Observing children writing on screen: Exploring the process of multi-modal composition

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Abstract

This article reports on small-scale studies from the United Kingdom which investigated

the processes engaged in by children as they composed texts on screen using e-mail,

PowerPoint and Word. The findings highlight these children's attention to visual features

and the iterative way in which they engaged with different aspects of the writing process.

Considerable creativity was evident in their writing, particularly in their use of multiple

modes and the interplay between use of ready-made resources and the development of

ideas for composition. Implications of these findings for the teaching and assessment of

writing and further research are considered.

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Introduction

Over recent decades, there have been a number of shifts in recommendations for teaching writing in schools. In the late 1980s/1990s, much thinking focused on encouraging children to see writing as a process. Building on the work of influential thinkers and practitioners such as Frank Smith (1982) and Donald Graves (1983, 1989) and championed in the United Kingdom through the National Writing Project (1990, 1991), such approaches prioritised composition (planning, drafting and revising) before concentrating on transcription (punctuation, spelling and finally presentation). Whilst this process was never intended to be perceived as a rigid, linear process, many teachers welcomed the opportunity to encourage children to delay concerns about surface features, including presentation, until they had developed their ideas.

Over recent years, however, an expansion in the use and range of electronic texts has led various commentators to suggest a reconsideration of the process of composition (Snyder, 2002; Kress, 2003). A number of differences between composing on paper and on screen are evident:

- Screen-based texts can be easily altered and manipulated and this ease of revision may prompt writers to experiment with text more extensively.
- Composing on screen may involve words but also images, video, hyperlinks, sound and animation. As Kress (2003) argues, the screen is a qualitatively different space for writing than the page, emphasising the

importance of "design" in constructing texts and noting that screen-based texts are "subordinated to the language of the visual" (2003:166).

- Texts and resources may be created or drawn directly from programs or online sources. The ease of appropriation of images, sounds and written text, may have implications for notions of authorship. As Kress observes, writers have always drawn from their experience of other texts when constructing their own, but in composing electronic texts this process may become more overt; constructing texts becomes a process of 'assembling according to design' (2003: 6).

- Writing on screen involves a different physical relationship with the text. We look *at* rather than *down on* writing. This may encourage writers to be particularly aware of the visual impact of their work. The physical relationship between writer (s), screen, keyboard and mouse may also facilitate joint composition; the appearance of writing on screen makes it easier to present work to others for comment.

- Connectivity is significant in enabling writers to communicate quickly with a range of audiences and publish work easily. These facilities imply new and varied relationships between readers and writers and these new contexts are characterised by linguistic experimentation and identity play (Turkle, 1995; Merchant, 2004; Merchant, 2005). It may be that the process of writing on screen (and consequently moves to redraft and edit) are marked by a particularly strong sense of audience.

The new opportunities presented by digital writing have implications for the teaching of writing. Such possibilities may prompt concerns among teachers. Matthewman and Triggs's (2004) examination of the on-screen writing process was in part prompted by teachers' concerns about "obsessive compulsive font disorder"- the tendency for children to "waste time" playing with different options (e.g. endlessly changing fonts or searching through images) rather than focusing on verbal composition. Other possible worries relate to the ease with which text may be copied and pasted between sources (with associated implications for plagiarism), along with logistical concerns about providing enough time for children to develop pieces of writing on screen, rather than simply copying out a finished product.

Such tensions are interesting in themselves. They make sense in the context of assumptions about priorities for composition of print-based texts However, given the particular features of digital writing listed above, it may be that the processes, skills and orientations appropriate to the composition of digital texts are qualitatively different to those associated with print-based texts. This is particularly significant as many children will have extended experience of accessing and even composing digital texts out-of-school (computer games, moving image, Internet, email and so on) and may draw from this experience and associated strategies for on-screen writing when composing texts in school (Bearne, 2003; Marsh and Millard, 2001).

