Blending play, practice and performance: children's use of the computer at home

Dr Toni Downes
University of Western Sydney, Australia

Abstract

In this paper I report selected results of a multi-method, multi-staged study of children's use of computers in their homes and examine the implications of such use for educators. The study took place between 1995 and 1998, drawing evidence from 500 children with diverse socioeconomic and cultural backgrounds from urban Sydney who regularly used a computer at home.

My aim with this study is to develop knowledge and understanding about the reciprocal relationship that develops between the child and the computer within the sociocultural context of the home. I explore social discourses surrounding children's use of home computers in ways that elucidate the relationship between discourse and affordances, and highlight the children's conception of the computer as a playable tool. In my discussion I consider the co-agency of the relationship between the child and the computer that leads to learning through a blending of play, practice and performance. This approach to learning is contrasted to the approaches imposed within schools when children are engaged in learning, either with or without the use of computer-related technology. The significance of these findings goes beyond challenging the way we integrate computers into schooling; it challenges the assumptions that underpin current teaching and learning practices in our schools.

In the early to mid-1980s, children were more likely to encounter a computer in their school than in their home. Today the reverse is more often the case. In the late 1990s, approximately 60% of Australian families with school-age children have working computers in their homes (Australian Bureau of Statistics 1998). Given current resource provision and curriculum practices in Australian schools, these children are more likely to use the computer in their homes than in their

schools. In Australian homes, children typically use computers between one and five hours per week (Australian Bureau of Statistics 1998), while in schools the duration is more likely to be closer to 30 minutes a week, if they use one at all (Downes 1998b). Given that this trend of greater use and access in the home is likely to continue, it is important for educators to understand the nature and context of children's use of computers in the home.

In this paper I report the results of a three-year study of children's use of computers in their homes, and examine the educational implications of such use. Previous studies have been focused on the impact of game playing on children's social lives and educational achievements (Buckingham 1993; Cunningham 1994; Gottschalk 1995; Sakamoto 1994; Smith et al 1995; Wober & Shehina 1994); on the issues of demographics, equity and the social context of computers in homes (Apple Computer Australia Pty Ltd 1996; Downes 1997; Hirsch 1992; Lally 1996; Morley & Silverstone 1990; Steinfield et al 1989); or on the patterns of children's leisure activities (Cupitt & Stockbridge 1996; Livingstone & Gaskell 1995; Sefton-Green & Buckingham 1996). With this study I draw these threads together, and look at how children use the computer as a tool for work-related purposes in their homes and their schools. In particular, I focus on how children come to view the computer as a 'playable tool' and use it in ways that blend play, practice and performance.

I situated this study within a poststructural, multidisciplinary theoretical framework, drawing on ecological psychology (Bronfenbrenner 1992; Valenti & Good 1991), cultural studies (Morley & Silverstone 1990) and the newly emerging paradigm of childhood studies (James & Prout 1990; Qvortrup et al 1994). Among the key concepts I drew from the various traditions were: childhood and technology as social constructions; children as active agents in constructing and determining their sociocultural lives within the home, simultaneously being constrained and enabled by the context they help to shape; the multifunctional domestic computer as offering a range of affordances shaped by its symbolic meanings and instrumental features; and the home as a microsystem of the child, with its own sociocultural practices, beliefs, gendered relations and resources. Within this framework, an affordance is the property of both the child and the computer; neither is privileged over the other. It refers to the perceived and conceived properties of a value-rich, socially-contextualised object (Valenti & Good 1991).

Methodology

The study had multiple stages and methods. It began in 1995 and involved over 500 children who regularly used a computer in their homes. The children were aged between five and twelve and came from a variety of social, economic and cultural backgrounds in urban Sydney. In Stage 1, data was collected mainly through same-age, mixed-gender discussion groups. In Stage 2, 275 students were interviewed using a common set of questions. Stage 3 involved an in-depth study of 12 children, their parents and their teachers. Computer diaries and semi-

structured interviews were used to collect data from the children, parents and teachers. All discussion groups and interviews were recorded and transcribed. The structured interviews were also recorded on a form. A key feature of the design of this study was an emphasis on children's reliability as informants and constructors of knowledge about issues that affect their lives. Qualitative data was analysed by coding to reveal emerging patterns, threads, tensions and themes, and any quantifiable data was also coded and tabulated.

Results and discussion

The main findings of the study were that children conceived of and used the computer as both a toy and a tool, and that when they were thinking of and using the computer as a tool, it was a 'playable' tool. Working with a playable tool provided opportunities for the blending of play, practice and performance.

