Mediating Family Play: Exploring the Expectations of Digital Media through a Mobile Application Designed to Facilitate Real-world Child-Parent Play

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Abstract

This article highlights the necessity of considering socio-cultural values and attitudes when designing digital media, through presenting a study that explores parental attitudes toward play and digital media in childhood. Here we present a study examining the effectiveness of a mobile application designed to encourage real-world play between parents and their children (aged three to five years old). A series of quasi-naturalistic play spaces were created in child-centric organisations with parents visiting these organisations invited to use the play space - including tablet devices loaded with the application. Surveys – including open and closed questions – were collected from 28 parents along with observational data focusing on parent-child-screen interactions. The research highlights a tension between the physicality and preconceptions of digital devices and parent-child play. We also note the mobilisation of the notion 'quality time' as somewhat antithetical to digital play - indeed, expectations of digital devices in childhood, alongside a presumed developmental purpose of certain forms of play, impacted the capacity of this application to facilitate real-world play. These findings and resulting methodological discussion have implications for both the design of mobile applications and future research. Moreover, this article highlights some of the values and assumptions that influence parental expectations of purposing play and digital media.

1.0 Introduction

Play is viewed as important to the extent that the United Nations Convention on the Rights of the Child has elevated play as a right of children (Nations, 1989). In Western cultures, play is '*culturally cultivated*' (Gaskins, Haight, & Lancy, 2007) and is viewed as key for children's development. Further to this, learning activities are often viewed as more effective when they are playfully framed (Cohen, 2007). Within this construction of play as developmentally important and an effective pedagogic approach (Kernan, 2007; A. S. Lillard et al., 2013b, 2013a; Sutton-Smith, 1997) there is a stratification of play types. That is, certain types of play are viewed as more developmentally important.

Children's digital play for instance, is often viewed as intrinsically purposeful such that they develop digital literacies (Bayne & Jen, 2011; Prensky, 2001; Selwyn, 2009), or this digital play is a means of engaging in educational content (DiCebro, 2015; Livingstone, Mascheroni, Dreier, Chaudron, & Lagae, 2015; Stewart et al., 2011). Discussion of digital play cannot however, be decoupled from the broader romanticising of, and anxieties surrounding, children's relationship with technology. For some children's interaction with digital technology is often presented as exemplifying a digital nativism (Livingstone, Buckingham, & Davies, 2009; Prensky, 2001). Conversely, there are also protectionist driven suggestions that digital technology is developmentally harmful for children (David Buckingham, 2008; Mendoza, 2013; Tapscott, 2009).

There is therefore a historical and culturally situated desire to purpose and curate play which to some extent informs expectations of digital play. However, with digital play there is also a sense of anxiety informed by the perceived impact of technology on childhood (Plowman, McPake, & Stephen, 2010; Postman, 1983). Moreover, with this technologically influenced 'death of childhood' (David Buckingham, 2008) there is an implication for parents and their role in curating playful activities – digital or otherwise. This research evaluates a mobile application that was designed in response to this parental responsibility to facilitate play. That is, this research explores the efficacy of a mobile application designed to facilitate parent-child, real-world play. Through this research we address the following questions:

(i) How do conventional notions of the purpose of play, the purposing of play, and the stratification of play types inform our understanding of children's learning and developmental relationship with digital-media based play?

(ii) How do assumptions surrounding the role of digital technology affect parental attitudes towards learning and development through digital play?

(iii) How do playful practices, and perceptions of such, manifest and represent the broader debates surrounding 'digital play'?

Question (i) is concerned primarily with mapping the broader socio-cultural context and will be explored through a review of relevant literature. Here we explore the socio-cultural purposing of play, and the subsequent rise in use of digital media in childhood. Questions (ii) and (iii) are explored through the empirical research project, in which the mobile application was evaluated.

2.0 Literature Review

In this section we explore the socio-cultural factors that inform the practices surrounding the use of digital technology to facilitate family play. The biggest factor here is the perception of play as an inherently purposeful activity, and section 2.1 will address this by providing a selective historical review some of the perceived functions of play. We build on this in section 2.2 by discussing the specific purposing of play for learning and control. From this we trace a link between the developmental purposing of play and approaches in the purposing of digital media for playful learning. We then explore the role of parents in this curation of acceptable digital play activities, whilst identifying the emergence of a rhetoric assuming a parental-play deficit - a notional deficit which underpinned the development of the mobile application we later evaluate.

2.1 The Purpose of Play

"[I]f a boy is to be a good farmer, or again, a good builder, he should play, in one case at building toy houses, in the other at farming We should seek to use games as a means of directing children's tastes and inclinations toward the station they are themselves to fill when adult." (Plato, 1971)

Plato proposed that play can be used to guide a child's development and, by extension, suggested that play can be educationally purposed (D'Angour, 2013). In addition, play researcher David Cohen (Cohen, 2007) suggests that the early 19th century saw the development of "*enlightened laws [giving] children a kind of freedom which they had never had before. If they used some of that freedom to play, then play had to have some purpose.*" (p27-28). For Cohen, there is an evident assumption that play must serve some purpose, however the proposed purpose of play developed over time.