Whilst school-based studies of children's approach to writing on screen are limited, some researchers have begun to explore children's perceptions of and approaches to this process. Matthewman and Triggs' (2004) observations of young students' digital writing suggested that visual elements (such as font size and colour, layout and use of

images) may be significant at all stages of composition and play a significant role in the generation of ideas. Maun and Myhill (2005) also found that students were particularly concerned about visual aspects of their writing and generally had clear reasons for their use of such features. Maun and Myhill did, however, note that some students found the varied possibilities available a distraction and note the significance for students of visual elements even when such elements could be deemed inappropriate for the text being composed. In a study of students' responses to writing on screen, Crook and Dymott (2005) found that whilst some students liked writing on screen, others found certain aspects problematic (for example in being unable to see a whole text on screen). What seems to emerge is a varied picture: empowerment and creativity for some are tempered by frustration and limitations for others. Responses may be highly varied as individuals experiment with different ways of managing affordances and draw from varied experiences in and out of school.

In order to contribute to this growing understanding, this small-scale exploratory study aims to provide further insights into children's digital writing. It addressed the following questions:

- How do children approach the process of composing on screen? (And how does this relate to traditional models of the writing process?)

- How do children respond to the possibilities offered to them in drafting and editing their work on screen? (How do they respond to the affordances of digital texts? What motivates the choices they make?)

The Writing Contexts

This study focuses on data drawn from children's engagement with writing tasks, which variously used Microsoft Word, First Class email and Microsoft PowerPoint. Within each context, the children's decisions to revise their writing were entirely their own (unprompted by teacher intervention or feedback).

Initial data were generated during an email project involving a partnership between a class of 8-9 year-old children from a rural Derbyshire school and a class of 9-10 year-old children at an urban Sheffield elementary (both in the United Kingdom). Each child was paired with a partner from the other school and, together, they used email to plan the joint creation of a series of PowerPoint presentations exploring their shared hopes, fears and interests. Twice during their project, they also met face-to-face, enabling each pair to work together 'live' to develop their presentations. The outcomes of this project have been reported more fully elsewhere, exploring children's use of linguistic experimentation in on-screen writing, approaches to collaboration and the potential for such opportunities to transform aspects of the literacy curriculum (Burnett et al, 2004b; Burnett et al, 2005). Here, however, the focus is on the way in which 12 children composed emails and PowerPoints during the project.

Further data were generated during observations of and interviews with six 10-11 year-old children from a suburban Sheffield elementary school, who were writing on screen as part of their ongoing literacy programme. These children were observed as they worked in pairs on two compositions: a summary of their own interests and enthusiasms (using Word) and a PowerPoint presentation promoting a sandal they had designed during Design Technology lessons.

Children were observed using a variety of different programmes in order to consider their writing within a range of contexts. It was recognised that the children may approach the writing process differently using different programmes within different contexts or in different genres: for example, PowerPoint prompts the writer to use design aspects more overtly than Word or email, and children may be more likely to see visual elements as appropriate to the advertising and presentational tasks.

Research Methods

Observation and interviews were used to explore how and what the children revised and their reasons for doing so. Observations were conducted as the children worked collaboratively on their PowerPoints and individually on their emails. A series of 48 10-minute structured observations were conducted in order to capture the sequence in which different elements appeared and any changes made. Any spoken comments were recorded in order to gain insights into decision-making. Given that children's physical relationship with their writing may well be a significant factor in the process, children's movements, such as gestures, and use of the keyboard were noted. Timings were recorded to give a sense of the fluency and ease of composition.

After the observations, a total of 15 semi-structured interviews were conducted. These focused on: the children's reasons for including certain elements in their writing and making any changes (e.g. linked to content, font choice, visual elements, etc) and their perceptions of writing on screen. Printouts of the emails and PowerPoints were used as a focus for these interviews, enabling us and the children to refer to particular features.

At the end of each project, the children were interviewed again and asked to make more general comments about the process of writing on screen.

