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Published version

MERCHANT, Guy. (2007). Digital literacy: New technologies for meaning-making in educational settings. Doctoral, Sheffield Hallam University (United Kingdom)..

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Digital Literacy: new technologies for meaning-making in educational settings

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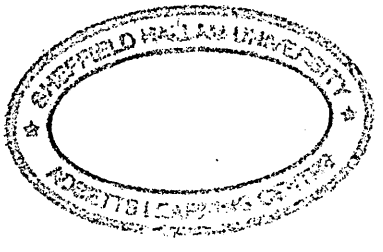
Published works submitted in partial fulfilment of the requirements of Sheffield Hallam University for the degree of Doctor of Philosophy on the basis of published work.

May, 2007



Ref No	Details of the Published Work
1	Merchant, G. (2001) 'Teenagers in cyberspace: language use and language change in internet chatrooms' *Journal of Research in Reading* 24:3 (pp. 293-306).
2	Merchant, G. (2003) 'E-mail me your thoughts: digital communication and narrative writing' *Reading, Literacy and Language* 37:3 (pp. 104-110).
3	Merchant, G. (2004) 'Barbie meets Bob the Builder at the Workstation: young children and digital writing' in J.Marsh (ed) *Popular Culture and Digital Literacies in the Early Years* London: Routledge Falmer. (pp. 183-200).
4	Merchant, G. (2004) 'Imagine all that stuff really happening: identity and children's digital writing' *Journal of E-Learning* 1:3 (pp. 336-340).
5	Merchant, G. (2004) 'What's you're a/s/l? Electronic communication and synchronous chat.' in M.Monteith (ed) *Teaching Secondary School Literacies with ICT* Buckingham: Open University Press. (pp. 133-149).
6	Merchant, G. (2005) 'Digikids, cool dudes and the new writing' *Journal of E-Learning* 2:1 (pp. 50-60).
7	Merchant, G. (2005) 'Electric Involvement: Identity performance in children's informal digital writing' *Discourse* 26:3 (pp. 301-314).
8	Merchant, G. (2005) 'The Dagger of Doom and the Magic Handbag: writing on-screen' in J.Evans (ed) *Literacy moves On: using popular culture, new technologies and critical literacy in the primary classroom.* London: David Fulton (pp. 59-75).
9	Merchant, G. (2006) 'Identity, social networks and online communication' *Journal of E-Learning* 3:2 (pp. 235-244).
10	Merchant, G. (2007) 'Digital writing in the early years.' In Leu, D., Coiro, J., Knobel, M., and Lankshear, C. *The Handbook of Research on New Literacies* New York: Lawrence Erlbaum (in press).
11	Burnett, C., Dickinson, P., Merchant, G., and Myers, J. (2006) 'Digital connections: transforming primary literacy' *Cambridge Journal of Education* 36:1 (pp. 11-29).
12	Merchant, G., Dickinson, P., Burnett, C., and Myers, J. (2006) 'Do u like dogs or writing – digital message exchange in the primary classroom.' *English in Education* (pp. 21-38).
13	Merchant, G. (2006) 'A sign of the times: looking critically at digital writing.' In J.Marsh and E. Millard (eds.) *Popular Literacies, Childhood and Schooling* London: Routledge Falmer (pp.93 -108)
14	Davies, J., and Merchant, G. (2006) 'Looking from the inside out – academic blogging as new literacy.' In Knobel, M. (ed.) *The New Literacies Sampler* New York: Peter Lang (pp. 167-197).

Abstract
As new techno-literacy practices become embedded in society, they impact on ever younger age groups. The technological environment that children and young people now inhabit directly involves literacy, both in the broadest sense and in the more specific area of lettered representation. This has profound implications for how we conceive of the use of literacy in educational environments and how we plan for literacy curricula. My work focuses on children and young people's on-screen experience and particularly the productive aspect of writing-with-new-technology. I suggest that writers are involved in the production of new kinds of texts, and that these provide opportunities for different kinds of identity performance. Over the last six years I have looked at different ways of theorising changes in written communication and the relationship between these changes and curriculum design and practice. I have documented a change of emphasis in educational responses to digital literacy, a move from concerns about *whether* to use new technology to *how* to use it in literacy, and suggest that there is a need for more work that shows how digital writing can be embedded in classroom practice in ways that provide authentic contexts for learning and communication. Because digital writing involves new kinds of skills and new kinds of social practices it cannot simply be grafted on to existing instructional practices and curricular objectives, so through my classroom-based studies I have illustrated some of the possibilities and the issues that are raised by incorporating these practices. I argue that there is a need to re-evaluate the ways in which writing is taught and develop our understanding of what constitutes writing development in digital environments. This will involve more exploration of what experiences, resources and guidance are most helpful in the early stages of literacy in order to build an understanding of the appropriate balance between experimentation, skill instruction and critical engagement with new writing tools and processes.

Overview

Children and young people are growing up in a rapidly changing social world - a social world that is marked by the spread of new digital technologies. The impact of these technologies on the toy and game industry, on mass entertainment and communication, and on the ways in which many of us live and work has been little short of transformative. In our schools, despite a substantial investment in computer hardware and software, there is still unevenness of provision and access, and considerable professional uncertainty about how to integrate new technologies in the curriculum. Nowhere is this uncertainty more keenly felt than in the area of literacy.

