A Vygotskian perspective on parent– child talk during iPad story sharing

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This study explores the themes in the talk of two mothers and daughters as they share a self-created story with an iPad app. Vygotsky's theory of learning is applied to in-form a thematic analysis and help interpret the learning potential within the observed parent–child exchanges. A deductive–inductive thematic analysis identified three re-curring themes in the parent–child talk: realistic fiction, scaffolding variations, and en-gaged players and objects of 'play'. The themes suggested that Vygotsky's theory has particular relevance in exploring the learning processes facilitated by the iPad app. In addition, however, post-Vygotskian theoretical frameworks were helpful in capturing the dynamic co-construction of the authentic and multimedia stories parents and children shared.

Introduction

As we move into a more digitalised society (Sonck et al., 2012), paper-based books are fre-quently being replaced by electronic books accessed through different hardware, for exam-ple, Kindle Readers, smartphones and iPads. These technologies bring children's stories to innovative platforms with different possibilities for the readers' own contribution. In par-ticular, several iPad apps have been developed to support story sharing and story making through specific features, such as for example interactive elements in children's fictional iBooks (e.g., Cinderella app™) or templates facilitating creation of children's own stories (e.g., Toontastic app™). Different formats of stories may transform the ways in which meanings can be constructed, expressed and shared (Wohlwend, 2009; Sakr, 2012) and in which knowledge is created and communicated between parents and children (Shuler, 2012). It is therefore an important issue for reading research and practice to consider how these new platforms may influence patterns of parent–child interactions and affect children's learning from the activity (Flewitt, 2008).

Emerging findings indicate that story-enhancing features provided by interactive digital stories accessible through iPads may not necessarily be beneficial. For example, in a com-parative study of parent–child

interaction with e-books and enhanced interactive iPad books, Chiong, Takeuchi and Erickson (2012) found that children demonstrate greater story comprehension with books that are less interactive and offer more opportunities for parental scaffolding during the session. It is therefore crucial to pay close attention to the specific affordances of app-based digital books to fully appreciate the effects they may have on the learning that occurs within parent–child interactions during story sharing.

Since early 2000s, several apps supporting story sharing and story creating have gained popularity with young children (O'Mara & Laidlaw, 2011). In addition to iPad book-based applications, which accompany fictional stories, book-making apps (e.g., StoryMaker™) are designed to support the sharing of user-created stories. Applications like these often 'blend' the affordances of oral and book-based story sharing, as they allow users to edit the content orally (i.e., users can add their own recordings to the story) but also have sim-ilar features to traditional books in terms of their book-size format and textual and visual representation (Kucirkova, Messer, Sheehy, & Flewitt, 2013). Despite the apparent conver-gence of modes in iPad stories and new technologies, most research has remained focused on a dichotomous comparison of paper-based versus oral story sharing (e.g., Farrant & Zubrick, 2012, Fivush 2008, 2011) or electronic versus paper-based books (e.g., Korat, Segal-Drori, & Klien, 2009; Shamir, Korat, & Fellah, 2012). To date, there is very little theorised doc-umentation of parent–child interactions supported by new interactive technologies such as book-making iPad apps. Although observational and comparison studies are important, lack of theorised understanding of the educational potential afforded by new technologies makes it difficult for practitioners and policy-makers to evaluate the educational potential of this kind of activity and their significance in children's lives. In this paper, we seek to gain insights into the educational potential of parent–child interaction with a specific story-making iPad app.

Theoretical framework: Vygotsky's learning theory

Vygotsky's theory of learning has become the central theoretical framework for studying parent–child interactions during story sharing with books. With an emphasis on the inter-play between parent–child conversations and specific tools in the process of knowledge construction, Vygotsky's ideas provide 'a natural framework within which to view par-ent–child literacy interactions' (Neumann, Hood, & Neumann, 2009, p. 313). The theory has become well established in a large corpus of studies in shared book reading research with traditional paper-based books (e.g., Crain-Thoreson & Dale, 1999) as well as emerg-ing research on the role of technology in collaborative meaning making (Kerawalla, Pearce, Yuill,

Luckin, & Harris, 2008). We therefore ground our study in this particular perspective to identify and explain the patterns of interaction with a new medium: an iPad app.

