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5

Digital games: providing unique digital literacy challenges in childhood

Dean Groom and Judy O’Connell

Introduction
As they become more accessible and more mobile, digital technologies are increasingly crossing the contexts of home, school, workplace and communities, and offering an expanding range of educational and social affordances (Haddon and Livingstone, 2014). This is a challenge for families and those seeking to better understand, engage and implement digital games in children’s education. Technology has become an important feature of family life in many households with children using some form of device with a screen every day (Gutnick et al., 2011; Holloway, Green and Livingstone, 2013; Vandewater et al., 2009). Children use and enjoy technology more and more, in a world of expanding technologies, access and media forms (Buckingham and Willett, 2013; Tyner, 2009; von Feilitzen and Carlsson, 2000). Ongoing improvements to technology have enabled children to access new media and technologies from an early age, and the YouTube clip of a baby manipulating a touch screen is all too familiar. Leathers, Summers and Desollar-Hale (2013) argue that babies who have had ready access to touchscreen technologies since birth learn to point at screens by the age of 10–14 months.

Children do not need to wait until they can operate a keyboard and mouse to begin interacting with digital media. Today, pre-verbal, non-ambulant infants have parents who are comfortable with their children...
using these child-friendly touch screen devices. Nikken and Schols argue, ‘through age 7, children are honing their fine-motor skills, which makes it gradually easier for them to manipulate touchscreens, small keys, gadgets and controllers’ and are ‘adept at using symbols, playing pretend games, interpreting relevant cues in their social environment, and gain knowledge of story grammar, which is essential for the formation of interpretive schema for processing more demanding media content’ (2015, 3423).

This chapter takes a focused look at the emerging opportunities provided by digital games and provides a rationale based on research to encourage individuals and organisations to consider games and gaming as mainstream channels of digital literacy engagement.

**Digital childhoods**

Digital games are an integral part of children’s environments, with findings pointing to continued growth and regular game play across a range of devices, driven by curiosity, challenge and interactivity (Blumberg and Fisch, 2013). Some researchers discuss children’s media use as ‘screen time’ rather than information and communication technologies (ICT) in order to try and encapsulate the ongoing diversity of devices being used, human interaction, preferences and experiences of use as well as the now common interoperability and synchronicity enabled by the internet (Clark, Demont-Heinrich and Webber, 2005). This interest in the notion of ‘screen time’ (Clancy and Lowrie 2005; Ernest et al., 2014; Randall, 2013; Stager, 2010) increasingly connects the home–school environment, indicating that educators need to consider children’s home use of screen time as part of their overall educational development.

Carson and Janssen (2012) investigated the screen time habits of children under the age of 5 in Canada, in order to gain a better understanding of the factors that influence the use of television, video and computer games. They argued that intrapersonal, interpersonal and physical environment factors within the home setting are essential to children’s use of ‘screens’ and that parental cognitive factors at the interpersonal level were of particular importance. This suggests that children’s experience of digital media remains diverse but, more significantly, they are actively engaged with media at a very young age. It was found that 37.9% of children (≤ 5 years old) played video games and
93.7% watched television. The authors found increasing parental awareness towards recommendations of ‘screen time’ improved their self-efficacy to refuse access and better regulate their children’s media diet (Carson and Janssen, 2012, 7).

Hakanen (2007, 3) argues that identities are being formed on the social grid and shaped by the dominant medium of the era, which includes digital video games. As players, children are placed into these mediums and their digital identity in part emerges from discourses salient to what media is offered to them and how adults think about what constitutes the self. The image of the child playing as an avatar in a game is a significant expression of the convergence of children’s corporeal and hypermediated worlds, also providing an enlarged sense of what media and communications are involved in digital childhoods (Hjorth, Burgess and Richardson, 2012). The real and the imaginary worlds come together to create new forms of engagement, motivation or places for play.