Literacy educators, it has been suggested, need to assess the significance of new communication technologies and the ways of producing, distributing and responding to messages that typify them (Lankshear and Knobel, 2003). This involves looking at new genres, emerging conventions of communication and the changes in language associated with them. In doing this, educators will inevitably have to negotiate the tension between notions of correctness and the realities of linguistic change, as well as a whole host of other issues that emerge with the growth of peer-to-peer communication and digitally-mediated social networks. It is against this backdrop of rapid social change and professional uncertainty that the work on digital literacy and new communications technology in this collection is based. The work focuses primarily on digital writing, but partly because of the multimodal nature of this communication, there is an inevitable overlap with the wider area of new media studies.

Table 1, below, shows how the work included constitutes an original contribution to new knowledge in the field of digital literacy, providing a map to the collected publications. This table shows the publications that are significant to the development of theory, those that employ new approaches in terms of methodology and those that contribute to our developing knowledge of digital literacy practices both inside and outside of formal educational contexts.

Theoretical development	• classification of digital texts • definition of digital literacy as a field of enquiry • the presentation of self and online identity performance • the concepts of anchored and transient identity	ref:1; ref:13 ref:10; ref:13 ref.4; ref:7; ref.8; ref:12; ref:14 ref:7; ref:12
Methodology	• combining on-screen text capture with observation and interview • collaborative action research with teachers using online intervention • parallel autoethnographies • online publication of fieldnotes and analyses	ref:1; ref:11 ref:2; ref:4; ref:8; ref:11 ref:14 ref:14
Empirical findings	• understanding of how blogging is used by academics • informal learning of teenagers engaged in online activity • description of kinds of linguistic innovation associated with digital literacy • knowledge of linguistic 'conventions' of digital literacy in young children • ability of young children to choose appropriate register for on-screen and paper-based writing • knowledge of the uses of digital literacy in the early years	ref:14 ref:1; ref:5 ref:1; ref:2; ref:4; ref:5; ref:6; ref:11 ref:4; ref:6; ref:11 ref:2; ref:11 ref:3

Table 1: Examples of how the work included here contributes to new knowledge.

Developing from an initial interest in the relationship between out-of-school literacy practices and the official literacy curriculum, my work can be seen as

a sequence of bridging exercises through which I have attempted to see what meanings and uses colleagues and teachers make of digital literacies in their classrooms. This has been set against the broader intellectual project of capturing, describing and theorising the changing literacy practices that are emerging in an increasingly networked society. Throughout this work four distinct, yet inter-related themes emerge. These are:

1. The changing landscape of communication in the digital age.
2. The changing nature of textual forms and the role of writing within these forms.
3. The changing materiality and affordances of digital writing.
4. The changing relationships and identities that are mediated by digital literacy.

These four themes will be explored in the following sections in order to contextualize the work and to develop the central idea that the future of writing is closely interwoven with the future of digital technology. Within these sections I will overview the original work undertaken and its contribution to the study of literacy before concluding with a critical view of the methodological dilemmas and directions for future research.

1. The changing landscape of communication

New technologies not only fundamentally change the ways we write, and communicate, they also change *how* we interact and *who* we interact with. Partly because of this, as Nixon (2003) suggests, a theoretical perspective that focuses on literacy as a social practice is likely to provide useful anchorage for investigative research. The work of Barton (1994) and Barton and Hamilton (1998) is particularly influential in this respect. Their explorations of literacy as a social practice show how specific activities (such as sending an email or contributing to a discussion board) are linked to the wider social structures in which these events are embedded and help to shape (Barton, 1994). Specific 'situated' literacy acts or events can then be analysed – for instance, by looking at the participants and settings, and the particular artefacts, activities and technologies that are used (Hamilton, 2000). These literacy events can be seen as specific instances of literacy practices which are linked to broader sets of values, attitudes, feelings, and relationships (Street, 1993).

Another useful perspective for looking at the changing landscape of communication comes from paying closer attention to the relationships between text, design and communication. New technology involves new ways of meaning making, and these often challenge the authority of the book and the page as dominant sites for representation (Kress, 2003). The socio-semiotic approach developed by Kress (1997; 2000; and 2003) has led to careful consideration of the characteristics of screen-based communication. His work has highlighted the affordances of the screen and suggested a descriptive framework for describing meaning in different media. This in turn has helped to develop an understanding of the visual nature of the screen and how its characteristics differ from that of the page. Emphasis on the visual

appearance of new textual forms has shifted attention to the multimodal design features of screen-based texts.