There are several Vygotskian concepts that have been used in exploring parent–child story sharing, for example, scaffolding (e.g., Morgan, 2005) or the relationship between social language and the development of cognition (e.g., Anderson, Anderson, Lynch, & Shapiro, 2004). To frame our understanding of the learning opportunities embedded in a new, so far little explored story-sharing context, we focus on three key concepts in this study: zone of proximal development (ZPD), dual representation and double stimulation. These concepts are explained in more detail next, as they are fundamental to story sharing and thus the present study.

Vygotsky viewed learning as an inherently social process during which knowledge ac-quisition is mediated by a more knowledgeable other (e.g., a parent) and specific cultural artefacts and activities (e.g., a storybook during book reading). The process of knowledge mediation proceeds through a 'vertical' process of knowledge sharing in the child's ZPDs. ZPD refers to areas of the child's potential learning (Vygotsky, 1978), which can be under-stood as the distance between the actual and potential levels of the child's ability, with the former determined by independent problem solving and the latter contingent upon adult guidance. Children's parents, educators or older peers can structure children's thinking (a term later referred to as scaffolding, Wood, Bruner, & Ross, 1976) and support them to complete tasks within their ZPDs. Shared book reading provides numerous opportuni-ties for the child to be exposed, in a ZPD, to the language of others, which may later be-come internalised. Vygotsky postulated that ideas and concepts originate in social and shared processes and considered child's intellectual growth to be 'contingent on his mas-tering the social means of thought, that is, language' (Vygotsky, 1964, p. 47). Others' thoughts become internalised as part of the child's inner speech, which is 'social speech turned inwards' (Ehrich, 2006, p. 13).

In addition to the importance of language and speech in mediating child's learning, Vygotsky (1978) specified that objects play a major role in knowledge acquisition. Vygotsky conceptualised this through the metaphor of dual representation. According to this metaphor, an object can be understood at two levels: on a concrete level (e.g., clock as an object on the wall) and on a symbolic level (e.g., a clock that signifies time). This perspective is captured in the research on concrete and symbolic representations in which children's reasoning abilities and symbolic understanding are studied and supported through the use of specific cultural tools (DeLoache, 1983, 1987). Books are a particularly useful tool to support symbolic understanding as the books' texts and

pictures allow chil-dren to engage with symbolic representations of reality.

To investigate how children develop their knowledge through conversing with an adult, Vygotsky (1928) and his colleague Sakharov developed the experimental method of dou-ble stimulation in which a child groups together a set of wooden blocks of different shapes and colours. The method allowed the researchers to investigate how children develop their knowledge through conversing with an adult. In addition, through the way children group the small wooden objects together, the researchers could see 'in real time' the progressive development of children's reasoning skills. The method was an ingenious way of making visible the influence of adult prompting the development of children's conceptual under-standing. Given that double stimulation focuses on uncovering the development of new knowledge, rather than simply the result of this development, it is well suited for dynamic assessment contexts (Portes, Smith, Zady, & Del Castillo, 1997). This includes book read-ing research, where parents' scaffolding patterns are expected to support children's learn-ing and literacy skills (Whitehurst et al., 1988). We adopted double stimulation as a conceptual framework (rather than a research method) to inform observation of children's manipulation of the iPad application and aimed to draw inferences about the potential learning opportunities within the observed interaction.

Multimedia and agency

There are two key features of iPad story-making apps that are different from traditional book sharing and that have particular pertinence from a Vygotskian perspective: multime-dia and agency. The multimedia within iPad apps provide opportunities for dynamic en-gagement with three modes of meaning expression: sound, images and text. Multimodal stories are different from the layout and representations afforded by paper-based or audio books (Lankshear & Knobel, 2003), as they come with new discourse conventions and place new learning potentials into the hands of parents and educators (Jewitt, 2008). The full potentials of iPad apps as a multimedia and multimodal means of story representation

(Macdonald & Vince, 1993) have so far not been empirically explored, but Vygotsky pos-tulated that advances in the technologies have the potential to change how learners con-struct and understand the world (Somekh & Mavers, 2003). This suggests that multimedia within iPad storybooks might have an impact on the child's learning experi-ence as they are a new, more advanced 'cultural tool' for meaning making (Vygotsky, 1978). We wished to explore how the multimedia features of iPad story apps might play out in the parent–child interaction with a specific book-making application.

