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"The mouse is not a toy": Young children's interactions with e-games

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Little is known about how children under 5 years respond to electronic texts. Traditional methods of transcription can record spoken language and paralinguistic features, but not the relations between children's non-verbal behaviour (e.g. gaze, gesture, facial expressions) and the visual elements which are the focus of their attention. In this paper, drawing on naturalistic videotaped data from 4 children aged 4–5 years interacting with I Spy *CD-ROMs (Scholastic), we offer an innovative method of transcription which may be used to help us understand children's responses in depth. The method captures each child's language, body posture, facial expressions and gestures, in relation to the visual image and game sounds they are currently attending to. Our detailed observations suggest that the manner in which young children engage with e-games varies according to the social context, the textual features of the e-game and their proficiency in using computer hardware and software. Several implications for educators are then discussed, including the need for teachers to be sensitive to the affordances offered by various kinds of software and different genres. The composition of the social grouping using multimodal texts is another important consideration for educators who wish to support children's 'multiliteracy' development.*

Introduction

Recent research has drawn attention to the fact that very young children, who may not yet be able to read and write in conventional terms, are engaging with electronic media and digital technologies in the years prior to school (Karchmer, Malette, & Leu, 2003; Marsh, 2005a, 2005b). Gillen and Hall (2003) define literacy as "an all-embracing concept for a range of authorial and responsive practices using a variety of media and modalities"(p. 9). With the new tech-

nological developments has come an awareness of the prominence of visual images and other non-verbal resources as vehicles for representing and exchanging meanings in electronic texts. Unlike picture books, which have been the focus of research attention for several decades, little is known about the types of electronic texts which young children encounter, how they engage with them, and how this engagement contributes to their emerging literacy development. Early childhood educators are increasingly being called upon to take into account the digital literacy behaviours and understandings as well as the "multiple literacies" which children bring with them when they commence formal schooling (National Association for the Education of Young Children, 1996).

While there are many detailed analyses of children's emerging language and literacy development, there are very few which investigate their emerging "visual" literacy and their engagement with digital texts. Recent audience studies have shed light on the duration of children's engagement with multimedia, the type of multimedia young children use, and the variety in adults' views on the benefits and dangers of children's interaction with multimedia (cf. Arthur, 2005; Buckingham, 2004; Marsh, 2005a; Marsh et al., 2005; Wartella, Lee, & Caplovitz, 2000, 2002). Several studies have focused on comparisons between children's engagement with print-based and electronic versions of the same basic narrative text (De Jong & Bus, 2003; De Jong & Bus, 2004; Lefever-Davis & Pearman, 2005). These studies, however, are yet to be complemented with detailed observations of the relationship between young children's behaviour during such interactions and the design of texts with which they interact.

While much recent research has provided valuable analyses of various kinds of multimodal texts (Kress & van Leeuwen, 2001; Unsworth, 2006; van Leeuwen, 2005; Zammit & Callow, 1999), it is essential to avoid the assumption that the meaning of a text resides solely within it. Much work on multimodal texts does not take into account the fact that the "meaning" of any text is socially constructed and negotiated between the reader/viewer and the author/creator, and is dependent on the background knowledge and previous experiences of the viewer. As Meek (1988), Nodelman (1988), Doonan (1993) and others point out in relation to the visual images in picture books, children must learn to "read" pictures just as they learn to read written texts: "Even representational pictures – the ones we call realistic – exist within systems of learned codes, and thus make little sense to anyone without a previous knowledge of those systems" (Nodelman, 1996, p. 217). This view of meaning carries particular resonance when considering the relationship between children and new media texts like e-games. We cannot assume that children and adults "read" digital texts in the same way. To understand how young children engage with e-games, it is necessary to observe their responses and behaviours in fine detail, in relation to the visual and aural features of the texts

themselves, and the surrounding interactions with adults and other children. In this study, we have aimed to provide a detailed analysis of the responses of 4 young children while interacting with e-texts, in order to identify those responses, verbal and non-verbal, which indicate intense engagement with the e-texts. In doing so, we have also analysed some stand-out features of the e-games which appear to have stimulated this engagement. In order to achieve these aims, it was necessary to develop a transcription method which would enable us to observe the relationship between the child viewer and the text in a detailed manner.

