

The introduction of new technologies: New possibilities for early childhood pedagogy

Maureen O'Rourke

KidSmart

Cathie Harrison

University of Western Sydney

In 2000, IBM invited the Australian National Schools Network to assist in the implementation of the international KidSmart Early Learning Program in Australia. By the end of 2003, more than 300 Young Explorer Units will have been donated to designated early childhood settings serving low socio-economic communities across Australia. This paper will outline some of the results of the case studies undertaken by educators in the participating settings during the first year of the program. The task of integrating the new computers into the early childhood program generated many issues and challenges for educators. Of particular interest were the pedagogical possibilities that emerged through the introduction of new technologies within early childhood settings.

Introduction and background to the project

The KidSmart Early Learning Program is an international initiative of IBM. The project aims to increase the access to technology for children from economically disadvantaged backgrounds and subsequently broaden their learning opportunities and support the transition to school. In Australia, a partnership with the Australian National Schools Network [ANSN] was formed in 2000 to manage the rollout of the program, design and facilitate professional development for educators, and conduct research and evaluation. By the end of 2003, more than 300 Young Explorer computer units will have been donated to early childhood centres around Australia.

Participating centres were selected on the basis of the following criteria:

- high incidence of socio-economic disadvantage;
- high proportion of children and families with language backgrounds other than English;
- strong links with indigenous communities; and
- limited computer access and availability within the local community.

Their formal involvement with the ANSN research circle lasted for one year. At the end of this time a new cohort of teachers and centres was inducted into the program.

The research and professional learning program designed by the ANSN was integral to the project. It aimed to raise awareness of pedagogical issues related to using information and communication technology [ICT] with young children and to investigate issues arising from the introduction of this particular technology to these centres. In addition to a two-day introductory workshop, research circles (clusters of early childhood centres and ANSN colleagues) were formed to explore issues that educators identified as being of concern or interest, such as the relationship between early childhood, new technologies, literacy and learning. In the first year of the program, 192 educators in three intensive states (Victoria, Western Australia, New South Wales) developed case studies that focused on their

particular inquiry interest. These were analysed in conjunction with national survey data from all states and territories.

While most critics agree that computers have the potential to bring massive benefits in later stages of children's education, the use of computers in the early childhood setting is an under-researched field. The majority of the research shows that computers can be extraordinarily powerful tools because they have the capacity to encourage young children to learn in new and dynamic ways (Clements, Nastasi & Swaminathan, 1993; Yelland, 1999). Some critics, however, are strongly against their use (Armstrong & Casement, 2001; Healy, 1998). Child development and technology are often seen as at odds with each other as technology can interfere with time for children to play with materials and to develop intellectually, emotionally, socially, physically and spiritually (Cordes & Miller, 2000).

Traditional early childhood philosophies have tended to emphasise a developmental or curriculum-centred approach to learning, both of which pose significant limitations for understanding ICT use. New approaches in early childhood education, such as cross-cultural and postmodernist approaches, have challenged traditional developmentalist discourses. The re-imaging of the child associated with an increased awareness of the early childhood experience of Reggio Emilia (Edwards, Gandini & Forman, 1998), the reconceptualising of the early childhood movement (Canella, 1997; Dahlberg, Moss & Pence, 1999), as well as socio-constructivist approaches (Vygotsky, 1978) have all forced early childhood educators to rethink traditional curricula and pedagogical approaches.

Introducing the program to early childhood educators

One of the key challenges faced by the education sector in Australia, as well as globally, is the need to provide educators with the skills necessary to integrate computers effectively in their teaching practice (Piannfetti, 2001; Becker, 2000). Educators do not automatically acquire a repertoire of skills to assist them in making decisions about how they can facilitate learning for young children interacting with new technologies (Wartella & Jennings, 2000; Elkind, 1996). Early childhood is the time when the foundations for literacy and numeracy are established (Clay, 1993), and yet there is a lack of large-scale, comprehensive research documenting and making recommendations for the use of computers. Until recently, computers have been a peripheral feature of early childhood education. Accordingly, the majority of early childhood educators in Australia do not have adequate knowledge of how the technology can be used to best aid children's learning.