The dramatic shifts in the forms, uses and technologies of writing that have taken place over the last twenty years raise fundamental issues about the nature of literacy and the role of education in promoting literacy. My own work continues to make an important contribution to the academic and professional debate about these issues. A significant amount of the existing body of writing and research on the topic acknowledges the possibility that new technology might *help* in literacy instruction or in the acquisition of literacy; but this rests on the assumption that literacy is somehow separate from technology - that it primarily exists in the practices of meaning-making of conventional print-based text (**ref:10; ref:11**). An alternative perspective, and one captured in part by the term 'new literacy' (Lankshear and Knobel, 2003) and developed through my own programme of research, suggests that there is an intimate relationship between technology and new communicative practices and suggests that, because literacy is radically changed by new practices, we need to re-draw the literacy map of schooling. My own case studies provide new insights into classroom practices that employ digital literacy in this way and identify some of the key issues that emerge. (**ref:2; ref:3; ref:4; ref:8; ref:11**)

Attempts to map the changing landscape of new communications and to chart routes through it for educators have prompted a flurry of activity. Armed with an intimidating array of terminology and a complexity of models commentators have waded into the deep water of digital media with something approaching revolutionary zeal. Some of the most influential theorizing has resulted in a rather arbitrary construction of binaries. For example, a new generation of video-gamers emerge as being more sophisticated and better purposed for late capitalism than those who are traditionally schooled (Gee, 2004a; 2004b); those with access to new technology are separated from an emerging underclass of those who haven't (Tapscott,1998); the digital world itself is split between 'natives' and incoming 'migrants' (Prensky, 2004). Even literacy, the field of study, mutates into something like 'new literacy studies' (Street,1997) or 'new literacies' (Lankshear and Knobel, 2003), distancing itself from the study of traditional print literacies.

When children and teachers set foot on this landscape we might well ask how useful these maps are, and how helpful it is to speak in terms of binaries or even compelling futures. My programme of research has attempted to shift thinking by providing case studies of new approaches to using digital writing which build on earlier research on writing but at the same time challenging existing assumptions (see for example, **ref:3** and **ref:11**). I have shown how early research on computers and writing, focused almost exclusively on investigating the possible motivating effects of writing on screen (**ref:10**). It was predicated on the assumption that first one learnt to read and write, and then these skills could be transferred to keyboard and screen. To ask if using computers can improve writing, or for that matter reading, is a notoriously difficult research question to answer and one that only really makes sense in a context in which there is real choice and genuine scope for comparison.

Over the last ten years we have moved to a position in which a literacy curriculum that ignores on-screen writing is an impoverished one, so rapid has been the pace of change. But we still have a long way to go in investigating the specific detail and there are some important questions to be addressed. They are, in fact, questions that require far more than a simple model in which literacy is *applied* to screen-based texts - and it is here that the concept of digital literacy is most useful.

In 'Literacy in the New Media Age', Kress (2003) argues that 'lettered representation' is a central defining feature of literacy. He goes on to develop a view of new media that illustrates how we construct meaning through a variety of modalities that complement, augment or replace written representation in different communicative contexts. This view of literacy and its place in reading a complex screen is not without its limitations, but is central to an informed understanding of digital literacy. Kress's definition is limited in the sense that it seems to distinguish between the use of letters and other symbols, such as icons, pictograms and numbers, as well as those visual features that indicate corporate branding, identify navigational functions and highlight hyperlinks. Surely, these fall within the domain of written or symbolic representation and are not simply concerned with letters and the related skills of de-coding. As Harris (2000) suggests, new technology begins to blur the 'conventional boundary lines which treat iconic symbols as non-words.' However I argue that, despite these concerns, it is important to place written (symbolic) representation at the heart of any definition of digital literacy (**ref:1; ref 6**).

Digital literacy could be defined as the study of written or symbolic representation that is mediated by new technology. Its prime concern is the production and consumption of the verbal and symbolic aspect of screen-based texts - and this would signal its initial point of departure with print literacy. Furthermore, the specific affordances of digital literacy could be conceptualised as a product of the technological means of its production and consumption. This is not to deny the complex and often very visual nature of many digital texts. As Kress (1997; 2000; and 2003) has repeatedly pointed out, the move from page to screen has resulted in a turn to the visual, and the development of multi-media technologies clearly allows for new possibilities of combination in the creation of multimodal texts (see, for example **ref:1; ref:3; ref:14**). Whilst there is no doubting the truth of this, we cannot afford to overlook the fact that written information has a central part to play in many screen-based forms and that some of the most popular of these (such as email; texting and blogs - **ref:13**) are conducted predominantly through writing.

So, it is important to acknowledge that one of the key characteristics of digital literacy is the way in which it readily combines with other modes of communication. Context is of central importance in any practice of literacy and the multimodal nature of many screen-based texts highlights the importance of combining our reading of visual and other modes with digital writing as we make meanings through these new texts. The central concern of digital literacy, however, is reading with and writing with new technologies -

technologies which involve the semiotic of written representation, regardless of whether or how they combine with other forms of representation. In this sense digital literacy extends out of print literacy despite the fact that the processes, surfaces and spaces of production and consumption are different. The common ground is writing and this I have argued, is helpful and important, particularly to educational and developmental debates. But when we consider the forms and functions of writing on-screen and the texts and contexts in which digital literacy is located, much larger shifts of emphasis become apparent. My work provides a clear and original classification of these shifts of emphasis. The most salient of these changes of emphasis are shown below (adapted from **ref:13**)

1. A move from the fixed to the fluid: the text is no longer contained between the covers or by the limits of the page.
2. Texts become interwoven in more complex ways through the use of hyperlinks.
3. Texts can easily be revised, updated, added to and appended.
4. Genres borrow freely, hybridize and mutate.
5. Texts can become collaborative and multivocal with replies, links, posted comments and borrowing – the roles of readers and writers overlap.
6. Reading and writing paths are often non-linear.
7. Texts become more densely multimodal (as multimedia allows for a rich interplay of modes).
8. The communicative space is shared and location diminishes in significance as the local fuses with the global.
9. The impression of co-presence and synchronous engagement increases.
10. Boundaries begin to blur (work/leisure; public/private; serious/frivolous)

The transformation is characterised by new possibilities for texts, easier combinations of semiotic systems and new communicative relationships (see **ref:1;ref:2; ref:11** for explorations of this). In addition more general features such as the ease and speed of communication and the largely unregulated nature of publication and audience are important to take into account (**ref:14**) Whilst these features challenge and extend our definition of literacy, writing still has a fundamental role to play, and this is a consistent theme in the work in this collection.

