In this chapter, we offer an overview of research on literacy and information and communication technologies (ICT) in the early years of schooling. The rationale for the focus on this age group is twofold. First, many of the reviews of ICT and literacy already in existence concentrate on children in the later stages of schooling (e.g., Andrews, 2004). Second, it is important for researchers in the field of ICT and literacy to be familiar with research that illuminates the practices of younger children, as this can inform approaches to work with older children and young people. The review therefore focuses on research relating to children aged from birth to 8 years.

The relationship between literacy and technology is a complex one. Marsh and Singleton (2009) suggested that:

Technology has always been an essential part of literacy. In order to write, one needs tools and the nature of those tools inevitably shapes the writing process. In order to read, one also needs a technology—paper, print, computer screen, etc.—on which to present text, and the nature of that technology inevitably influences the literacy experience. (p. 1)

However, what is becoming increasingly obvious is that new technologies are fundamentally changing literacy practices and texts (Lankshear & Knobel, 2006). It is, therefore, timely to focus this review on literacy practices that are mediated by new technologies—what some have termed ‘digital literacies’ (Carrington & Robinson, 2009). This involves reading, writing and meaning-making with texts that are created using digital technologies and disseminated via a range of media such as computers, mobile phones, and televisions.

The chapter addresses three key areas of work. First, we consider research that has examined young children’s digital literacy practices in homes. Many children are, from birth, immersed in a technological world and these experiences have profound consequences for their literacy development. We then move on to consider research that has illuminated the way in which new technologies are informing pedagogical practice with regard to literacy in early years settings and classrooms. Finally, we examine recent research that has illuminated the continuities and discontinuities in digital literacy practices across home and school domains. We close the chapter by reflecting on the implications of our analysis for further research in this field.

ICT and Literacy in the Home

There is extensive evidence that young children are, from birth, immersed in a media and technology-rich environment. In the UK, Marsh, Brooks, Hughes, Ritchie, and Roberts (2005) conducted a survey of 1,852 parents of children aged from birth to 6 years in 10 Local Authorities in England in which young children’s use of popular culture, media and new technologies was identified. The Digital Beginnings study concluded that many young children were competent users of technologies from an early age and that parents felt that children developed a wide range of skills, knowledge and understanding in this use. Plowman, McPake, and Stephen (2010) reported on a study conducted in Scotland in which they surveyed 346 families in Scotland and conducted 24 case studies of young children’s use of technology in the home. This study identified that children and parents were active users of technology, that patterns of interaction differed across families due to a range of factors, such as parents’ attitudes towards and experiences of technology, and that an increase in technological items in the home does not necessarily relate to amount of use of technology by children. This work resonates with a study conducted in the United States which indicated that children under the age of 6 are immersed in technology from birth (Rideout, Vandewate, & Wartella, 2003).

Much of this use of digital technology can be characterised as creative and playful in nature (Willet, Robinson, & Marsh, 2009) as it offers potential for children to engage as produsers (Bruns, 2006), to re-mix and mash-up cultural....
content in the production of new texts (Lankshear & Knobel, 2006). Media and digital cultures are arguably at the centre of leisure practices for many children in developed countries and this area of childhood culture has, more than any other, led to concerns regarding the commercialisation of childhood (Kenway & Bullen, 2001). However, what is frequently overlooked in these debates is the fact that commercial practices and childhood are mutually constitutive (Cook, 2008). Children are engaged in literacy practices linked to what Appadurai (1996) terms ‘mediascapes’. Mediascapes reflect the global distribution of electronic media and images of the world created by media. These inter-relate to create narratives in which commodities and ideology are combined in complex ways and Appadurai argues that these mediascapes offer scripts for imagined lives. Globalised mediascapes are locally recontextualised in children’s literacy practices, which are culturally situated in children’s everyday lives.

Children undertake a range of reading and writing practices using digital technologies. Table 24.1 summarises the practices identified in a range of studies (Marsh, 2006, in press-a; Marsh et al., 2005).

