestrated and organized the learning environment, for example, by introducing the educational value of the activity (Rubegni & Landoni, 2014) and building upon the child's engagement with storytelling to make their learning explicit (Di Blas et al., 2010). In

collaborative storytelling involving groups of children, the teacher subdivided the task and orchestrated the collaborative work between students (Di Blas et al., 2010). Teachers were also involved in the storytelling activity itself by supporting the children to create the plot structure when children found this challenging (Rutta et al., 2020) (Di Blas et al., 2010), with this suggesting the need for adult intervention despite the presence of interaction design scaffolds for narrative thinking. Teachers have thus played a guiding role in planning and scaffolding children's use of DST.

Though parent-child interaction in the context of DST has received limited attention within existing empirical research, digital storytelling research concerned with video making has shown that turbulent familial power dynamics can exist when families work together on a digital story. One case study, reporting on a mother and her son co-creating a digital story, reported a tension between adult authority and childhood agency (Lewis Ellison & Wang, 2018). On the one hand, the child resisted his mother's guidance wanting to show his digital competence and use of media in creative ways. On the other hand, the mother approached the digital story with task expectations regarding the pair's timeliness and approach leading her to use compromise, negotiation but also exercise authority to ensure her son participated in alignment with her expectations. In contrast to this work, other case study research, reported productive co-creation of digital stories in a family (Pahl, 2011). This was achieved by creating opportunities for each family member, including the parent, to first express and capture autobiographical memories the children went on to build on in their videos. At the same time as highlighting that children and parents can import a range of existing roles and relational dynamics into these creative tasks, these case studies also indicate the importance of exploring if interaction design scaffolds, often found in DST, support or hinder the collaborative process (Koenig Kellas, 2005).

2.4. Research questions

In summary, our paper responds to a growing interest in the use of digital technology by families (e.g. (Christensen et al., 2019)). As our review above shows, contrasting to the use of DST in formal education which is driven by predetermined learning outcomes, at home, the expressive possibilities of DST can offer potential opportunities to mediate family identity and relations ((Koenig Kellas, 2005) (Vasalou et al., 2020b)). Our first RQ asks: *What type of stories do children and parents co-create, and what purpose do these stories serve in the family?* Even though past research has shown that social interactions between parents and children are often shaped by the technology's interaction design features, to our knowledge, it is not well understood how the aforementioned DST scaffolds are appropriated by parents and children in the home context, and the effect they have on the storytelling process, which is inherently social. This is addressed in RQ2: *How do parent-child dynamics influence the co-creation of digital stories when using scaffolds aimed at supporting narrative thinking and visual literacy, and how do these dynamics differ?*

3. Methodology

3.1. Participants, study context and tasks

Child-parent pairs were recruited using snowball sampling, e.g., through posts in school groups or direct contact with individual parents. Thirty-five families were either approached or contacted us for further information, of which ten expressed interest to participate in the study. Of these, seven pairs of children-parents completed the study. The first inclusion criterion was children's age. Child participants were between the ages of six and seven. Similar to (Rubegni & Landoni, 2014) children's early literacy skills ensured they were able to use their traditional literacies in concert with the other literacies involved in digital storytelling. Whilst children's gender was balanced (four female/three male),

except for one male parent, the parents were predominantly female. Bar for one family, the rest were multilingual and were split between living in the US and the UK. English was the children's first language and they had different levels of exposure to a second language (e.g., Spanish, Persian, Greek, French). Owning a home tablet was the second inclusion criterion which all the families recruited had. Children and their parents reported being regular users of technology and digital learning apps.

Each family carried out the research tasks in their home with asynchronous and remote support from the researchers owing to restrictions from the COVID-19 pandemic at the time. The final interview was conducted over videoconference. Once the study commenced, parents were asked to co-construct stories with their children using their home tablet. Three separate storytelling tasks were presented, which were shared successively. Therefore, only once the pair had completed a given storytelling task, the researcher released the next task. Storytelling tasks were described in a single page and shared by the researcher with the parent via email. Given our aim to understand what types of stories families create to make meaning, we did not share with the participants any story criteria (e.g., goal, length) leaving it up to them to shape the storytelling process. Initially, we had planned for the study to run for a period of four weeks, with three weeks consisting of the story making tasks and one week dedicated to a post-interview. However, given the diverse rhythms of family life, families completed the tasks in different timeframes ranging from four to eight weeks. During the study period, the researcher kept contact with the parents through email reminders to ensure the families continued to engage.

A commercial digital story making app was provided to the child-parent dyad to craft their stories called Kids Story Builder.¹ The app was selected based on two criteria. First, we wanted to ensure it was available for iOS and Android allowing participating families to download and use it across a range of tablets they already owned. Due to its commercial nature, Kids Story Builder was stable and there was technical support available, which was particularly important given the remote design of the research. Second, we were guided by past research indicating the importance of multimodal storytelling (see 2.2). To select a suitable storytelling app, we initially identified design features (e.g., multi-modality, clear page layout) shown in past research to support children's inclusion in the story making process as our design criteria (Bonsignore et al., 2013). In line with this, within Kids Story Builder, for each page of the story, there was the option to audio record the narrative, add text captions, take/attach a new photo/visual resource and view a sample story using these features. The app also allowed the users to switch between a *story authoring mode* to create the story and a *view mode* to play the story (see Fig. 1).

Each family completed three story making tasks, with the second and third task offering two types of interaction design story scaffolds, for visual literacy and for narrative thinking, designed to support the storytelling process and embedded by us within Kids Story Builder.

- **Task 1 "App as designed"**: The first task was based on the app as designed. The child-parent pair were asked to create a story with Kids Story Builder using its standard features as presented above.
- **Task 2 "Scaffolds for visual literacy"**: The second task provided a library of 45 illustrated images the parent downloaded on their tablet and could use when constructing the story with their child within Kids Story Builder. Mapping to the story dimensions proposed in previous work (e.g. (Aylett et al., 2006) (BentonGeorge and Vasalou, 2019)), we included 14 *characters*, 8 *actions*, 6 *events*, 12 *objects* and 5 *places*. To maintain a consistent look and feel, the images were chosen from the Flaticon website, following (Makini et al., 2020) who used the same visual resource to design a writing app for

¹ https://play.google.com/store/apps/details?id=homes.jared.kidsstorybuilder&hl=en_GB&gl=US.