Findings

The children approached these tasks with confidence and enthusiasm. They used multimodal elements within their writing within each context. Within Word, they experimented with font, colour, visuals and layout. In PowerPoint, they created, located and imported images, added sound and animation and made changes to the size of font and image, background, colour and order of slides. The children using email did not draw so fully on the resources available: children did attach photographs to emails and clearly saw these as integral to their message, but none changed the font size or colour or used images. Some writers did seem to have experimented with layout (e.g. centring, or using double-spacing) and with the kinds of visual elements which seem to typify asynchronous and synchronous computer-mediated-communication, such as emoticons, abbreviations and phonetic spelling (e.g. see Werry, 1996; Merchant, 2001; Burnett et al, 2004a).

In examining the process through which the children composed on screen, the analysis below focuses on four features of their on-screen writing that seemed of particular relevance to this consideration of the writing process:

a) The early stages of composition;

b) The iterative process of on-screen composition

c) Awareness of impact on audience;

d) Use of readymade digital resources.

In order to preserve anonymity, children from the email project are referred to using aliases they used throughout the project, and other children are given pseudonyms.

Early Stages of Composition

The children seemed to go through a distinct phase of attention to visual elements when beginning composition in PowerPoint or Word. Initial decisions related to layout and font size with little reference to verbal elements. It seemed to be important for them to frame the text in some way. PowerPoint, through its provision of templates, encourages such considerations. However, even in Word, which does not impose restrictions on length of text, all three pairs observed (either explicitly or tacitly) created a frame for their writing before focusing on content in any detail. One pair decided to create their piece in the style of an acrostic; they listed all the letters of 'The Interests of Year 6' down the side of the page and then added words and phrases to these. Another pair constructed a frame of clip art before adding any writing. The third seemed to make no explicit decisions about framing, but worked completely within the frame as defined by what they could see on the screen. When asked to comment on how they knew they had finished their piece, they explained the reasons for this tacit decision:

Alex: We just finished everything that we wanted to put on.

Stephen: It just looked complete. It's full.

Alex: There isn't anything else you could do. There isn't any little

                   spaces.

When ideas were not forthcoming, the children seemed to "doodle" on the screen as they tried to generate ideas, making rapid insertions, deletions and changes to written and visual text. This is reflected in following sequence, which describes what one pair did

during the five minutes after they first sat down at the computer. (Functions within Word are highlighted in bold.)

> *Stacey opens Word, then types football, underlines it, centres it, enlarges heading, then goes to select **background**. There are no words spoken, but as Stacey opens the different **colour options** for the background, Michael says ''red and white, red and white' (the Sheffield United FC colours) until Stacey selects 2 colours, red and white. Stacey then rapidly makes a series of alterations on the screen: she changes the size, font and location of the heading, centring it. Next the both sit back and put their hands on the back of their heads, elbows sticking out. Stacey asks, 'what shall we do?' Michael says, 'Here' and then types <u>foot</u>. Stacey comments, 'Take the thingy off' (referring to **underline** function). Michael types: Football, football. Stacey reaches across and writes FOOTBALL, looks then deletes word and re-writes in lower case, presses return, notices that grammar has been highlighted by grammar check, investigates (looks at suggested revisions), ignores, changes font size, goes into **clipart** file, searches for football, scrolls down and chooses image, then moves to bottom right hand corner, then searches, finds and inserts football player. Again, there is no talk during any of this. Stacey then deletes the 'football' title and replaces with 'what we like Y5/Y6'. Michael comments, 'We're year 6'. Stacey deletes Y5, then also deletes 'football, football, football'. (There is now no text on the page but clip art remains).*

During this sequence, there is very little discussion but elements are rapidly added, moved, resized and deleted. This doodling may be seen as a new manifestation of an old problem. The children were unclear about the task in hand, short of ideas and unsure about how to negotiate a joint response. Alternatively, this may give the children thinking time while they settle and orientate themselves to the task. There is little evidence of this experimentation remaining at the end of the sequence, but in fact the children have played with a range of options.