Another significant difference between the iPad and traditional books is that stories cre-ated with the Our Story app are highly customisable as users can easily change the audio, textual and/or pictorial representation of their stories. Such a reconstruction of story repre-sentation is a form of agency, which in Vygotskian terms originates in the 'use of external artefacts to reach a redefinition of a situation' (Engestrom, 2006, p. 6). A redefined situa-tion is likely to transform the knowledge created within it, and the ways this knowledge is expressed. The extent to which specific iPad story-based apps might support children's agency in relation to story-making is currently un-documented. In line with a Vygotskian theory of learning, we hypothesised that multimedia and agency may generate new parent– child interaction patterns during story sharing.

The present study

Qualitative methods of analysis and a Vygotskian perspective have been helpful in under-standing the learning potential of new technologies in previous research. We therefore employed a qualitative research methodology to explore the interaction patterns of two daughter–mother pairs. This included a deductive–inductive thematic analysis (Fereday & Muir-Cochrane, 2008), which has been suggested as particularly useful for contexts with little prior research. Our method of investigation aligned with Vygotsky's use of case studies (Daniels, Cole, & Wertsch, 2007) and a naturalistic observation of narrative interactions of parent–child dyads (Vygotsky, 1978). The use of a case study fitted our aim of offering a rich understanding of a specific parent–child interaction context, unique in its time, place and cultural context (Yin, 1994).

We focused on a detailed analysis of knowledge expression (cf. Diezman & Watters, 1998) represented through parent–child talk in the moment of the experience. Aligned with a Vygotskian emphasis on language as the 'tool of tools' (Wilson, 2005, online), we focused the analysis on parent–child talk. The research questions that guided our analysis were as follows: What themes are present in parent–child talk when they create and share their own iPad stories? To what extent can the

Vygotskian theoretical framework account for the knowledge expression in the parent–child story sharing mediated by the story-making iPad app?

Methodology

Study participants

Two mothers and their daughters took part in the study. These two dyads were selected from our database of participants in past studies and were specifically targeted because the mothers had reported frequent use of smart technology and regular engagement in lit-eracy-promoting activities with their children in our previous projects (Kucirkova et al., 2013).
Child 1 was 33 months old and was the only child of the family. Child 2 was 41 months old and had a younger sister. The families lived in English Midlands; the mothers were both educated to university degree and were of middle income.

Study procedure

Both dyads were visited at home and given iPads (iPad 1) with a pre-loaded story-making application called Our Story. Our Story enables parents and children to share their own stories, as if during parent–child reminiscing, and also to view and read their story in a dig-ital book format, as in shared book reading. The app was designed for young children, with clear user interface and simple navigation using large iconic buttons, with the aim of supporting parents and children in creating and sharing their own multimedia stories (http://creet.open.ac.uk/projects/our-story/). The user interface consists of a gallery of pictures and a storyboard, which resembles a filmstrip and is located at the bottom of the gallery of pictures. The storyboard (or filmstrip) enables users to put digital pictures into a sequence of book 'pages', and for each picture, users can add text and/or recorded sound. The app allows for open-ended multimedia content, that is, users can insert any pictures, text or sounds they like to create their stories. The app is accessible as a free public down-load for both iOS and android platforms from the Internet.

   The two parent–child pairs were encouraged to use the app as they wished and were told that the researcher (first author of this study) would visit after 1 week to see how they liked the app and would be interested in any stories they might have created. No specific instruc-tions were given in regard to the actual use of the app; it was emphasised that the re-searcher aims to simply observe and record the mothers' and children's natural activity with Our Story, in whichever way the two pairs decide to use it. After 1 week, the researcher visited the two pairs at home again and

asked about any stories made with Our Story. At this visit, the researcher observed how Mother 1 and Child 1 shared for the first time a story the mother had created for her daughter, and how Mother 2 and Child 2 spontaneously created and shared a novel story. These sessions were videoed and later transcribed. The approach used was in line with the British Educational Research Association ethical code of practice (BERA, 2004).