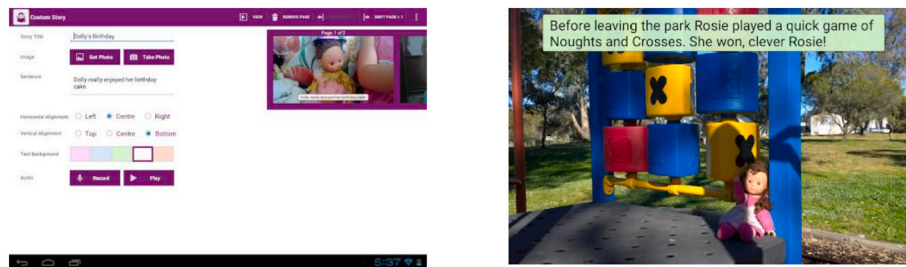


Fig. 1. – Left: story making authoring page; Right: story in play time mode.

children. Families were instructed to use the images within their stories as they wished.

- **Task 3 “Scaffolds for narrative thinking”:** The third task provided the writing blocks for a story plot in the form of a story spine. We chose a moral story given the use of this story type in children’s home storytelling experiences with their parents (Vasalou et al., 2020b). Semi-completed story prompts were included as captions in a pre-filled Kids Story Builder story with a start (once upon a time ...), middle (everyday, but one day, because of that ...) and an end (until finally, ever since then, and the moral of the story was). In total 11 slides were included in the template. The families were asked to adapt the story file and customise the prompts as they wished when creating their own story.

Task 2 and 3 were counterbalanced and all families completed Task 1 first.

3.2. Data collection and analysis

Following each story making task, the parent and child separately completed a **short diary** designed to trigger recall during a later interview (Carter & Mankoff, 2005). Both diaries included questions about the ease of completing the story, the enjoyment in crafting the story, their satisfaction with the story output, and the pair’s relative contribution to the story making process. For the interaction design scaffold tasks, there was an additional question regarding whether the scaffolds were used during story making. The parent and child diary included the same set of questions, adjusted with child-appropriate language in the case of the child diary. Parents were asked to take a supportive role to ensure their child’s diary completion and scaffold their child to understand the questions if they struggled. Parents were instructed to allow their child to complete the diary independently where possible, and, if help was needed, to support the child only with understanding the meaning of the questions. None of the pairs reported finding the diary difficult to complete. The parents were also asked to share their **stories** with the researchers. Immediately after the third story task was completed, we held a **semi-structured online interview** with the pair (via Zoom) (see Appendix A). The interviews averaged 45 min ranging between 25 and 60 min. At the start of the interview, the parent and child were shown the three stories on screen and prompted to explain each one and its meaning for the child/parent. This served as a memory trigger that allowed us to unpick their experience within each story task. Once both participants acknowledged the stories, the child and parent were interviewed separately. Given the online setting, most parents were present during the child interview, which was held first allowing the child to leave once it was completed. Having evaluated the pair’s diary responses and story outputs prior to the interview, the researcher was able to prompt each participant to elaborate and recall their responses. The interview questions centred on the story content and its meaning (RQ1), as well as their subjective experience using the Kids Story builder app, how they used the scaffolds, the participation and roles the parent/child took in the story across the three tasks (RQ2).

The interview served as the chief method to understand the pair’s

storytelling experience in relation to the storytelling tasks explored in the research. Inductive thematic analysis was conducted on the interview data and triangulated with a descriptive multimodal analysis of the story outputs the pair produced. For the *inductive* interview analysis, following immersion with the data, individual codes were developed and iteratively grouped into themes (Braun & Clarke, 2006). This showed saturation in some of the themes with clear patterns emerging across all families (e.g., child-led story making). However, there were also diverse and contrasting reactions, particularly in relation to how the three storytelling tasks and their scaffolds were experienced by the child-parent pair. We thus employed a negative case analysis, in which we identified both common patterns and counter examples that contrasted to the patterns, to unpick the different experiences families had and the reasons for this. Our analysis is in keeping with a socially constructivist epistemology and thus seeks to demonstrate the plurality of interactions families had and the distinctive child/parent perspectives in relation to the dynamics they experienced (Braun & Clarke, 2006).

For the story output analysis, we coded the story title and the use of modes. For the visual mode, we generated brief descriptions of the type of visual used (e.g., stock images, images of environment, drawings etc.) with reference to the image content (e.g., representing toys, interests etc). For the verbal mode, we coded whether the child had used text captions or audio narration. The role of this coding was to ascertain the modes used within each task, allowing us to draw further insights about the role of the interaction design scaffolds in the storytelling process. The analysis was carried out by the first author. To establish rigor, two of the authors met regularly to iterate on the descriptive codes and themes, and collaboratively developed the interpretive analysis reported in the paper.

4. Findings

4.1. What type of stories do children and parents co-create, and what purpose do these stories serve in the family

During the interviews, two of the parents, elaborated on the need to **maintain their child’s agency**. In the words of Kate (P): “*When the children are older, when they can say their own stories and everything, you want them to be creative. You want them to use their own words. You want their story, right? That was interesting for me, that ‘OK, Mark is telling me a story, so I want to see his creative side!’*” The significance parents placed on child agency was demonstrated by their children’s active participation and leadership in the storytelling process. The parents discussed their children’s previous experiences with storytelling, both with and without digital apps. None of the families had used digital storytelling technology before. Although all of the children had encountered storytelling as part of the national curriculum at school, only two out of seven had pursued it as a creative hobby at home. This revealed that, despite their varied prior experiences, the children remained engaged in digital storytelling, taking the lead in developing their own plots.