Several different factors in children's experiences with computers combined to make the 'playable' tool. These included: the sociocultural context of children's domestic computing; the approaches used by families and children in learning to use computer games as well as other software; and their overall patterns of use.

Sociocultural contexts of children's domestic computing

In all homes, complex and subtle gender and socioeconomic differences interacted with varying resources, parental discourses, family rules, parental and sibling expertise and patterns of family use, to create a range of computing experiences for children.

Patterns of access were strongly influenced by parental expertise developed in the workplace and by family affluence. All children who participated in the study had access to basic hardware and software at home that could support game playing, word processing and drawing. In more affluent homes, children usually had access to the full range of peripheral devices, such as CD ROM drives, printers or modems. In a significant number of these homes (14%) there was more than one computer. Children in less affluent homes were less likely to have access to the full range of peripheral devices, except where the home computer was a recent purchase and came as a package with all devices and a range of 'tool', game and educational software programs.

Children more often perceived that the computers in their homes were jointly owned by their family, rather than owned by an individual family member. Families in less affluent communities were more likely to have a computer perceived to be the child's or children's. In these less affluent homes, parents were less likely to use the computer for work-related purposes; generally, the school-aged children were the main users. Children from more affluent families rarely, if ever, assigned themselves as owners of the family computer(s), perhaps because their parents were more likely to be regular users of computers,

particularly for work-related purposes. So, in these homes, computers were either conceived as belonging to the parents or to the family.

Parents from all communities participated in a number of discourses when discussing the importance and place of computers and computing. These discourses included 'computers as the future', 'computers for education' and 'computers as personal productivity tools'. While children actively participated in these discourses, they added - not unexpectedly - the discourse of 'computers as entertainment'. Parents accepted this role, but did not feature it in their discussions about why they brought computers into their homes. Surprisingly the discourses were not strongly gendered: computers were important for the future for both girls and boys, and accepted as entertainment for both.

When talking about the computer as a personal productivity tool, parents and children spoke about the work-related tasks of writing and accessing information and explained how the computer makes these tasks less arduous. They believed that using computers makes it easier and quicker to access information, easier to edit (due to surface features such as spelling, punctuation, grammar) and easier to make work look better. When discussing how writing could be improved through the use of word processing software there was a strong focus on the 'look' of texts rather than the quality of the writing itself. In this sense, word processors seemed to relate to form rather than function. Such an affordance was shaped by the features of the software environment and the way children (and possibly parents) approached writing tasks.

Similarly, children described the ease of accessing information either from a CD ROM or the Internet compared with using books and libraries, and also how much more interesting electronic forms of information were than print. With the processes of researching topics or questions, the affordances of computers related to 'getting information' quickly, rather than involvement in the more cognitively demanding tasks of making sense of information and incorporating it into knowledge.

This construction of the computer as a tool that makes things 'easier' for the children created real dilemmas for many parents and teachers. From their perspectives, a danger arises if children become over-reliant on the tool aspects of the computer, while still in the process of mastering traditional skills such as handwriting. In speaking about children's access to electronic forms of information, parents and teachers were not so much concerned with the matter of losing more traditional library and book skills, but rather with losing an appreciation of print-based technologies and the preparedness to put in the effort that older technologies demand.

Both boys and girls spoke extensively about the importance of computers as a source of entertainment in their homes. Game playing was seen as an active form of leisure where the process of trying to win, or of winning, was pleasurable. The children believed that game playing could help them to develop

some useful computing skills and that there was educational value in games that involved them in learning basic skills such as reading, maths, spelling and general knowledge. Only two parents of the twelve families commented negatively about game playing, implying by comments like 'I do not want them to use it as a toy' that they wanted the children to view the computer as a tool. The parents who were happy with their children playing games were comfortable with the family computer being used as both 'toy' and 'tool'. They generally encouraged 'tool use' while permitting 'toy use' within limits.

In all the homes involved in the study, families had developed rules for managing the use of computers. These rules generated a 'hierarchy' of legitimate use, defining who was allowed to use the computer, for how long and for what purposes. Priority access was generally given to those wanting to 'work' over those wanting to 'play', and older family members had priority over younger ones. The most common family rule was limited time for game playing on the computer because of the time consuming nature of this activity. These family rules provided a strong indication to all children that computers were for 'work' as well as 'play'. They also interacted in particular ways with family discourses and children's patterns of use to produce important outcomes for girls. Girls' preferred activities (eg word processing) were more closely aligned with parents' priorities, and these preferred uses were accorded higher status than game playing.