Analysis method

Transcripts were analysed using a combined deductive–inductive coding (Fereday & Muir-Cochrane, 2008). This approach to thematic analysis uses 'broad deductively determined codes to home in on the data, and then inductive coding to explore this in more detail' (Rivas, 2012, p. 371). Similar to the deductive–inductive procedure undertaken by Mintz, Branch, March, & Lerman (2012), we used broad, deductive codes to guide our interpre-tation of data. These deductive codes were based on Vygotsky's learning theory, notably on the three key concepts central to shared book reading research: ZPD, dual representations and double stimulation. Before commencing an in-depth analysis, we explored the data within these broad themes and wrote a short descriptive passage to capture the issues raised within each theme and its relationship to the data. To identify major themes, we also considered the codes 'multimedia' and 'agency' in the initial analysis stages. As a second step, inductive codes were derived from the data, separately for each parent–child pair. These inductive codes were combined with the deductive codes based on our pre-established themes. Subsequently, conceptual similarities were identified across the data (Carley, 1990). This step was followed by a customary procedure for thematic analysis, that is to say, revision of the codes through iterative and reflexive process of comparison and contrasting, leading to the development of higher-order themes (Tesch, 1990). For reliability of coding, the thematic analysis was performed three times, and the coding of each transcript was compared through discussion be-tween the first and second authors of this study. The two researchers worked together to arrive at the final themes and resolved any discrepancies in coding through discussion (Boyatzis, 1998). Final interpretations were modified in subsequent review and discussions with the third author of the study.

Findings

Thematic analysis revealed three comprehensive themes, which we present later, supported by examples and participants' comments, selected on the basis of their illustrative value.

Realistic fiction

This theme relates to the everyday nature of the story contents embedded in fictional story worlds discussed by the two pairs. In the first dyad, when discussing the story plot, a major part of mother–child talk revolved around ordinary daily experiences that involved both real (e.g., mother and child) and imaginary story characters (e.g., Barbie doll that was snor-ing) carrying out day-to-day routines such as eating, drinking and washing. The mother used pictures and audio-recording to provide the child with several concrete entry points into an abstract story world: the story occurred in the past, in a remote location and with a fictional story plot but was brought to the child's present through pictures from a familiar event (the family holiday) and text and audio-recorded by the mother. As such, the mother facilitated the child's transition from concrete to more abstract thinking (or from real to fictional stories), which includes 'perceiving relationships' and 'sensing continuity and se-quence' (Carrier, 1963, p. 2). The following extract illustrates how Mother 1 and Child 1 brought each other 'closer' to their world of stories in a playful exchange:

Mother 1: And what's Barbie doing in this
picture? Child 1: Snoring! [child starts
imitating snoring sound]
Mother 1: [laughs] And what do we say to Barbie when
she's snoring? Child 1: Wake up Barbie, wake up!

For the second parent–child dyad, the talk centred around everyday activities because of the girl's focus on the daily routines carried out by her toy clock. When constructing her story, Child 2 pretended to type sentences in relation to the routines carried out by this toy and also audio-recorded parts of her story, with several repetitions of the same storyline:

Child 2: [speaks and types on the keyboard random letters] He had a bath and then played a song and then [pause, child starts recording] and then he had a bath.

The girl's incorporation of the daily routines represented by a toy into an imaginary story shows her ability to think about an object in two ways at one time (i.e., the concrete

object of a toy clock represents an abstract time sequence of daily routines the child is used to). In addition, the child's pretend typing of the toy clock's routines could be viewed as the child's first steps towards the understanding of the complex relationship between speech and print (cf. Nation & Snowling, 1998). The child's writing and story composing were on this occasion scaffolded by both the more knowledgeable adult (i.e., the girl's mother) and the app, which allowed assembling together a digital photograph of the toy clock, the child's audio-recorded sounds and her pretend typing. With both support mech-anisms, the girl was able to 'solve' a relatively complex task of story composing, with a considerable sense of agency – a point we return to in the Discussion.

Scaffolding variations

This theme relates to the instances when the two mothers were scaffolding different aspects of children's learning in varying ways. In the first pair, the mother verbally supported her daughter's recall and sequence of the story so that the child could understand the story plot. This was apparent in mother's 'giving her clues' about elements of the story and reminding her of what had happened. The mother frequently used incomplete sentences, which indi-cated clear attempt to structure the child's performance towards the child's independent story narration:

Mother 1: and here we are on a…? on a…slide. Do you remember?

   The mother also used many interrogatives, such as where, what and who, to help with child's meaning making and naming the people depicted in pictures:

Mother 1: And what was daddy doing there? And where are you in the picture?

