OBSERVING AND ASSESSING CHILDREN'S DIGITAL PLAY IN EARLY CHILDHOOD SETTINGS

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Abstract

In early childhood education children increasingly have access to digital technologies to play on and with. Research often centers on using traditional play theories to understand what is occurring, but some theorists are now using a social-cultural lens to explore digital play in a way that is meaningful for the children and educators involved. In this paper we present a new conceptual framework to understand how children learn to use technologies through play. The framework is called the Digital Play Framework and is informed by the socio-cultural concept of tool mediation (1997) and Hutt's (1966) ideas about explorative and ludic play. The framework is pedagogically useful because it explains the relationship between technology-as-tool and children's play-based behaviours. It is important to understand this relationship in early childhood because play is the basis for curriculum provision. With play as the basis for curriculum provision, educators need a way to assess and plan for children's digital activities. In this paper we illustrate the potential of the Digital Play Framework for achieving this goal.

Introduction

Play has long been argued as the way children learn in early childhood education (Wood, 2013). Using the Early Years Learning Framework (Department of Employment, Education and Workplace Relations (DEEWR), 2009), educators are required to observe and assess children's learning through play. The increased use of digital technologies within early childhood educational settings means that in addition to observing and assessing children's more traditional learning through play, they now also need to observe and asses children's learning to use technologies through play (DEEWR, 2009). Understanding how children learn to use technologies through play is the first step towards educators being able to competently observe and assess young children's digital play. In this paper, we present a new framework called the 'Digital Play Framework' as a new pedagogical tool for helping educators observe and assess how young children learn to use technologies through play (Bird & Edwards, in press). Drawing on data derived from a project involving young children using technologies in a play-based early learning setting (Bird, 2012), we present a case study application of how the 'Digital Play Framework' can be used by educators to support the observation and assessment of young children's learning to use technologies through play.

Assessment in early childhood

While play-based learning has long been argued as the central pedagogical approach in early childhood education, how children learn to use digital technologies through such learning is still being researched. In an era in which accountability for the achievement of children's educational outcomes are 'high' (White, 2007, p. 8), early childhood educators require assessment tools that help them to meet regulatory pressures and recognise the sociocultural context of children's learning and development in terms of the increased role of digital technologies in very young children's lives.

Historically, assessment in early childhood education focused on young children's developmental outcomes (Carr, 2001). A developmental approach to assessment described children's development as a universal process, with each child moving through the developmental process at a given age. Areas of

development that were 'achieved' or still 'developing' could be readily identified by determining whether or not a child was meeting particular developmental outcomes. Recently, early childhood education has taken on a more sociocultural lens for understanding children's learning and development. This perspective recognises the role of context and culture in young children's learning and development (Robbins, 2005). Approaches to observation and assessment in early childhood education have moved away from using developmental checklists towards a more sociocultural approach because such lists are now recognised as providing educators "with relatively little information to guide service delivery, instructional planning, or progress monitoring" (Snyder, Wixson, Talapatra & Roach, 2008, p. 26). Instead, contemporary approaches to assessment are based on observations of children's play and their interactions with the peers and educators in the context of the early learning setting (McLachlan, Edwards, Margrain & McLean, 2013).

Rather than being largely summative in approach (Swaffield, 2011), assessment in early childhood education is generally formative in nature and represents an ongoing process (Karlsdóttir & Garðarsdóttir, 2010). In Australia, "educators use a variety of strategies to collect, document, organise, synthesise and interpret the information that they gather to assess children's learning" (DEEWR, 2009, p. 17). The use of observations in early childhood education is a valuable strategy for collecting information orientated towards assessing children's learning through play (Rogers & Evans, 2007). The reasons educators complete observational assessments of children's learning through play include: to identify individual strengths and weaknesses; understand children to guide their behaviour; inform work with parents and other professionals; extend shared interests within a group; note individual interests that can extend group learning; reflect on the flow of the day; and evaluate their own teaching (Hatch & Grieshaber, 2002). Educators observe children's play and interpret what they see based on their understandings of children's learning and development in social and cultural contexts (McLachlan et al., 2013). This approach to observational assessment is now well established in early childhood education with respect to children's more traditional play-based learning, such as pretend play, gross motor play and block play. However, a recent problem for educators is how to use observational assessment to understand children's learning to use technologies through play.