2. The changing nature of textual forms and the role of writing

Because digital literacy involves different ways of producing and distributing text, it creates new possibilities for how we might operate in and construct the educational environment. These possibilities include the exploration and critical evaluation of new text types, as well as the ways in which learning can be supported and enriched through new kinds of interaction (see for example **ref:2** and **ref:8**). The recent and rapid growth of social-networking, including music-sharing sites like Pandora, the popular production of personal pages (using Myspace and Blogger), and photo-sharing (Ringo and Flickr) draw our attention to exciting possibilities of dispersed interactivity and interest sharing

through affinity spaces (Gee, 2004a). Social-networking of this kind, I have argued, provides new avenues for educators to explore (**ref:9**).

In the growing literature on digital literacy it has become quite commonplace to distinguish between asynchronous and synchronous digital communication and this can indeed be helpful in identifying the textual characteristics and social affordances of new textual forms. Figure 1 plots some of the more popular uses of synchronous and asynchronous digital communication against their characteristic levels of interactivity. This can help us to understand and account for the variations in the texts themselves, to be specific about similarities and differences with forms of print literacy and to begin to envision the educational implications of embedding these in classroom practices. A brief exploration of some popular forms of synchronous and asynchronous communication follows.

Email, one of the most widely known and used kinds of digital writing, is essentially asynchronous. Although the promise of co-presence and rapid message exchange are a defining feature of email, the impression of immediacy is a by-product of the speed of delivery - sending an email does not depend on the recipient being online at a particular moment in time. As email comes of age, it is easy to overlook the fact that it serves a wide range of purposes, from institutional control to opportunist marketing, and from everyday social contact to light relief in the workplace. Genres and sub-genres of email continue to proliferate and with them so do the linguistic markers of formality and informality, authority and power. Young learners need plenty of experience of email (**ref:2**). Email provides excellent opportunities for purposeful writing, and the asynchronous nature of the medium allows communication with other learners, experts and others without precise co-ordination of timing. A number of my own studies have illustrated how different uses of email technology enrich and transform the literacy curriculum (**ref:4; ref:6; ref:11**). Despite the simplicity and adaptability of emails, many schools in the UK still struggle to integrate its use into the curriculum (**ref:2**). In short, the huge potential that email offers to young writers in providing them with the tools to communicate purposefully with peers and experts beyond the classroom has yet to be fully realised (**ref:11**).

Discussion boards are another popular form of asynchronous digital writing. In my work I have shown how subscribers' contributions often have the function of providing nuanced orientations to cultural products (**ref:6; ref:9**). We can find discussion boards on an extremely wide range of topics from politics to video-gaming, celebrity gossip to home-schooling. Discussion boards are typified by multiple use, the text itself is ongoing, being co-constructed by subscribers who read and reply. The majority of studies on educational uses of discussion boards focus on higher education (see for example Burnett, Dickinson, Merchant, Myers, 2004), but there is plenty of scope now for their use both within localised VLEs and in more public settings.

	Synchronous	Asynchronous
One-to-one	2-way instant messaging	Most text messages Inter-personal email
One-to-many	Broadcast messaging	Blogging Webpages
Many-to-many	Chatrooms 3D Virtual Worlds Online gaming	Discussion boards Wikis Photo-sharing

Figure 1: Interactivity and online literacies

The growing popularity of weblogs (or blogs) – created with relatively simple publishing tools which allow users, often at no cost, to publish on the web - is of particular interest here. Blogs are personal (or group) webpages that are regularly updated, often with fairly brief postings in date order. They have become a very popular form of digital text and one that is carefully explored in my own work (**ref:13**). Experts estimate that there are literally millions of blogs worldwide (Blogcount.com, 2005) serving the needs of a wide range of individuals and affinity groups. Blogs, as a form of digital writing, are characterised by the promise of a public platform for the individual user and are used for a wide range of purposes (see Knobel and Lankshear, 2006 for a typology of blogs). Language use in blogs varies widely in terms of formality and bloggers often incorporate other media in the form of embedded visual or moving image content. In a recent collaborative study with Davies (**ref:14)** I investigated the phenomenon of academic blogging from an insider-perspective. This is the first published account of academic blogging. For schools, blogs provide possibilities for rapid online publication and for networking with geographically dispersed audiences. As a relatively new genre of digital literacy, blogging is already beginning to capture the interests of schools.