Recent work (Marsh, in press-a) indicates that young children are becoming increasingly social in their reading and writing on the Internet. Whereas in previous eras children may have simply accessed favourite Internet sites, often media-related, to play games, there is now evidence that children are using social networking sites to interact with others in online play. This play sometimes takes place in virtual worlds, which are online simulations of offline spaces and involve the use of an avatar to represent individual users. Popular virtual worlds include sites such as Club Penguin, Barbie Girls, and Webkinz. What these kinds of activities offer is the opportunity for children to be engaged in social networks with both known and unknown interlocutors and they learn, from their earliest years, what is means to be involved in the participatory culture (Jenkins, Clinton, Purushotma, Robison, & Weigel, 2006) of the new media age.

There is, therefore, widespread evidence that young children are confident and competent users of a range of new technologies in the home and that, through this use, they develop understanding and knowledge relating to reading and writing on screens. In the next section of the chapter, we move on to consider how far ICT and literacy are integrated in early years classrooms.

### ICT and Literacy in the Early Years Setting

It is now commonly expected that most children will encounter aspects of digital technology within the early years setting. Indeed, having gathered data from teachers and practitioners in four English cities, Bearne et al. (2007) discovered that young children are often exposed to computers, interactive whiteboards, televisions, videos, and digital cameras in their school or pre-school setting, while others also used mobile phones and games consoles in their role play situations. Yet what are the implications of this technology for pedagogic practice, particularly in relation to the teaching and learning of literacy?

As we suggested previously, it is becoming increasingly acknowledged that literacy and technology are

### TABLE 24.1
Young Children’s Digital Literacy Practices in Homes

<table>
<thead>
<tr>
<th>Media</th>
<th>Texts read</th>
<th>Texts written</th>
</tr>
</thead>
<tbody>
<tr>
<td>Words and symbols on remote control</td>
<td></td>
<td>Random typing of letters</td>
</tr>
<tr>
<td>Electronic programming guide</td>
<td></td>
<td>Writing of name</td>
</tr>
<tr>
<td>Text included in games</td>
<td></td>
<td>Writing lists, letters and stories</td>
</tr>
<tr>
<td>Words, signs and symbols in programmes and advertisements</td>
<td></td>
<td>Typing in words/phrases in online sites such as games and virtual worlds</td>
</tr>
<tr>
<td><strong>Computer</strong></td>
<td>Alphabet on keyboard</td>
<td>writing lists, letters and stories</td>
</tr>
<tr>
<td></td>
<td>Text on web sites</td>
<td>Writing of name</td>
</tr>
<tr>
<td></td>
<td>Text instructions for programs</td>
<td>Writing lists, letters and stories</td>
</tr>
<tr>
<td></td>
<td>Text in programs</td>
<td>Typing in words/phrases in online sites</td>
</tr>
<tr>
<td></td>
<td></td>
<td>such as games and virtual worlds</td>
</tr>
<tr>
<td><strong>Handheld computers</strong></td>
<td>Text instructions for programs</td>
<td>Pressing random letters</td>
</tr>
<tr>
<td></td>
<td>Text in programs</td>
<td>Choosing emoticons</td>
</tr>
<tr>
<td><strong>Mobile phones/PDAs</strong></td>
<td>Text on screen e.g. text messages</td>
<td>Pressing random letters</td>
</tr>
<tr>
<td></td>
<td>Signs and symbols on the keypad</td>
<td>Choosing emoticons</td>
</tr>
<tr>
<td><strong>Electronic games e.g. LeapPad</strong></td>
<td>Alphabet on keyboards and text on screen</td>
<td>Typing in letters and words</td>
</tr>
<tr>
<td></td>
<td>e.g. alphabet games</td>
<td></td>
</tr>
<tr>
<td><strong>Console games</strong></td>
<td>Text instructions for programs</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Text in programs</td>
<td></td>
</tr>
<tr>
<td><strong>Musical hardware e.g. CD Players/radios/karaoke machines</strong></td>
<td>Words and symbols on operating systems</td>
<td></td>
</tr>
<tr>
<td><strong>GPS technologies e.g. TomTom</strong></td>
<td>Words on screen with karaoke machines</td>
<td></td>
</tr>
<tr>
<td><strong>Other domestic electronic devices e.g. microwave, washer</strong></td>
<td>Text on screen e.g. navigation page</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Words, signs and symbols on the devices</td>
<td></td>
</tr>
</tbody>
</table>
intrinsically related (Burnett, in press; Marsh & Singleton, 2009; Robinson & Mackey, 2003), but it is important that this relationship is understood within the context of the early years setting, if teachers and practitioners are able to effectively utilise such media within the classroom. As Marsh and Singleton (2009, p. 1) pointed out, research into literacy and technology has tended to follow two avenues of enquiry; the first seeking ‘to determine the ways in which literacy needs to be redefined in a digital age’, while the second has been concerned with investigating the ways in which ‘technology can enhance learners’ skills, knowledge and understanding in relation to the reading and writing of print’. Both of these strands of research have substantial implications for the early years setting. First, given the ‘new textual landscapes’ (Carrington, 2005) of modern communication systems, schools must acknowledge that definitions of literacy, and constructions of what it means to be ‘literate’, are indeed currently changing. But this raises questions about the extent to which the early years literacy curriculum has accommodated, or is attempting to accommodate these changes. Second, even though technology may be mediating change within the global discourse on literacy, it remains the case that children are expected to acquire a level of print literacy during their first years in school. Key questions relate to how far print literacy fits within this broader discourse on literacy and how effectively the early years curriculum allow children to develop understandings about print within this broader context.