   As such, the mother skilfully ensured that the task fell within the child's ZPD. This was a tendency notable also in Mother 2's speech, but she used a different scaffolding strategy to keep the activity within her daughter's ZPD. Namely, Mother 2 supported her daugh-ter's activity by giving instructions mostly in relation to the process of story composition. As a result, for this mother–daughter pair, the interactive features of the application served as important conversation anchors and stimuli for extending the knowledge. The majority of talk for this dyad was generated by descriptions of what the app did and how it could be used. The following quotes show how physical engagement with the app generated talk about procedural knowledge development for mother as well as the

child, with both partic-ipants demonstrating the app's functions to each other:

Mother 2: If you don't want it you press here. Press here, that's it. (…) Press this button and now you can speak.
Child 2: And when we finish we press it again [child pressing the audio button].

Thus, both mothers used different strategies for supporting different kinds of knowledge, providing their children with different opportunities for assisted performance and gradual autonomy within their ZPDs (Wood, Bruner, & Ross, 1976). With Mother 1 focusing on the linguistic aspects of the shared story and Mother 2 on the procedural functions of the app, there were clear differences in the nature of knowledge scaffolded, as well as the processes for accessing and sharing it. In Discussion, we elaborate on the parent's and child's status of novice versus teacher in this process.

Engaged players and objects of 'play'

This theme relates to the parallels between Vygotsky's double-stimulation method and the sharing and representation of knowledge expressed in the interaction of the second mother–child dyad. Similar to the processes occurring in a double stimulation, we saw ev-idence of how key story skills were developed as part of the story sharing/story creation session in a situation akin to problem solving (cf. Portes et al., 1997): there was a gradual integration of more advanced story elements (i.e., pictures, sound and text), which was aided by a mediating artefact, such as the recording feature of the app, as well as the mother's scaffolding (e.g., mother helping the child find letters on the onscreen keyboard). Both processes provided an insight into the dynamic development of the child's multimodal story-making skills. In addition, both story participants were actively engaged in the story creation and story-making process, which could be framed in Vygotskian terms as a prob-lem-solving activity in which the mother and child needed to solve an authentic problem of creating a personalized multimodal story. However, although the process of story creation resembled a double-stimulation activity, the use of the Our Story app gave rise to a par-ent–child interaction that had a different learning potential than the one afforded by cultural artefacts from Vygotskian time. The app's affordances for multimodal knowledge expres-sion captured the process as well as representation of both the mother's and child's story worlds and represented these dynamically, instantaneously and in three modes (picture, audio and text). The

following example illustrates that when it came to joint parent–child co-construction of the story, the app was treated as a dynamic and shared object of 'play'.

Child 2: [Child 2 dictates the story to her mum who is typing it into the story box] Clock had a bath and then he played a song and then he eated it
Mother 2: Eated what?
Child 2: Mummy, I want to sit and do it!
Mother 2: OK, you do the eating bit, yeah? So we say and then he eated it. Oh, we say ate. That's quite an easy word, you want to try it? You should be able to do this: a, tttt
Child 2: Rosie? [Child 2 is typing random letters as part of her story]
Mother 2: No, t-t-t for tortoise. Here! [mother types T and adds it to child's writing] Child 2: Look mummy, here! [child switches from writing to audio mode and records part
of her sentence, 'mummy here' into the story]

In the next section, we elaborate on the knowledge represented through the collaboratively produced story, and the learning potential of the process underlying the story production.

Discussion

We aimed to explore the knowledge expressed in parent–child talk as they share a self-created iPad story. On the basis of deductive–inductive analysis, we organised the key patterns of par-ent–child talk into three main themes that were grounded in previous literature (Vygotsky's learning theory) and prevalent patterns within the data. In this section, we discuss the three themes in more detail, with reference to both Vygotskian and post-Vygotskian theories. This en-ables us to theorise possible explanations for the findings and novelty of the study contribution.

In both pairs, independent and guided problem solving collided because the child's knowledge was scaffolded by the mothers together with the app. This dynamic knowledge exchange between the mothers and their daughters and between the participants and the tool builds on Vygotsky's theory and was captured in the themes realistic fiction and scaffolding variations. Both themes are intermingled within the wider notions of agency and the expanding potential of ZPD. In the case of Child 2, the expression of the child's agency was a key characteristic of the interaction. With the app, the girl was able to com-pose a story merging reality and fiction and meshing the audio with typed letters and digital pictures. The