Regarding the **types of stories** developed by the children, they reported drawing inspiration from their own lives to craft plots in various ways. Some stories were sparked by *fiction or interests in characters*. For

example, Camilla, Henry, and Mark elaborated on their favourite characters from stories and films, such as fairies, mermaids, Iron Man, and dinosaurs. Other children created characters based on personal connections with *pets and animals*. Emma, for instance, introduced her favourite animal, a horse she saw at a camp she visited after school, while Chloe crafted a story centred on her pet dog. Two of the children, Mary and Camilla, used their stories to *re-enact familiar narrative plots*, such as those from recent school plays or books. All of the children used their stories to reflect a *range of anticipated or past life events shared with their families*, such as Christmas or a summer holiday. When the children drew upon past events, their stories demonstrated the positive affective connections they shared with their families. In the following excerpt, Chloe (C) elaborates on a story about her lost pet dog and how pets are a core part of her family's identity.

Researcher: *So, the second story is about Pebble. Do you have a dog named Pebble?*

Chloe: *Yeah.*

Researcher: *And, that was the real picture of Pebble?*

Chloe: *Yeah.*

...

Chloe: *It's a boy and his main obsession – balls!*

Researcher: *Is he a retriever? Do you know what type of -?*

Chloe: *He's a springer spaniel, it runs on my mum's side of the family. Literally everyone who's alive that we really know (laughter) of mummy's side has a dog.*

Researcher: *Okay!*

Chloe: *Our aunt, our uncle, our other aunt and uncle on mummy's side of the family, our grandparents ...*

Researcher: *So, you come from a dog loving family?*

Chloe: *But one of our aunts and uncles, Tom and Fi, breaks the record ...*

4.2. How do parent-child dynamics influence the co-creation of digital stories when using scaffolds aimed at supporting narrative thinking and visual literacy?

4.2.1. Parents assuming the manual storytelling labour

Before we consider the parent-child dynamics the scaffolds supported, we first discuss one role that parents took across all three tasks. Even though all the children were able to write, five out of seven **parents took a leading role in typing and/or taking pictures** the child requested. In explaining why this role was needed, Ariana (P) relived how her son was engrossed in developing the story plot verbally while she documented it: "So, it was like very funny how he kind of absorbed everything. He was like, 'Oh this, this, this'. I'm like, 'Okay, wait, wait'. I had to type." In addition to the impact of typing on the flow of story making, a few of the children explained the general effort and time it took them to type. In the words of Mark (C): "So, I kind of said what to write and I drew the pictures and I made, I got the story, and then I didn't really write it because it would take a really long time. So, just, my mom wrote it ..."

By relieving the manual labour of typing, parents made sure their children could maintain their focus on the creative work. Advocating for the need to mitigate this barrier, children and parents proposed recording their story narration verbally through the existing audio recording feature offered in Kids Story Builder. One child drew on his broader experiences with technology to suggest 'speech to text' as a future feature to remove the need for typing: "... you'd just say it and then while you say it the words go, like if I said 'New York City was under attack', it like was T-H-E space and you didn't need to type it, it just went for you."

4.2.2. Kids Story Builder: using external scaffolds to stimulate creative agency

In their first storytelling task families created a story using the Kids Story Builder app. Four children imported external visual images to express their story plot within the app, but three children made no use of images. In all stories, children included either text captions or a pre-recorded narration of the story. This highlighted the communicative importance of the verbal modality.

The interview data revealed that **stories were effortlessly created when children were able to independently draw upon an external (to the storytelling app) scaffold** to develop their plot, which two of the children did. For instance, Chloe (C) found a picture of a recent holiday. This provided her with a central theme to her story in which she reproduced this past family holiday. Mark (C) on the other hand relied on a plot of a movie he had recently seen, which he used as a starting point to develop his story plot: "I got the whole story based on Iron Man ... it was not like the story was based on Iron Man. I did a few changes." The two children were largely unaided by their parents as they created their stories.

In contrast, the remaining **child participants struggled to begin their story plot**. One of the parents, Ed (P), experienced frustration when taking a directive role to engage his son in the story creation. The resultant story was crafted chiefly by Ed since his child, Henry, did not accept his support: "well the process was in each story to think about a central character. For the first one, I needed to give a lot of hints as to what this character could do, what could be his plot ...". Ariana (P) anticipated that her son might have difficulty starting his story, so she introduced external physical scaffolds, such as toys, to inspire his plot. She explained: "I just grabbed like the three toys and I hadn't like at the beginning, I know, I just put them next to me. Casually. And then we started kind of following the instructions. And I said, 'Oh yeah, let's picture this guy'. And like he saw it next to me. And then I said, 'Oh how about the car?' I would just kind of like providing very subtle the object."

Summary: Storytelling came naturally to some of the children who identified their own plot triggers. In those instances, children didn't require parental support. In contrast, other children needed their parents to directly support them with the story plot. Yet, as Ed's (P) and Henry's (C) experience indicates above, children were not always open to using these parental scaffolds.

4.2.3. Kids Story Builder with interaction design scaffolds for visual literacy: images fostering children's associative thinking

The second task involved Kids Story Builder, where children and their parents were provided with a library of images to use in their stories. Six children utilised the image library to create their stories, while only one child predominantly used their own visuals, discarding the library. Similar to the first task, all seven children included captions or pre-recorded narration in their stories.

During the interviews, five of the participants (three parents and two children) explained that the **image library offered an implicit structure** to the story which supported the child to generate their plot. Kim (P) explained: "So, she looked down them all and then got that inspiration and then literally I didn't have to ask her any more prompts because she just said, 'Oh I want the girl, I want the present, I want ...' so the icons really did help her think of the story and structure it. So, that worked really well and obviously if you have a bigger range of icons, that's lovely but as a concept, that worked well and she liked doing that and it was definitely, I could see it was easier for her to build the story with that." Henry (C) explained how he chose a focal image he liked to start his story. Using this image as a guide, he created a plot that directed the selection of the remaining images. As a result, the children developed their story plots by finding narrative connections between the images. Furthermore, in the cases of Henry (C) and Camilla (C), the image library provided the sole opportunity to use visuals across all three of their stories, and both children reported enjoying this task the most.