To return to the first issue, it is clear from the research reviewed in the previous section that many children entering the formal education system today are already proficient in using a variety of digital media. Indeed Bearne et al. (2007, p. 11) reported that ‘very young children show expertise in on-screen reading, even where homes have no computers’, as the handling of such texts is now embodied within a culturally valued discourse. As a result, it appears that young children are developing the skills to become ‘digitally literate’ (Glister, 1997) before they come into the school setting. While this may mean that young children are developing strategies that allow them to access and read a variety of digital texts with fluency (Levy, 2009a), Merchant (2007) argued that the term should relate to more than a general confidence in handling screen texts, and should be orientated towards the ‘study of written or symbolic representation that is mediated by new technology’ (p. 121). In other words, the term ‘digital literacy’ can help to redefine conceptualisations of literacy as an ability to understand the many sign and symbol systems in existence within texts today as well as the ways in which children make sense of them within their home environments.

Many young children entering the school system today have therefore not only been exposed to a variety of digital and paper texts, but are already developing skills to help them make sense of complex multimodal features (Albers, Frederick, & Cowan, 2009). This has clear implications for the schooling of literacy. In a recent review of research into technology and literacy in early childhood settings, Burnett (in press) cites nine studies which demonstrate ‘the complex interactions that occur between children, technology, and their wide-ranging experiences of literacy’. For example, she noted how particular studies (Cohen, 2005; Teale & Gambrell, 2007) have shown how networked technologies, such as email, support children’s on-going literacy development by creating new audiences for children’s writing ‘through engaging in new communities or managing existing communities in new ways’ (Burnett, in press). Moreover, Burnett also explained that further research has shown that regular use of screen-based texts in early years settings has encouraged increasingly sophisticated interaction to occur between children themselves (Chung & Walsh, 2006; Hyun & Davis, 2005). This included skills of collaborative dialogue and exploratory communication.

It is clear that new media has much to offer the early years classroom, both in terms of children’s day-to-day interaction with texts and as well as teaching approaches. Nevertheless it must be recognised that texts, whether they are paper-based or digital, carry particular affordances in terms of their value within the classroom. For example, the Interactive Whiteboard appears to be widely used in schools, however as Bearne et al. (2007, p. 23) point out, ‘the large screen is not in itself a magic formula for transforming teaching. Its use can be stultifying if not planned as part of a varied approach to teaching’. It is possible that media such as the Interactive Whiteboard could end up being used in much the same way as a whiteboard or a flip chart if teachers do not recognise the potential of the resource, as the software does allow for considerable flexibility (given the features such as colour and sound effect) that can help teachers to meet the individual needs of children in their class. As Bearne et al. conclude, teachers can develop ‘the potential afforded by the large screen in a new and exciting way’ when they understand the possibilities within such texts (p. 23).