Initially, play was framed as a necessity to expel excess energy before moving towards an evolutionary perspective of play as, for example, the development of skills needed for survival, an induction into the world of predetermined roles and activities, or the cathartic expression of primitive behaviours (Cohen, 2007; Huizinga, 1971; Sutton-Smith, 1997). In part due to the exhibition of playful behaviour in the animal kingdom – with greater frequency in youth – this evolutionary approach is still present today, even in neuroscientific enquiries into play (Wang & Aamodt, 2012). For developmental psychologist Lev Vygotsky, play was something akin to wish fulfilment, in which children use their imagination to free themselves from immediate situation constraints (Vygotsky, 1978).

Now, this framing of play as a liberating activity for children is echoed by contemporary discussions of digital play and digital nativism - children's presumed affinity with technology. Indeed,

the notion of children's playful, unconstrained, or 'fearless' engagement with technology forms a key rhetorical justification for some intrinsic understanding of digital technologies (Prensky, 2001; Selwyn, 2009). In addition, the capacity for digital games to create 'safe-spaces' – or magic-circles (Huizinga, 1971; Salen & Zimmerman, 2003) – in which children can explore at their own pace, and fail without fear, forms a key argument for the justification of games-based learning (Hudlicka, 2008; Prensky, 2006; Van Eck, 2006). Here then we can begin to draw links between historical discussions of play's purpose, and contemporary approaches to designing digital media for children.

Following his conception of play as something freeing, Vygotsky suggested that *"[i]n play a child always behaves beyond his average age, above his daily behaviour; in play it is as though he were a head taller than himself"* [26, p. 102]. Interestingly, this begins to identify the perceived pre-eminent purpose of play as supporting children's development. This association of play with learning or development is also represented through the conception of children's development as linked to age. For instance, Jean Piaget posited that play affords an opportunity to consolidate existing skills and develop a sense of mastery (Piaget & Cook, 1952). Moreover, he also suggested that the children's play activities were can be mapped to a developmental sequence. That is, children's capacity for certain types of play is indicative of their developmental level (Broadhead, 2006; Cohen, 2007).

Mirroring Vygotsky's elevated framing of play, and Piaget's linking of play to children's development, psychoanalyst Erik Erikson presented a romanticised notion of play such that when playing together:

"[t]he playing adult steps sideward into another reality; the playing child advances into new stages of mastery. I propose the theory that the child's play is the infantile form of the human ability to deal with experience by creating model situations and to master reality by experiment and planning." [31]

This captures a common assumption of play's perceived purpose as something associated with children's development and learning. Now, we can already identify some inherited assumptions from this perceived purpose of play for the application of digital media in childhood. However, further inherited assumptions can be identified through extending our discussion from the *purpose* of play, to the *purposing* of play. That is, exploring the historical curation of playful behaviours.

2.2 The Purposing of Play

For Enlightenment-era philosopher Jean-Jacque Rousseau *"to a child of 10 or 12, work or play are all one"* (Cohen, 2007). This notion of play as the 'work' of the child was influential for the educational approaches pioneered by Friedrich Frobel and Maria Montessori – approaches that are still apparent today. Both educationalists advocated for the purposing, or controlling, of play. Frobel's kindergartens predominantly used teacher-directed imaginative play and Montessori prioritised object-based, real-world, interactive play. Contrary to popular interpretation, Montessori's discussion of "play [as] the work of the child" refers specifically to a structured, prescriptive form of play.

Together Frobel's and Montessori's approach to playful learning raises two points of significance for the contemporary discussions of digital play – harnessing play's captivating nature, and the stratification of play types. We will address this curation of play first as, in the context of digital play, it informs the subsequent stratification of play types. The capacity to use play as a pedagogic approach – that is framing learning activities playfully – has direct corollaries with justifications for games-based learning through using the *'holding power'* (Turkle, 1984) and engagement ability of digital games (Connolly, Boyle, Macarthur, Hainey, & Boyle, 2012; Slussareff, Braad, Wilkinson, & Strååt, 2016; Phil Wilkinson, 2016). Abstracting this perspective slightly reveals a

use of play as a means of controlling behaviour that, according to David Cohen and Brian Sutton-Smith, again has historical origins.

In Brian Sutton-Smith's extensive historical review of play (Sutton-Smith, 1997), he suggested that the $100milllion development of American playgrounds between 1890 and 1920 was motivated by a desire to integrate young people into society. This use of play spaces to entail desired cultural and societal values is traced to Henry Curtis, who suggested that *"the idleness of the street… is morally dangerous"* (Cohen, 2007). Building on Sutton-Smith's suggestion, David Cohen more pointedly asserts that, *"Western societies have used play to make children conform."*(Cohen, 2007). Now, this notion of curating physical play spaces due to an anxiety over children's unprescribed behaviours can be directly translated into contemporary protectionist assumptions regarding children's un-curated engagement with digital technologies.

The perceived negative impact of digital technology for children's development and safety invites a curation of children's digital habits (Mendoza, 2013) that is reflective of the historical purposing of play. That is, just as unstructured free-play was dismissed by Montessori, or the *"idleness of the street"* invited a moral imperative, children's engagement with digital technologies is a source of anxiety such that this engagement necessitates parental curation. Moreover, digital play exists within a discord of play types. Just as, Montessori's focused on real-world play, consciously eschewing Frobel's prioritised pretend-play (Cohen, 2007; A. Lillard, 2007) digital play's relationship to other play types can be viewed as somewhat oppositional.