app allowed her to practise emergent typing skills and to demonstrate mastery of oral language skills (during audio-recording) and provided space for a story, which less-ened distinctions between fictional and real. This would not be possible with a traditional book or indeed any closed-content digital tool for story making. To a certain extent, the app thus facilitated interaction spaces where the child could practise skills that will even-tually support her 21st-century literacy skills such as recognition of digital signs or collab-oration on a joint project (McPake, Plowman, & Stephen, 2012). Vygotsky believed that for the child, knowledge scaffolding happens through imitation and that a child can 'imitate only what lies within the zone of his intellectual potential' (Vygotsky, 1987, p. 210). However, for learning contexts where the intellectual potential of participants is jointly extended with new technological tools such as Our Story, the ZPD has less explan-atory power. In the interactions observed here, we saw evidence that at times, the children too can act as a more knowledgeable other and that the activity of multimodal story making can shape mastery of traditional as well as new digital literacy skills. In such open-ended, collaborative and creative contexts, a shared communicative space is created in which both the adult and child negotiate their positions in the activity and the division of learner and teacher becomes blurred (Littleton & Mercer, 2013). This interpretation prompts us to extend Vygotsky's notion of ZPD to an intermental development zone (IDZ, Mercer, 2000; Mercer & Littleton, 2007), in which the parent and the child (or a teacher and a learner) stay attuned to each other's changing states of knowledge and understanding dur-ing the course of the interaction. Using IDZ as an interpretative frame acknowledges that open-ended digital contexts require that the parent and child operate within a shared space, which may foster new, so far little explored digital literacy skills. Applying the IDZ framework is thus a novel way to evaluate parent–child story making and story sharing.

As for the parents' role in the observed knowledge exchange process, the analysis showed that the two mothers fulfilled a central role as the 'more knowledgeable others' when it came to the talk around the story. With their more advanced oral and orthographic skills, the mothers verbally scaffolded children's knowledge and assisted their performance in co-creating (Mother 2) or providing the story content (Mother 1). The kinds of knowledge that mothers scaffolded and the strategies they used to do so differed. Whereas Mother 1 guided the child through the process of story comprehension (by asking interrogatives such as who, where and when), Mother 2 concentrated more on the app mechanics and supplemented the story sharing with descriptions of the procedural aspects of story making (e.g., where and when to push the delete button).

Vygotsky addressed the importance of orienting teachers' and parent's support 'not on yesterday's development in the child but on tomorrow's' (Vygotsky, 1987, p. 211), and in both pairs, we saw evidence of parents' attempt to enhance their daughter's future skills. However, there was a difference between the expert/novice bal-ance in the story production. The first dyad was more parent led, whereas the second story produced by the child together with her mother may have facilitated a more negotiated and balanced learning space. Instead of creating a story on the basis of past experiences, the sec-ond mother–daughter dyad created a story spontaneously, in the moment of story sharing, leveraging the synergies between a personal story and an open-ended software. Vygotsky recognised the expanding potential of ZPD and with the double-stimulation method underscored the importance of studying learning processes in unrestricted creative activities. In this case, similar to the learning potential of double stimulation, the child's multimodal story could be considered a representation of learning (Pantaleo, 2009; 2010), and to some extent, so could the process of story composing, which, in this example, occurred in an au-thentic context supported by multimodal means of knowledge making with the mother (Jewitt, Kress, & Mavers, 2009). However, although double stimulation focuses the activity towards a specific goal (and examines how the child solves a problem in relation to this goal), the app has no such focus, it is a creative tool, and the problem solving occurs in relation to any activity created between the mother and child. Furthermore, there are differences in the recording of the knowledge expression. Although in double stimulation, any changes to the perceived object characteristics remain at the thinking level (e.g., child's manipulation of the wooden blocks in her head before moving these on the table), with the app, any changes to the story are captured and recorded automatically and transparently (although the user has the choice to either delete or save these). Thus, the object of knowledge mediation here shaped and evidenced the dynamic story-creating process of both mother and her child and afforded the possibility for visualising the process and result of the thinking processes of both partners. Vygotsky's framework, which foregrounds the novice/teacher dichotomy in the knowledge scaffolding process, is less convincing here. This was also the case with the third theme – engaged players and new objects of play – where the app mediated knowledge ex-pression beyond that interpretable with a traditional Vygotsky framework.

