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A Self-Reflection Framework for Technology Use by Classroom Teachers of Young Learners

Sharla Snider, Ph.D

Texas Woman's University, USA

Sharon Hirschy

Collin College, USA

This paper highlights the key components of a developmentally supportive approach to technology use and integration for teachers of young learners. The impact of electronic technology on the growth and development of the young child, professional positions on the use of technology by young children as well as research findings suggesting best practices are addressed. Specific consideration is given to the use of technology tools within classroom and home settings including a framework for self-reflection, shaped by standards promulgated by the International Society for Technology in Education. This framework is intended for classroom teachers to use in the decision-making process related to technology use and the young child. The information in this paper benefits early childhood professionals and preservice teachers in the following areas: classroom management, technology use within the curriculum, developmentally appropriate practice, and working with parents.

Framing Technology Use with Young Learners for Classroom Teachers

Technology can be defined as the use of tools and methods to create and produce. Technology has been around since the first person dug a hole using a stick. 'Everyday technology' (Carr, 2001), such as crayons, paper, and scissors, is universally accepted as positive for children's development. However, the developmental appropriateness of electronic technologies, including TV, MP3 players, video games, and computers is questionable (Vandewater, et al., 2007). Today's technological tools continue to evolve in increasing complexity, including modalities for usage. Children and youth spend more time with technology than most other pursuits, many times multi-tasking with more than one form of technology (Roberts & Foehr, 2008).

Emerging technologies provide more avenues for children to be involved in media. Technology that previously did not involve younger children has reached down into their midst. For example, virtual reality media Web sites like Webkinz, combined with the appeal of stuffed animals purchased at local stores, now offers greater access for pre-readers and is appealing to young children (Buckleitner, 2008; Hindo, 2007). Research findings (Downes, 2005; Marsh, 2004; Mitchell & Dunbar, 2006) and positions of professional groups (International Society for Technology in Education, 2007, 2008; National Association for the Education of Young Children, 1996; Southern Early Childhood Association, 2004) provide a beginning blueprint for integrating and monitoring technology use with young children while



considering the realities of these powerful tools within the classroom and home environments.

In thinking about the evolution of these tools and in light of current tool usage by young children, several questions arise. What are the effects of current technology on a young child's development? How can teachers assist children in using technology tools in ways that support natural inquiry and a fluidity in thinking and learning? What are the best methods to bridge the home-school connection to help parents in the decision-making process and use of technology in the home?

This paper explores these questions by reviewing research findings regarding the impact of technology on the growth and development of the young child from a 'whole' child perspective while specific to the cognitive, physical, and social-emotional developmental domains. Research findings as well as recommendations from professional organizations are utilized to present information on how early childhood professionals can adjust their use of technology tools to more fully support children in their care while bridging this support to the home environment. A framework constructed from these recommendations is presented for classroom teachers to use in self-reflection and the decision-making process related to technology use and the young child.

What are the Effects of Technology on a Young Child's Development?

Physical Development

According to accepted reports, such as *Zero to Six: Electronic Media in the Lives of Infants, Toddlers and Preschoolers*, children under the age of 6 spend an average of two hours a day watching television – equivalent to the amount of time they spend playing outside, and more than they spend interacting with books (Rideout, Vandewater, & Wartella, 2003). Research suggests that young children who watch more television than that recommended by the American Academy of Pediatrics (2001) manifest attention problems as they mature (Christakis et al., 2004) and they tend to have irregular sleep patterns (Thompson & Christakis, 2005). And yet, there are indications that almost half of children under 2 watch television, contrary to the American Academy of Pediatrics recommendations (Certain, Kahn, & Kahn, 2002).

In addition to possible attention and sleep problems caused by television use, research has linked obesity to the use of electronic media by young children (Dennison, Erb, & Jenkins, 2002; Faith, et al., 2001; Landhuis, Poulton, Welch, & Hancox, 2008). This link is perhaps the most alarming effect of the use of electronic media by today's youth. Other forms of technology have also been scrutinized. Children's use of MP3 players has caused concerns about hearing loss in young children who may use them inappropriately (Portnuff, 2006). In addition to possible hearing loss, electronic media can impact both large and small motor development. The use of computer and video games has been associated with problems of the neck, tendons, and associated muscle issues with the hands (Ramos, James, & Bear-Lehman, 2005). There are concerns about the ergonomics of the computer environment, such as improperly positioned computers and keyboards. The implications are that television, video games, and computer usage by children can have negative consequences and that such usage must be carefully monitored (Healy, 2004).