It is worth emphasising that our research approach is qualitative and designed to enable an exploration of the terms and contexts in which certain responses occur, rather than how frequently they occur. The aim of this exploration is thus not to arrive at statistical statements about the distribution or probability of particular responses, partly because such statements are unlikely to be meaningful with a small sample. Finally, the exploration was motivated by a desire to determine the implications for early childhood educators and parents.

The e-games

Software for children prior to school is one of the fastest growing markets, so there is a wide variety of games available, ranging from those which are marketed with an explicitly instructional purpose to those which are focused more on entertainment. For this study, we looked for games which would be sufficiently challenging for the more experienced children, yet entertaining enough for the less experienced children.

The game chosen, *I Spy*, has well-known "real world" variants. *I Spy* games have long been popular in children's culture, both orally and in print (see Coles Funny Picture Books, first published in 1879). Although the game does indirectly "teach" children about sound-symbol correspondence, it is oriented more towards being playful and visually attractive, rather than overtly pedagogical. This is evident from the text on the package:

> *I Spy School Days* challenges you with lots of brain-teasing activities. Solve tricky picture riddles by searching for objects hidden in plain sight! (River Hillsoft Inc., 2000)

I Spy games are well suited to CD-ROM technology, as their affordances make it possible for the child to be rewarded instantly for solving riddles (with applause and fanfare) and enable the child to search with a cursor for objects which quiver and shake. Print materials, by contrast, cannot offer the child audio and animation (cf. Carrington, 2005). The *I Spy* games differ from electronic books (De John & Bus, 2003; Unsworth, 2006) in that they are not intended to provide children with an ongoing narrative thread which may, or may not, have a print version.

Theoretical underpinnings

As stated above, a rich account of young children's engagement with multimodal texts calls for a multidimensional analysis. Social semiotic theory (Halliday, 1978; Hodge & Kress, 1988; van Leeuwen, 2005) provides a model for studying meaning-making as a social process that is always multimodal. It also offers us tools for interpreting the participants' verbal interactions and the use of language in the e-games (Halliday & Matthiessen, 2004) as well as a grammar for analysing the visual design and imagery of e-games (Kress & van Leeuwen, 2006 (1996)). An important distinction for this study is the difference between narrative and conceptual imagery. A narrative image presents, amongst other things "unfolding actions and events" while conceptual images represent "participants in terms of their more generalized and more or less stable and timeless essence, in terms of class, or structure or meaning" (Kress and van Leeuwen, 2006 (1996), p. 79).

Whilst the theorists above have provided an interpretive framework for analysing language and the visual elements of the e-texts, it is also necessary to analyse children's non-verbal responses, as they convey important information about children's engagement with multimodal texts. Drawing on the concept of "flow" (Csikszentmihalyi, 1997) and indicators of intense engagement in young children (Laevers, 1996), as well as the work of Roberts and Howard (2005) on toddlers' responses to a popular television program, we have developed a framework for identifying behavioural indicators of engagement in young children. This framework is detailed below.

Methodology

Participants

Four children participated in this study, Bill (4.1 years of age), Nicholas (5.0 years of age), Annabel (4.0 years of age) and Millie (5.1 years of age). All had some experience with computers and with e-games at home and at preschool. All children came from white, monolingual, English-speaking middle-class backgrounds. Two children, Bill and Annabel, were recruited by word of mouth, and contact with the other two children, Nicholas and Millie, was initially gained through a local preschool.