Reflecting on the first story task where they had to scaffold their

children's story plot, parents recognised that the images removed the need for this role. Nonetheless, when children didn't pause to mentally conceptualise their plot, there was weak coherence in their stories, and this required some parental facilitation. As Ariana (P) reported: "I don't think he was thinking about the structure. He was like, 'We have to use them all'. It was so natural to him. He was just, 'Oh, let's do this one and let's do that one,' and, yeah, so he found it really easy to put them altogether. I was reminding him there has to be a problem and something has to be solved. Like I was kind of pushing it a bit. Not a lot. But you could see like, and then what will happen?"

The image library included as part of this task comprised 45 pre-selected images. As we have evidenced so far, most children used the available images as a springboard to generate their story plot (e.g., Alex, Henry). However, there was also a **tension when the children came to the task with their own story plot ideas**. The most striking example was shared by Kate (P), whose son Mark (C) adopted an iron man theme story plot across all three story tasks: "Since we had the story beforehand, we had the idea so the pictures weren't that relevant. That's why we just used a couple of them. So if you want to use the pictures and you don't have any story in mind and you look at the pictures you might come up with a story which was interesting. So that helps you to make your own story. But if you have a story, then it doesn't help." Mark discarded most of the images in favour of creating and adding his own drawings into his story. In contrast, Chloe (C), who had also brought a story plot to the task, moulded it to align with the images available. While recognizing the tension that the pre-defined image library introduced, Chloe's parent Sabrina (P) believed that the images helped her daughter to connect the elements of her story plot. Acknowledging this limitation, seven participants (three parents and four children) suggested the inclusion of a searchable image library as a potential future feature of the storytelling app.

Summary: Parents and children reported that the images benefited children's storytelling process. The images allowed children to use their associative abilities (Benedek et al., 2012) which involved combining the visuals in new ways to form a story plot. However, in a couple of cases, the images also required additional parental facilitation to maintain story coherence. Conversely, when children approached the task with a pre-determined story plot that they were unwilling to change, the images did not align with their creative storytelling process.

4.2.4. Kids Story Builder with interaction design scaffolds for narrative thinking: spine supporting children's story planning and coherence

The third task used the Kids Story Builder app and the pairs were asked to apply a spine to construct their story. Four children introduced their own visuals to create their stories, though three of them included visuals in only some of their story pages. Only one child included visuals in each story page. Three out of the seven children chose not to use any visuals. In all cases, children included text captions on their slides with one child adding pre-recorded narrations in line with his previous stories.

Overall, there was a strong parental preference in favour of the spine. During the interviews, five parents reported that the prompts within the **spine supported their children to develop a structured and coherent plot**. Sabrina (P) explained: "I found the one with the story structure the easiest and I think it made her come up with a more coherent story as a result. It sort of forced her to think through her plot and make more meaningful choices for her narrative without even realising that it is forced on her. It also helped that they were familiar words, e.g., 'once upon a time', etc." Three of the parents, such as Yvonne (P), found that the **spine helped the parent better support their child**: "It definitely was easier with the structure. It reminded me of Mad Libs, this old game we used to do. Cos when she, you know, I could prompt her, I tried not to prompt her in the other ones because I wanted it to be her imagination. But with this prompting it was easier for her to come up with something." Parents also recognised the **valuable learning potential of the moral story ending**. Ariana (P) elaborated: "And then you have to find the moral, what's the moral, and if you were like,

'Hmm'. So, he took a while, and I really enjoyed the moral of the story. It's beautiful. And even when you're an adult you still have to learn something. I found it beautiful when he said that ... I think it's the one that he struggled a little bit more because we needed a moral. And his stories, he didn't have a moral. It was just like the story without reflecting. So that was nice. That was nice to put it in his life."

Despite the positive reports from most parents, however, similar to what was found when using images as story scaffolds, two **children who came to the task with their own story plot, experienced the spine as a barrier to the story they wanted to create**. This created a facilitation tension for parents. Kate (P), who had earlier expressed an appreciation for her son's creative agency, found this particularly challenging: "... just because we had the story, I didn't like the leading sentences. Because then we had to change the whole thing, and then I had to talk to Mark about it and he was a little resistant at the beginning 'no, we don't wanna do that, we don't wanna do this'. And then, we just had to come up with another version." Contrary to Kate (P) and Henry (C), both Ariana (P) and Alex (C) reported enjoying this particular task the most. Alex depicted the story's characters and dynamics using drawings and photos he imported into the app. Simultaneously, he **relied on the story spine as a guide to help shape the plot**. As the pair found it difficult to align the repeated spine prompts with their evolving story, and in accordance with the task instructions that allowed participants to remove prompts if necessary, the duo decided to delete some of the prompts. This resulted in a spine structure that effectively balanced their creative aspirations and the overall coherence of the story. Ariana explained:

"I think that's the one that he enjoyed the most, yeah. It was a mixture of things because there was more structure as well. We were forced to kind of follow that structure. Because he said, I don't remember which slide was it, and then after there was a slide that it repeats a prompt. Can we not do like all of them? Like I said, 'Yeah, you can delete all of them if you want'. I think that's the end of it. So, he liked the structure of things."

A second source of frustration reported by three of the children was the **repetitive nature of the spine prompts** offered in the story template. In the words of Henry (C): "And I hated it because it would always say 'because' (spine prompt), I mean 'because' ..."

Summary: For the most part, parents perceived the spine to benefit children's storytelling process by enhancing their story planning, coherence as well as higher order thinking. Therefore, the spine made children's learning explicit. Nonetheless, there were also instances during which the spine's structure clashed with the story plot children wanted to develop, and a flexible perspective was found to be pivotal to how children benefited from the spine.