Are there any positive effects on physical development? There can be. Positive effects of the use of computers on eye-hand coordination have been reported (Li & Atkins, 2004; Nir-Gal & Klein, 2004; Plowman & Stephen, 2005). Other positive effects include the use of children's music, television programming, and videos that encourage dancing and movement as children watch television. Findings indicate a positive effect on young children's physical activity and motivation to become engaged through and by electronic media (Zachopoulou, Tsapakidou, & Derri, 2004). It is clear that while there can be positive effects, most of the research gives significant cause to be concerned and highlights the need to monitor carefully children's use of electronic media to enhance physical development.

Social-Emotional Development

There is evidence that the use of computers with partners or in small groups correlates with increases in positive and more elaborate dramatic play, social interactions, and problem-solving (Brooker & Siraj-Blatchford, 2002; Lomangino, Nicholson, & Sulzby, 1999). Children build connections and share experiences when sharing computers and interacting together. They also benefit socially, emotionally, and cognitively from shared interactions when teachers are involved with children while using technology (Plowman & Stephen, 2007).

Children see computers as both play and learning tools (Yelland, 1999) and use them as such. A lack of appropriate guidance from teachers and the creation of inappropriate computer learning environments do not support the optimal environment that encourages developmental play (Olgun, Bayhan, & Yelland, 2002; Plowman & Stephen, 2005, 2007). Classrooms where children's learning is supported and facilitated appropriately and where they are encouraged to solve problems and work together using developmentally appropriate software provides positive social benefits for children (Tsantis, Bewick, & Thouvenelle, 2003). Teachers should guard against situations that promote a lack of activity or interaction between children such as the use of headphones while at the computer or the overuse of television.

The American Academy of Pediatrics strongly recommends against television and computers usage for children under 2. However, adults who care for children do not always follow this advice. A widely referenced report (Kaiser Family Foundation, 2006) indicated that 61 percent of children under 2 use electronic media and 42 percent watch every day. Parents report that media has become a critical tool in busy homes, enabling parents to complete domestic tasks while the children watch television. These parents state that their children learn from educational television and videos and they are a necessary component of family life.

Vandewater, Bickham, and Lee (2006) found that the more time children spent watching television, the less time they interacted with the family – particularly with infants and toddlers – and the less time they spent in creative play. Perhaps a proper understanding of the consequences of television watching for young children is absent. Or perhaps there are other components of children's television habits that actually contribute in different ways to healthy functioning in our current society, both in the home and school setting.

There is one area that all experts seem to agree on: the negative effects of violence on young children. Violent media, including movies, TV, video games, and music, correlate with lower self-esteem, verbal and physical



aggression, and poorer outcomes for children (Anderson et al., 2003; Anderson, Carnagey & Eubanks, 2003; Carnagey et al., 2007; Fleming & Rickwood, 2001; Funk, Buchman & Germann 2000). The younger the child, the more effects violent media has on growth and development (Paik & Comstock, 1994). It is critical that exposure to violent media is limited. Children's emotional and social development is tied to the interactions around them. If their interactions occur primarily with media only, particularly violent media, there may be negative consequences for physical and mental development (Healy, 2004). However, when children engage and interact with others through various forms of media, emotional and social development may be enhanced (Downes, 2005; Marsh 2004; Mitchell & Dunbar, 2006). The defining variable relates to media that promotes a positive, non-violent context. Additionally, interactions with supportive adults while engaging with this type of media can have positive implications (Hill, 2004; Downes, 2002).

Cognitive Development

When examining the effects of technology on cognitive development, it becomes apparent that the type of technology exposure makes a difference. Young children can gain cognitively from child-oriented educational and informational programs through all forms of electronic broadcasts (Moses, 2008). Children over the age of 2 exposed to these types of modalities perform better on cognitive tests and achieve more in academic endeavors in school than those who do not watch such programs (Wright et al., 2001). There is a vast amount of research available on educational television programs such as *Sesame Street* (Fisch, 2004; Garrsion & Christakis, 2005; Moran, 2006). The research indicates that most educational television provides positive outcomes for children. However, there seems to be a critical mass. Too much of any type of television appears to be problematic. There are also indications that children who watch general television programming do less well academically (Kaiser Family Foundation, 2005). Children over the age of 2 demonstrate larger vocabularies and expressive language when exposed to certain types of television programming. Programs such as *Dragon Tales*, *Blue's Clues*, *Clifford*, and *Arthur*, that talk and interact more directly with child viewers were correlated with an increase while other types of programming, such as *Teletubbies* in which little language is used were correlated with lower language development (Linebarger & Walker, 2005).