The Iterative Process of On-screen Composition

Having established their overall layout, the children did not seem to move through stages in the writing process in a linear way. Instead, they moved quickly between trying things out, revising them, experimenting with presentation and proofreading their work. In Word, children continued to play with positioning of clip art, font size and shape at various stages of the process, and revision of surface features happened throughout as the children read and amended their work. Within each context, there seemed to be a constant interplay between different elements of the writing process.

This can be seen in Figure 1, which records one child's email writing. In this typical example, the child writes a word or phrase, reads it and then makes changes to form or content.

Figure 1: Child emailing

Time	On screen	Physical action	Talk (s=self/o=other)
11.12	Starts new sentence: 'm'	Looks at screen	
11.13	Changes 'm' to 'M'		

	Adds 'y'	Gazes down at legs Looks back to keyboard to find key	
11.14	'dad was a football'	Looks at screen	
11.15	Changes 'football' to 'footy'	Looks at screen	Reads 'my dad was a footy'. Giggles. (s)
11.16	'plaa'	Looks at screen	
11.17	Removes 'a' and completes 'player' Adds '!'		'Why did I put an 'a'?' (s)
11.18	What	Looks at screen, then down – hunched over keys, fingers poised	
11.19	Adds 's' and 'your dad.' Presses space bar twice. Deletes one space.	Looks at screen	
11.20	'I luv the GUNNERS'		

		Gazes round room away from screen. Looks back at screen	
	Deletes 't' in 'the' and changes to 'The'		
11.22		Looks at screen	Gasps – ooh
	Goes back and changes full stop after 'your dad' to question mark		

On-going revision of surface features (such as the spelling correction at 11.16 and the change in punctuation at 11.22) is supplemented by some changes designed to have an impact on meaning: for example, the capitalisation of 't' at 11.20 increases the importance of the football team. The regular checks for sense seen here were a common feature of children's e-mail writing. Some children would also track their re-reading with mouse-controlled cursor movements, as if poised to make minor changes or corrections.

The constant interplay between writing and reading prompts speculation about whether the physical separation of text from author supports children in editing or revising their writing; the appearance of the text on screen may encourage the writer to view it more objectively than when on paper. This may explain why some young writers pay close attention to accuracy of spelling and layout when working on-screen. In making

changes, the children seemed to assume the reader will make judgements not just on what is *said* but on what it *looks like*.

A slightly different process was observed amongst children using PowerPoint. With this program, the children seemed to move through a process of revision and editing within each slide before moving on to the next. In composing each slide, they tended to work through a series of tasks in a particular order: creating a background, then adding text and clip art and finally animation and any links. This process may reflect how the children had been taught to use the program or the internal logic of the program itself: by requiring them to settle on a slide design format in the first instance (even if only the default setting), the program prompted them to consider layout first before focusing on words.

Awareness of Impact on Audience

Decisions and revisions were often justified in direct response to a desire to create a particular impression on the children's readers. When writing their early emails, for example, the children were evidently conscious that what they wrote drove the impression their partners formed of them. Consequently, they were particularly concerned with the form their emails took. This was evident in the language they chose to use and their preoccupation with spelling. One child, for example, was comfortable using abbreviations such as 'u' for 'you' in his emails but carefully corrected the spelling of 'allso' to 'also'. When asked about this during interview he said: "I just want to do it right – cos I think the school's quite posh. Yes- I don't like people who think I'm a little town boy – I am one but I don't want them to think that."

He recognises 'u' as appropriate in this context but is keen to avoid other unconventional spellings in case his partner makes derogatory judgements about him.