We created the 'Digital Play Framework' to help educators observe and assess children's learning to use technologies through play. The 'Digital Play Framework' understands technologies as cultural 'tools' Vygotsky (1997) that children master through two forms of activity, including epistemic and ludic activity (C. Hutt, 1966). Together, epistemic and ludic activity comprises children's play. Behaviours associated with each form of activity are identified in the 'Digital Play Framework' as potential indicators for children learning to use technologies through play. The 'Digital Play Framework' builds on existing research in the use of early childhood digital technologies that has largely established that young children are regularly users of a range of technologies in their family homes (Plowman, McPake & Stephen, 2012); that children integrate traditional and digital forms of play (Edwards, 2013; Goldstein, 2011; Marsh, 2010); and that further knowledge is needed in the early childhood sector regarding appropriate pedagogical uses of technologies with young children (Aubrey & Dahl, 2014; Marsh et al., 2005).

Theory

The 'Digital Play Framework' is based on combination of Vygotsky's (1997) concept of mediated tool use and Hutt's (1966) ideas about epistemic and ludic activity comprising play. Vygotsky's (1997) argued that people use tools derived from their social and cultural contexts to mediate the activities they engage in. The concept of mediated tool use is often illustrated by a triangle with subject (child), object (epistemic or ludic activity) and tool (technology) located at each point of the triangle. As the child masters the tool (technology) the object of activity changes. Hutt (1966) investigated children using play to explore a novel object and categorised their behaviours as either 'epistemic' or 'ludic'. In the 'epistemic' play behaviours children explored "what does this object do?" (C. Hutt, 1966, p. 76, italics in the original). The play behaviours changed to 'ludic' play as the children began to explore "what can I do with this object?" (C. Hutt, 1966, p. 76, italics in the original). The play range of behaviours identified by S. Hutt, Tyler, Hutt and Christopherson (1989) helped to define the children's activity as either epistemic or ludic. Ludic

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activity emerges once children have explored the novel object and mastered epistemic activity. By combining the concept of tool mediated with the epistemic and ludic activity we were able to create a 'Digital Play Framework' (Bird & Edwards, in press) that describes the range of play behaviours associated with each type of activity as children learn to use different technologies as tools (Figure 1).

	Object of activity	Behaviours	Indicators	Description
Digital technologies-as-tool	**Epistemic play**	**Exploration**	Seemingly random use of the device	Seemingly random footage, images, pressing the iPad, moving or clicking the mouse.
			Locating the operating functions of the device	Locating the on/off button (video camera), shutter button (still camera), home button (iPad), keyboard (computer) or mouse (computer)
			Exploring the operating functions of the device	Exploring the on/off button (video camera), shutter button (still camera), home button (iPad), keyboard (computer) or mouse (computer)
			Following directions of the device or other people	Following the directions of the device or other people
			Seeking assistance for desired outcome	Asking adults or peers for assistance to use the device
		Problem solving	Relating actions to the response/function	Pressing the on/off button, relating turning the camera to what is in the viewfinder (video camera), pressing the shutter button, relating turning the camera to what is in the viewfinder, pressing the Home button to change Apps, scrolling through Apps (iPad), relating mouse and keyboard to actions on the screen (computer).
			Trying different actions to solve an issue	
			Intentional use of the operating functions	
		Skill acquisition	Intentional and deliberate use of functions for desired outcome	Being able to view taken footage (video camera) or images (still camera), scrolling and tilting (iPad), using mouse to move cursor, click and double click program icons (computer)
			Sharing learned actions with others	Being able to share knowledge of functions of the device with others for the purpose of teaching others (ZPD)
			Intentional and controlled footage of observable people, events and situations or manipulating the App or program for own purpose	
	Ludic play	**Symbolic**	Deliberate use of device for pretend play	Using the device to record already established pretend play or to record re-enacted play (video and still cameras), selecting an App specifically for pretend play (iPad), selecting a program specifically for pretend play (computer)
		Innovation	Creating pretend play deliberately for use of the device	Creating a pretend play to record (video or still cameras), selecting an App specifically for pretend play (iPad), selecting a program specifically for pretend play (computer)

Figure 1: The 'Digital Play Framework' (Bird & Edwards, in press).

Methodology

In this paper we use the 'Digital Play Framework' as an observational assessment tool. The data presented in this paper is a single case study of Rithik taken from a research project that explored children's activities on digital devices within a kindergarten classroom. The devices included: digital still and video cameras; iPads and a computer (Bird, 2012). Both parent and child consent was sought from a class of 27 children, with 20 consenting children being part of the research (Dockett & Perry, 2007). The kindergarten served a low-to-middle class suburb of Melbourne, Australia, with families from a range of cultures including from African, Asian and Western-European descent. The educators included a qualified educator and two assistants. The digital technologies were available to the children during the three classes each week, with each class running for approximately five hours. The project ran for five weeks, with data being collected by both the children, through photographs and video recordings (see for example Bird, 2012) and by the educators through photographs, video recordings and written observations (Marshall & Rossman, 2011). The digital technologies were introduced to the children during a group time by the educator (who was also the researcher) with the names of the devices, and safety rules like using the wrist strap were explained.