The discourses and patterns of use combined to reinforce the potential affordances stemming from the functional identity of the computer. The affordance of 'tool' was strengthened through the dominant discourses, the rules regarding priority use and the actual patterns of use of parents and older siblings. The affordance of 'toy' was legitimated by parental approval, if not active participation in the discourse of computers as entertainment. It is important to note, though, that this approval in some families was somewhat restricted by concerns about the time consuming nature of game playing. The legitimation process was also supported by parental and sibling game playing, though such game playing was gendered, and in the case of parents, strongly related to community affluence.

It is through these processes that the affordances of 'toy' and 'tool' coexist for children in the home. This notion of coexistence is a significant finding. Many of the earlier researchers in the discourses surrounding domestic computing spoke in terms of competing discourses (Haddon 1988; Murdock et al 1992). In this study, we found that while affordances are shaped differently through interactions of the discourses and patterns of use, both are legitimate conceptions of the home computer and are perceived as such by both parents and children.

Children's ways of learning

Children's patterns of learning to play games and use other software were relatively similar across age, gender and family background. Some differences

occurred in the initial stages of learning to use the computer, where boys were more likely to 'fiddle' and girls were more likely to seek help through asking others, reading the manuals and looking up help files.

When children began describing how they 'got better' at games after the initial learning period, the overwhelming majority of children in Stage 2 of the study (87%), with equal proportions of boys and girls, reported that they did so through repetitive play:

> Every time you play a game ... you always get up a level ... you keep on doing it and doing it and you get better because there's clues and you've got to keep them in your head. And at the end you just keep going and start a new one.

Some children mentioned how they consciously altered their responses to various situations based on previous outcomes, and others spoke about using trial and error approaches. This approach was also applied to what the children called 'educational games'. One child described her approach as:

> … well playing it more than once ... like going on to different stages and like just say it's a mathematical game, like trying a different concept like I did addition last time, I'll do subtraction this time.

One of the more important findings from these discussions was that there was little differentiation in the minds of the children between the notions of playing the game for fun/competition and playing to get better at the game. That is, in most children's conversations, the distinction between performance and practice was blurred; children learnt from playing and played to learn. A small number of older children reported that on occasions they did separate out episodes of performing and practising. They described how sometimes they would play to learn, not to win. Particularly in complex strategy games, they would save where they were up to, and would try a variety of options, returning to the saved position before trying the next option either until they had checked all options or found one that worked.

It is noteworthy that several characteristics of the games themselves facilitated the blurring of the performance/practice dichotomy and increased the value of the trial and error approach to improvement. These included: the existence of different levels of difficulty; having a number of 'lives' so that users can 'die' several times before they are out of the game completely; the facility to cheat, where users can 'break' into a level or place without having to go through the whole game or level; and the ability to save games and return to particular positions. Combined with the graphical and sound feedback about the quality of the decisions or moves users make, these characteristics create an 'affordance'. This affordance is equally shaped by the characteristics of the game environments and the conceptions children develop through their own game-playing behaviours. The outcome is that children conceive of the computer as an environment where the combination of exploratory learning and learning by doing works well. Given that the majority of children in Stages 1 and 2 of the

study reported that their first computing experiences were within a game-playing environment, this affordance might be significant, as it could well become a dominant conception of the computer.

The other strategies, particularly used by younger children when learning to play a new game, also generated important features of the total learning environment. For many children these included easy access to 'just in time' help/advice/teaching and an environment characterised by mentoring and modelling, which comes with the opportunities for spectatorship and apprenticeship within the family. This latter characteristic was mainly available to children who had older brothers and sisters and was mainly used by younger boys. One feature of this total learning environment was particularly important for girls. Help, advice, mentoring and modelling were generally available within the family context. This reinforced the domestic culture around computer game playing that facilitated children's own game-playing activities.

A further important feature of this learning environment was that electronic game playing was a learning environment, where the children were setting their own goals and were in control of their own learning strategies. In general, adults were not seen as 'resident' experts in either the skill/knowledge domain of the game, in the processes of playing the game or in the processes of learning/improving game performance. Parents did not have a stake in the quality of their children's performances possibly because they only 'allowed' rather than 'encouraged' children to play games. Generally they only contributed to the teaching and learning when asked to do so, and usually this was only at the early stages, when a child, particularly a younger child, was learning a new game. This provided many children with the 'space' to develop their own expertise using their preferred methods.

The modes of learning by doing and exploratory learning, while accepted as natural and appropriate for young children's informal learning, are much less accepted in the older child's world, especially in those environments that are governed by rules, such as educational settings (Mayall 1994). Computer game playing provides one environment where children can continue to use these processes into middle childhood and adolescence. The children in this study viewed gaming contexts as 'adult-free' computing zones, where they set their own goals and were in control of their own strategies.