Previous research (Merchant, 2001) has highlighted the way that children can perceive the use of abbreviations and emoticons (such as smileys) as "cool." These children are keen to use this "cool" language (and perhaps to show their correspondent that they can do so). The level of informality was at times carefully cultivated; in the example above, for example, the child takes 4 minutes to write "my dad was a footy player," including a painstakingly slow alteration of "football" to "footy." Interestingly, once the children had met face-to-face, their interactions became less self-conscious, with fewer attempts to refine surface features. (The abbreviations stayed but spelling/punctuation remains uncorrected.)

> I rellly liked you'r idear it was coll i have done something to a cuple off slides
>
> hope u like it

Within Word and PowerPoint documents, there were very few changes to verbal text but many changes to visual aspects. Again, these seemed to be prompted by an awareness of how their audience would *view* their compositions. For example,

Stephen: Did you change anything as you went along?

Alex: We changed some of the way that they came in. One of them flashed and then it went straight off and you couldn't read it in time. So we changed it so that it came on in a different way and it stayed.

Stephen: We changed some of the colours.

Interviewer: Why?

Alex: Because some of the words came out in a pale colour and you

could hardly read them.

Concern with layout and visual impact was repeatedly mentioned by the children reflecting on how they had approached their composition. They commented on making particular decisions in order to make things "show up," "stand out" and "look better." Their approaches to this reflected varied levels of consideration of the impact on the audience.

Two children, for example, simply welcomed the wide range of possibilities offered by the PowerPoint menu. Here they discuss the reasons why they chose different backgrounds for each of their slides:

Interviewer: Was it important to have background colours?

Corky: It looks boring with all the same colour…

Half-Life: …and it looks more colourful with different backgrounds.

Others had a more sophisticated understanding of how to create visual cohesion by using a limited colour palette:

Ivy: We kept the same background all the way through cos if we'd have

changed it they would have all looked different but you know we

had white going into pink going into white. We could have had red

going into pink going into white in a repeating pattern.

Interviewer: You didn't use it – why?

Pixie: It's nice the way it is. If you changed it, it would seem like

different.

Ivy: We wanted it all to connect so that people think that's like that one

               that's like that one.

Some children also made comments suggesting that they recognised that using too many

different elements would compromise the impact of their presentation. Here Izzie and

Twinkletoes discuss their use of animation:

Interviewer: What moves in your presentation?

Twinkletoes: The Horse rider moves sideways onto the page.

Izzie: The ball moves.

Interviewer: How did you decide?

Izzie: You know when you kick a football it would be a bit like

               dribbling. The horse rider would be like galloping on….Some

               things should be still like the tennis player standing….If more of it

               had moved in different ways it would have been better…like the

               heart would have cracked and then disappeared.

Twinkletoes: We wouldn't have wanted everything to move.

Izzie: Would have been boring

Twinkletoes: and then everything would be the same.

Not only do Izzie and Twinkletoes make selective use of the animation function, but they

recognise that overuse of a particular feature will lessen its impact. Too much movement

would have been 'boring' for the audience. Similarly, Heartbreak Kid used movement in

a number of slides but decided not to animate the written text because he "thought it

looked silly." Although these children were given no teaching input on composition, they

seemed to have developed understandings of the importance of variety and selectivity in design.

Some of the children even considered the pathways a reader might make when accessing their text. One pair (Chloe and Rachel), for example, used animation to enable each element of a PowerPoint slide to appear successively. Here, Rachel explains why:

> Because if it was just there as soon as you clicked on screen, they thought that
> they'd got to read it all at the same time. If you clicked on it, then you know what
> order to read the things in. So we put like the pictures on this and who it was
> designed by and then we put the price on and last the hyperlink in cos that's the
> last thing we wanted them to do. Cos we didn't want them to go to the next slide
> before they've read all the things on this one.

Linked to this was the children's awareness that certain features could be used to grab their audience's attention. Here Half-Life and Corky comment on their choice of a drum roll to accompany their slide on crocodiles and Pixie and Ivy give reasons for including a dissolve effect on their Special People slide:

Half-Life: On that one the crocodile was a drum roll.