New literacies in and out of the classroom

Digital technologies have become common in children’s homes and schools, yet a survey of 2462 teachers about their use of technology at home and in their classrooms suggested that while educators outpace the general adult population in personal technology use, 42% of teachers feel that their students know more than they do about using digital tools (Purcell et al., 2013). Technology use in the home context has been the focus of research (Burnett, 2010; Marsh, 2006; Pahl, 2010; Plowman, Stephen and McPake, 2010) with strong arguments for the need to continue to examine children’s literacy and learning practices in these contexts, all the more crucial given the home–school nexus.

A fundamental requirement of learning is to be able to read. But what does ‘read’ mean in the 21st century? Lamb (2011) argues that reading goes beyond interpreting text to also include graphics, sound, motion and other kinds of symbols in addition to or instead of text. To become fully literate, students must become proficient in the new literacies of 21st century technologies (International Reading Association, 2009). Literacy educators have a responsibility to integrate these new literacies into the curriculum. This interpretation (for example) is supported by the Australian Curriculum: English, which states that students ‘listen to, read, view, speak, write, create and reflect on increasingly complex and sophisticated spoken, written and multimodal texts across a growing range
These new literacies are multimodal, comprising multiple modes – visual, sound and text – and are more participatory (Wilber, 2010). In other words, literacy as metaliteracy action (Ipri, 2010) – where information being accessed and read takes many forms online and is produced and communicated through multiple modalities (Mackey and Jacobson, 2011) – happens whenever children and young people read and interpret their world, as many young people comfortably use a wide variety of the literacies associated with new technologies to construct and distribute knowledge (Coiro et al., 2014; Lenhart et al., 2007).

Essentially the field of new literacies focuses on how language and literacies are shaped by the ongoing development of new tools and technologies. Learning in online environments involves skills and processes that are common to print literacy but also important skills that are unique, such as using search engines, reading websites, selecting appropriate hyperlinks, and comparing information (Asselin and Doiron, 2008). Understanding how the use of technology is distributed in multiple settings includes understanding how, when and why access to information and novel kinds of technologically mediated learning environments – such as online special interest groups, tutorials or games – can support learning for children on their own terms (Barron, 2006, 194).

Digital games
A digital video game as a concept is an ‘electronic’ game that involves human interaction with a user interface to generate visual feedback on a device. The forms grow increasingly diverse and some of the most commonly used games by children or for educational purposes with children includes alternate reality games, massively multiplayer online games, multiplayer online battle arenas and social, casual and mobile games.

The alternate reality game genre is much more than simply being a pre-coded application, and can be flexible enough to allow teachers to create a narrative or plot, and to use some free web-based tools to create a playful and immersive environment which is not real, but which engages with the real world in a way that draws players into the fantasy narrative. Popular alternate reality games include Ingress (2013; www.ingress.com) and Pokémon Go (2016; www.pokemongo.com). Alternate reality games can also be games driven by storyline and typically supported through some

These digital games demonstrate the developments taking place in the history of this genre. The rapid expansion of game types, platforms, experiences, media-convergence, human interfaces and growth of game popularity in our society increasingly requires parents and educators to address the challenges, opportunities and potential of digital games.

Player participation and engagement
Players do not just engage in ready-made gameplay but also actively take part in the construction of these experiences: they bring their desires, anticipations and previous experiences with them, and interpret and reflect the experience in that light (Ermi and Mäyrä, 2003). Digital games allow ‘the full experiential flow’ by linking perceptions, cognitions and emotions with first-person actions (Grodal, 2003). Digital games provide a fertile environment for learning (Gee, 2005). Role-playing games allow child players to take an ontological position that may be unavailable in their lived existence. This allows a player to make sense of the play experience and construct an interpretation of the game that draws on personal and social contexts of their life or builds beyond current situational, social or cultural contexts. Additionally, games are a force in the (re)construction of contemporary childhood (Papazian, 2010); this provides models of good learning practices which can be used to develop practical competencies and social practices in early childhood (Manessis, 2011). Because children test out an idea by acting on parts of it, the boundaries between the real world and the game world can become blurred.