Of course, there is also a movement towards digital media co-engagement between parents and children and an educational value imbued in some digital play activities (Lauricella, Barr, & Calvert, 2014; Livingstone et al., 2015; Livingstone & Sefton-Green, 2016; P. Wilkinson, 2016). Therefore, with the historical perspective presented here digital play can be viewed as existing on a developmentally stratified hierarchy alongside other play types. Therefore, digital play can at times be viewed as oppositional to other forms of play, in that it takes away from opportunities for more developmentally nourishing forms of play (Fisher, Hirsh-Pasek, Golinkoff, & Gryfe, 2008; Gaskins et al., 2007; Wood, 2012) – just as Montessori elevated real-world play over pretend-play. Now, what is of relevance here is the underlying perception of play as serving a developmental purpose, and the use of play to mediate behaviour. In the context of digital play however, there is the introduction of additional assumptions that inform perceptions of digital technology in childhood (D Buckingham, 2007; McDougall, Wilkinson, & Readman, 2016; Ravi, Sean, & Zane, 2009).

2.3 Summary

In contemporary assumptions of play's role in children's development, several antecedents and parallels have been identified – two of which have significance for this research. Firstly, the purposing of play for regulating children's behaviour – for learning or otherwise – can be linked to the now somewhat controversial use of digital play (Livingstone et al., 2015). Secondly, and perhaps most importantly, the underlying assumption that play has a purpose, or indeed must be purposed. This same assumption can be applied to digital play. However, with digital play there is an added imperative to control, or curate, children's digital play due to protectionist assumptions regarding digital technologies' negative impact on children's development, and fears regarding their safety (Mendoza, 2013).

As this selective historiography reveals, anxieties about play and childhood are nothing new. A variety of investments in children's development, social utility and social order can all be identified in both the past and present. What marks the present as distinctive, however, is the ubiquity and mutability of digital technology together with an amplification of the attendant anxieties. The mobile application evaluated here was developed, in some way, as a response to these anxieties.

3. Mobile Application Design: Purposing Digital Media to Facilitate Real-World Play

The application presented here was developed with the intention to facilitate real-world play between parents and their pre-school aged children. Before outlining the design of the application, it is worth considering the intention behind the application as this is illustrative of some of the values and assumptions identified in the previous sections. The application was produced in partnership with a well-known children's television programme in the US, and a creative digital agency in the UK. The application was developed in response a notion of parental deficit in curating 'good' play activities. This was in part response to a then, as now, pervasive protectionist notion of children's relationship with technology i.e. the '*death of childhood*' [20] and an assertion that "*parents are forgetting to play with their children*" [21].

The company conceived the app as a counter to contemporary trends of producing developmentally playful, but insular and screen-centric, digital media. The application was therefore designed with the aim of providing parents with short (3 to 5 minutes) real-world games that are contextually appropriate. As such, when opening the application parents are first asked to select their current location from different options (See Figures 1 & 2).
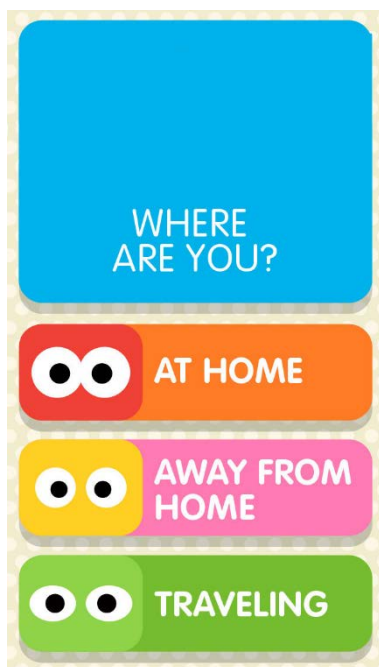

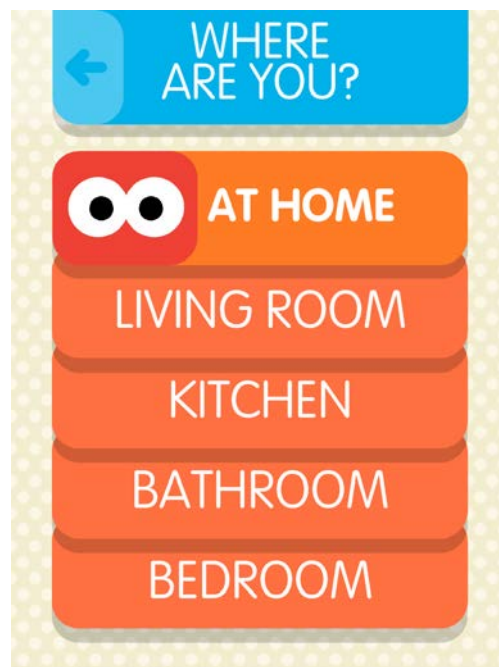Figure 1: Screenshot of Mobile Application Home Screen

Figure 2: Screenshot of Mobile Application Location Options

The application well then choose from the 150 games that are appropriate for that specific location and present this game as an option for the parent to play. If they chose not to play, they will be presented with another game appropriate for that context (See Figure 3). Once they have selected a game they wish to play they will then be given a series of screens to explain the rules of
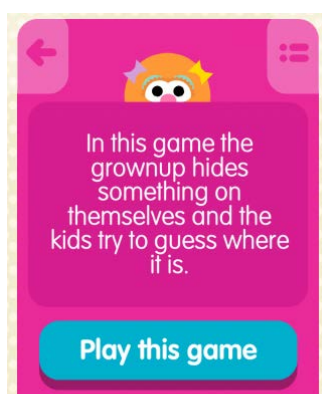

Figure 3: Screenshot of Mobile Application Game Choice

Figure 4: Screenshots of Mobile Application Game Rules Explanation

the game as simply as possible (See Figure 4).