It therefore appears to be the case that rather than suggesting that young children should be exposed to digital texts in the early years setting to help them to ‘do literacy’, practitioners and policy makers need to recognise that digital texts ‘are literacy’. Yet as Burnett (in press) points out, despite the fact that in England the government has published case studies demonstrating how technology can be used in the early years setting (DCSF, 2009), this does not translate into the curriculum. She stated that:

The ‘early learning goals’ for ‘communication, language and literacy’, which establish expectations for what most children will achieve by the age of five (DCSF, 2008), contain no reference to children’s engagement with digital texts. From age five onwards, the government currently recommends that children’s literacy learning is structured by the primary National Strategy Framework for Literacy (PNS, 2006). Whilst this requires teachers to plan to use on-screen multimodal texts, assessment criteria still reflect the skills and knowledge associated with print-based alphabetic literacy.
This brings us to the second issue raised above. If schools are to acknowledge children’s broader interactions with texts, as a consequence of the digital age, what are the implications for the teaching and learning of print-based alphabetic literacy? This issue was recently explored by Hassett (2006, p. 82) who argued that the reluctance for schools to accept new forms of reading ‘has less to do with a “new” medium…and more to do with the way that alphabetic print literacy discourses are maintained in education.’ Hassett goes on to claim that print-literacy skills need to become embedded within a broader discourse on reading that values the variety of sign and symbol systems in existence in texts today, including, but by no means confined to, the decoding of print.

What is more, further study has indicated that young children may already be developing not only understanding, but confidence in handling print through their interactions with screen texts in their own homes. In a recent longitudinal study of 12 young children (aged 3–6), Levy (2009a) discovered that these children were not only making meaning from iconic symbols and pictures within the context of the computer, but were making sense of printed prompts in much the same way. For example, many of the children appeared to understand the meaning of printed prompts such as ‘Play’ or ‘Play again?’, which they reported to mean ‘Start’ or ‘Go’. The project data strongly suggested that the medium of the computer in particular allowed the children opportunities to make sense of print within a context that was meaningful and free from proficiency grading. Yet the study also indicated that this confidence in handling print was at risk of disruption by the demands of the school curriculum as the children moved to more formalised approaches to the teaching of reading in school.

As was indicated previously in our review of young children’s use of virtual worlds, it is becoming increasingly clear that literacy in a new media age is leading to literacy practices that are embedded in social networks. Recent research in some early years classrooms has focused on the use of Web 2.0 sites and products and has indicated how powerful the adoption of some of these out-of-school practices can be for literacy learning. For example, blogging is now quite prevalent in many schools and in some early years settings, as it can offer valuable opportunities to connect with ‘real-world’ audiences outside of school (Marsh, 2009; Merchant, in press). Other Web 2.0 practices are becoming utilised in schools. In Marsh (in press-b), the work of a teacher of 6- and 7 year-olds in the north of England, Martin Waller, is outlined. He allows the children in ‘Orange Class’ to use the social networking system (SNS) Twitter to log their thoughts and activities over the course of a school day. Twitter enables users to upload to the Internet messages containing up to 140 characters, known as tweets. Twitter enables users to log accounts of their activities over the course of a day if they so wish, with some decriing this seemingly trivial use of technology (Sandy & Gallagher, 2009). However, others suggest that these apparently mundane exchanges have the effect of thickening offline social ties and that there are numerous examples of the way in which SNS can have a positive impact on the lives of individuals (Dowdall, 2009; Ito et al., 2008). Martin enables the children to upload their photographs on Twitpic, which are then attached to one of their tweets and used to extend the children’s communication, or reinforce their messages. Adults and other children using Twitter respond to ‘Orange Class’ and in this way, Martin ensures the children have an external audience for their work. As Merchant (in press) suggests:

This work suggests that it is fruitful for schools to find ways in which to develop children’s own constructions of literacy practice, based on their everyday experiences, particularly in relation to the use of digital media. Unfortunately, these kinds of practices are not yet widespread. This means that sometimes, children have to resort to other measures in order to incorporate digital technologies into their school experience. This is wonderfully rendered in Karen Wohlwend’s (2009) account of children who are located in print-centric early years classrooms, yet who long to play with the new technologies and media that are part of their everyday experiences outside of school. She details how one child, thwarted by the limitations of the toys on offer in the classroom, drew his own mobile phone:

He gave an oblong piece of paper rounded corners and penciled a 3 by 3 array of squares below a much larger square to represent a numeric pad and an LCD screen. Additional phone features (receiver, compact size) were emphasized by adding play actions: he held the opened paper flat in the palm of his hand, raised his hand to his ear, talked into the paper for a few seconds, then snapped it shut with one hand, and tucked it into his pocket. (p. 125)

The 5-, 6-, and 7-year-old ‘early adopters’ in Wohlwend’s (2009) study used paper and pencil to create mobile phones, ipods, and video games in order to bring their own cultural worlds into being in the face of technological neglect. This is a reminder that experiences of computer technology tend to be situated within the child’s own unique social and cultural heritage (Facer, Furlong, Furlong, & Sutherland, 2003; Holloway & Valentine, 2003), and it seems that such digital ‘funds of knowledge’ (Moll, Amanti, Neff, & Gonzalez, 1992) appear to stem largely from the home setting. It is therefore important to consider the ways in which the literacy discourses of home and school relate to one another in terms of digital text use, which is the focus for the next section of the chapter.
ICT and Literacy: The Home, the School, and the Space in Between

In a study investigating 12 children’s perceptions of reading, Levy (2008) describes how nursery school children were using aspects of their home experience, such as television texts, computer technology, popular culture, and play, to find continuity between home and school discourses on reading. For example, Shaun (aged 4) demonstrated confidence and skill when using unfamiliar computer texts in the classroom, even though his own experiences of interactive games within the home tended to be situated within television texts (interactive games on Sky television), handheld games consoles and games on his father’s mobile phone. Yet even though Shaun had not been actively taught how to use a computer within either the home or school setting, he appeared to have developed a certain ‘digital literacy’ in handling technology that allowed him to access a variety of digital texts with fluency across the boundaries of home and school. This suggested that digital technology helped to create a comfortable space for Shaun in between the literacy discourses of home and school.

Yet the study indicated that for some of the children, discontinuities between home and school meant that they lost confidence in their own constructions of reading from their earliest years in school. As the domination of a ‘schooled’ discourse seemed to overrule their own constructions, some of the children began to devalue their own strategies to make sense from a variety of texts. For example, two girls in the study (Caitlyn and Kelly) were observed making regular use of the computer in their homes and were also described by their parents as displaying a substantial ability to navigate a variety of screen texts with independence. However, the nursery school teacher reported that both girls showed little interest in the computer within the school context, and rarely chose to use it when given a free choice of activity. Screen reading therefore became confined to the home setting for these children.

What is more, the study further revealed that aspects of the girls’ book reading behaviour also became increasingly confined to the home setting. Having followed the children over the course of one academic year, changes were identified during the period of data collection. While Caitlyn in particular was observed creating detailed and sophisticated narratives based on the pictures in books, during her nursery year, by the time she was in the first year of elementary school she was claiming that this was not ‘real’ reading, because she now had to use the printed words to ‘see if they sound’ and make sure they are ‘the right letters’. Similarly, in the final phase of the study, Kelly’s mother reported that Kelly enjoyed reading her own books at home more than her schoolbooks. She went on to explain that Kelly ‘is not reading word for word, but she’ll look at the pictures’ and will be ‘putting quite a lot of expression in’ when reading her own books at home, which contrasted with Kelly’s reading of her schoolbooks which her mother described as being ‘quite monotonous’.