Patterns of use

Patterns of use within the home were strongly gendered and related to age. Overall, game playing was the most common activity. Boys played games more often and for longer periods than did girls. Boys were also more likely to play games that were borrowed, shared or purchased. Girls were more likely to play games already installed on the computer (eg solitaire). This provides some insight into the differences found between the interests of boys and girls in the operating system and technical specifications of their computer (Cupitt & Stockbridge 1996; Downes et al 1996). Boys who shared and bought games

needed to know about the compatibility of the game and their operating environment.

Both boys and girls spoke about the pleasure of playing games in terms of the challenge, creativity, unexpectedness, discovery, choices, excitement, complexity and overcoming the obstacles. It is interesting to note that many of the processes of game playing that children described relate to cognitive performance: challenge, complexity, choice and creativity. Overall, the preference for these cognitive processes was not gendered nor related to the community in which the children lived.

As well as playing games, girls and boys engaged in a wide range of other computer-based tasks. The common tasks were drawing, writing, looking things up and making things such as cards, posters and banners. Less common tasks included manipulating sound and images, communication by email, designing and making newsletters and stationery, searching the Internet for information related to leisure pursuits or for software to download, and listening to music through the computer's compact disc system while using the computer. These tasks have been grouped into four categories listed in Table 1. In this table, the term 'texts' refers to any written, spoken, non-verbal, visual or auditory communication involving language (Board of Studies, New South Wales 1998). Locating texts, for example, includes looking for information on a CD ROM or a website.

Table 1: A classification of children's non game-playing activities*

Creating texts	Using texts	Communicating	Using technical processes
• composing writing	• locating	• phoning	• booting the computer
• editing writing	• browsing	• emailing	• shutting down the computer
• decorating writing	• searching	• chatting in chat room	• running software
• constructing images	• viewing, listening and/or reading	• chatting one-to-one	• loading files
• manipulating images	• using	• role playing	• saving files
• designing texts with words and images	• organising	• joining an interest group	• printing files
• making texts with words and images		• searching for people with particular characteristics	• managing files
• *creating sounds*		• sending greeting cards etc	• customising software
• *manipulating sounds*			• fixing problems
• *integrating writing, images and/or sounds*			• recording sounds
			• scanning/digitising images
			• dialling and connecting to network service
			• downloading from networks
			• altering desktop features
			• installing software
			• altering system configuration

* normal print represents common tasks, *italics* represents less common tasks.

These activities performed two distinct functions. Some were leisure activities generated by the children for their own pleasure or that of others. The remainder of the activities were work related. Leisure-related activities were further subdivided into playful and purposeful tasks. Figure 1 shows the relationship between the nature and purpose of the tasks.

Within this framework an episode of game playing could be playful - in the sense of 'fiddling around' to find out more about a particular place or event within the game, or just playing 'for fun' - or purposeful, for example 'beating my dad'. Using information texts could be playful - as in 'surfing' compact disks or the World Wide Web - or purposeful, in terms of looking up a favourite pop group. Work-related activities for the children in this study were purposeful tasks that were usually connected with schoolwork. Within these purposeful tasks, children engaged in playful episodes that were often the result of being distracted, taking time out to 'check out' or 'figure out' something, or merely to 'enjoy' or 'play' along the way. This ability to shift backwards and forwards

from work and play as needed basically allowed them to complete purposeful tasks through playful means. Comments from children such as 'I can play painting', 'I played typing stories' and 'I played the encyclopaedia' illustrate this. The use of the word 'play' here can be viewed like 'playing a musical instrument', referring to the skilful use of the features of the computing software. Through episodes of purposeful leisure-related and work-related activities, these became 'playful' experiences for the children. These factors combined to create, in the minds of the children, an affordance of the computer as a playable tool.

This conception of the computer has a number of interesting consequences. One relates to children who regularly used computers for personal and work-related writing. Playful episodes involved children in playing with the 'look' of the text rather than its meaning. By using WYSIWYG word processors, children could see the direct results of their various formatting commands, and the act of improving the look of the text became integrated into the composing process. Given the obvious and immediate feedback on the look of the text, it is not surprising that when combined with children's approaches to learning and using, a dominant affordance emerged: word processors are for improving the 'look of' the text. This predisposition to use word processors in particular ways needs to be carefully considered when educators plan to use computers in the teaching and learning of writing.