Data collection

All participants were invited to play an *I Spy* game in their own home or at their preschool (only one child, Nicholas, played in both contexts). They could choose to play *I Spy School Days* (River Hillsoft Inc., 2000), *I Spy Spooky Mansion* (Topics Entertainment, 2004) or *I Spy Fantasy* (Topics Entertainment, 2003). In order to create as natural an environment as possible, the participating children were encouraged to choose whether they wanted to play either with other children or with adults, or by themselves. Bill and Annabel played with siblings and friends, while Millie played with school-friends, and Nicholas chose to

play by himself, with the adults around him providing occasional assistance when Nicholas asked them questions. The aim here was not so much to 'control' for different groupings as to make it possible to observe children in a range of different interpersonal contexts.

Each child's interaction with the game was video-recorded. With the camera variously focused on the young player(s) and the computer screen, we were able to record each child's behaviour and speech while playing. Each tape thus captures the child's facial expressions, movements, gestures, language and attention to the screen or elsewhere. By cutting away to the computer screen at crucial moments, we were also able to record the screen or part of the game that the child was focusing on and the elements of the game's design that the child was responding to. This allowed us to achieve an exact match between the video-recorded responses of the participants and the corresponding game screens and sounds in transcribing the interactions. Admittedly, however, future studies may facilitate the transcription process through more time- and labour-efficient technology, where available.

We collected audio and videodata on seven different occasions during November 2005, both in homes and at preschool. The table below shows the names, location of recording and nature of the group relationships for each child on each occasion. (We had planned to tape Millie at home but were denied permission.)

Table 1. **Name, location and nature of group.**

Focus child/ren	**Gender of group**			**Location**		**Relationships**		
	Boys only	Girls only	Mixed	Home	Pre-school	Adult/ child dyad	Peers	Siblings
Nicholas				✔		✔		
Nicholas			✔		✔		✔	
Millie		✔			✔		✔	
Bill & Annabel			✔	✔			✔	
Bill & Owen	✔			✔				✔
Annabel			✔	✔			✔	✔
Annabel				✔		✔		

Drawing on Csikszentmihalyi's (1997) concept of 'flow' and Laevers' (1996) signals of involvement in the task, we selected key segments where observable children's responses suggested emotional engagement (e.g. laughter, surprise, pleasure), concentration (e.g. focused gaze, frowning), playfulness (e.g. talking to or imitating game characters) and physical investment (e.g. touching or moving closer to the screen). The beginning and end of such strong engagement in the activity defined the boundaries of each of these segments. These segments were then subjected to more fine-grained analysis.

The segments were transcribed using a transcription template which set out the data using columns to record the responses of the children while simultaneously showing the screen which the children were viewing and/or interacting with (see Figure 1 for a transcription excerpt). Each column of the transcript represents one of the dimensions described in Table 2. A new row is introduced in the transcription table when there is a shift in either (a) the screens that the children are attending to or (b) the behaviour of the children or others around them (e.g. when the mother enters or leaves the interaction in Bill's case).

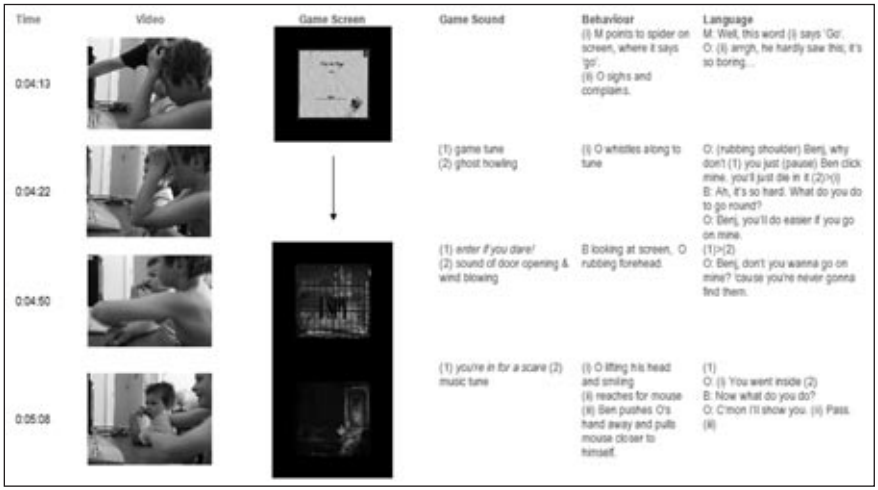

Figure 1. **Transcription excerpt.**

Table 2. **Dimensions of each row included in the transcription.**

Dimension	Description
time	the beginning of each row within the key segment in video record in hours: minutes: seconds format
video still	a video still representing the children's behaviour at that time
screen capture	the screen from the e-game at that time
game sounds	verbal description of any sounds and a record of the narrator's words (in italics)
behaviour	verbal description of the interactants' behaviour
language	transcript of participants' verbal interaction