Where games differ from other media is that they require the participation of players and, unlike older media, the actions of players
themselves play a key role in reshaping them as a multimodal experience of enjoyable playful interaction. Digital games provide an active process of meta-cognitive engagement and decision making within creative action. They can provide authentic learning situations, promote social interactions, increase motivation, encourage higher-order thinking, and foster 21st century skills (Qian and Clark, 2016) as well as promote collaboration, problem solving and communication (Johnson, Adams and Haywood, 2011).

Craft (2003, 42) identifies that this action of creativity involves passing of control to the learner; placing a value on learners’ ownership and control to encourage thinking and debate as well as co-participation in learning. Reilly argues that children are learning through new media as a ‘set of social skills and cultural competencies, are not tied to traditional curriculum standards and practices, but instead are best developed through creative and engaging projects’ (2011, 473). These new literacies merge the creative modes fostered through a variety of media tools, to encourage socially constructed meanings and forms of self-expression. There are strong links with discourses surrounding digital childhoods (Buckingham, 2013) and implications for education (Steinkuehler, Squire and Barab, 2012). Essentially, this process of creative ‘dialogue’ reveals how metaliteracy transactions are being transformed in digital games.

Gaming literacies
During gameplay, gaming literacies (elements of game play and complex understanding of computer systems) as a metaliteracy are used to accomplish difficult but motivating tasks in order to develop new knowledge by navigating a complex, changing virtual environment (Apperley and Walsh, 2012). Learning can become an immersive participatory experience (Barab and Dede, 2007) where the knowledge learned in the game and the knowledge learned at school scaffolds disciplinary content (Barzilai and Blau, 2014). Games can also convey meaningful messages that young people value, and through active game creation can motivate and improve the capacity to learn (Altura and Curwood, 2015). Games give educators the opportunity to introduce layers for conceptual learning and new taxonomies for pedagogical design, and herein educators are understanding the complex learning that gaming can involve (Steinkuehler, Squire and Barab, 2012, 271).

Felicia (2011) argues that playing video games stimulates affective,
cognitive and communicational processes, thus facilitating the emergence of knowledge. These strategies can be viewed through a pedagogical classification of games; they can develop psychomotor, intellectual, identity and relational skills, which support a range of academic, problem solving and sense-making situations. In essence, games provide spaces for accelerated and simultaneous information processing, competence and skill development (St-Pierre, 2011), however understanding how information behaviour affects game design and gaming interactions is also critically important.

Boundaries of engagement

When playing digital games, players must make choices about game mode and challenge levels (Sit, Lam and McKenzie, 2010), retrieve information to solve problems or make sense of situations, in a variety of ways that may well be different from their other experiences (Adams, 2009). Knowledge construction in games is also an extension of game design, which ideally supports the learner’s needs within the information-seeking context while also generating successful immersive experiences for problem solving (Liu, Cheng and Huang, 2011). It is also suggested that in games it is helpful to create a flow experience (Thin, Hansen and McEachen, 2011), in which students are motivated to apply trial-and-error, learn-by-example and analytical reasoning strategies. Inal and Cagiltay (2007) also found that challenge and complexity elements of games had more effect on flow experience in an interactive social game environment than clear feedback only.

A game does not exist without players (Bourgonjon, 2014, 4) and the learning that takes place is an intersection of the experience designed by the game designer and the intentions of players (Steinkuehler, Squire and Barab, 2012, 247). Zimmerman outlines these intersections as gaming literacy through systems, play and design (2008, 24). Harviainen, Gough and Sköld (2012) introduced the concept of games as information systems, in the sense of systems that inform. The authors explain that in order to progress through digital games, players must recognise and process information from the user interface, cues and clues embedded in the game environment, and through interacting with non-player characters. They also explain that as reasons for seeking game-related information touch on cognitive issues, the conceptual connection between information seeking and information behaviour is significant to the
construction of games as information systems.