Many of the early childhood educators who participated in the KidSmart program did not have previous computer experience and therefore experienced some anxiety in relation to their participation. The professional learning program was designed to not only alleviate this anxiety but also provide a space for educators to develop understandings of ICT that were connected to their existing early childhood philosophy and the pedagogical stance this implied. This meant beginning with what educators already confidently knew about the way children learn, as part of a two-day workshop. This pedagogical framing also guided the workshop process, with educators being provided with opportunities to learn about the new technology by playing, talking together, observing each other's work, and working in pairs. The program also addressed issues such as the role of multimedia in young children's learning and the development of new literacies, curriculum integration, software evaluation (particularly in relation to open-ended and closed software and the degree to which the child was in control), organisational issues, and technical skills.

The response from educators after the two-day introductory workshop indicated that many felt their existing ideas about computers and young children had been challenged so that they saw ICT use in a much broader context. They also increased their expectations in terms of the development of children's understandings, moving beyond simple technical skills such as mouse control, to expectations of creative thinking, problem-solving, social skill development, and increased awareness of the role of ICT in society and daily life. Some educators also reported that they had not previously seen the connection between what children did on computers and other sensory experiences. The workshop process included time to develop ideas as to how the two-dimensional concepts children were exploring on the computer could be connected and developed further in real-life sensory experiences.

Most educators agreed that the initial workshop, although valuable, was not enough on its own to support them in their endeavours to develop children's learning through integration of ICT into the early childhood curriculum. At least one follow-up workshop was necessary, together with regular cluster meetings that were conducted as part of the research circle process. These enabled technical, organisational and pedagogical issues to be addressed within a reasonable time frame from when they arose.

The research process

Two strands of research were conducted, one based on collaborative practitioner research which involved educators as co-researchers (Noffke & Stevenson, 1995) and the other a more traditional, standard survey questionnaire. In recent studies, variations of collaborative practitioner research have been successfully used to identify learning outcomes, confirm understandings about teaching and learning, and enable educators as researchers to 'identify and speculate on new findings with regard to links between teaching practice, school organisation and student learning' (Cherednichenko, Davies, Kruger & O'Rourke, 2001, p. 2). Research circles were established based on the principles of collaborative practitioner research.

Survey

A survey questionnaire based on the following issues was developed and mailed to 98 centres in all participating states and territories across Australia, with a 50 per cent return rate:

- how does the KidSmart program improve learning?
- which software programs and teaching strategies are most suitable and effective? and
- how might KidSmart be integrated into the community context?

A set of 'core international questions' developed by the international KidSmart evaluators was also provided. These related to:

- teachers' previous use of computers;
- level of teacher and student comfort regarding computers in the classroom;
- time allocated to computer use; and
- how computer use is regulated.

The ANSN researchers also asked for examples of how computers were integrated into the early childhood curriculum and suggestions for further enhancing the KidSmart program. The centre directors took responsibility for the completion of the survey forms, and, where appropriate, other members of staff also responded to particular questions.

Research circles

Research circles enable educators to be active researchers in their own teaching situation and to share their ideas and experiences in a professional forum. This strategy encouraged further building of professional skills through ongoing action research that was planned during the initial workshop, then revisited and collaboratively analysed through regular cluster meetings. The facilitation of the research circles provided early childhood educators with access to current research and expertise in ICT and assisted with the ongoing development of site-based action research and case study projects. Data generated through the research circles also provided a major source of research data for the overall project evaluation, particularly the documentation of case studies.

Case studies

Centres in the three research circles (NSW, Victoria, WA) developed case studies associated with their research interest. This allowed the ANSN researchers to gather information about complex issues such as effective teaching strategies and the integration of Young Explorer into the community context. The case studies were developed in response to individual action research inquiries where participating teachers identified a particular question or issue they wished to explore. Research questions explored such issues as gender and ICT use, pedagogy, family involvement and attitudes, equity, appropriate software, attitudes of cultural groups, social skills, and the impact of the computer on teaching strategies. Collaborative discussion and some joint analysis took place during the research circle meetings.

It was evident from the case studies that KidSmart provided the educators involved in the project with the opportunity to analyse and to question how things are done in early childhood education. Involvement in the research and the ANSN process of reflection is most effectively undertaken within a collaborative context. Unfortunately, early childhood educators are frequently isolated from their colleagues, with few opportunities for ongoing discussion, shared reflection, and professional development. The project provided the catalyst and, together with the training days, offered a context for teachers to talk about their work. The teachers' voices provided rich, valid and valuable information to analyse and from which to draw themes and pinpoint significant issues for consideration. The themes that emerged from the case studies primarily focused on issues relevant to teaching and learning with specific consideration of the impact on children, educators, and families.