The role of the first author in this project was as a 'play researcher', working for the creative digital agency to evaluate the potential effectiveness of the application. His specific remit was determining the 'effectiveness' of the application in encouraging family-play following the development of the application. This deceptively instrumental evaluation of 'effectiveness' inevitably connected with more profound questions and it was clear from the outset that the evaluation of the application provided ample opportunity to engage with the broader socio-cultural context of digital technologies and family play, such as the assumptions that informed the design and development of the application itself.

Given assumptions about digital media being a detriment to developmentally important play, and family play more generally, the application's digital facilitation of real-world play was also characterised by a tension. The research elicited some of these tensions, their manifestation in the parent's response to the design of the application, and the accompanying beliefs about the relative value of different playful activities.

4. Methodology

This research evaluated the effectiveness of a mobile application, which was designed to encourage real-world family play. The analysis of data collected draws out parental perceptions and practices in relation to digital play. In the discussion we highlight how these practices and perceptions relate to the broader socio-cultural expectations and assumptions in purposing digital play.

4.1 Survey Design and Participant Observation

This research used a mixed methods approach (Tashakkori & Teddlie, 2003), adopting self-reported questionnaires and quasi-naturalistic observation of child-parent interaction. This allowed us to capture data reflecting playful practices with digital technologies as well as parental perceptions of these playful practices. The use of both methods enabled us to triangulate the research findings and provide a more comprehensive set of data to minimise biases that can occur in interpretation (Creswell JW, Clark P, 2011).

The questionnaire was split into two sections and used open and closed questions. The first section focused on evaluative questions related to the mobile application itself – including questions regarding its potential effectiveness. The following section asked questions relating to attitudes towards play and typical play practices. The intention of capturing parent's general attitudes towards play was two-fold. Firstly, comparing parental attitudes towards play and its developmental can be analysed in relation to their perceptions of the application itself. Secondly, and most significantly for the overall aim of this work, parental attitudes can be compared to the underlying *expectations* of parental attitudes and approaches to play that informed the development of the application.

Closed questions were used to provide a descriptive quantitative base to stratify perceptions of play. Closed questions were predominantly comprised of Likert scales such that parents could self-identify their attitude on a pre-coded scale (Bryman, 2015; Oppenheim, 2000). Open questions were used to allow parents to expand on their answers and elucidate their underlying assumptions that informed their closed-question answers. Moreover, as Robert Peterson suggests in *Constructing Effective Questionnaires*:

> "Although the two question types tend to produce different answers even when they are semantically equivalent, neither type is universally superior to the other for all research situations" (Peterson, 2000, p. 30)

The suggestion that semantically similar questions will invite different responses is interesting here. That is, parental responses that are in some-way contradictory have potential to highlight underlying attitudes towards play, and the perceived need of *performing* certain attitudes or playful practices (Oppenheim, 2000; Peterson, 2000). The questionnaire was completed by parents independently and the researchers were conscious of appearing overly invested in the results - such that there is a positive bias, especially in relation to the application's evaluation. Moreover, there is of course a necessity to ensure anonymity. However, upon finishing their questionnaire, there was casual conversation about their experiences with the application that was captured into observational field notes.

Play spaces were created and presented in such a way to mirror typical spaces in the host organisation. As parents used these play spaces, observational notes were taken specifically documenting the following:

- Examples of enjoyment, frustration, or boredom in using the application
- Examples of 'atypical' use of the application compared to expected use
- Physical handling and child-parent engagement with the application
- Levels of engagement for parent and child (characterised by affections of disinterest)
- Amount of time played

These guiding notes were primarily designed to explore the 'efficacy' of the application through identifying any potential barriers – especially in relation to its technical production and ability to engage. Given the context of the research, and a desire to not affect play practices through overt note-taking, field notes were taken inconspicuously and as 'scratch notes' (Bryman, 2015, p. 443).

4.3 Participants

Participants were recruited from visitors to three locations, chosen to include parents from a variety of socioeconomic backgrounds. This includes Talbot Woods' Nursery, Children's Discover Story Centre, and The Good Play Café – a child catered 'soft-play' café. Posters were placed around these organisations explaining that a new play-space / exhibition was available for their use. The space was used by numerous participants, of whom 28 agreed for their observational data to be used and to complete the questionnaire. Of the 28 participants who took part in the study, 26 identified themselves as primary caregivers. Of these 26, 17 were individual caregivers visiting with their children; 6 took part as a family unit and the remaining 3 visited as a group of parents.