Email exchange, discussion boards, and blogs do not depend on co-presence. However, other kinds of digital communication do. Various forms of online chat, instant-messaging and virtual world play fall into this category, often referred to as synchronous communication. Up until relatively recently, synchronous communication has been limited to face-to-face interaction, the use of telephones and video-conferencing. The increased speed and availability of broadband connectivity has led to a proliferation of synchronous communication, most of which is transacted through writing, rather than the spoken word. In the past synchronous communication through writing was relatively rare (the passing of notes in class being a notable exception); now

instant-messaging, chatrooms and virtual world play attract large numbers. My own study of teenagers' use of synchronous chat (**ref:1; ref:5**) shows how actual and virtual friendships are sustained and new relationships negotiated through these onscreen communicative practices. I observed that when teenagers are online they deploy a whole range of new literacy skills (including the use of symbols, hyperlinks and abbreviations) - but it is worth reiterating that these are mediated through rapid typing, motivated by a drive to maintain pace, relationship and the conversational flow of synchronous interaction.

In chat, as well as in the sort of interactions that occur in online gaming and virtual worlds, we see the emergence of a new form of writing described by Ferrara, Brunner and Whitemore (1991) as Interactive Written Discourse in which relatively unpolished, tentative, and grammatically incomplete turns are commonplace. Interactions occur in real time and, as a result, securing a turn in the conversation calls for speed and brevity in message production (**ref:1**). Users often experiment with word abbreviation and non-alphabetic keyboard symbols. As Werry (1996) shows, these sorts of linguistic innovation are features of synchronous chat, regardless of the language they are conducted in. My work on teenagers' digital literacy led to the development of an original descriptive categorisation of this linguistic innovation. (**ref:5**)

In synchronous online communication, writing is often used in ways that are traditionally associated with speech (**ref:5**). As the euphemism 'chat' implies, interactions are typified by their spontaneity and informality, all of which suggest that in educational settings, chat may come to be viewed as part of a learning process rather an as a written product in itself. So, for example, in an educational 3-D Virtual World environment, digital literacy plays an important part in 'getting things done'. Children engage in a range of genres of written communication to achieve learning goals some of which may include more polished written texts.

These examples of new genres of digital text suggest a need to re-conceptualise writing, our approach to learning about writing, as well as our ideas about teaching and using writing in the classroom. They may well provide us with templates for a new interactive literacy which reaches well beyond the classroom walls.

3. The changing materiality and affordances of digital writing

If writing and reading are intimately connected with the technologies employed in their production (**ref:6**) it seems important to identify what exactly is new about the technology of digital writing. As I have already argued there are key differences in the ways in which digital texts are produced and consumed, and that alongside these there are new possibilities for interactivity. However, in doing this, it is easy to overlook some of the most basic features of digital writing. These are related to the materiality of the technology. When we write with a pen or pencil there is a direct relationship between the hand and the letters that are formed. We create patterns from memory of the alphabetic shapes of our writing system, whereas when we use a keyboard or the buttons on a mobile phone, we select from a palette of

letters, numbers and related graphic symbols. Our writing appears on a screen (or the screens of others) with relatively little effort on our part, looking deceptively like print on paper. This, in fact, constitutes a radical shift in the way we write and distribute writing – a shift which some have argued is as significant as the development of the printing press (**ref:13**). One of the most basic changes is concerned with the 'simple' physical activity that characterises digital literacy. Harris points out that in writing on screen:

> '...the basic operational units are no longer, as in traditional scripts, either the word or the letter, but the separate keys provided by the keyboard; and the operational syntax is the combinatorial logic of pressing them in sequence or simultaneously. '
>
> (Harris, 2000:241)

This combinatorial logic has been so rapidly assimilated into our literacy practices that it is often taken for granted. My own observational study of children's spontaneous play with new technology in an early years setting shows how ways of handling and using devices like mobile phones and laptop computers have become everyday knowledge for some (**ref:3**). However, this and later observational work with primary school children (**ref:11**) suggests that this basic operational knowledge may be unevenly distributed and that poor keyboarding skills could become an obstacle to educational progress.

The affordances of digital literacy have also transformed some of the composition and editing processes associated with print literacy. Functions such as inserting and deleting, cutting and pasting, and shifting blocks of text – which are, incidentally, still described as if they involve physical labour - have been reduced to key strokes, allowing for more fluidity in text construction. How text looks on the screen, as Kress suggests (2003), becomes important and layout and design features assume more prominence particularly when we introduce figures, illustrations and other media. In looking at younger (**ref:3)** and older (**ref:6**) children's digital writing I have shown how their concerns for visual presentation are expressed.

Digital literacy, as Mackey (2003) has observed, radically alters our physical relationship with the text, and in educational establishments new tools for writing and reading continue to have a profound impact on the physical geography of classrooms. Computer labs often break with the long tradition of requiring pupils to 'face the front' and, like internet cafes, adopt the idea of the private booths which draw the learner's gaze to the screen rather than into eye contact with the teacher, the board or the text flat on a desk (Holloway and Valentine, 2002). As machines become more portable and networking more commonplace, new possibilities arise. Intimately connected with these changes in classroom geography are questions about the nature and direction of communication in contemporary learning environments, particularly as the possibilities for communicating with the world beyond the classroom walls increase (see **ref:6** and **ref:8**). At the extreme these developments question the need for learners and their teachers to be in the same place at the same time - admittedly an idea that is more familiar in the area of adult distance

learning - but with the rapid uptake of VLEs and Learning Platforms it is likely to become more common in the school sector. Contrast this with popular uses of interactive whiteboards which re-instate the traditional 'face the front' classroom geography and we begin to see some of the tensions that lie at the heart of digital literacy.