Pedagogical possibilities: Learning from case studies

Introduction of a new element to the environment

The inclusion of a new element in the environment necessitated analysis, reflection and negotiation between staff. The physical dimensions of the Young Explorer Unit meant that some centres had to undertake considerable re-organisation of the physical space within the playroom in order for the new computer to fit. Requirements for power outlets, adequate lighting, and security also needed to be considered. One centre with a large skylight in the ceiling of the playroom found that they had to move the computer every few months in response to seasonal variations in natural light patterns that impacted on the visibility of the screen. Issues of traffic flow, the need for adequate supervision, and the suitability of adjacent experiences were also considered.

While somewhat complex, the process of working through the various issues was valuable. The decisions regarding placement of the computer stimulated in most cases a review of the entire

physical layout of the learning environment and the effective organisation of resources and physical space. Early childhood educators generally worked through these issues collaboratively. The process involved careful observation of children, a review of teaching practices, approaches to learning, classroom management, and a re-evaluation of the daily program.

For some early childhood educators, the introduction of the computer generated concerns regarding the place of computers within a play-based philosophy. Some were anti-technology because it 'gets in the way of children's play'. This concern resulted in more limited computer use in some centres but in others led to a conscious attempt to integrate the computer as another learning centre alongside other play experiences such as block play, literacy play and socio-dramatic play.

Teaching strategies for introducing and managing the computer

Different settings adopted different teaching strategies for introducing KidSmart. These strategies reflected particular approaches to teaching and learning and also levels of computer competency amongst educators. Educators with prior computer experience tended to be more open than those without. At some centres there was little formal instruction on using the computer. One educator commented:

With this approach the children are much more inclined to take appropriate risks, and explore their options. This teacher-supervised strategy as opposed to the teacher-directed approach, allows the children to feel safe working to their limits. Of course we ensure the children are aware of all the options available to them. But we do this in a way that lets the children take charge of their learning, and does not place unfair expectations from adults upon them.

For some educators the commitment to sequencing of skills was strong, with some focusing on the step-by-step acquisition of skills the children needed in order to operate the computer. In some centres children were given very limited options at the beginning, as some teachers believed it helped children acquire skills if they limited choices initially. Others changed the choices regularly as a way of maintaining the levels of excitement. Significantly limiting or controlling choices may have been seen to be the most effective strategy but may have offered little recognition of the diversity of backgrounds, experiences, and levels of computer competency the children brought to the centre. In some centres educators saw the children as explorers finding their way and were more willing to share the decisions about computer use with the children.

In particular, early childhood educators at all the centres receiving the Young Explorer Unit grappled with the complex issues associated with equity of access. In most cases initial observation of the children at the computer clearly indicated that some strategies were essential to ensure equitable use of the unit. As one educator commented:

Gaining equitable access to the computer became an issue. There were children who would spend enormous amounts of time daily using the software and there were children who rarely accessed the system during the course of the week. Whilst some children were mastering skills at a high level others were still not co-ordinated with the mouse.

A number of early childhood educators found it useful to consider what values were being transmitted and encouraged by the way the computer was introduced and used in the centre. As an

aspect of the 'hidden curriculum' different approaches to the management of the computer promote different attitudes and outcomes. Issues of independence, interdependence or dependence, equity and fairness, and self or external regulation are significant and need to be carefully considered. Most centres moved away from a 'system' of turn-taking, to children accessing the computer when they wanted to in a similar way to how they accessed other experiences offered within the program. Other educators asked:

What about children who are over-keen—are these children who use repetition or are they extending what they know? What else is happening in their lives? What about the children who are pulled off the computer? What if they are really engaged, interested and extending their learning? What message does it give them when adults say you have had enough now? What about children who are not interested? Do we make all children do everything that is offered? If they haven't been to an area do we make them go there? Others view that if the child is learning through another medium then that's OK. What do we do if the child says 'it's not for me?' Does limited time on the computer give it an added attraction and value above other experiences offered within the program?