Interviewer: Why a drum roll?

Half-Life: Cos the crocodile came in.

Corky: You didn't expect it… you thought it would just go onto the next
               slide.

Interviewer: How did you decide what would move?

Pixie: Just like the type of things.

Ivy   Like this [pointing at slide on 'special people'], you've got to like

look at it quick cos when you look at it again it disappears and

makes it stand out so people connect if you know what I mean.

By using sound and animation here, the children seem to draw from their experience of moving image texts and computer games in recognising that they can use the unexpected to maintain the audience's attention. The children seemed to feel that it is important to avoid predictability.

Use of Readymade Digital Resources

The commentary above suggests that the children usually had very clear ideas about the impact of different multimodal elements on their audience and some children had developed fairly sophisticated concepts of design. Significantly, however, interview data suggested that readymade resources, such as images, audio files and custom animation, also played an important part in the process of composition and that often the search for readymade resources itself stimulated the children's creativity.

Sometimes the children's choices about what to include seemed random rather than considered:

Interviewer: How did you choose the sounds to put on?

Boudicca Battleaxe: We just put any on.

Heartbreak Kid: I just went: 1, 2, 3, 4… just scrolled down the list and got

them.

Interviewer: Why did you use the spiral animation?

Michael:	We just …because…there's lots of different options you can have and we just thought it would look better to have a range of different effects

Generally, however, the children recognised the potential for different modes (sound, illustration, words, movement) to create meaning. They demonstrated considerable awareness of the semiotic potential of these elements:

Half-Life:	There's one that Corky did – that dinosaur one (140 million years ago)…I liked it cos of the noise that came on.
Interviewer:	How did you choose which noise to use?
Corky:	I just chose which was best to go with which slide.
Interviewer:	So why did you choose that noise to go with this slide?
Corky:	Cos it was a bang and the dinosaurs died out not from poachers but kind of like them.
Interviewer:	How did you choose which font to use?
Ivy:	It's because we thought what type of writing would go with the thing, like special people we chose that to be all lovey dovey and like families have been going for ages we did it in like an old/Tudor one…
Interviewer:	Did you put any animation in?
Alex:	We made the writing swirl in as curtains
Steven:	Like as an opening to the presentation.
Alex:	It's like when you make an invention and then you reveal something, and then you see it.

The children seemed to have scrolled through the menus on PowerPoint and made links between resources available and their own ideas. It is unlikely that Ivy set out to find a Tudor style font for her slide, or that Corky and Half-Life searched for a 'bang' for their dinosaurs, or even that Alex and Steven searched for a 'curtain-opening' effect. However, having scrolled down the menu and seen these options, they saw the possibilities for making conceptual links with what they wanted to say. Whilst the children used pre-recorded sounds and pre-designed images and backgrounds, they interpreted these themselves and suffused them with their own specific meaning. Through juxtaposing different elements, they created unique products.

At times, the children's openness to the possibilities available to them enabled them to respond creatively, making significant changes to the focus or structure of their text as new resources were discovered. An example of this occurred as one pair worked on their advert for a pair of slippers based on their potential to transform the wearer into Superman. In searching for pictures of Superman in clip art, they came upon a picture of a man watering plants. The pair then collected a series of pictures of people occupied in various mundane jobs accompanied by the question: "Fed up with watering your garden?.." followed by the assertion that these particular slippers would transform the wearer's life to be as exciting as that of Superman! Again, rather than being limited by the ready made resources, the children had responded by creating their own meanings.

Given the range of multimodal resources available to the children in writing on screen it is interesting that several children commented that the screen offered fewer

opportunities for creativity than paper. They regarded their writing on screen as being limited by the menu of tools and items provided:

> Alex: When it's on paper you can set it how you want but on the computer you
>
> can't….When you're writing [by hand] you've got more choices.
>
> Amy: On a piece of paper you can do loads of different things and get a bit
>
> carried away and just start. . .but with this, there's certain things you can
>
> do and you've got to choose from those things.