Interactivity and collaboration are rapidly becoming key features of digital text production. Through a number of research projects I have demonstrated how email can be used to establish dialogue between children and experts (**ref:2**; **ref:4; ref:6**) and between children in different schools (**ref:7; ref:11**) in the process of collaborative writing. Other forms of digital writing show how texts can acquire a new sense of depth through hyperlinking and how online collaboration in wikis and blogs can result in multiple authorship (**ref:13; ref:14**). Synchronous communication in chat, instant-messaging and 3-D virtual world gameplay draw our attention to how more conversational interaction can take place through relatively unpolished writing that has much in common with the spoken world. These developments suggest that digital literacy involves new ways of creating and using the written word.

In the future it is likely that the ability to combine and access media will become much easier (and much faster) but there is little to indicate major changes that will threaten the centrality of written communication. In fact it seems likely that digital literacy will become more significant and that the current tendency for it to develop distinct registers (such as those used in discussion board posts; instant messaging; texting and so on) will continue. Building a flexible and intelligent educational response to digital literacy then becomes important both from the point of view of valuing children's everyday digital experience and in terms of preparing them for the future (**ref:10**).

4. The changing relationships and identities that are mediated by digital literacy

The study of online communication repeatedly shows the extent to which interaction is interwoven with identity performance (Turkle, 1995; Markham, 1999; Sunden, 2003; Thomas, 2004). A similar pre-occupation has been observed in my studies of children's digital interactions (**ref:6; ref:7; ref:12**). There are a variety of accounts for this phenomenon. The most persuasive revolve around two positions. The first is related to the affordances of the technology itself, and the second based on an account of the wider social conditions in which new technology is embedded.

One explanation derives from an acknowledgement of the impact of the recent and rapid increase in alternatives to face-to-face communication. Although the facility to communicate with those who are not co-present, or who are geographically remote, is arguably as old as writing systems themselves, new technology undoubtedly provides us with a range of tools which enable us to interact in different ways within more diverse and dispersed networks than previously imaginable. Although we are beginning to see some developments in the use of webcams and internet-based video-

conferencing, most online interaction takes place though digital writing - a relatively lean medium which is stripped of the prosodic features of oral communication and the paralinguistic features of face-to-face communication. In other words it may be important to signal who we are and what we feel in different ways. From this perspective, new tools for communication provide a context for new kinds of identity performance, or as some commentators argue, have helped to create a new kind of person (Thomas, 2004).

Another alternative explanation for this growing interest in social identity and new media derives from a broader view of the contemporary social context. Wide-reaching changes in the economic, political and social order, which have had both global and local impact, have produced both the necessity and the desire to create and maintain new kinds of social networks (Giddens,1991). The rise of a new capitalism (Gee, 2004b) with a global reach has given rise to a system in which it is less likely that goods are produced and consumed locally, and more likely that production is co-ordinated across locations and that goods are marketed to consumer-types rather than geographical locations. This sort of arrangement requires the development of particular communicative tools, but more pertinently leads to the emergence of new social identities – identities that are more accurately defined by lifestyle, media consumption, and affinity spaces than by the more traditional makers of, race, class, gender and place (Kress and van Leeuwen, 1997).

Whichever explanation we find the most persuasive, it seems an inescapable fact that the landscape of communication has changed, and indeed continues to change, and that fact in turn raise new possibilities for constructing and performing social identity. In my study of teenagers in chatrooms (**ref:1**) I showed how participants established allegiances around favourite TV shows, humorous websites and popular music. Later in a study which focused on the development of primary school children's narrative writing through email exchange (**ref:4**) I noted how the role-play characters they constructed hybridised their interests in fashion and relationships with their media interest in the fantasy genre. A closer look at the linguistic features of children's interactive email messages, and follow-up interviews (**ref:6**) showed how children were aware of how particular linguistic forms could signal specific identities. This work led on to some theoretical development on identity performance in online communication (**ref:7; ref:9**) in which I developed a model which accounts for the ways in which children and young people perform both *transient* identities (for example those associated with popular culture, iconic figures and objects or fandom) and *anchored* identities (which reflect gender, position in family, religion, age, social class and geographical location).

The idea of anchored and transient identities has subsequently been used by other researchers in the field, and there is now a need for further some further refining of the ideas, particularly with respect to the ways in which the two different kinds of identity performance inter-relate and overlap. So, for example, the ways in which gender identity can be signalled in online interaction by making reference to musical preference, sporting icons and

other interests is a particularly fruitful area for exploration. My recent collaborative study of academic blogging (**ref:14**) adds to the theme of identity performance through an exploration of how it manifests in self-publication and through online social networking.

5. Methodological dilemmas

Working in a new field, and one in which there are a number of radical breaks with tradition, presents considerable challenges for the researcher. In this section I will explore some of the methodological dilemmas that have emerged through my research in digital literacy, as well as raising some questions for future work.