The story co-created by the mother and child in our case study could be later shared with others (e.g., a story can be sent to the child's friends or family) who can further develop the story and in doing so create a new jointly developed 'cultural object'. To comprehensively capture the

characteristics and the learning potential of this tool, the context would be better framed as a trialogical process of learning (Sami & Kai, 2009). In trialogical learning, empha-sis is laid on the 'interaction through the "shared objects" that are in the process of being developed' (Paavola & Hakkarainen, 2009, p.85). As with Mercer and Littleton's concept of the IDZ, the trialogical perspective of learning acknowledges both parents and children as collaborative learners who draw on each other's knowledge in balanced rather than top-down fashion. In addition, it encompasses the dynamic nature of co-construction of shared objects of a unique personal value. Importantly, the trialogical perspective of learning is well suited not only for describing and analysing the process but also the representation of knowl-edge expressed during the observed story-sharing process, that is, the final story the parent and child created. This seemed to have been perceived as an object of play rather than a didactic tool by the study participants, perhaps because of the app's dynamic affordances to contribute to the knowledge expression during the interaction. As such, trialogical perspective of learning appears to be a suitable framework for future studies seeking to analyse both the process and product of knowledge representation during parent–child iPad story sharing.

Study contributions

The study provides an empirically driven application of a well-established theoretical framework to a novel research context and specifies the extent to which it can account for the themes in parent–child talk during joint multimodal story sharing. By presenting ev-idence for a clear link between Vygotskian learning theory and corresponding patterns in parent–child talk, we can conclude that this well-established theoretical framework aptly captures the previously little documented interaction patterns of parent–child story sharing with iPad apps. However, from our findings, we can also infer that there are some affordances of story-making apps that are better explored through post-Vygotskian theo-ries. These affordances refer to the app's possibilities for the expression of collaborative, transparent, creative and playful knowledge, manifested in both the process and product of story making. We therefore conclude that the trialogical theoretical learning paradigm and the IDZ concept may provide a suitable basis for future research in this area.

   The study also indicates aspects to be considered in future practice of parent–child–iPad story sharing. Notably, the study details some specific parent–child iPad story-sharing practices in authentic home settings and connects them to their learning potential. This may encourage educators to use the app with a specific focus on those aspects of behaviour that are traceable to specific learning outcomes (as outlined for example in describing the theme scaffolding variations). However, we also alluded to

the potential of the app to nur-ture digital literacy skills, benchmarks of which are yet to be established. We highlighted the ways in which the app afforded the child a sense of mastery and agency through story composition (the realistic fiction theme). This may inspire future applications of iPad apps to shared adult–child activities where expectations are not set by the adult compass but are child led and left to emerge during shared interactions. Finding a balance between a tradi-tional and digital story-sharing practice is not easy but can be achieved, as demonstrated in these two case studies.

Study limitations

The present study was grounded in a specific sociocultural framework, which draws upon established practices in story-sharing research. In keeping with this approach, the case study sought to obtain rich data about the experiences of two particular mother–child pairs, rather than seeking a systematic and comprehensive analysis of larger numbers of partici-pants. However, this does not allow us to explore comparatively the different patterns of language use and parent–child engagement in different sociocultural groups (Heath, 1986; Lankshear & Knobel, 2011). Rather, in keeping with other story-sharing research (Reese, 2012) and sociocultural approaches to researching children's talk opportunities (Lambirth, 2006), we acknowledge that our own backgrounds and that of the participants shaped and constructed our findings.

Conclusion

In conclusion, we set out to obtain an in-depth understanding of the knowledge expressed by parents and children in a new story-sharing context mediated by a specific digital tech-nology. Such an idiographic approach reflects 'the wealth of living reality' (Luria, 1979, p. 174), and the case study method allowed us to capture in detail the complexity of a so-far little researched phenomenon. By interpreting the results with Vygotskian theory, we could consider the extent to which the new story-sharing context supports parent–child interac-tion patterns, which have been previously recognised in children's literacy development. Our analysis suggested three principal themes in the talk of two mother–daughter pairs, and a Vygotskian perspective was a useful tool to illustrate the learning opportunities orchestrated by adults during iPad story sharing. The trialogical perspective of learning complements Vygotskian perspective through its dynamic account of the collaborative and multimodal learning opportunities and is necessary to ascertain the extent to which the mothers and children leveraged specific app affordances to

represent their ideas in the collaborative story-making process. We therefore recommend that future research and practice acknowledge the traditional as well as contemporary affordances of this spe-cific '21st century story-sharing context' for children's reading development.

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