In order to show the temporal relation between features of each *I Spy* text and the participants' verbal and non-verbal behaviour during their interaction with it, the symbols presented in Table 3 were used.

Table 3. **Temporal relationships symbols.**

Symbols	Meaning	Example
1, 2, 3,…	These numbers identify the order of game sound/narration sequences within a row.	(1) *you're in for a scare* (2) music tune
i, ii, iii, …	These numbers identify the order of non-verbal behavioural elements within a row.	(i) O lifting his head and smiling (ii) O reaches for mouse (iii) B pushes O's hand away and pulls mouse closer to himself.
>	This symbol follows an utterance, a game sound number, or a non-verbal behaviour number to show that one of these features of the interaction precedes the feature after the sign.	(1)> (i) = O: You went inside > (2) B: Now what do you do? O: C'mon I'll show you. = (ii) > Pass. > (iii)
=	This symbol follows the number of either a game sound or a non-verbal behaviour to show it coincides with a feature of a different kind, which may be a non-verbal behaviour or an utterance.	(1)> (i) = O: You went inside > (2) B: Now what do you do? O: C'mon I'll show you. = (ii) > Pass. > (iii)
==	This symbol signifies the beginning of overlap between verbal utterances.	O: (i) I've made all six of them but you need to … == … B: == Which is button number one?
…	This symbol signifies inaudible speech.	

Like every transcription method, the one presented here reflects the purpose of the study for which it has been developed (cf. Baldry, 2005; Baldry & Thibault, 2006; Norris, 2002, 2004a, 2004b; Thibault, 2000). As the transcription relies both on images and on language to capture the interaction between images and sound in each CD-ROM and the children's non-verbal and verbal behaviour, it is a multimodal transcription. Moreover, as it juxtaposes images and sounds from the CD-ROMs with stills from the video records of the children's interactions with these texts, it allows one to compare two texts: i) an *I Spy* text and ii) children's interaction with it, and can therefore be described as 'a comparative multimodal transcription' (Baldry, 2005).

Framework for analysing children's verbal and non-verbal engagement with e-games

A number of response categories were evident in the segments we had identified as suggesting emotional engagement, concentration, playfulness or physical investment in the activity of interacting with the e-game texts. The

categories were based loosely on the protocol of categories used in an observational study of very young children's mainly nonverbal responses to television programs (Howard & Roberts, 2002; Roberts & Howard, 2005). This protocol was devised by early childhood researchers in an analysis of young children's intense engagement with electronic texts. We believe that it suits the early childhood context and our specific purposes within it better than more general protocols (cf. Norris, 2002, 2004a). The final set of seven categories was decided after intensive viewing and discussion amongst ourselves and our research assistants. It should be acknowledged that these categories are not necessarily mutually exclusive. Behavioural data rarely present neat categories for the researcher, but in agreement with Flewitt (2006), it is important to look for patterns or categories nonetheless.