In sum, this study revealed that these young children were developing broad constructions of reading literacy within their home settings, which allowed them to use a wide variety of multimodal cues, such as icon, colour, picture, sound, and print, in order to make sense of screen and paper based texts. Yet as the children moved into their first year of elementary school, definitions of reading became dominated by a ‘schooled’ discourse that focused on the need to decode printed text in books (and within schooled reading scheme texts in particular) (Levy, 2009b). As a consequence, many of the children in this study were seen to forsake their own strategies to make sense of text. Moreover, many of these children also lost confidence in themselves as readers, because their own ‘home’ constructions of reading did not match with those of the school. This strongly suggests that schools need to not only recognise the variety of literacy skills that children bring with them into school, but must find ways in which to build upon these valuable ‘funds of knowledge’ within the school context.

It now seems imperative that the prevalence of digital technology in modern society becomes more greatly reflected within the early years literacy curriculum. This does of course raise questions with regard to the implementation of the early years reading curriculum. In particular, what are the implications for assessment? First, as the above study has indicated, Bearne et al. (2007) also argue that young screen readers use a range of skills to access meaning from text, however they go on to claim that many of these skills can be described by the QCA Reading Assessment Focuses. When one reflects upon the specific targets for reading as outlined in the Foundation Curriculum, it is clear that young screen readers are meeting these targets by demonstrating a knowledge that print conveys meaning, recognition of familiar words, understandings of directionality, and the ability to access stories as well as displaying sequencing and information retrieval skills.

However, if early years settings are to show that they value children’s home constructions of literacy, then it may be that they also need to recognise that some aspects of children’s literacy skills cannot be described by assessment focuses. For example as Bearne et al. (2007) pointed out:

Children’s multimodal compositions, by their very nature, cannot be assessed in the same way as paper-based texts.
The same is true of multimodal reading. The reading assessment focuses cannot capture the interpretation of sound, movement and colour as part of the reading process. (p. 20)

Perhaps the time has come to re-evaluate the role of assessment altogether within the early years literacy curriculum. Rather than focusing attention on formal literacy assessment, perhaps schools should concern themselves more solidly with finding ways to build young children’s confidence in themselves as readers and writers of text. Given the issues covered in this chapter, this will include
widening opportunities for young children to engage with a variety of different paper and screen based texts during their early years in school, and finding ways to encourage the development of individual literacy identity through the use of meaningful contexts.

Concluding Thoughts

In this chapter, we have considered ways in which literacy and ICT relate to each other across home and school domains. From this overview, we can identify a number of areas in which there is need for further research in the years ahead. First, much of the research considered here has been undertaken in the developed world and there is a need to extend this to ensure that literacy and ICT in a global context can be the site for analysis. Second, there is still much that needs to be understood about the way in which children’s understanding of digital literacy is constructed through inter-generational practices as well as peer-to-peer interaction. Emergent research (Voida & Greenberg, 2009) on the inter-generational use of console games, such as Nintendo Wii, for example, indicates that the dynamics between family members are a rich site for further analysis in the development of an understanding of how family cultures shape practices. Third, the significant work that has been undertaken on young children’s critical literacy practices (Vasquez, 2004) needs to be extended to include digital texts, so that young children can develop further their ability to analyse critically the range of online texts they encounter, which are often shaped by discourses of commercialisation. Finally, there is a need for research that can inform the development of innovative curricula and pedagogy that are relevant for a new media age. We need to understand issues relating to children’s meaning-making across multiple modes, and what progression might look like in this regard. Given the pace of change due to the rapid development of technologies, this work needs to be undertaken urgently if we are to enable young children to join the digital `literacy club’ (Smith, 1987) of the 21st century.

References


Rachael Levy and Jackie Marsh (Eds.), *Play, creativity and digital cultures* (pp. 200–218). New York: Routledge.