5. Discussion

5.1. DST fostering identity work in the family with the child at the centre

Drawing from previous research which has shown how oral stories allow families to make meaning of their identities together (e.g. (Koenig Kellas, 2005) (Vasalou et al., 2020b),) we wanted to explore if storytelling with DST would engage² parents and children alike in a process of negotiation and story co-creation to engender a shared experience. In contrast to this, across all tasks, our findings showed that the digital story authoring process was led by the child. Parents valued the opportunity to witness their child's creativity and children showed eagerness to lead the crafting of the stories. There was thus a shared appreciation in the dyad of the child's creativity and agency in the context of DST. On the surface this connects with research in the classroom which has shown that teachers define creativity as a learning outcome of DST (Rubegni & Landoni, 2014). However, taken together

² We note that the term engagement is used throughout the paper to refer to participation in the task, i.e. behavioural engagement (Hospel et al., 2016).

with Vezzoli et al. (Vezzoli et al., 2020) who found that parents co-reading with their children at home promote child agency and take joy from their children's immersion with books, we propose that the **child's creativity and agency in leading DST activities at home is an overarching family value** adopted by both children and parents.

In contrast to past empirical work on families' digital storytelling (Liaqat et al., 2021; Pahl, 2011; Vasalou et al., 2020b), we didn't find evidence that children and parents *together* negotiate their identity. This draws a sharp contrast with oral storytelling suggesting that the introduction of technology changes the dynamics between parent-child. Despite this, an examination of the content of the stories created across the three digital storytelling tasks showed there were both 'child-centric' stories (i.e., children making sense of their own identity) as well as 'family-centric' stories (i.e., children reporting shared family experiences) evidencing that the stories mediated how children constructed their selfhood and their family identity (Bruner, 2003). Family-centric stories reported experiences either shared in the past within the family (e.g., going on holiday, losing a pet), or anticipated moments with one's family (e.g., Christmas). Children also explicitly discussed their stories in relation to their family identity (e.g., a shared love for animals across the intergenerational family). During the interview, whenever children shared stories reflecting the past, it was clear that their stories re-ignited the child's memories and affective connection with their family. Contrasting the role of family-centric stories with child-centric stories, which expressed the child's interests, lives and affects, we posit that child-centric stories can also play a role in the family, strengthening parents' understanding and appreciation of what matters to their children with stories playing a transformative role, particularly if children are reluctant to share how they feel (WallbaumSwamy et al., 2017). Our work shows that **stories created with DST foster children's understanding of themselves and their families, with family-centric stories strengthening the affective bond in the family.**

In their study on parental roles during digital game play, Yen (Yen et al., 2018) cautioned researchers against proposing normative roles and highlighted the importance of exploring what children and their parents find meaningful in their digital interactions. By building on the unfettered perspective of how the parent-child approached DST-enabled activities, our work highlights the importance of sustaining the child's agency and creativity through the design of DST, an issue which we also discuss in the next section. Considering these findings, we believe parents can be involved before, or after the story creation to orient children's stories toward the family and further strengthen family identity. Drawing from researcher-led interventions that have previously involved parents in story development through different prompts (e.g., sharing memories, pictures of meaningful objects) (Liaqat et al., 2021; Pahl, 2011), *DSTs could offer features that allow parents to capture events, objects, or memories involving the family, leaving it for children to use them in their stories.* Echoing implications reported in (Liaqat et al., 2021) for storytelling between immigrant grandparents and their grandchildren, we also *propose that the role of stories in strengthening the family's affective bond raises the potential for designing DST as memorabilia allowing families to return to and re-experience shared memories.*

In the absence of the parental co-creation role we had initially anticipated, the next sections examine the facilitative roles parents ended up taking in digital storytelling. After reviewing the need for scaffolds in DST, we focus on the nature of parent-child interactions when using the two interaction design scaffolds for visual literacy and narrative thinking.

5.2. Establishing the need for interaction design scaffolds in storytelling

In the first task of the study, children used the Kids Story Builder app to create a new story without the use of interaction design scaffolds. This provided a baseline understanding into children's narrative thinking and visual literacy skills, indicating that for many children these skills

were still developing. Several children found it challenging to initiate and develop their own story plots without some parental support, similar to results reported in (Pittarello & Bertani, 2012). Moreover, many of the children did not use visual resources consistently within their stories that have been previously proposed to be critical for identity expression (Pahl, 2011). With regards to children's traditional and technology literacies, even though the verbal modality was used in all stories, parents were tasked to type the stories mirroring findings from Pittarello and Bertani (Pittarello & Bertani, 2012) who showed that children in their research preferred audio recordings rather than typing. This latter finding emphasises the *design requirement for audio recording and/or speech-to-text within DST, which many of our participants requested.* Against this context, the two interaction design scaffolds supported children in distinctive ways with each of them raising different requirements for parental facilitation.

5.3. Interaction design scaffold for visual literacy: supporting child agency in storytelling

The task involving the *visual literacy scaffold* triggered children's associative abilities. Children were able to effortlessly draw associations between the visual resources, i.e., a library of images, to craft new stories. Importantly, this task offered the only opportunity to two out of the seven children to practice their visual literacy, since these children did not use visual resources in the remaining tasks. This highlights the value of this scaffold since some children may not naturally draw on their visual literacy. A couple of parents occasionally prompted their children to maintain the coherence of their story as children's immersion with the visual sometimes overtook their narrative thinking. Despite this subtle intervention, parents reported remaining largely uninvolved, thus acting as 'spectators' (Yen et al., 2018) who observed their child's story authoring. These findings indicate that the **visual literacy scaffold was successful in both maintaining the valued agency uncovered in 5.1 and effectively supporting children to construct their story plot from the visual resources available.** We thus propose that *visual literacy scaffolds are a valuable addition to DSTs designed for the home.* A critical design implication for future DSTs, raised by the participants, however, was the *inclusion of extensive and searchable image libraries that can support the diversity of story themes children want to pursue in the home context.*