Appropriate computer usage also makes a difference. According to Vernadakis, Avgerinos, Tsitskari, and Zachopoulou (2005): "Results demonstrated a significant contribution of computer use in the classroom as a learning tool" (p. 103). Children with access to computers in child- or home-care situations show greater academic and cognitive ability including flexibility, abstract thinking, and vocabulary – as long as the software is open-ended (Nir-Gal & Klein, 2004; Shields & Berham, 2000).

However, the same correlation with cognitive ability is not found for video and electronic games (Li & Atkins, 2004). Children's literacy and writing abilities are enhanced by open-ended software, such as *Kid Pix* and *Kidspiration*, along with appropriate scaffolding by teachers and parents (Boltman & Druin, 2001; Goldberg, Russell, & Cook, 2003). Children who can use a program to tell or create stories benefit from their use. Learning centers, where there are open-ended (rather than drill-and-practice) software and opportunities to explore the computer, provide positive cognitive outcomes (Plowman & Stephen, 2005). Teachers who incorporate computers in the classroom and who provide adult support and interactive



experiences with other children, provide an enriched learning environment for children (Mitchell & Dunbar, 2006). It appears critical, however, that teachers take an active role.

Professional Positions

Based on current research findings, position statements have been made by many leading organizations concerned with the development and learning of young children. The American Academy of Pediatrics (2001) has released several position statements relating to different forms of media and their use with young children. The Academy advises that children over the age of 2 should watch no more than two hours of television a day. Children under 2 should not watch any television. They have been particularly vocal in expressing concerns about the impact of media on obesity in young children (American Academy of Pediatrics, 2003) issuing a public policy statement warning of the risks of obesity for children heavily engaged in the use of electronic technology and encouraging parents to remove television from children's bedrooms and to limit media usage.

One leading professional organization focused on the care and education of young children is the National Association for the Education of Young Children. In 1996, this organization issued a position statement recognizing both the positive and negative influences that media have on children's development (NAEYC, 1996). Its conclusions were that it is the responsibility of teachers and parents to be informed and controlling of their children's media use and that technology should be used in ways that are appropriate to the developmental level of the child. This professional organization holds firm to its position and uses this statement to govern best practices today as evidenced by a recent publication by this organization (NAEYC, 2008).

In 1998, the International Society for Technology in Education presented standards for students and teachers that identify how technology should be used with student and what students should know. These standards have been further refined to address the complexities of emerging technologies and rapidly changing technology in the report "National Educational Technology Standards for Students: The Next Generation (ISTE, 2007). What students should know and be able to do to learn effectively and live productively in an increasingly digital world." Among the foundation of these standards are guiding elements and performance indicators for all learners no matter the age, such as:

- creativity and innovation
- communication and collaboration
- research and information fluency
- critical thinking and problem solving
- digital citizenship
- technology operations and concepts

These standards for students were followed in a recent publication from this organization with parallel standards as well as performance indicators for teachers. These standards and indicators focus on the use technology as both teaching and learning tools (ISTE, 2008) while keeping involved in the forward momentum that is technological evolution in an information age.

The importance of standards of practice for educators and parents is evident in the fact that the leading professional organizations in pediatrics, early childhood education, and educational technology have all developed



statements. It is clear that children are being affected significantly through their interactions with electronic media at increasingly younger ages. Teachers and parents can help make this a positive impact. Given the current research findings and professional positions regarding the use of technology by children under the age of 8, specific recommendations to teachers and parents can be made.

Implications for Supporting Young Learners in the Classroom

As supported through the tenets of appropriate practice of educating young children, a wide variety of experiences, including the use of electronic technologies, are paramount. Young children benefit from a constructivist approach to learning that emphasizes the processes inherent in any learning situation as they construct their own understandings. This approach advocates for classroom environments and curricula rich with a wide variety of activities and meaningful opportunities to manipulate, collaborate, and investigate the natural phenomena that constitute their world. Teachers can include technological tools and the access to information they provide as a part of the natural learning environment, especially when children seek solutions to authentic problems. Integration of technology into the curriculum rather than as a curriculum 'add-on' is key to constructivist teaching and learning. Critical to this integration is a mindfulness to provide equal access to both genders while employing sensitivity to the benefits for learners with exceptional needs.

A Reflective Framework

While many teachers are aware of these suggestions, this task is not always easily accomplished. Daily, teachers must examine what they want children to learn and what children want to learn and incorporate technology as one of many tools to accomplish those goals. Technology should be one of many methods employed, one that is equally important, not more or less, as the use of dramatic play and other manipulatives in a classroom. The main question teachers should ask is: How can I assist children in using technology tools in ways that support natural inquiry and help them become more fluid in their thinking and learning?