There is also evidence of games as being an important constituent of media education, literacy and information fluency learning (Beavis, Dezuanni and O’Mara, 2017; Buckingham, 2007; Buckingham and Burn, 2007; Buckingham and Willett, 2013). All games are systematic and use an array of information and techniques to communicate with players (Squire, 2006). Video games often provide players with just-in-time information through a range of audio, visual and haptic clues triggered by choices and interaction with the game world. Steinkuehler and Williams (2006) say that the way information is revealed to players is part of the socialisation needed for them to behave in certain ways. The information from the environment is then processed by players, who then select appropriate behaviours. Players in multiplayer games are part of the information giving process. For example, watching the mistakes of another player is a way of processing information to improve a player’s performance without verbal communication between those players. Information giving is common in games (asking others how they did something, what they need, how to find and so on). Players are involved in an ongoing social relationship with an audience, drawing on language and communication to reproduce information. In this way, the hardwired, ‘designed in’ informational boundaries are supplemented with additional knowledge inside and outside the game.

Digital player identity is another complex topic related to literacy through body, gender, age, race and ethnicity to demonstrate affiliation and relationships as players adopt certain storylines and discourses in online gaming (Thomas, 2007, 9). Martin (2012) argues that player self-identity is an important component of online play where participants’ skill and level in the game as well as their play style and information practices influence their success at school.

It is important, therefore, not to see digital video games as a homogenous whole, but rather as a complex and changing set of technologies which by their very nature include literacy requirements and experiences. Through gameplay and narratives found in today’s digital video games children are clearly being immersed in transmedia navigation, which is contributing to the ongoing development of theories about the literacies of game play in formal and informal settings (Barnett, 1976; Kafai, 2006; Kangas, 2010; Yee, 2006). Previous boundaries between informal and formal learning are blurring and so are the required literacies.
that reflect contemporary life (Hagood, 2009).

Games and gaming action involve a dynamic, active process of knowledge construction in which learners constantly strive to make sense of new information. This information behaviour is influenced not just by information seeking that a participant may engage in, but also by the game mechanics that have been established in the game itself.

Examples in action

Quest Atlantis (now maintained as part of the Atlantis Remixed Project at http://atlantisremixed.org) was created by Indiana University and allows students to complete educational tasks in 3D multi-user environments. In this digital game students can move around freely and complete quests based on educational goals and chat to collaborate with other students about work and tasks. The most beneficial part of Quest Atlantis is its inclusion of curriculum-appropriate tasks that students are required to complete directly connecting curriculum and learning goals in the game (Turkay et al., 2015, 3). Quest Atlantis encourages students to take risks and use their failures as exploration of topics (Gee, 2005, 35). Students develop better motivation, confidence, knowledge and understanding, creative thinking and negotiating skills (DEECD, 2011, 14). Other key learning outcomes included enhanced motivation, confidence, reading and comprehension skills (DEECD, 2011, 21–7). Students had also begun to develop their creative writing skills, by creating their own characters and quests for other students to complete (DEECD, 2011, 14). It was also found that Quest Atlantis allowed students to develop or extend knowledge at their own rate without feeling overwhelmed (DEECD, 2011, 18).

Scratch (https://scratch.mit.edu/) is a game created on the Scratch platform using blocks of code in a drag and drop interface, to manipulate sprites on the screen. Scratch promotes mathematical and computational skills as well as creativity, reasoning and collaborative working. The internet is populated with Scratch resources and professional learning opportunities, including Code Club Australia, which is establishing a network of events for students aged 9–11. There is a wealth of literature on the application of Scratch for learning (Breen, 2016).

Minecraft (https://minecraft.net/) is not simply a digital game that allows children and youth to build and create virtual worlds, but also an educational tool used as a vehicle for teaching critical content. Through
the ability to take control and be active learners, motivation is enhanced in areas as diverse as science, maths, history, engineering, architecture and computer coding (Ellison and Evans, 2016).

Transmedia storytelling (https://www.coursera.org/learn/transmedia-storytelling) provides a digital game experience and learning tool that has the power to motivate, persuade, entertain as well as educate. Inanimate Alice creates an experience that immerses the reader in the complexity and emotional journey of a story through the impact of sound and vision of the multilayered story, with new storylines emerging to enrich the tale, making Alice a unique digital reading experience built on the mesh of game, puzzle, sight and sounds to embellish a story (Fleming, 2013).