5.4. Interaction design scaffold for narrative thinking: parental roles introduce diverse dynamics

The task involving the *narrative thinking scaffold* was also facilitative, this time in improving children's story structure and coherence, which most parent participants reported. By stressing the need to maintain a coherent story, this task highlighted children's related weaknesses in narrative thinking, aligning with Rutta et al. (Rutta et al., 2020). In contrast to the asymmetry of roles observed during the visual literacy interaction scaffold task, the nature of the task introduced an implicit learning aim which parents supported by taking an active role. Parents commended the function of the scaffold in helping them to act as 'coaches' (Yen et al., 2018), prompting their child on how to apply the spine. Nonetheless, there was also a mixed reaction in using this interaction design scaffold by parents and children alike. Whereas one of the parents perceived the scaffold as a threat to her child's agency, some of the children found the constraints posed by the spine to impede their creativity.

Our study shows that **the narrative thinking scaffold supported children to use their narrative abilities during the storytelling process.** In bringing focus on children's learning and introducing the need for an engaged *educative* parental role, it also **aroused power dynamics between parents and children that were deemed by some dyads problematic.** Our study aligns with past case study research reporting similar power tensions during digital, video storytelling

(Götzel, 2011). In highlighting children’s need for support, the narrative thinking scaffold may have limited the children’s agency in the DST, while foregrounding the adult expertise in a domain the children viewed as their own. Whereas our findings align with previous research indicating that children may still need adult support in their narrative thinking (Rutta et al., 2020), *future research should explore other ways to design narrative thinking scaffolds that contribute to a better balance between children’s narrative thinking and their agency; for instance, by avoiding the use of the narrative thinking scaffolds as the entry point to digital storytelling.*

5.5. Interaction design scaffolds and the need for appropriation

Finally, we look at our research findings across all three digital storytelling tasks to suggest **appropriation as a possible avenue for the use, as well as design, of DSTs intended for the home context.** Children who were able to appropriate the scaffolds ‘as designed’, i.e., negotiate and adapt them to the story they wished to make, benefited from their inclusion in the ways shared in 5.3 and 5.4. Our study shows that parents have an important role to play in recognizing the relevance of appropriation and the support required to promote the child’s cognitive flexibility in relation to the storytelling task. An example of this came from one of the dyads (Ariana-Alex) who moulded the use of the spine to align with their use of multimodal resources (see 4.2.4).

However, two of the dyads found it more challenging to appropriate the scaffolds into their storytelling in the same way, with one of the children-parent pairs (Mark-Kate) offering the most illustrative example: when participating in the three tasks Mark held a pre-determined story plot he was unwilling to adapt, experiencing the interaction design scaffolds as an impediment to his agency (see 4.2.4). In contrast to the workflows often embedded in DSTs for schools (e.g. (Di Blas et al., 2010; Pittarello & Bertani, 2012; Rubegni & Landoni, 2014)), we propose that *DSTs for the home must offer the possibility to activate interaction design scaffolds in ways that are meaningful to the child. E.g., DST could invite children’s self-assessment of what supports they need before/during the storytelling personalising the scaffolds presented.*

Table 1 summarises the design implications of the study as they apply to DST intended for the home.

5.6. Limitations

Our study focused on DST for tablet-based interactions which reflect the hardware most families have at home. There are other set ups such as tangible digital storytelling where users can often participate in a task with others without needing verbal negotiation. It is thus possible that parents’ creative engagement was limited by the fact that their children had control of the tablet when using the DST (also (Hiniker et al.,

Table 1
– Design implications for DST at home.

DST implication supporting parent-child storytelling	Rationale
Providing parents with tools to capture events, objects, or memories involving the family, which their children can use in their stories	Introducing a valued parental role (5.1)
Designing DST as memorabilia allowing families to return to and re-experience shared memories	Strengthening the affective role of stories at home (5.1)
Introducing audio recording and/or speech-to-text within DST	Removing parents’ manual labour (5.2)
Including extensive and searchable image libraries	Allowing children to express a wide range of stories (5.3)
Embedding narrative thinking scaffolds in the storytelling and avoiding their use as an entry point	Maintaining children’s agency and ameliorating power tensions with their parents (5.4)
Allowing parents-children to activate different interaction design scaffolds	Allowing parents-children to create stories in ways that are meaningful to them (5.5)

2018)). Future work could explore whether the child-centric role we identified manifests when the technology allows for symmetrical action. Moreover, we recognise that previous work has found cross-cultural differences in how parents get involved in children’s use of digital technology, and thus our findings should be interpreted within a UK and US context with more research needed to understand if they transfer to other settings. Also, owing to the qualitative nature of our study and the effort required to maintain a field study remotely, we involved seven families. While we acknowledge that more participants would have strengthened the analysis, we reached saturation for the first RQ, meaning that patterns recurred across the interviews, indicating that the sample was sufficient. For our second RQ there were divergent patterns found that benefited the interpretive analysis and the expansion of the design space, yet it is possible that the inclusion of more families could introduce new dynamics. Finally, the study was conducted during the second year of the pandemic and families’ engagement with digital technology may have impacted on how the dyads participated. For instance, families may have struggled to complete the tasks in a timely way due to the dominance of online education at the time, but equally it is possible that children acquired new digital literacies due the pandemic positively affecting their participation in the digital stories.