To answer this question, teacher can check to see if they are: (1) providing a wide variety of experiences; (2) solving authentic problems; and (3) ensuring equal and supportive access. The following questions are offered as a self-reflection framework to ensure that teachers meet the technical realities of children living in an information age.

Providing a Wide Variety of Experiences:

- Have I chosen media that involve multiple senses and diverse learning styles and perspectives?
- Are the computers in my classroom established within learning centers in which children can explore and utilize the tools independently and collaboratively?
- Am I selecting software that bridges real-world connections?
- Am I overusing drill and practice software programs?
- Have I provided a variety of technology, including computers, electronic games, online content, digital cameras, tape recorders, music, and video as part of the natural learning environment?
- Am I aware of my own technological limitations and am I working to



ensure I don't transfer these to the learning opportunities in my classroom?

- Am I aware of the realities of what young children do and do not know about technology in their own worlds both outside and inside the classroom?

Solving Authentic Problems:

- Am I offering opportunities to use a wide variety of resources, including electronic modalities, while solving authentic problems?
- Do I model and encourage my students to use the computer as a tool for learning?
- Am I using the computer as part of the "real work" or as a reward after the "real work" is completed?
- Do I integrate technology use with classroom instruction matching the use to classroom objectives?
- Do I limit the use of television, videos, and other electronic media to instances when it is appropriate for the classroom objectives?
- Do I communicate with parents regarding any media that has been utilized?

Ensuring Access – Equal and Supportive:

- Have I selected software that supports student collaboration instead of competition? Collaboration supports learning and social interaction. Software that works from a competitive nature distracts students by focusing on extrinsic values.
- Have I allowed for equitable computer time and use of other technology for all students, paying attention to children who do not get to work with these tools?
- Have I identified adaptive devices to assist children with special needs?
- Am I current on professional development? Do I have a plan?
- Have I let my administrator know of my specific needs so that I can make technology work in my classroom for students?
- Do I expect professional development to support my own learning?
- Am I familiar with the philosophy and mission statements of the various educational organizations regarding technology and young children?
- Do I use this information to engage peers, parents, and administrators?

Thinking of Tools within Classroom Contexts

Often it is necessary to "see" what the various uses of technology "look like" in the reality of the classroom. This provides a stronger conceptualization to a guiding framework. Imagine this: You have entered a preschool classroom where several children are gathered around a computer talking animatedly about the elements they want to include in the picture they are designing. In the center of the room, a few children use a digital camera to take a picture of the tower they just built. A small group of children gathers with the teacher around a computer where she is showing a video clip of a cow being milked and talking about it with them. The children become excited about what happens to the milk after it leaves the cow. The teacher starts to capture the children's comments and questions in a word-processing document while they talk. From this list, she helps them compose questions to send to the "Ask the Scientist" Web site. Later, she arranges a virtual field trip to a dairy



farm for her students and begins structuring the child-initiated class project.

You leave this room and enter the classroom next door. Here, children are engaged in individual and small group activities including a center-based exploration of natural objects collected that morning. The teacher uses a digital camera to take pictures of completed work on the wall. A child interrupts to inquire about one of the nature objects. The teacher provides the child with the correct term for the object and continues to take pictures of the completed class work. The classroom computer, covered with a dust cloth, sits on a table behind the teacher's desk.

Many preschoolers know how to use technology. Even when they are not focused on the tools themselves, this awareness is a part of the development of their sense of self within various contexts (Downes, 2005). The way that children use language gives us clues on how they make sense of their world. Listening in on the first classroom you might hear children talking about 'burning' a CD to save their creations or 'Googling' an idea on the computer to increase their depth of inquiry. They are giving new meanings to words being used to help understand and utilize technology (Labbo, 2005; McGee et al., 2006).

In the second classroom, you see technology being used by the adult to document learning. The technology is used solely by the teacher rather than as a meaningful learning tool with the child as part of the decision-making process that is learning. The teacher could have improved the learning situation by engaging in conversation with the child and connecting the child's question to the natural objects they collected. He could have extended this opportunity for learning even further through the use of technology to further explore the child's question.