In looking at the writing of children and young people there is a well-established tradition of focusing on the texts produced (from the work of Rosen and Rosen,1973 to that of Dyson, 2003) and I begin by addressing some of the difficulties encountered in adapting this approach to the study of digital literacy. Textual analysis is, in a sense, an obvious starting point for the study of writing practices and the history of research in the social sciences provides many blueprints for this. Although there is a considerable experience of working with print-based text as research data this is not an entirely unproblematic area. As Hodder (2003:156) reminds us, 'texts have to be understood in the contexts of their conditions of production and reading', and, in the final analysis, there is no single 'correct' reading of a text. The same caveats are, of course, equally applicable to digital texts: all the researcher can hope to offer is *one perspective* on the text. Further to this, the complex configuration of digital texts which are often multimodal, hyperlinked and dynamic in character, make even these partial readings increasingly problematic.

Despite these limitations current research on digital writing makes heavy use of established approaches to textual analysis. Here, researchers draw on the practices of print-based textual study, incorporating linguistic and semiotic analyses. For example, Shortis's (2001) study of a corpus of text-messages focused on the linguistic features of abbreviation and non-standard spelling in SMS texts, whereas Burnett et al. (2004) adapted approaches from conversational analysis to look at functional characteristics of the exchange structure of synchronous chat between students. A seminal work on chatroom interaction by Werry (1996) provided a detailed analysis of discursive features such as turn-taking and addressivity, and a more general look at linguistic innovation. My own work on synchronous chat (**ref:1; ref:5)** attempted to supplement this narrow focus on text by including observational and interview data. Nevertheless an emphasis on textual products such as chat episodes, screenshots and archived messages continue to be a defining characteristic of this work. Techniques used here tend to freeze and decontextualise these dynamic textual forms in order to make study possible.

Recent theorising in the domain of literacy studies has been dominated by a social account of literacy. Street's concept of socially embedded literacies (Street, 1997), descriptions of literacy practices and events (Barton, 1994) and the semiotic approach (Kress, 1997) all demonstrate the intricate

connections between text production and consumption, and social interaction within discourse communities. From this perspective, a robust methodology for the study of digital writing would need to take account of the multiple perspectives and activities of readers and writers as well as analyses of the complex texts produced. In my collaborative work with teachers, I have attempted to set my impressions of children's digital writing, alongside their own reflections and those of teachers involved **(ref:6; ref: 11)** to provide a richer account of the texts produced. This has begun to uncover the ways in which children draw on popular culture in their writing and this theme recurs throughout the work in this collection **(ref:6; ref:8** and **ref: 12).**

Writing is an aspect of material culture, and its history is one of changing technologies of production. The turn of the digital, it has been argued, changes the nature of writing, its forms and purposes as well as the disciplines of the body and the physicality associated with the use of new tools. A defining feature of digital literacy is the use of keys and screens, and the combinatorial logic of this kind of writing; and so, an informed account of new writing practices would need to include the mediating forms of technology that are intimately connected with textual production. Observational work in this collection pays close attention to the keyboarding and screen-navigation behaviours of teenagers **(ref:1),** of primary school children **(ref:11),** and young children in an early years setting **(ref:3).** In the earlier work **(ref:1** and **ref:3)** I used fieldnotes to capture these observation, whereas in the later work **(ref:11)** I developed a time-sampling approach with my co-researchers to capture the relationship between spoken interaction, keyboarding and writing on screen.

If the complex interactions between people and machines lie at the heart of communication through digital writing, methodological questions about the nature of enquiry and the position of researchers are equally important. Existing work in the field of digital writing shows how researchers can adopt a number of possible relationships to the digital culture they study. We may recognise in this kind of work an attempt to capture and document new practices and, in the case of Rheingold's work, even to predict the future (Rheingold, 2003). There is perhaps, an unspoken concern here that age and scholarship may combine to create the distance of an outsider, as the researcher becomes as remote as that of the colonial anthropologist (Denzin and Lincoln, 2003). From this perspective, even detailed ethnography of the textual worlds of Japanese schoolchildren can seem like outsider readings of 'exotic' practices (Ito, 1995).

Relatively few studies seem to give the lead on insider research. A notable exception is Sunden's online ethnography of a MUD community (multi-user domain). In her very readable account (Sunden, 2003), the researcher becomes a full participant in the community, creating her own online identity, whilst at the same time skilfully managing ethical considerations by sharing her offline research agenda. Using a similar approach, Mortensen and Walker (2002) use a strategy that has more in common with autoethnography to chart their own involvement in blogging. My interest in the area of digital writing has been profoundly influenced by personal experience and this has informed

much of my work. This is evident in classroom-based work, but is more explicit in theoretical work (**ref:9** and **ref:13**) and takes centre stage in the study of academic blogging which is based on systematic reflection on first hand experience (**ref:14**). This provides a differently nuanced account - an insider view, in which the researcher is at the same time the research subject.

Different research positions certainly provide a starting point for a systematic study of the role of writing in digital culture, but there is clearly scope for development and synthesis. I want to conclude this section by sketching out some important themes for further consideration. These themes cluster around the inter-relationship between the unit of analysis and the mode of data collection. As we have seen, a number of studies tend to isolate elements of digital writing, focusing on, for example, the writer or the text. Yet a common characteristic of popular digital writing is the way in which the word onscreen mediates a social relationship between two or more people. From this it seems that a more rigorous approach would involve the study of digital writing in its broader social context, uncovering the subtleties of local settings and their interplay with the different perspectives of participants. This in turn would have implications for modes of data collection. Ways of describing the dynamic nature of onscreen communication are needed in order to understand collaborative text construction, movements between reading and writing, and the changing, visual nature of screens (Kress, 2004).