4.4 Procedure

A series of 'stay-and-play' spaces were created in three child-centric organisations: a children's nursery, a children's museum, and a soft play café. Parents visiting these organisations were invited to use the play space which include typical household items, craft resources, soft pillows for seating, and tablet computers preloaded with the application. This environment was set up with a consciousness of Dave Cohen's criticism on non-naturalistic research that compartmentalises aspects of play (Cohen, 2007) – especially with regard to the 'physicality' of the play space itself. As such the play space was presented as 'warm home-like laboratory' (Cohen, 2007) informed by those who worked at the respective organisations. As such the spaces themselves were close approximations of the kind of spaces visitors would expect to see.

Following this quasi-naturalistic physical set-up of the environment, parents were invited to use it as they would any other space within the respective organisation. That is, parents visiting these organisations were invited to use the play space - including props and tablet computers

preloaded with the application – in whatever capacity they wished to. This was of course prefaced with telling parents we are undertaking research to, ostensibly, evaluate an app, however, this was not necessary if they wished to use the space. Therefore, parents were invited to opt in to the research if they wished. Upon opting in they were asked to complete a short consent form, informing them that there is a participant observation element and a questionnaire to fill when they were finished playing with the app. That is, they could choose how long to play for and this time was noted in participant observations.

4.5 Thematic Analysis

The qualitative data collected here (questionnaire responses and observational notes) were thematically coded with reference to the issues identified in the literature review. The thematic coding process followed the phased approach outlined by Braun and Clarke (Braun & Clarke, 2006). Initial codes were generated through a semantic analysis of participant data in combination with topics identified in the literature review. That is, topics identified in the literature review (e.g. play, digital technology) that may inform parental perceptions of digital play, and indeed informed the development of the application itself, were used to generate initial codes.

In the initial stage, codes were stripped of presumptive values identified in the literature review (play's presumed purpose, protectionist views of technology) such that they did not *"narrow [our] analytical field of vision"* (Braun & Clarke, 2006). For instance, a consistent theme that emerged from the literature review as the notion of play serving some purpose, or as something to be purposed. This served as an initial code for exploring parent reflections on the playful activity the mobile application sought to deliver. In addition to the codes generated from the literature review, a code for 'utility', or perceived usefulness, was notionally used in support of evaluating the application. From this deductive, top-down approach starting point to identify codes, initial themes were generated through semantic analysis (Patton, 1990) of participant's framing of these topics.

Initial themes were then analysed to draw out underlying presumptions and values that informed participant framing – as such the authors drew on discourse analysis (Gee, 2011a, 2011b) such that these themes could be related back to the socio-cultural presumptions identified in the literature review. The initial round of thematic analysis was conducted by the first author and drew upon observational field notes. These themes were then reviewed in conjunction with the second and third author evaluating the internal consistency and external demarcation of each theme (Patton, 1990). Finally, these themes were assessed through a final phase to further *'refine and define'* them (Braun & Clarke, 2006).

5.0 Description and Discussion of Results

The aims of the field work were three-fold: (i) to explore the efficacy of the mobile application in facilitating family play, (ii) to capture parental perceptions and practices in using digital media in relation to play, and (iii) to contextualise these findings with the broader themes of digital play identified in the literature review. In this section, we address all three aims, drawing on the quantitative data, open-ended answers, and observational data. To begin we address the perceived utility of the mobile application before moving through perceptions of digital media in family play. To end, we will loop back to the mobile application and how underlying presumptions informed its development and subsequent efficacy.

5.1 Perceived Utility: Play Ideation and Timeliness

Parents generally responded positively to the perceived usefulness of the application adding that the ideas for play could provide support for their own ideas – rather than as a source of ideas as was the application's original intention. Based on the responses to Q14, 'Where do you most often get your ideas for play activities?' (Table 1), there is a disconnect between the presumed lack of

ideas for playful activities that informed the development of the application, and parent's reported source of ideas. In addition, Q12 asked 'Who initiates play most often?' according to parents, playful activities are initiated relatively equally by parents and pre-schoolers (n=15) - although eight parents said it was the pre-schooler and two parents indicated that they initiated play.

	1. Very Rarely	2. Rarely	3. Sometimes	4. Often	5. Very Often	Mean
Personally Generated	0	0	7	14	4	3.88
Pre-schooler Generated	0	1	8	15	1	3.64
Other Parents	3	4	11	7	1	2.96
Nurseries	5	2	6	12	1	3.08
Books	6	6	8	6	0	2.54
Internet	5	6	8	4	3	2.77
Television	5	7	10	3	0	2.44

Table 1: Responses to Q14, 'Where do you most often get your ideas for play activities?'.

In response to a question (Q8), asking what affected the amount of time spent in play activities parents reported a lack of time as the most significant hindrance to play (Table 2). This fits with an assumption that informed the development of the application; the app was designed to facilitate play though generating short, contextually-aware activities on request. As one parent suggested:

'the short nature of the games means it is easy to fit into a busy day'.

Perhaps reflecting this notion of fitting play into a *'busy day'* parents also indicated that play most often takes place at home (n=19) as opposed to whilst travelling (n=3) or outside of the home (n=10). What is also significant here, is a presumption that parents are not playing 'enough' with their children. In response to Q15 'To what extent do you agree with the following statements about the time you spend playing with your preschooler?' parents suggested that both they (n=19) and their child (n=14) would like to spend more time playing together. Moreover, they identified external influences as presenting this (n=20).