1. *Attention level* was based on the concept of *viewing intensity* (Cupitt & Jenkinson, 1998). Children's attention may range from *watches with great concentration* (rapt attention) to *diminished level of attention and engagement* (associated with slouched/drooped sitting posture).
2. *Parasocial response* constituted behaviour that was indicated by interactants joining in with what was happening in the game. The children's responses could be *physical* (imitating onscreen actions and associated sounds) or *verbal* (joining in by answering questions, talking to characters, etc.).
3. *Computer/game skill response* reflects interactants' engagement with computers themselves (understanding icons, using the mouse and keyboard) and with games (understanding how to start a new game, how to navigate to different parts of the game).
4. *Cognitive response* describes behaviours suggesting that the interactants are actively trying to make sense of the content of the game and their purpose within it. It is indicated by signs of puzzlement, surprise, and deep concentration, amongst other categories.
5. *Pleasure responses* are probably the easiest to identify. They often occur alongside other responses (e.g. sharing with companion(s)) and are realised through facial and other physical expressions, like smiling and laughing, as well as verbally (e.g. 'This is so funny!').
6. *Action around the computer* serves to describe physical action around or focused on the computer screen, keyboard and mouse. It includes actions such as thumping on the table, moving closer to or further away from the screen and protecting and/or gaining control of the mouse.
7. *Sharing with companion(s)* deals with behaviour that clearly indicates interactants' desire to share the experience with a companion. Our data display two different kinds of interacting – *communal* and *imperative*. The communal category includes turning to, leaning over and touching a companion and verbally sharing with companions one's pleasure or frustration. The imperative category captures those moments when

one more knowledgeable player directed a less knowledgeable player, mainly through pointing to objects on the screen and verbal commands or suggestions. It may be part of a controlling style of engagement, discussed below.

In keeping with our aim of exploring the terms and contexts in which certain responses occur, rather than how frequently they occur, we have chosen to concentrate on shifts in and out of these clusters of responses and on those categories which stood out in terms of distinguishing between the four children, or pairs of children. In addition, we have looked in the data for distinguishing patterns across the categories. Finally, we have reported on those findings which allow us to keep sight of the text by showing how certain features of the e-games affected children's engagement.

Findings

Computer/game skill and pleasure responses

The two younger participants, Bill and Annabel, were less knowledgeable about the way the computer worked or the way the game might work. This was demonstrated by fewer computer/game skill responses (Category 3) in their interactions. More importantly, they sometimes struggled to find the words to obtain the help of others (Annabel), or to reflect on and direct the behaviour of the more knowledgeable other (Bill). These younger children listened to imperatives and tolerated the frustrations of not knowing how to play. In contrast, older participants asked questions of the adults to help overcome successfully key obstacles in the game (Nicholas). Unlike the older children, however, younger participants experienced intense pleasure (Category 5) when attending to certain aspects of the game.

Types of engagement with the e-game

Four types of engagement are discernible in our data: *communal*, *combative*, *contemplative* and *controlling*. We shall discuss each in turn in relation to the behavioural characteristics described above. It should be noted that these kinds of engagement are not confined to Category 7, 'sharing with companion'. While communal engagement is built on sharing, combative and controlling engagement may involve only imperative sharing or no sharing at all, and contemplative engagement may be a solitary style.

Communal engagement involves joint problem solving and sharing of strategies for playing the game successfully. This style is characterised by relatively intense concentration (Category 1), much smiling and enjoyment (Category 5) and numerous communal sharing responses (Category 7). While it may involve a single child being in possession of the mouse for the whole interaction, there is no fighting for control of the mouse or the keyboard and when shifts in control do occur, they are peaceful. This style is exemplified by

Figure 2. **Communal style engagement with the e-game.**

the interaction between Millie and her two schoolfriends, as shown in Figure 2.

Combative engagement can be characterised as "the swirl of shouting and pointing that characterizes boys' participation" (Vered, 1998, p. 55). It features relatively intense concentration (Category 1), much action around the computer, (Category 6) and numerous imperative commands (Category 7). There is frequent struggle (both physically and verbally manifested) for gaining or regaining control of the mouse and keyboard. For example, Bill's older brother, who has previous experience with the game, constantly issues commands. When he is not in possession of the mouse, he also repeatedly and emphatically points to the screen. Interestingly, despite his lack of experience and younger age, Bill continually asserts his right to maintain or regain control of the mouse, and thus also of the game. The stills of Bill and his brother in Figure 1 show the boys just before they commence engaging with the game combatively.