The children did not realise that they could or were permitted to create their own audio, visual or animation effects and so were limited by those they could find. Paradoxically, then, digital resources may both prompt and confine individual composition and creativity.

Discussion

These findings have highlighted significant features of the approach adopted by these children to writing on screen. They certainly responded to the ease of experimentation within digital texts and engaged in ongoing review as their compositions developed. Observations revealed that the children moved quickly between aspects of presenting, drafting, revising and editing. Like other studies of the on-screen writing process discussed earlier, this study showed the importance to children of visual aspects of their composition. Considerable time was spent on developing and refining visual elements and this was particularly the case as children began their writing.

In some ways this reflects what is known about children's preoccupations when writing in school-based contexts. Various studies have shown that children's revisions often focus on surface features and even when explicitly encouraged to engage in writing

as a process, children often still often see correct spelling and neat handwriting as their major priorities (Bereiter and Scardamalia, 1987; Medwell, 1994; Wray, 1993). However, whilst some revisions reported here seem to parallel these longstanding concerns, for example, in the children's attention to spelling and capitalisation during email writing, other revisions could be seen as evidence of new considerations in the writing process.

Various actions here suggested that children were approaching design in a very considered way. The children saw the multimodal elements and their juxtaposition as key to meaning-making. Whilst some children's choices seemed random, in most cases, children made deliberate decisions about which elements to include and how to use them. Interview data suggest that an awareness of audience (or at least a strong sense of the visual impact of their texts) drove these decisions. Multimodal elements were not merely additions or "eye-candy" (Burrell and Trushell, 1997) but central to the meaning the children wanted to convey. These children did indeed seem to be "assembling according to design" (Kress, 2003: 6). They appropriated elements from elsewhere but used them within their own compositions.

The children did not seem to develop a design concept before starting work. Instead, the concept seemed to emerge as the children explored the options available to them. Whilst sometimes the children did search for particular elements (e.g. a rugby ball to place on a slide about sport), much of the time, there appeared to be a creative interplay between the children's ideas and computer-based resources. The children seemed to use ready-made resources as ongoing stimuli, which prompted other ideas for both content and design. Paradoxically, however, the children themselves welcomed the

resources but felt their options were limited. The easy access to readymade resources perhaps limited the likelihood of them creating their own visual, audio or animated elements.

These insights into the iterative nature of the digital writing process and children's use of ready-made resources have a number of implications for classrooms. Firstly, they serve as a reminder that, if children are to exploit fully the resources offered by the computer, they need to draft and develop their work on screen, rather than simply moving to the computer for the final draft. This enables them to capitalise on opportunities to craft their writing and draw from the on-screen resources as they do so. Secondly, it may challenge the sometimes formulaic approaches to planning used in classrooms: an overly prescriptive plan may inhibit creativity at later stages of composition.

Enthusiasm for the potential for creativity and composition offered can, however, be tempered by the recognition that readymade resources do not always meet the children's expectations and may restrict meaning making. Whilst juxtaposing readymade elements may be a legitimate way to create an original text, such resources may be limiting. Programs such as PowerPoint encourage the presentation of ideas within a specific format and children seemed to see the options for images, layout and sound as restricted to those available in the menus. Children rarely created their own images to supplement those contained in the readymade menu.

If we are to recognise the potential of multimodality and encourage children to experiment with this in the classroom, then the creation of images, moving images and sound files perhaps need to be seen as part of the writing process (Bearne 2003). At the same time, there is a need to encourage children to evaluate the digital options they are

offered. This means encouraging children to consider the impact of different choices carefully (as these children certainly seemed to be doing), but also prompting a more critical analysis of options available. The children in this study demonstrated some awareness of the limitations of the programs they used but such recognition needs to be actively encouraged and developed.