Figure 1: A framework of children's uses of the computer
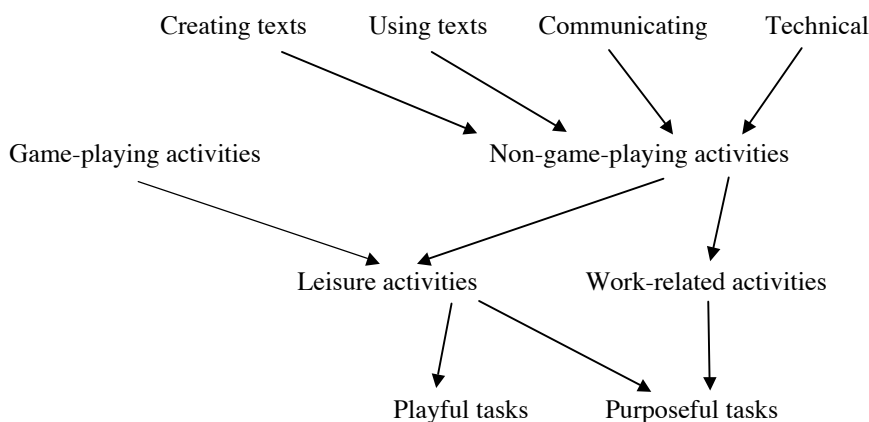
Similarly, the predisposition of children to use and learn to use computers in particular ways has implications for computer use in educational settings. For the majority of children in the study, their sense of control over their computing activity at school was severely limited compared with that at home. They spoke of being told 'not to fiddle' and 'if you have a problem - ask - don't try and fix it yourself'. They also spoke of having limited time to use computers at school, with rarely enough time even to finish substantial tasks in one sitting. The practice of playing an educational game only once was in stark contrast to the

way children learned at home and it denied them the opportunity of 'getting better' through an integrated mode of performance, practice and play. Given that children's access was restricted to a weekly session of 20-30 minutes duration in the majority of schools, this raises the question about the role of educational games in the classroom. For the children interviewed, the opportunity to improve performance through repetitive play simply did not exist.

Computing experiences at school were either heavily teacher-directed in order to achieve syllabus outcomes in the key learning areas, or were at the other extreme - incidental, one-off game playing during free time. In contrast to the situation at home, children were not allowed space to develop their own expertise or learning strategies. Little genuine integration of various technologies into units of work occurred, and tokenistic computing involved activities such as using the word processors to type information reports and stories. The teachers and children who were interviewed justified word processing as an easier and better way for children to present work. The disadvantages they perceived in using word processors were in agreement with the views of parents: lost skills, lost motivation and effort.

It was evident that the belief systems of individual teachers strongly influenced how computers were used in classrooms. Many teachers still considered computing to be a marginal activity, with many unresolved pedagogical and technical issues. Some of the teachers interviewed were able to rationalise that computer use was not essential for present societal functioning and focused strongly on the ability to use technology in the future world of work.

Conclusion

The emergence of the computer's affordance as 'playable', and children's own predisposition to use and learn to use computers through exploratory learning and 'learning by doing', demonstrate the co-agency of the relationship between the computer and the child. They interact in reciprocal ways, to re-shape both affordance and use. Through these interactions a number of approaches to learning are further reinforced. These include the blending of the processes of play, practice and performance. Pathways to playful learning and working are created through the interaction of exploratory learning and the interactive nature of the computer. The computer helps children to extend their exploratory skills and approaches beyond the traditional 'early childhood' years.

The blurring of the processes of play, practice and performance in using the computer at home contrasts strongly with the dominant pedagogical approaches in schools that continue to separate learning and doing, or practice and performance. This creates tension where educators employ computers and related technologies within traditional curriculum and pedagogical frameworks, and when children find that their preferred learning strategies are discounted or denied authenticity within the classroom. Educators cannot continue to ignore this discontinuity between the learning affordances of the computer and the

traditional pedagogies of classrooms. As more and more children use this technology in their homes and develop predispositions, skills and understandings within particular ways of learning, the gap between learning with the technology and learning at school becomes wider.

If children who regularly use computers in their homes come to school with different orientations to learning and different sets of orientations to traditional texts, literacies and technologies, then educators need to question many current practices and assumptions underlying the way they teach. Pedagogy that reflects a convergence between learning by doing, and children's preferences for control and freedom to explore, must be more appropriate. The level of expertise gained by children from informal settings such as the home needs to be acknowledged in the school curriculum, in order to assist children to further their learning about computers. Effective integration of technologies rests on teachers' beliefs that computing is essential and on their abilities to advance children beyond surface-level engagement with the content and meaning of electronic texts.

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