Controlling engagement features less intense levels of concentration (Category 1) than the previous two styles of engagement, much more physical parasocial play (Category 2) and virtually no sharing the actual computer game experience (Category 7). It tended to occur in mixed-gender interactions where the boys would not relinquish control of the mouse, even when unsuccessful in their attempt to find an object and even when asked by a researcher to give another child a turn. This is illustrated by an interchange where Bill defends

Figure 3. **Playing ghosts with *I Spy Spooky Mansions*.**

his right to control the mouse first by stating that "the mouse is not a toy". The girls adopted a more passive role in these types of interactions and unless sound and animation held their attention, they lost interest in participating.

Contemplative engagement occurred when children concentrated intensely when considering their next moves (Category 1). It was observed more frequently in the two older children, Nicholas and Millie, who, unlike the younger participants, offered many examples of computer/game skill response (Category 3) as well as high levels of cognitive responsiveness (Category 4). When in control of the mouse, the younger children sometimes clicked without seeming to think or did not click at all.

Differential engagement with narrative and conceptual images

In this section, we will report on those findings which allow us to keep sight of the text. We will discuss instances where the children appeared to respond particularly intently on or enthusiastically to certain features of the games. We will discuss them in terms of narrative and conceptual elements or orientations in the visual and aural features of the games. It is beyond the scope of this present study to identify other correlations between the children's responses and the features of the game.

Narrative elements "serve to present unfolding actions and events, processes of change, transitory spatial arrangements" (Kress & van Leeuwen, 2006 (1996), p. 59). In addition, vectors can be implied by direction of gaze, or

trajectory of predicted movement. The younger children (Bill and Annabel) showed intense interest and enjoyment, albeit not necessarily progress, when engaged in narrative segments such as a sequence in *I Spy Spooky Mansions* where they are involved in "making" a ghost. Once they had succeeded, rather than trying to make another, they replayed the making of the ghost (an animation accompanied by a variety of sounds) several times, as if they wanted to prolong the pleasure of the moment by performing it themselves. These behaviours resonate with the behaviours noted by Lefever and Pearman (2005), who observed young children interacting with electronic storybook texts. They found that when there were numerous hotspots and graphics, the children began to interact with text as if it were a game, rather than a narrative.

When the girls engaged with the game, they showed more interest in parts of the games with what may be called a narrative orientation. To illustrate, Figure 4 shows the screen which was the focus of Millie and her school-friends' sustained attention, as shown in Figure 2.

Figure 4. **The questing screen from *I Spy Fantasy*.**

Although there are no vectors emanating from the knight's body, the setting and the presence of a human figure suggests that he is about to go on a quest. Kress and van Leeuwen (2006 (1996), p. 117) claim that gaze offered encourages an interactive relation between viewer and viewed. But gaze is denied in this screen because the knight's eyes are obscured by his visor, so arguably steering

Figure 5. **The alphabet screen from *I Spy School Days*.**

the girls away from an interactive game with the figure and into a more active relation with the setting, a successful strategy for playing *I Spy*. The design of this screen is such that it attracts the girls but then steers them away from interacting with the figure towards interacting with the setting, which is where they need to look for various objects in order to complete this section of the game. Thus, the screen's design – with its narrative orientation and lack of gaze – is likely to have contributed to the girls' successful interaction with this part of the game.

Nicholas appeared to be more focused on what may be termed conceptual or classificatory elements of the games.

The composition of this screen lacks any hierarchy of salience. By not offering a predetermined narrative sequence to follow, such screens may encourage interactivity, and an active approach to learning (Kress & van Leeuwen, 2006 (1996), p. 213), albeit within the circumscribed repertoire of possibilities offered by the game.

Discussion

Our finding that the younger children had difficulty in understanding how to play the e-game challenges the common perception that young children engage easily and naturally with computers, compared with adults (Buckingham, 2000, p. 41). As Tsantis, Bewick and Thouvenelle (2003) note: "According to this myth, children are intuitively computer competent and have an inexplicable, innate ability to use the computer and learn new software"(p. 4). There are two aspects to this. First, young children are often seen as intuitively competent with computers and as having an innate ability to use new software. Our findings show that as with all learning, certain skills need to be in place before children can learn how to play e-games. In order to play successfully, children need to be able to use language to reflect on strategy and to ask the right questions. They need to be able to elicit the constructive help of others.