As a result of considerable reflection and collaboration, a number of strategies for time management on the computer were developed and progressively modified. Careful observation, and systems for monitoring the interactions and participation in relation to the computer were considered important. As one educator commented, 'sharing the computer seat does not necessarily ensure equitable computer use'. The children were often active participants in the process for managing the computer, and various schemes for turn-taking were devised and implemented. Management strategies appear to be evolving, with some early childhood educators reconsidering their approaches as they gain experience with the computer. An educator at one centre noted:

I had begun in a very structured manner by setting up charts with the children's names on lists of who was due for a turn and who had finished. I only allocated one time of the day for computer use. The children showed me that I was going about this the wrong way! I began to enjoy the computer with the children. The computer was turned on in the morning and off in the afternoon when they left. There were no charts; the children told me who had turns and who had not. Children were encouraged to have a turn and if they wanted another turn they were accommodated. I was amazed at how quickly the children learned the software and how they learned from each other. They showed me how to do something new.

Grouping

The introduction and ongoing management of the Young Explorer Unit also motivated a review of methods of grouping children within the early childhood program. In some cases, whole group experiences were utilised as an effective means of introducing the computer. Introductory 'lessons' to the whole group of children, explaining aspects of the computer, relevant terminology and processes, were implemented in some cases. The educator recorded the following comment:

Large group activities on the computer are an excellent way of introducing new programs and exploring curriculum areas, e.g. science and technology units. I found this a useful strategy for engaging the whole class. The children have also enjoyed this learning style.

Other educators chose to use less didactic approaches and introduced the computer to small

groups of children through a more active and participatory process. Others worked with individuals or pairs of children. In many cases, as the computer became more familiar, children were paired together strategically to enable a more able child to scaffold for a child who was less familiar with the computer processes or in the case of particular software. Over time the children took greater control in this process, as reflected in this comment from the educators at one long day care setting:

The more experienced children were used as teachers to assist the other children, so often buddy systems were set up by the children themselves.

The increased recognition of the potential of peer scaffolding for effective learning and teaching has significant benefits in early childhood education beyond the use of information technology, and is being increasingly recognised in contemporary approaches to early childhood education (Edwards, Gandini & Forman, 1998; Dahlberg, Moss & Pence, 1999). Child-initiated learning and working with small groups of children who share a common interest also supports the move toward interest-based planning in early childhood settings and the re-imagining of the child as strong and capable. The Young Explorer Unit has been used effectively in some settings as a means of implementing a project or emergent curriculum approach and early childhood pedagogies based on the Reggio experience (Edwards, Gandini & Forman, 1998). Children have been encouraged and supported in the cooperative exploration of shared interests, with adult facilitation rather than direction.

Opportunities for integration

The case study reports provided by the participants in the project highlighted some valuable opportunities for effective integration within the early childhood program using the Young Explorer. The focus of play experiences, particular concepts, and areas of interest were frequently followed up with relevant computer programs, as evident in the following comment:

Children's interests, imagination and creativity are the starting point for planning computer-supported learning experiences. In most cases children select a computer activity just as they would any other activity—on the basis of interest to them. Letter writing using KidDesk was very popular. The children enjoyed writing letters to each other and posting them to their friends. Many were printed and kept in the individual portfolios which go home at the end of the year.

Similarly, the content of various computer programs was used as a source of direction for follow-up play and learning experiences:

A craft table was set up where children could create their own bug from a variety of craft materials. A play dough table was designed to create 'My Friend'. ... sequencing pictures were made where children could tell a story found in Make a Story (Bailey's Book House) and Make A Movie (Sammy Science House) and a large mat game was designed based on the Jelly Bean Hunt (Trudy's Time and Place), a popular game with the children.

The early childhood educators at one setting noted that some of the children would use the computer and then transfer what they had learned from the computer into their other play:

This included using the construction program in Millie's Maths House and then following

up with construction in the block area. Using the money machine in Millie's Maths House followed up by a walk to the local shops and then shops for dramatic play. Some of the children would make a card at Bailey's Book House and then use the writing shelf to write messages and the art table to add creatively to their cards.

Individualised and responsive programming

A broad range of experiences was possible with the computer-assisted individualised programming, as noted by staff:

All children are individuals and they utilise the computer in ways that reflect their current interests and in different ways according to their level of development. The computer programs enable them to do this.

An educator at a different setting commented in a similar way:

Children all learn differently, and some learn better if they can repeat it as they need to, if they can see it and hear it, and if it is presented attractively, with bright colours, movement and sounds to match...