	1. Very Little	2. Little	3. Some	4. Great	5. Very Great	Mean
Time	1	2	7	9	6	3.73
Money	8	7	9	1	1	2.23
Ideas for Activities	9	7	4	6	0	2.27
Personal Interest	9	7	6	4	0	2.19
Preschooler's Interest	6	7	7	5	0	2.44
Environment / Location	6	8	7	5	0	2.42

Table 2: Responses to Q8, 'To what extent do the following factors influence the amount of time you spend playing with your pre-schooler'.

From these initial findings there is a perceived utility for the application, in that it may provide additional ideas, or mediations of existing ideas, for play. Moreover, the design of the application to provide short-games fits with parents' identification of time as a significant barrier. However, a disutility begins to emerge when viewing this application, and the presumptions that informed its design, in the context of preconceptions of play and digital media.

5.2 Real-World vs Digital Play

For parents, there is a suggested reluctance surrounding digital media and play – especially when it comes to family orientated play. Therefore, when parents discussed digital play in relation to family play they made a clear distinction between the two. For instance:

"It's purpose is not really clear – it is the opposite to the use of apps / iPads for children, they are used for when adults are unable to offer one to one play"

Here the parent is highlighting an expectation of the application to be used individually in child-centred play - as alternative to real-world play. Therefore, parents not only make a distinction between notions of family and digital play, in doing so they elevate real-world family play, above digital family play:

"I try to play with books and toys with my daughter"

Additionally, the implication in the use of the term *'quality time'* is that other play activities lack 'quality'. Again, reflecting other research suggesting digital play is used as a control strategy, parents see digital play as a compromise:

"Playing with my child does not involve an iPad or computers."

This was typical of parents' responses to the types of play in which they and their pre-schooler participate (see Tables 4 and 5). From the questionnaire (Q17), parents report that they are less likely to participate in technology-based play with their children than other types of play. Moreover, the types of play pre-schoolers participate in by themselves (Q18) are more likely to feature technology than play with their caregivers. Again, this highlights a tendency to frame digital play as an individual activity – rather than for co-engagement by default.

	Never	Rarely	Sometimes	Often	Very Often	Mean
Imaginative	0	0	5	9	12	4.27
Symbolic	0	1	3	9	13	4.31
Construction	0	2	5	12	7	3.92
Social	0	2	2	12	10	4.15
Physical	1	1	5	10	9	3.96
Technology	2	5	11	6	2	3.04
Talking	0	1	10	10	5	3.73
Creative	0	2	5	11	8	3.96
Co-Operative	0	0	10	11	4	3.76
Competitive	0	7	14	3	1	2.92

Table 4: Responses to Q17, 'When your preschoolers play by / amongst themselves, how often do they engage in the following types of play?'

	Never	Rarely	Sometimes	Often	Very Often	Mean
Imaginative	0	3	8	7	8	3.77
Symbolic	0	2	8	10	6	3.77
Construction	1	2	8	7	7	3.68
Social	1	2	7	7	8	3.76
Physical	1	4	8	8	4	3.4
Technology	2	6	12	4	1	2.84
Talking	0	1	3	16	5	4
Creative	0	1	8	10	6	3.84
Co-Operative	0	1	10	11	3	3.64
Competitive	2	7	11	5	0	2.76

Table 5: Responses to Q18, 'When you play with your preschoolers how often do you engage in the following types of play?'.

Some parents however, recognised an opportunity in the application to encourage real-world interaction around digital media – as a means of rejecting individual approaches. When asked why they would be likely to use the application in the future they spoke in terms of co-engagement, as opposed to individualistic play.

"The app is parent responsive. Parents are required to interact with the children instead of giving the child to play on their own."

"Get involved in game rather than child play on their own game."

In discussing the utility of this application in relation to types of real-world play an implicit separation begins to emerge. That is, real-world play is viewed as something relatively distinct from 'digital play' – or at least interaction with digital technologies. Now, for this application specifically this creates an inherent barrier to its efficacy as it is difficult to decouple this notion of real-world play, and digitally facilitated real-world play.

5.3 Decoupling Digital-Facilitated and Digital-Orientated Play

The application was designed for parental interaction, such that they would read the rules of the game then lead the play activity. Designing for an individual, rather than co-engagement, proved problematic for family play as a shared expectation among parents and their children began to emerge that is counter to the application's intention. That is, there was a shared expectation that the child would also interact with it.

When asked about the application, the researcher struggled to explain the intention of the application simply; parents expected it to be an application designed for their child, that they would at most support, however, as the application was designed for adults and predominantly text-based, it was not typically understandable by children. Of course, this is an obvious finding – that an application not designed for children is not suitable for children. However, what is interesting here is a demonstrable expectation when it comes to digital technology in parent-child interactions. Interestingly, over the course of the play sessions however, the researcher was able to more clearly explain the purpose of the application by directly framing it as counter to typical uses of applications with children.