Unity (https://unity3d.com/) is a complex digital programming game tool with advanced graphic capabilities. Free learning resources can be accessed via the Unity website and there is a wide variety of assets and a community of developers across the web. An understanding of general programming language such as C# or UnityScript is required to make best use of the features. However, this does not prevent youngsters from becoming capable and enthusiastic game builders. In a short video 12-year-old Cooper explains that Scratch can be too easy and describes what motivates him to play Unity (YouTube, 2017). Learning what ‘real’ game engines are and becoming involved in the game-building opportunities of coding provides such youngsters with unique meta-cognitive and metaliteracy learning opportunities.

On a novel twist on digital games, Breakout EDU (https://www.breakoutedu.com/) is similar to the popular ‘escape room’ game, but has a marked difference as this game is about opening a locked box. It is a timed challenge that involves solving puzzles, discovering clues, finding hidden items and red herrings, and ultimately figuring out how to unlock a series of locks to open the box. The sessions have an underlying theme or story that underpins each Breakout, focusing on collaboration and problem solving. Breakout EDU is often used to introduce new concepts, reinforce learning, bring closure to a lesson, and reinforce skills and concepts learned, all in a fun way (Goerner, 2016). While this is a ‘physical’ game, Breakout EDU Digital (https://www.breakoutedu.com/digital/) encourages teachers to play alongside students to model a growth mindset playing the game completely online. This has been used successfully to create many game challenges. Among the many available a game on the French Revolution, Escape the Guillotine! (https://sites.
google.com/site/escapeguillotine/), involving solving various clues about events around the revolution, has been used successfully in Years 11 and 12 curriculum studies in Australia. The riddles and puzzles resulted in social interaction between group members creating multiple stories, confirming the finding that students learn more when they are left to engage with a game in a group competition (Admiraal et al., 2011).

Museums are developing serious games to engage students in history content with successful results. The project Playhist (http://www.experimedia.eu/2014/02/25/playhist/) in Carnegie Mellon University uses 3D technology to immerse students into the environment of Tholos (virtual theatre) in the Foundation of the Hellenic World of Athens, requiring players to engage in some mini games. Progress in the game through ‘learning by playing’ provides a better understanding of an historical subject (Perez-Valle, Aguirrezabal and Sillaurren, 2014).

The portability of devices for gameplay is also demonstrated by Game 1910 for learning history, which allows a player to live through the 1910 revolution that led to the establishment of the republic of Portugal (Cruz, Carvalho and Araújo, 2017). This game was designed after research into students’ game preferences to understand rules, obstacles and choices, and players need to learn through failures to be successful (Gee, 2007).

According to Squire and Steinkuehler (2005), when Santa Monica Public Library, CA, hosted gaming nights for teens to come and play games, there were many positive benefits. Not only did the gaming nights reorient young people towards the library and allow librarians insight into youth culture, but half of the students who attend game nights and played games such as Age of Empires (https://www.ageofempires.com/), Civilization (https://www.civilization.com/) or Rome: Total War (https://www.totalwar.com/) ended up borrowing a book based on an interest generated through gameplay. Such games require serious thought and stimulate an interest in multiple topics including history, politics, economics and geography. For many, they raise curiosity, spark passions and inspire lifelong interests, and should be included and promoted in public library collections for these reasons (Squire and Steinkuehler, 2005, 41). Brown and Kasper (2013, 756) argue that games can be fused with library agendas and posed three questions to investigate how games affect reading, learning achievement, information literacy and library use:

- What do participants in a library’s video game program learn?
How do library gaming programs assess participants?
What steps can programs take to improve their assessment?

Next steps
When we think about game-playing, where fun and immersion drive meta-cognitive, reflective experiences playing games such as World of Warcraft, Destiny, Halo, Guild Wars, Lord of the Rings and so on, many players are almost entirely focused on the gap between their current position and the ‘next level’ and the term ‘levelling up’ is a common phrase applied to gaming success. The game level, or rather information processes at that game level, are entirely designed to give feedback to players such that no external ‘judge’ is required. Arguably, educational games are more likely to be considered for implementation if the intended learning outcome has recognisable curriculum facing materials. Where teachers and designers are required to deliver the object of study as concepts, definitions, formulae, facts and problems, the intention may seem less obvious and so lead to questions about implementation.