In some cases the computer provided a useful bridge between home and preschool for children having difficulties settling into an unfamiliar environment. One educator noted that this provided a useful strategy:

One child in particular had already had access to the software at home, so found the computer a solitary activity until he could overcome his anxiety after separating from his mother. Others were then encouraged to join and interact with him; this worked quite successfully.

Many early childhood educators participating in the project undertook regular and detailed observations of the nature of the children's computer use to facilitate individual planning. Such documentation enabled the educators to ensure a more responsive approach to the individual needs of children within the group:

Through initial observations I discovered that less than half the children were using the computer. Consequently I undertook a more direct focus on the children not using the computer, identifying the particular issues for each child which inhibited their use of the computer. Support programs were introduced to encourage these children to become more familiar with the computer and confident in its use. Secondly, I wanted to ensure that children who enjoyed using the computer and felt confident with the programs were not disadvantaged. These children needed to be extended and were able to cope with more difficult programs. To achieve this, a peer program with fifth class was implemented. The older children worked on a roster basis to support the preschoolers.

Observations were also used as means of identifying particular interests and programming to support these. The following documentation from a teacher's journal reflects this:

T (3.0) is showing great interest in numbers and letters. Our ideas to support this include 'Millie's Math House' and 'Bailey's Book House'. We have also included walking to the shops to look for numbers and letters. On our walk we bought babies' nappies. We looked at the price and the number of nappies in the packet. The children showed an interest in

the cash register, receipt and change. When back at the centre we put Millie's Maths House on. The children pretended to be in the shop pressing the numbers. Thomas was pressing 20 and read it on the receipt from the nappies we bought. This worked well in relating the experiences together.

The computer was used as an effective documentation tool and way of recording children's progress at a number of centres. One educator commented:

I especially like the fact that each child has their own KidDesk and icon where they can enter their own personal program. This is a very impressive tool to show the parents, as it consolidates the fact that each child is able to learn at their own pace, regardless of past experiences.

Possibilities for emergent curriculum and interest-based planning

The experiences of some early childhood educators, documented within their case studies, suggest that the inclusion of the computer and information technology within the early childhood learning environment can provide the impetus for re-invigorating the early childhood program. For some it was a catalyst for change:

From a teaching perspective, the addition of the computer provided positive professional implications, challenging teacher's perceptions of approach and expanding the preschools horizons in its approach to early childhood teaching. The project provided teachers with an additional forum to meet their peers and compare teaching approaches.

The centres which have moved or are moving towards child-initiated and emergent curriculum seemed more able to offer the flexibility and open-endedness which enabled the children to maximise the potential of the computer as a resource for learning and teaching. The introduction of the computer provided an opportunity for centres to integrate core curriculum, such as literacy and numeracy, with emergent curriculum that is child-generated and develops from the children's individual and shared interests. These elements can come together in conjunction with the children's experience of the world. The following excerpts from a teacher's journal reflect this:

B. spent approximately 45 minutes in Millie's Math House. He selected the building program and was successful in building two houses and a birdhouse. Occasionally he found it difficult to move the mouse but he persevered and showed good patience. B. has displayed an interest in construction before, when a project was initiated by building with blocks. A walk to a local construction site was included as part of this project.

Attitudes to information and computer technologies

Although some early childhood educators began the project with a degree of apprehension and reluctance, almost all their case studies indicated their increasing commitment to information and communication technologies in early childhood settings. The hands-on computer experience and the commitment to action research associated with the project helped early childhood educators to be more aware of the positives and negatives of computer use for young children. The documentation they gathered, both within the centres and from information provided by families, formed a useful basis for analysis, reflection and collaboration. The cultural diversity and socio-economic disadvantage evident within the various settings also highlighted the importance of empowering the

children as confident and competent computer users. One educator noted:

I cannot imagine a classroom without a computer in it. It is never too early to expose preschool children to the realm of technology that a computer offers.

For some educators the lack of knowledge of information technology added to the many other pressures of the workplace. In some centres the computer became an additional source of anxiety, and the result was avoidance or limited use of the computer. The provision of additional resources to early childhood services, particularly in areas of disadvantage, as well as opportunities for ongoing professional development and additional teacher release time, would help to alleviate this anxiety.