Data relating to a particular child – Rithik (male, aged 5 years), was identified to form a single case (Stake, 2006). When engaging in a case study, research questions that ask "how" and "why" are employed because they "deal with operational links needing to be traced over time" rather than specific incidents (Yin, 2009, p. 9). The data examined for this paper explores how Rithik was learning to use the digital technologies (digital still and video cameras; iPads and a computer) through play over a five week period. The aim of this paper is to illustrate how the 'Digital Play Framework' can be used as observational assessment tool for understanding children's learning to use digital technologies through play. Accordingly, the data was analysed using a deductive approach in which data are assigned to pre-existing categories (LeCompte, 2012).

Findings

Thirty-seven observational sets of data involving Rithik using the digital technologies were abstracted from the larger data set (Marshall & Rossman, 2011). These observations were categorised according to the play behaviours listed in the 'Digital Play Framework' (Figure 2).

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Object of activity	Behaviours	All devices	Descriptions of activities	Observations of Rithik
Epistemic play	Exploration	Seemingly random use of the device	Seemingly random footage, images, pressing the iPad, moving or clicking the mouse.	17/10/11 - Rithik filming the ground and someone's legs 17/10/11 - Rithik filming randomly outside 17/10/11 - Rithik filming randomly outside, Joyen and Shaheen run past 17/10/11 - Rithik filming randomly outside, Shamone and Shaheen run past 17/10/11 - Rithik filming tanbark and shadows 17/10/11 - Rithik films a group of children running past 17/10/11 - Rithik filming Shaheen turning around 17/10/11 - Rithik filming random children
		Locating the operating functions of the device	Locating the on/off button (video camera), shutter button (still camera), home button (iPad), keyboard (computer) or mouse (computer)	17/10/11 - Rithik learns to zoom in and out on the Flip camera and practices
		Exploring the operating functions of the device	Exploring the on/off button (video camera), shutter button (still camera), home button (iPad), keyboard (computer) or mouse (computer)	8/11/11 - Rithik filming and asking an adult questions 8/11/11 - Rithik films Mr Potatohead and zooms in and out
		Following directions of the device or other people	Following the directions of the device or other people	
		Seeking assistance for desired outcome	Asking adults or peers for assistance to use the device	17/10/11 - Rithik asking why the numbers on the Flip camera are changing 8/11/11 - Adult explaining to Rithik how to stop and start the Flip camera 8/11/11 - Rithik asking an adult how to watch his movie 8/11/11 - Rithik asking an adult how to know if the Flip camera is working

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Problem solving	Relating actions to the response/function	Pressing the on/off button, relating turning the camera to what is in the viewfinder (video camera), pressing the shutter button, relating turning the camera to what is in the viewfinder, pressing the Home button to change Apps, scrolling through Apps (iPad), relating mouse and keyboard to actions on the screen (computer).	17/10/11 - Rithik asks his educator to show him the letters he needs for his name on the keyboard 20/10/11 - Rithik playing on the iPad pressing the Home button to change Apps
	Trying different actions to solve an issue		20/10/11 - Rithik playing Talking Gina on the iPad and he tries different actions to complete the activity
	Intentional use of the operating functions		17/10/11 - Rithik zooms in and out at children playing
Skill acquisition	Intentional and deliberate use of functions for desired outcome	Being able to view taken footage (video camera) or images (still camera), scrolling and tilting (iPad), using mouse to move cursor, click and double click program icons (computer)	17/10/11 - Rithik films children eating their snack 17/10/11 - Rithik filming himself telling a story 17/10/11 - Rithik filming an adult filming him 20/10/11 - Rithik playing Ant Smasher on the iPad 20/10/11 - Rithik is playing RF Alphabet on the iPad and manipulates the puzzle pieces 25/10/11 - Rithik playing FaceGoo on the iPad and distorting the image 8/11/11 - Rithik filming Mr Potatohead
	Sharing learned actions with others	Being able to share knowledge of functions of the device with others for the purpose of teaching others (ZPD)	8/11/11 - Rithik showing Shaheen the Mr Potatohead movie he made 14/11/11 - Rithik explains to other children how he is making a video
	Intentional and controlled footage of observable people, events and situations or manipulating the		25/10/11 - Rithik playing Reader Rabbit on the computer and deliberately doing the wrong action for the computer's response, laughing each time