More work is needed to explore ways of helping children to consider the way in which programs and readymade resources frame their compositions and influence the meanings they convey. Just as children can be encouraged to reflect on and revise the writing frameworks offered to them in the classroom, so they may examine and analyse the less explicit frameworks for writing presented within different computer programs such as PowerPoint. Discussion of the impact of these on their own writing may be valuable not only in prompting conscious decisions about which program to use for particular tasks but in challenging the design frameworks which exist within different digital environments. Such analysis is challenging for elementary children but perhaps not unrealistic given the level of sophistication in these children's understanding of the semiotic potential of different multimodal elements.

Children can also be encouraged to consider more critically the nature of the resources available to them and their implicit values and assumptions. Clip Art files, for example, present particular representations of the world; a search for images on the theme of "work" for example, demonstrates an emphasis on male roles in business, reflecting the origins of such programs in organisations. Again, children can be encouraged to look critically at such material and could also be involved in creating their own resource bank.

In their on-screen composition, it was clear that the children made many and frequent changes to visual aspects of their work. In contrast, limited attention was devoted to the words chosen, particularly within PowerPoint and Word. Whilst this may have been appropriate for some tasks (the advertisement and presentation), it was less so for others (the email and piece on interests). Such observations may reinforce concern that children's preoccupation with other modes may distract them from focusing on their use of the written word. Clearly classroom discussions need to focus on the appropriateness of different elements for different tasks. Maun and Myhill's commentary on the implications of seeing the writing process as a "design process" may be helpful here. They argue that viewing all writing as design is an important condition for critical consideration of which kinds of texts will benefit from predominantly visual and predominantly verbal elements (and of course subsequently how different elements may be developed and juxtaposed) (Maun and Myhill, 2005).

Elsewhere, we have written of the potential for using children's reflections on the differences between on screen and paper texts to develop their own metalinguistic awareness (Burnett et al, 2004b). It may also be possible to use reflection on the process of composing on-screen texts as a starting point for considering the writing process within paper-based text production. Sensitive teaching could draw direct parallels between the kinds of changes that children make to sound and vision in order to enhance meaning and use these as the starting point for considering the kinds of changes that may be possible with words.

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Conclusion

Despite the small scale of this research, the findings here do concur with other studies which have suggested the significance of visual aspects of on-screen writing. This has implications for planning for digital writing in classrooms. It would seem that children are likely to benefit from a variety of open-ended tasks in which they compose a range of texts for different purposes on screen. At the same time, they need opportunities and encouragement to reflect critically on the process of composition and the decisions they have made, as well as on the resources available to them.

As writing on screen becomes more commonplace, changes are clearly needed in relation to curriculum guidance and assessment of writing to acknowledge the significance of multimodal elements (Bearne 2003). In these studies, observation and discussion with children provided valuable insights into children's on-screen writing; focusing on the final product would have provided a far more limited impression of their skills and understanding. This underlines the value of observation of the writing process as an important aspect of assessment.

However, as Gee argues, literacy skills are not objective attributes but are relevant to specific contexts; they are "ways of participating in culturally, historically and institutionally situated social practices, not just as internal cognitive states manifested in behaviour" (Gee, 2000; 3). Within schools, of course, the influence of national policy, access to resources and classroom ethos will all help to create a very particular context for children's writing. If we are to further understand the on-screen writing process (or processes), there is a need for more focused studies of the ways in which children interact

with technology in different contexts when writing (for example using varied programs and for different purposes and audiences).

Significantly, however, children themselves will draw on varied experiences and the opportunities children have to use and experiment with digital texts will evolve over time, as will the programs used and on-screen resources available. It would therefore seem inappropriate to devise a formulaic approach to facilitating the process of writing on screen. Rather than this, we suggest that approaches to the writing process need to be under review as changes in technology, and importantly people's responses to these, are likely to shape the process of composition in new ways in the future. This ongoing review is something that children can participate in too, as they reflect on the way in which they tackle composition, share and evaluate different approaches and critically assess the resources available to them.

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