Conclusion

The possibilities conceived by teachers, parents, and children in relation to the use of the Young Explorer in the early childhood setting resulted in high enthusiasm, willingness to persevere in the face of technical difficulties, and willingness to share and experiment. Parents were often aspirational, seeing the computer as providing their children with opportunities to 'get ahead'. The KidSmart program is helping to clarify what genuinely assists disadvantaged children in developing an image of themselves as confident and powerful learners. Teachers identified fine motor, social, emotional, cognitive and language development as all benefiting from children's use of the Young Explorer Unit.

The case studies also identified differences in teaching approaches, with a strong developmentalist approach sometimes resulting in the separation of developmental areas so that these became the focus of content, e.g. fine motor development through the teaching of mouse skills. A concern that such approaches may result in fragmented learning that limits the use of the computer as a resource for integrated approaches and interest-based learning was identified through the case studies. The move away from strict developmentalist approaches (which can sometimes focus on what children lack) enabled educators to recognise children's strengths and interests. This led to the re-imaging of the child as strong and capable and enabled educators to help children more effectively utilise the many skills they have.

The KidSmart Early Learning Program is making a significant contribution to early childhood education in Australia, both in terms of increasing opportunities for teachers' professional learning and raising awareness of the role of ICT in young children's learning with families. Educators in the first stage of the rollout of the program have identified a number of areas that have guided the development of additional professional resources. These are now available to subsequent participants in the program and other interested educators. In addition to suggestions about introducing the computer to the early childhood environment, teachers have shared a range of different approaches to classroom organisation, safety rules, and turn-taking. Case study research has helped understandings about the link between ICT and children's learning to develop in a grounded way, while interaction with colleagues has explored a wide range of possibilities for curriculum integration. As well, the use of the Young Explorer Unit in the early childhood setting has been linked to the early development of 'multiliteracies' (New London Group, 1996) that require multi-modal communication. This will be explored further over the next three years, owing to the award of an Australian Research Council grant to a team of researchers from Western Australia, Victoria and New South Wales.

Further information on KidSmart Early Learning Program Evaluation in Australia and overseas is

provided on the Australian National Schools Network Website at <<http://www.ansn.org.au/>>.

References

- Armstrong, A., & Casement, C. (2001). *The child and the machine*. Melbourne: Scribe.
- Becker, H. J. (2000). Who's wired and who's not: Children's access to and use of computer technology. *The Future of Children: Children and Computer Technology*, 10(2), 44-75.
- Cannella, G. S. (1997). *Deconstructing early childhood education: Social justice and revolution*. New York: Peter Lang.
- Cherednichenko, B., Davies, A., Kruger, T., & O'Rourke, M. (2001). Collaborative practices: From description to theory. Paper delivered at the AARE (REF), Fremantle.
- Clay, M. M. (1993). *An observation survey of early literacy achievement*. Auckland: Heinemann.
- Clements, D. H., Nastasi, B. K., & Swaminathan, S. (1993). Young children and computers: Crossroads and directions from research. *Young Children*, 48(2), 56-64.
- Cordes, C., & Miller, E. (2000). *Fool's gold: A critical look at computers in childhood*. Alliance for Childhood: [online] <http://www.allianceforchildhood.net/projects/computers/computers_reports.htm>. May 2003.
- Dahlberg, G., Moss, P., & Pence, A. (1999). *Beyond quality and care in early childhood education: Post modern perspectives*. London: Falmer.
- Edwards, C., Gandini, L., & Forman, G. (Eds) (1998). *The hundred languages of children: The Reggio Emilia approach* (2nd edn). Greenwich, CT: Ablex.
- Elkind, D. (1996). Young children and technology: A cautionary note. *Young Children*, 31(64), 22-23.
- Healy, J. M. (1998). *Failure to connect: How computers affect our children's minds, for better or for worse*. New York: Simon & Schuster.
- New London Group (1996). A pedagogy of multiliteracies. *Harvard Educational Review*, 60(1), 66-92.
- Noffke, S., & Stevenson, R. (Eds) (1995). *Educational action research: Becoming practically critical*. New York: Teachers College Press.
- Piannfetti, E. (2001). Teachers and technology: Digital literacy through professional development. *Language Arts*, 78(3), 255-62.
- Vygotsky, L. (1978). *Mind and society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wartella, E. A., & Jennings, N. (2000). Children and computers: New technology—old concern. *The Future of Children: Children and Computer Technology*, 10(2), 31-43.
- Yelland, N. J. (1999). Technology as play. *Early Childhood Education Journal*, 26(4), 217-220.