6. Conclusion

DST offer a way of negotiating and making sense of identities, experiences, and knowledge through the multimodal and open-ended opportunities they offer for self-expression. The aim of this study was to advance a new perspective on DST by situating it in the home context to contribute an understanding of how the child and parent engage in DST together. Recognizing the role of digital technology design in shaping these interactions *and* supporting children’s storytelling we focused on two scaffolds previously used in DST for visual literacy and narrative thinking. Our study makes three contributions to DST for the home context. *First*, we show that children and their parents both value the child’s agency and creativity in the context of DST. Findings from the study show that this child-centric approach can be effectively supported with DST that employ interaction design scaffolds for visual literacy, though these need to reflect the diversity of story themes explored in the home. *Second*, children approach digital storytelling at home in distinctive ways. Not only can their initial story goals vary, but they also have different experiences with appropriating technology to align it with what they want to achieve. Contrasting with the workflows designed into DST for schools, a challenge of designing DST for the home context will be to offer malleable scaffolds that can support children’s varied approaches, and thus appropriation. *Finally*, alongside the parent’s lack of creative engagement in using DST reported above, our study reveals power tensions arising when children’s skills are not yet developed and require parental support, a concern the narrative thinking scaffold most vividly raised. While we don’t wish to undermine the value of child-led creative digital storytelling we found in the home, we also concur with Hiniker et al. (Hiniker et al., 2018) who identified the need for parental roles in screen-based apps designed for pre-schoolers. Inspired from our own findings, and in particular children’s family-centric stories, we believe there an opportunity for future interaction design research on DST to explore how to embed supports that allow both parents and children to contribute meaningfully to digital stories and contribute their respective expertise.

7. Selection and participation of children

Seven children were involved in this research recruited via their parents. Following initial contact with the researcher to establish the pair’s commitment, standard ethical procedures were followed as approved by the University ethics committee. Children gave consent prior to participating. An age-appropriate information sheet was presented and discussed with children and parents, and an online consent

form was given to each participant. Throughout the paper, we refer to participants by a designated pseudonym.

Declaration of competing interest

There are no conflicts of interests to declare.

Data availability

The authors do not have permission to share data.

Acknowledgement

This research was funded by the EPSRC project ‘Dynamic, Real time, On-demand Personalisation for Scaling (DROPS)’ under EP/R033838/1 and a seed grant from the Culture, Communication and Media department at UCL’s Faculty of education and society. We thank the children and parents for their participation, and our DROPS project partners for their continuing feedback on our research.

APPENDIX

Child interview

- Did you enjoy using the app to make your own stories? Why or why not? Do you think you’ll continue to use it now that our experiment is over?
- Can you please explain to me briefly what each of these stories are about?
- How much of each story was created by you and how much by your mum? Which parts were made by whom?
- Can you please explain to me briefly your process? Where did you get your ideas from? How did you choose your characters? How would you decide what happens next, or how the story should end?
- Which story are you proudest of out of the 3 stories you created? Can you explain why you liked that best?
- If you could change one thing about the app, what would it be and why?

Parent interview

- When making these stories, was it difficult to engage your child to participate in the creation process? If yes, in what way or why?
- Do you agree with your child’s account of his contribution to the story creation compared to yours? If not, how much of the story and which parts would you say were your contribution?
- Explain your process: where did you get your ideas from? How would you decide the story’s characters, plot, what should happen next, how it should end, etc?
- Out of the three stories you created together, would you say one was more enjoyable to create than the others? If so, which one and why?
- Out of the three stories that were resulted, which do you like best and why?
- Would you say the app helped with getting you or your child more engaged in the activity, or was it more of a hindrance/distraction?
- In retrospect, do you think either feature of the app - the icons and/or the story structure - helped you in creating your own story, as compared to using the app without either feature (as you did during week 1)? If yes, which feature did you find more helpful? And why? If no, why not?
- If you were to change something about the app, what would it be? Why would you want this feature?