One aspect of this description concerns human interaction with technology. Some researchers have used screen capture software (Leu, 2000) which can provide a detailed record of activity onscreen (edits, clicks, navigation etc), which clearly has some advantages over the static screenshot used in other studies (eg: Burnett et al., 2004). However, an inherent difficulty with screen capture software is the vast amount of data generated. As we have seen observational approaches are useful in monitoring social interactions around screens as well as individual's keyboard behaviour.

Finally, it is important to ask to what extent the study of digital culture could (or should) influence ways of conducting and disseminating research. As Facer argues, we could easily see new literacy practices as:

> '...a phenomenon existing 'out there' in the world of research subjects rather than a set of practices that might reciprocally alter the ways in which researchers interact with research subjects, each other and the wider audience for [...] research.'
>
> Facer, K. (2002)

Here, there is the suggestion that studying digital culture in daily life and education may not only lead us to re-think how we do research but also how we present data, involve participants and disseminate our findings. In the study of academic blogging (**ref:14**), fieldnotes, in the form of a metablog were publicly available from the inception of the study as were the initial analyses. Although these did not attract a lot of attention, fellow researchers not directly involved in the project were able to follow its development and were invited to comment. This approach presents interesting possibilities for

participant-checking but also has wider implications for the research process. Research traditionally begins with data collection and analysis and only reaches publication when this has been synthesised. This linearity is challenged by the possibilities of instant publication and feedback that are now available. Clearly there is a need for more work in this area and, as Nixon (2003) observes, a focus on *how* we research as well as *what* we research. Nevertheless, despite the challenge to rethink research, the evidence that writing practices are changing is incontrovertible, and this has implications for how we think about literacy in everyday life and in education.

6. Future directions

New trends in digital culture, sometimes collectively referred to as Web 2.0 (O'Reilly, 2005), have begun to emerge over the last few years. These have come about through the increased availability of broadband connectivity coupled with rapid dissemination of user-friendly applications that depend upon social participation as a way of generating new content, exchange and playful interaction. Of particular note here are individual and group blogs; sites which are designed for collaborative authorship (such as wikis); sites for generating and exchanging media such as music, still and moving image; and 3D virtual worlds. These social networking sites provide a context for affinity, and facilitate the development of ad hoc and purpose- or interest-driven groups in which self-directed, informal learning can take place. They not only provide us with powerful models for structuring learning communities but also the opportunity to modify existing software for explicit educational purposes.

Popular networking sites allow geographically dispersed groups and individuals to communicate, exchange information and develop ideas. They also thicken existing social ties, by opening new channels of communication to those who are already known to each other, such as family and friends (**ref:9**). Furthermore they are places for rehearsing ideas, making new connections, and new meanings. As such, the practices meta-tagging and the creation of folksonomies are a powerful iteration of new literacies (**ref:14**). For an increasing number of young people, social networking provides ways of communicating with friends and ways of making new friends. This sort of interaction lies at the very heart of online social-networking. As we know, computer systems can store and retrieve huge amounts of data in different media. Harnessing this capacity to enhance communication and collaboration is the life-blood of online social networking. However, social networking is almost exclusively mediated through written communication and as such constitutes a prime site for future research into digital literacy.

3-D virtual worlds provide life-like settings for multiple users to interact in real-time. Users are embodied as human (or non-human) avatars through which they can explore a virtual world and interact with each other. Again interaction and collaboration are normally achieved through digital writing – and this resembles the synchronous conversations of chatrooms. The most popular of these virtual worlds, Second Life, is already being used for educational purposes, but more established providers, such as Active Worlds have designed purpose-built educational worlds (see: http//:www.virtuallylearning.com). My current research is located in this kind of environment and looks at how

teachers can embed this kind of immersive online experience into classroom literacy routines.

Web 2.0 developments raise new questions about digital literacy. For instance: what should we teach children about kinds of online communication that are helpful to relationships and helpful to learning; how can teachers support and encourage peer-to-peer interaction without stifling it, and above all how can we help pupils to become critical readers and writers in online environments? My research has begun to explore the characteristics of digital literacy and has helped in making sense of new forms of synchronous and asynchronous communication, the changing nature of literacy, and the skills, understandings and attitudes that we will need to encourage in our schools. I suggest that a clearer sense of what is involved in digital literacy will result in teachers and pupils being better prepared for digital futures.

Gaps between real-world uses of technology and new technology in the classroom continue to be a cause for concern (**ref:11**). At the heart of this concern is the sense that a whole range of cultural resources fail to be translated into cultural capital by the school system. We need innovative work in digital literacy and particularly in educational settings to investigate the implications of new forms of social networking, knowledge sharing and knowledge building. And finally, because of the pervasive nature of digital technology, the commercial interest that is invested in it and the largely unregulated content of internet-based sources we also need to begin to sketch out what a critical digital literacy might look like. There is, in short, plenty to be done if we are to prepare children and young people to play an active and critical part in the digital future.

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