		App or program for own purpose		
Ludic play	Symbolic	Deliberate use of device for pretend play	Using the device to record already established pretend play or to record re-enacted play (video and still cameras), selecting an App specifically for pretend play (iPad), selecting a program specifically for pretend play (computer)	8/11/11 - Rithik filming the children packing up the blocks on the mat 14/11/11 - Rithik films two adults packing up the shed 15/11/11 - Rithik filming an adult reading a book 15/11/11 - Rithik filming himself singing a song
	Innovation	Creating pretend play deliberately for use of the device	Creating a pretend play to record (video or still cameras), selecting an App specifically for pretend play (iPad), selecting a program specifically for pretend play (computer)	8/11/11 - Rithik films Lara's spaceman movie 8/11/11 - Rithik films as he asks Tiffany questions about her favourite things at kindergarten 8/11/11 - Rithik creates a spaceman story so an adult can film it

Figure 2: The 'Digital Play Framework' used as an observational assessment tool for understanding Rithik learning to use digital technologies through play.

Discussion

Using the 'Digital Play Framework' as an observational assessment tool for Rithik suggests that children's learning to use technologies through play can be observed in the context of the early childhood setting. For example, observations of Rithik are located in the epistemic and ludic aspects of play using different technologies as cultural tools. Rithik's learning is illustrated in terms of how he explored the various functions of the devices through play (e.g. locating the viewfinder of the still camera; learning to zoom in and out on the video camera; using the Home button on the iPad™ for the selection of a new App). Importantly, the extent to which social interactions featured in this learning are identified (e.g. Rithik asking an adult how to watch a movie he has recorded; asking how to use camera; asking how to use the keyboard). The points at which he seemed to master the epistemic play and move into ludic play are also evident (for example: 14/11/11- Rithik films two adults packing up the shed; 15/11/11-Rithik filming an adult reading a book; and 15/11/11- Rithik filming himself singing a song).

Existing approaches to observing and assessing children's learning through play in early childhood education highlight the need to determine contextual aspects of activity (McLachlan, Fleer & Edwards, 2010). The 'Digital Play Framework' aligns with these existing approaches by providing space for contextual description. Educators can use observations in relation to the indicators of children's learning to use technologies through play as identified in the 'Digital Play Framework'. This suggest potential for using the 'Digital Play Framework' as assessment tool in early childhood education as it helps educators identify the most appropriate pedagogical response to a child learning to use technologies through play. This addresses a pressing need in early childhood education, as there are very limited options available to early childhood educators wanting to observe and assess children's learning to use technologies through play (Aubrey & Dahl, 2014; Flannery & Bers, 2013). In this case example, the 'Digital Play Framework' provides a basis for an educator to better understand Rithik's learning to use technologies through play - and therefore identify opportunities for planned future learning. For example, if Rithik is observed spending his time in exploration and problem solving it would be counterproductive for an educator to plan experiences for him focussed on the generation of digital content. Instead, more time and opportunity for continued exploration of the functions may be needed. Here, an educator might engage in intentional teaching on how to use a given technology, or even pair the child with a more capable peer in using the technology so that there is continued opportunity for social learning. At the same time, wanting to stretch the child towards a greater understanding of the potential usage of the technology, an educator might provide Rithik with examples of differently generated forms of digital content so that he can become aware of what the functions he is exploring are able to achieve. In this way, the educator can simultaneously plan for current learning to use the technology through play, while promoting awareness of how the technology can be used once the epistemic activity is mastered. Such practices would be orientated towards existing approaches to play-based learning, observation and assessment (Carr & Lee, 2012; Wortham, 1998) and while also fostering a deliberate focus on the use of technologies in early childhood education (McLachlan et al., 2013).

Conclusion

Digital technologies are increasingly accepted as an important aspect of early childhood education. A problem for early childhood educators is to how best observe and assess children's learning to use technologies through play. This is particularly important in early childhood education settings because play-based learning is the accepted pedagogical approach. In addition, current policy initiatives such as the Early Years Learning Framework (DEEWR, 2009) and National Quality Framework (Australian Children's Education and Care Quality Authority [ACECQA], 2013) note that assessment should be orientated towards the achievement of learning outcomes for young children; and include the play-based use of digital technologies. In this paper, we have applied observational data associated Rithik's learning to use technologies through play to the 'Digital Play Framework' to determine the

potential of the framework as an observational assessment tool for understanding children's technology learning in play-based contexts. This early use of the 'Digital Play Framework' indicates that it may be useful for helping educators to identify how children are learning to use technologies through play, and therefore for identifying appropriate avenues of future learning. In this way, early childhood educators can work actively towards achieving the goal of enabling children's technology use in terms of ludic activity. Further research is now needed to evaluate the use of the tool with a broader population of children and educators to determine its efficacy in helping educators observe and assess young children's digital play in the early years.

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