References

- Agnese, A., De Donato, R., Palmieri, G., Pellegrino, M. A., Petta, A., Scarano, V., & Serra, L. (2020). Visual storytelling by novelette. In *2020 24th international conference information visualisation* (Vol. IV, pp. 723–728). <https://doi.org/10.1109/IV51561.2020.00126>
- Agnese, A., De Donato, R., Palmieri, G., Pellegrino, M. A., Petta, A., Scarano, V., & Serra, L. (2021). Novelette, a useable visual storytelling digital learning environment. *IEEE Access*, 9, 168850–168868. <https://doi.org/10.1109/ACCESS.2021.3137076>
- Aylett, R., Figueiredo, R., Louchart, S., Dias, J., & Paiva, A. (2006). Making it up as you go along – improvising stories for pedagogical purposes. In J. Gratch, M. Young, R. Aylett, D. Ballin, & P. Olivier (Eds.), *Intelligent virtual agents* (pp. 304–315). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/11821830_25
- Benedek, M., Könen, T., Aljoscha, C., & Neubauer. (2012). Associative abilities underlying creativity. *Psychol. Aesthet. Creativ. Arts*, 6(3), 273–281. <https://doi.org/10.1037/a0027059>
- Benton, L., George, V., & Vasalou, A. (2019). *Leading by example: Exploring the influence of design examples on children’s creative ideation* (Vol. 122, pp. 174–183).
- Bonsignore, E., Quinn, A. J., Allison, D., & Bederson, B. B. (2013). Sharing stories “in the wild”: A mobile storytelling case study using StoryKit. *ACM Transactions on Computer-Human Interaction*, 20(3), 1–38. <https://doi.org/10.1145/2491500.2491506>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- Bruner, J. (2003). *Making stories: Law, literature, life*. Cambridge, MA: Harvard University Press.
- Carter, S., & Mankoff, J. (2005). When participants do the capturing: The role of media in diary studies. In *Proceedings of the SIGCHI conference on human factors in computing systems* (pp. 899–908). <https://doi.org/10.1145/1054972.1055098>
- Christensen, P. K., Skovgaard, C.Ø., & Petersen, M. G. (2019). Together together: Combining shared and separate activities in designing technology for family life. In *Proceedings of the 18th ACM international conference on interaction design and children* (pp. 374–385). <https://doi.org/10.1145/3311927.3323141>
- Churchill, N. (2016). *Digital storytelling as a means of supporting digital literacy learning in an upper-primary-school English language classroom*.
- Di Blas, N., Paolini, P., & Sabiescu, A. (2010). Collective digital storytelling at school as a whole-class interaction. In *Proceedings of the 9th international conference on interaction design and children* (Vol. 10, p. 11). IDC. <https://doi.org/10.1145/1810543.1810546>
- Drew, C., & Piper, A. M. (2017). How parents engage children in tablet-based reading experiences: An exploration of haptic feedback. In *Proceedings of the 2017 ACM conference on computer supported cooperative work and social computing* (pp. 505–510). <https://doi.org/10.1145/2998181.2998240>
- Giannakos, M., Papamitsiou, Z., Markopoulos, P., Read, J., & Hourcade, J. P. (2020). Mapping child–computer interaction research through co-word analysis. *Int. J. Child-Comput. Interact.*, 23(24), Article 100165. <https://doi.org/10.1016/j.ijcci.2020.100165>
- Göttel, T. (2011). Reviewing children’s collaboration practices in storytelling environments. In *Proceedings of the 10th international conference on interaction design and children* (Vol. 11, pp. 153–156). IDC. <https://doi.org/10.1145/1999030.1999049>
- Hiniker, A., Lee, B., Kientz, J. A., & Radesky, J. S. (2018). Let’s play!: Digital and analog play between preschoolers and parents. In *Proceedings of the 2018 CHI conference on human factors in computing systems* (pp. 1–13). <https://doi.org/10.1145/3173574.3174233>
- Hobbs, R. (2017). *Create to learn: Introduction to digital literacy*. John Wiley & Sons.
- Hospel, V., Galand, B., & Janosz, M. (2016). Multidimensionality of behavioural engagement: Empirical support and implications. *International Journal of Educational Research*, 77, 37–49. <https://doi.org/10.1016/j.ijer.2016.02.007>
- Koenig Kellas, J. (2005). Family ties: Communicating identity through jointly told family stories this paper is based on the author’s dissertation study and was presented on the top four panel of the family communication division at the national communication association convention, november 2003, Miami, FL. *Communication Monographs*, 72(4), 365–389. <https://doi.org/10.1080/03637750500322453>
- Lewis Ellison, T., & Wang, H. (2018). Resisting and redirecting: Agentive practices within an african American parent–child dyad during digital storytelling. *Journal of Literacy Research*, 50(1), 52–73. <https://doi.org/10.1177/1086296X17751172>
- Liaquat, A., Axtell, B., & Munteanu, C. (2021). Participatory design for intergenerational culture exchange in immigrant families: How collaborative narration and creation fosters democratic engagement. In *Proceedings of the ACM on human-computer interaction* (Vol. 5, pp. 1–40). CSCW1. <https://doi.org/10.1145/3449172>
- Makini, S. P., Oguntola, I., & Roy, D. (2020). Spelling their pictures: The role of visual scaffolds in an authoring app for young children’s literacy and creativity. In *Proceedings of the interaction design and children conference* (pp. 372–384). <https://doi.org/10.1145/3392063.3394392>
- Pahl, K. (2011). My family, my story: Representing identities in time and space through digital storytelling. *Teachers College Record: The Voice Scholarsh. Educ.*, 113(13), 17–39. <https://doi.org/10.1177/016146811111301302>
- Pittarello, F., & Bertani, L. (2012). CASTOR: Learning to create context-sensitive and emotionally engaging narrations in situ. In *Proceedings of the 12th international conference on interaction design and children* (Vol. 12)IDC.
- Robin, B. R. (2008). Digital storytelling: A powerful technology tool for the 21st century classroom. *Theory Into Practice*, 47(3), 220–228. <https://doi.org/10.1080/00405840802153916>
- Rubegni, E., & Landoni, M. (2014). Fiabot!: Design and evaluation of a mobile storytelling application for schools. In *Proceedings of the 2014 conference on*

- Interaction design and children* (pp. 165–174). <https://doi.org/10.1145/2593968.2593979>
- Rutta, C. B., Schiavo, G., Zancanaro, M., & Rubegni, E. (2020). Collaborative comic-based digital storytelling with primary school children. In *Proceedings of the interaction design and children conference* (pp. 426–437). <https://doi.org/10.1145/3392063.3394433>
- Vasalou, A., Kalantari, S., Kucirkova, N., & Vezzoli, Y. (2020a). Designing for oral storytelling practices at home: A parental perspective. *Int. J. Child-Comp. Interact.*, 26. <https://doi.org/10.1016/j.jjcci.2020.100214>
- Vasalou, A., Kalantari, S., Kucirkova, N., & Vezzoli, Y. (2020b). Designing for oral storytelling practices at home: A parental perspective. *Int. J. Child-Comp. Interact.*, 26. <https://doi.org/10.1016/j.jjcci.2020.100214>
- Vezzoli, Y., Kalantari, S., Kucirkova, N., & Vasalou, A. (2020). Exploring the design space for parent-child reading. In *Proceedings of the 2020 CHI conference on human factors in computing systems* (pp. 1–12). <https://doi.org/10.1145/3313831.3376696>
- Wallbaum, T., Swamy, A., Borojeni, S. S., Heuten, W., & Boll, S. (2017). Towards a tangible storytelling kit for exploring emotions with children. In *Proceedings of the on thematic workshops of ACM multimedia 2017 - thematic workshops '17* (pp. 10–16). <https://doi.org/10.1145/3126686.3126702>
- Yen, K., Chen, Y., Cheng, Y., Chen, S., Chen, Y.-Y., Ni, Y., & Hiniker, A. (2018). Joint media engagement between parents and preschoolers in the U.S., China, and taiwan. In *Proceedings of the ACM on human-computer interaction* (Vol. 2, pp. 1–19). CSCW. <https://doi.org/10.1145/3274461>.
- Zhang, Z., Xu, Y., Wang, Y., Yao, B., Ritchie, D., Wu, T., Yu, M., Wang, D., & Li, T. J.-J. (2022). StoryBuddy: A human-AI collaborative chatbot for parent-child interactive storytelling with flexible parental involvement. In *CHI conference on human factors in computing systems* (pp. 1–21). <https://doi.org/10.1145/3491102.3517479>