According to Burgun (2012) planning to incorporate digital games in community or education contexts should involve asking what kinds of actions will be possible in the game and what types of interactions could take place. Burgun suggests we begin by asking, ‘Will interactivity help me do what I want to do? . . . Will a game system, with its goals, its competition and its player interaction be helpful?’ If the answer is no, then a game might not be the right medium (2012, 21).

Some educational games are simple in design, focused on content with low levels of literacy demand, which emphasise drill and practice or memorisation. Research has shown that other games can promote meaningful learning by providing players with adaptive challenges, curiosity, self-expression, immersion, collaboration, competition, variable rewards and low stakes failure (Qian and Clark, 2016). Such games can provide situated learning, promote social interactions, increase motivation and engagement, and provide opportunities to develop valued 21st century skills (e.g. collaboration, creativity, communication and critical thinking).

Games in general, and educational games in particular, pose unique requirements on the perception and processing of information by gamers–learners. Any education or community organisation is able to introduce games and gaming in the context of the services to children and youth, and provide intrinsic integration of learning content for knowledge and
skills exploration and acquisition. Schools and libraries share in the unique opportunity to foster literacy and knowledge construction through digital games. Games fit the mission of libraries to promote literacy and informal learning as they encourage reading and information literacy, and are great for students with diverse learning styles, by people of all ages, families and other intergenerational groups (Gilton, 2016, 37).

Digital literacy and/or metaliteracy transactions are the enabling factors connecting literacy, systems, play and design. Ultimately, where knowledge has been successfully integrated, the game mechanics can also serve as platforms for trying out and experimenting with ideas that have been acquired outside of the game:

Imagine learning about avionics and how wing designs affect speed and manoeuvrability, or reading historical descriptions of the British longbow and how it changed the way battles were fought, and imagine having a tool to try out and experiment with those concepts, seeing how they play out and how changes made by the player effects the outcome.

Mozelius et al., 2017, 352

Conclusion
The growth of digital video games is likely to continue and therefore remain a fixture in educational discourses. Likewise, digital games have also captured the attention of institutions that wish to harness the engagement and motivational qualities of games for a variety of nongaming purposes from consumer loyalty to advocacy and education (McGonigal, 2011).

Children have been shown to play video games as part of their leisure and learning time in numerous studies. Arguably, this has helped to drive teacher interest in using games (Kenny and McDaniel, 2011). Young people are increasingly engaging in practices that remix traditional and newer literacies (Gainer and Lapp, 2010), creating an imperative to understand the knowledge construction process in games as information systems, driven by new and emerging literacies as metaliteracy transactions, digital identity and knowledge construction. Game play can consist of single or multi-aged player groupings, and can support developmentally determined expectations beyond the normal curriculum learning and teaching imperatives. In such contexts, the importance of new and emerging literacies become a priority consideration. To succeed
in today’s interconnected and complex world, workers need to be able to think systemically, creatively and critically. Equipping students with these 21st century competencies requires new thinking not only about what should be taught in school but also about how to develop valid assessments to measure and support these competencies (Shute and Ventura, 2013). Digital games provide a unique environment for engaging with conceptions and constructions within digital childhood experiences – and understanding the participatory new literacies involved provides a rich field for ongoing and expanding research in digital childhoods.

References
Beavis, C., Dezuanni, M. L. and O’Mara, J. (2017) Serious Play: literacy,
learning, and digital games, Routledge.
78 PART II LEARNING IN A DIGITAL WORLD


Gutnick, A. L., Robb, M., Takeuchi, L., Kotler, J., Bernstein, L. and Levine, M.
GROOM AND O’CONNELL DIGITAL GAMES 79


80  PART II  LEARNING IN A DIGITAL WORLD

Technology: a parents’ guide, AuthorHouse.


Thin, A., Hansen, L. and McEachen, D. (2011) Flow Experience and Mood States Whilst Playing Body-movement Controlled Video Games, Games and Culture,
PART II LEARNING IN A DIGITAL WORLD