For both parents and children then, there was an expectation that the application would either be designed for co-engagement, or for a child-led activity – rather than parent led. From the observational notes, this was captured by parents '*handing-off*' the tablets to the children, before using the application or inquiring about its use. Likewise, when parents were using the application as intended, children would expect to 'play' with it as well as was demonstrated by them reaching up for the tablet in an attempt to interact with it themselves. As one parent succinctly captures:

"Expectations of the iPad are to play on it"

Parents who used the application as it was intended, then found themselves resorting to co-engaging with the application to hold their children's interest. As mentioned, this practice created its own problems:

"My child would rather touch the iPads and was not interested in listening to me"

"Kids disturbing me so that I could not read properly."

Additionally, this practice also revealed another, rather obvious, finding in that the application was developed for parents with pre-schoolers there were issues regarding its age appropriateness. Interestingly, though pre-school refers to a relatively narrow age range (3 to 5 years) the developmental significance of this age range creates an issue when this application was used for co-engagement.:

> "I like it, but my toddler is three years, she wasn't very interested, she wasn't listening, visual stimulation is what she likes at this stage"

Perhaps ironically, in attempting to promote real-world play between parents and children the digital format of the application presented a barrier due to preconceived notions of digital devices as being in opposition to real-world play. In this discussion of the difficulty of decoupling real-world play from digitally facilitated real-world play, there is an apparent framing of digital technology as serving a specific purpose. That is, the application is counter to typical uses of digital technology.

5.4 Purpose of Play vs Purposing of Digital Play

The from Q21 (Table 6) and Q23 (Table 7) speak to assumptions of the role of play in children's learning and development, with most parents suggesting education and development as a primary motivation for their motivation to play. Indeed, according to parents in this study children's education and development forms the primary motivation for their engagement in play. Following this, they view play's ability to occupy their children as an additional, though less significant, motivation. This split of play's purposing creates a distinction that is analogous to the perceived distinction between non-digital, and digital play.

	Very Little	Little	Some	Great	Very Great	Mean
Personal Enjoyment	3	1	5	11	5	3.42
Keep them Occupied	0	0	9	12	4	3.65
For their Development	0	0	4	14	7	3.96
For their Education	0	1	3	15	6	3.88
Obligation	5	7	8	4	1	2.46
Social Interaction	0	3	4	14	3	3.42

Table 6: Responses to Q21 'To what extent do the following reasons influence your motivation to play with your preschooler:'

As discussed in other studies, digital media has been framed as something to occupy children (Livingstone et al., 2015; Mendoza, 2013) (a continuation, perhaps, of the notion of television as an 'electronic babysitter' (Austin, Knaus, & Meneguelli, 1997)). This is a sentiment is expressed by parents in this study. Moreover, parents suggest that digital play becomes a stop-gap in favour of real-world play:

> "The iPad is used in short bursts as a break or whilst cooking dinner."

> 'Its purpose is not really clear – it is the opposite to the use of apps / iPads for children, they are used for when adults are unable to offer one to one play'

There is therefore a distinction worth exploring here when comparing parents' perceived purpose of play, and their purposing of digital play. Parents view play, generally, as developmentally

important whilst distinguishing digital play as something that is primarily suited for occupying children. Even then, only in *"short bursts"*. There is a need to be conscious of parent's response here, as they be a direct response to this specific application.

Parent perceptions presented here may be a direct response to the application, with questions about how it will fit in with their current playful practices guiding their lack of clarity over its purpose. However, the fact that in evaluating the application they draw upon 'typical' uses of digital devices is significant as it highlights expectations they bring forward when using technology. For instance, this preconception of digital technology, and its observed distracting nature in this study, lead multiple parents to support the purpose of the application but request that the games be published on physical cards instead. In addition, this can also be tied to a general parental sense of 'screen-anxiety' (Blum-ross & Livingstone, n.d.) as, when asked about using the application, one parent responded they:

Concentrated time taking them away from TV

For parents, as captured in their survey responses, and children, as observed in their interaction with tablet, the digital device itself had some effect. That is, the physicality of the tablets used, and their expected typical use, influenced how parents and children initially interacted with the mobile application and their presumption of its purpose. In addition to this, is also the expectations that are placed on parents in terms of curating developmentally beneficial playful activities.

5.5 Facilitating vs Encouraging Family Play

What was interesting from parent's reception to the mobile application's intended purpose was a sense of defensiveness. Now it is necessary to be cautious of overstating this defensiveness, or incorrectly ascribing it to just broader expectations of parents. However, the intention of the application was to 'encourage' parents to play together with their children more - thereby assuming they currently aren't playing together enough. Now, in presenting this question to parents, there was an explicit defensive response in relation to this notion of 'encourage'. Question 6 asked, '*Would having the application available to you encourage you to play with your children more?'* :

"No encouragement needed"

"I spend lots of quality time with my children".

"I play with my kids anyway"

"We play a lot together already"

Of course, the use of this term encourage in retrospect should have warranted additional methodological consideration. However, the response from parents to this question is illustrative of a tension behind expectations on parents, their response this this, and the intentions of the application's developer. That is, as discussed earlier the mobile application was designed in response to notions of parents not playing with their children *enough*, nor are they engaging in developmentally appropriate forms of play - socially interactive, real-world family play.