The software alone cannot teach children these necessary language skills.

Second, a closely related perception is that more knowledgeable older children can teach younger children how to engage with e-texts. It is not necessary for adults to intervene. Our findings show that children benefit from focused, sensitive assistance. Children need someone who is prepared to help them reflect on what they are learning while using the computer. That someone may be an older, more experienced sibling, but we found that it was more likely to be an adult. In support of this, De Jong and Bus (2003, 2004) and Lefever and Pearman (2005) found that adult input was necessary to facilitate children's engagement with e-books, by helping children understand the function of different elements such as icons and graphics.

In terms of the manner in which individuals and groups of children engaged with this particular e-game, our findings are compatible with those of audience research on play and interactions with and around computers in early childhood (Davies, 1989; MacNaughton, 2000; Merchant, 2005; Vered, 1998; Walkerdine, 2000; Yelland, 1998). Our data also demonstrates children can and do shift between styles depending on their purpose in a given situation.

The differences in the manner in which the girls and boys in this study interacted during the e-games are in line with the findings of other larger-scale studies which point to a relationship between gender and children's interactions around and engagement with e-games, and their game screen preferences. In agreement with the findings of many researchers, we also observed gender differences around computer use (Knudsen, 2005, p. 15). Although the influence of gender has received much recognition from parents, educators and researchers alike, most discussions of its effect on young children's engagement with computer games tend to raise concerns about stereotyping, the limited appeal that most computer games have for girls (attributed mainly to the lack of focus on characterisation and relationships), and the environment in which boys and girls use computers (home/private vs. school or childcare/public) (Arthur, 2005; Green, Reid, & Bigum, 1998; Merchant, 2005).

By contrast, on the basis of several naturalistic observations in a coeducational primary school classroom and interviews with 6–9 year old participants, Vered (1998) argues against these studies' dominant emphasis on content, stating that "the social setting and interpersonal dynamics [or] the game playing environment may be a greater factor" (p.55) in determining girls' and boys' differential involvement in computer game interactions. Our observations, on the other hand, suggest that both the interactions themselves and the players' engagement with specific aspects of e-games are affected by and play a role in construing gender identity.

Previous research also suggests that gender relates to preference for certain types of multimodal features. Girls are found regularly to prefer the kinds of games where the interpersonal dimension is foregrounded, what has been

described as 'the xx factor of a story' (Knudsen, 2005, pp. 16, 27). It is important to add here that our observations are not offered as typical examples but rather as 'telling' cases, in keeping with the tradition of other early literacy researchers who favour smaller-scale research (Bissex, 1980).

Implications for educators

This study of children's engagement with e-games confirms the findings of other studies of children interacting with electronic books, where features of the electronic text have been shown to influence children's responses in various ways, suggesting that teachers need to be sensitive to the affordances offered by various kinds of software and different genres. In early childhood settings, teachers and other adults can gain an understanding of the learning potential of different types of software by close observation of young children's behaviour surrounding the use of these texts. A further implication is that social groupings and the presence of a more knowledgeable user affects the learning environment. Each of the learning styles we identified may provide evidence about the quality of the engagement. For example, the controlling style appears to offer least potential for learning, as it is associated with minimal collaboration and loss of interest on the part of other children.

Conclusion

In this paper, we have discussed an innovative method of transcribing and analysing young children's interactions with multimodal texts. We have then used this methodology to observe 4 children's engagement with e-games in fine detail, taking into account not only the spoken language, but also the visual and aural elements of the e-text and the children's non-verbal responses. It is important to take into account all these elements if we are to fully understand children's 'multiliteracy' development. The method presented in this paper is currently being applied to a longitudinal exploration of changes in the manner in which children engage with e-games. Future research will also need to look more closely at how different types of e-texts affect children's responses.

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