For parents then, there is a presumption of deficit that this mobile application was designed to mediate. Now, this has obvious connections with overarching notions of technological solutionism – the *"[r]ecasting all complex social situations either as neatly defined problems with definite, computable solutions"* (Morozov, 2014). Interestingly, the developers of the application were indeed mindful of the situations the application would be used in - as exemplified by the choosing of physical location and complexity of games offered. However, the expectation that play must serve a

purpose, which justified the development of the application and is shared by parents, was mediated a somewhat didactic application design. In addition, there are broader pressures and anxieties faced by parents, such as notions of parental deficiency in curating developmentally appropriate playful activities whilst effectively managing their children's relationship with technology (Bayne & Jen, 2011; Fisher et al., 2008; Hill, 2010; Livingstone et al., 2015).

6.0 Conclusions

Through the analysis of the qualitative and quantitative data we were able to provide on one hand an evaluation of the 'effectiveness' of the application and, on the other, a deeper analysis of assumptions about the purpose of play, attitudes to digital technology, and the relationship between playful practices and broader debates about digital media in childhood.

As the data suggests, the ability of the application to facilitate family play is limited. Additionally, the study itself highlights assumptions inherent in the application's intent and design. For instance, the broader intention of the application to foster a culture of family-play due to an underlying assumption that parents aren't playing with their children enough, proved problematic. In undertaking this research, it became apparent that a digital application designed to foster non-digital games had a certain irresolvable tension at its core and, in moving away from digital play – or any screen-based interaction for the children – the application, ironically, became a source of distraction rather than a facilitator of real-world play. There are, therefore, two insights here for future design of comparable applications.

First, rather obviously applications designed for parent-led activities that include children should be designed with co-engagement in mind. Even if an application is not designed specifically for children to interact with directly, their presence in the activity the application facilitates should be accounted for in its design. Second, and building on our first insight, there are inherent values, expectations, and perceptions associated with digital technology's physicality and role in childhood that necessitate consideration. To illustrate this point, consider the significance user familiarity in human computer-interaction design.

A user will carry certain expectations of how to use a system informed by use of comparable systems. This concept of familiarity can be extended beyond the physicality of the object to include its social context. Therefore, a user not only has preconceptions of how to use an object, but also how to use that object in a given social situation, and what purpose that object is typically used for. Naturally, adopting this situated perspective invites consideration of complex socio-cultural factors. However, as Morozov argues:

> "For technology truly to augment reality, its designers and engineers should get a better idea of the complex practices that our reality is composed of."

In the case of this mobile application, designed to facilitate (or rather, encourage) family play there were several socio-cultural values that affected the efficacy of this application. Some – such as perceptions of digital technology in childhood – will be a relatively pervasive consideration in the design of digital media for children. Others – such as the presumed purpose of play, its importance in childhood, and digital play's existence in a play-type stratification – are more conceptually localised. Both however, had an impact on the efficacy of the application and serve to illustrate the necessity to consider socio-cultural values and attitudes when designing digital media for children.

7.0 Limitations and Future Research

This paper explored socio-cultural assumptions of family play and their influence on parental-child engagement with a mobile application designed to facilitate real-world family play. The intention of this research was to provide recommendations for the design of future mobile applications. The previous section highlighted two such recommendations – designing for co-engagement by default and considering potential socio-cultural assumptions. Here, at the risk of invalidating our findings, we question the initial recommendation and further develop the second. To begin, in our analysis, we relate parental defensiveness to broader cultural messages of parental deficiency, within a context that contests the role of technology whilst elevating the importance of play.

This parental defensiveness was revealed, unintentionally, by a methodological issue in the phrasing of a survey question. Further, the survey design presented a demarcation of play types that was intentionally instrumental at the cost of providing a simplistic and superficial account of play. This is paralleled by broader academic inquiry that attempts to situate digital play within pre-existing play taxonomies (Fleer, 2016; Marsh, Plowman, Yamada-rice, Bishop, & Scott, 2016), at the cost of not accounting for a transient dynamic of real and digital play in practice. As Cathy Burnett and Guy Merchant writes, the sociomaterial entanglement of social and digital becomes more or less of the focus of an activity such that this digitally mediated play dynamically "assembles and re-assembles" (Burnett & Merchant, 2016, p. 221).

This draws us to our final recommendation, or perhaps more aptly, our final point for consideration. The design and evaluation of a mobile application is a compromised reification of complex interactions between digital materialities, situated engagements, and social cultural values. In understanding this dynamic, complex, assemblage of various influences it is perhaps worth considering both sociomateriality and actor network theory (ANT) as an informative framework. Both equate human and technological agency in forming 'reality' (Latour, 1996; Leonardi, 2013; Orlikowski, 2010) According to McDougall and Potter, ANT asserts:

> "that humans are quasi-subjects and non-humans are quasi-objects [and] neither has a pure distinction from the other" (McDougall & Potter, 2017, p. 118).

The application of actor network theory or sociomaterial perspectives of digital engagements may provide the necessary holistic perspective advocated for here. However, this is only a methodological solution that in fact creates further challenge. As with this research, the increasing engagement with complexity makes it more difficult translate findings to operationalized, functional recommendations for mobile application design. Indeed, here we have raised several questions regarding perceptions of play and digital technologies, without providing concrete answers. Instead, we argue for the importance of a continued reflective, and holistic approach to research and design.

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