These examples highlight not only the missed and embraced opportunities of using technology tools to create inquiry and document learning but also the changing nature of the context itself. Technology today is in every part of children's lives in increasingly accessible forms with multi-functional and interactive features (Plowman & Stephen, 2005; Vanderwater et al., 2007). Yet, many times, these tools are absent or misused within the preschool classroom. These tools can also be misused in the home environment, but rarely are they absent. At home, children watch television, play video games, care for electronic pets, and use the computer to expand beyond the walls of their homes. Many young children extend the care of a favorite stuffed animal by creating realities and identities online through social networks such as *Club Penguin*. It is hard to compete with these novelties, if competition is warranted, to motivate children to learn. There are strategies that teachers can use as part of their personal framework to support parents in the use of technology in the home while building connections between the classroom and the home environment.

Supporting Parents in Using Technology in the Home

What are the best methods to bridge the home-school connection in relationship to supporting parents in the decision making process and use of technology? Teachers can help parents understand the importance of using technology to support literacy and overall development while setting realistic goals and expectations (Shields & Berham, 2000). Most importantly, teachers can help parents understand the importance of balancing technology use, including 'screen time', with meaningful opportunities for active engagement in learning. It is equally important for teachers to consider the social-cultural context of the home (Siu & Lam, 2005) when



making recommendations.

When thinking about how to advise parents on technology use with sensitivity to the home culture, it is useful to answer two frequent questions: (1) how will technology impact and/or improve my child's thinking and learning? and (2) what technology should we use at home? It is important to help parents understand that these tools do not replace more traditional tools, like crayons, clay, and blocks. Rather, these can be used together with media to enrich and support the learning and creative process.

Impact on Child's Thinking and Learning

Teachers can help parents to understand that television exposure before age 2 can be detrimental to a child's language development (Zimmerman, Christakis, & Meltzoff, 2007). They can also teach parents how to provide opportunities for children over 2 to get involved with education television and video programs, particularly those that encourage activity. Some programs, such as *Sesame Street* routinely present segments that invite children to get up and move or dance. Many programs, such as *Dora the Explorer* and *Blues Clues* (Linebarger & Walker, 2005) engage children by having characters act as if they are speaking to the child, which involves them and improves vocabulary. In keeping with the recommendations of various professional organizations, teachers should stress the importance of monitoring the amount of television and video programs that children watch and balancing these activities with active learning experiences.

It has been suggested that the use of developmentally supportive software can enhance school readiness for young children (Li Atkins & Stanton, 2006). In helping parents choose supportive software for use at home, teachers can provide reviews by early childhood professionals. Many times, the library media specialist or technology liaison within the school setting can be a valuable resource for this information.

The most important consideration is that teachers should help parents learn to rely on recommendations of experts as these can facilitate the purchase of software that is purposeful and appropriate. The type of software that teachers help parents choose and the way they engage the child are also critical (Plowman & Stephen, 2005). Open-ended software allows the child to make more than one choice and attain more than one outcome. Programs that use drawing allow children to make a variety of choices and that send children along different paths in the software depending on their choices are open-ended programs. Much of today's software is drill-and-practice, where there is one right answer and the child receives a 'reward' – usually in the form of a new game, or a character commenting 'good job'. These software packages may be quite visually attractive with a variety of experiential activities, but they encourage limited problem-solving. Open-ended software allows children to use their imagination and encourages the use of creativity.

Technology Tools to Use at Home

Teachers can help parents become familiar with the technology services offered by schools and what policies are in place for technology use. If aware of the manner in which these tools are utilized in the schools as well as the content children are investigating, parents can be better software consumers and improve the ways they utilize Internet access and other technology. Parental appeal and/or the latest fads should not drive



technology purchases or the manner in which young children are given access. Teachers can model communication with electronic tools by providing information and interactivity with parents through school web sites, class blogs, and wikis. Parents should be encouraged to involve their young children in daily activities that rely on technology in the home, using these opportunities to discuss how and why those tools are used.

At the same time, parents should monitor the use of electronic tools and media by young children to ensure safe and appropriate use and exposure to content. It is paramount that teachers help parents understand the importance of ensuring their child is safe from offensive and violent programming and Internet concerns. Without supervision, a child could be unintentionally exposed to inappropriate Web sites and media images not conducive to healthy social-emotional development (Anderson et al., 2003; Anderson & Pempek, 2005).

Summary

Young children should receive exposure to the tools of their world within all of the contexts of their daily experiences. They are exposed to computers at school, and to computers, digital devices, and televisions daily in their homes. Early childhood professionals and informed parents can make a positive difference in the lives of children by knowing how to utilize technology appropriately and support young children's use of electronic media. Developmentally appropriate uses of technology enhance children's physical, intellectual, emotional, and social development, but when technology is used inappropriately, children suffer negative consequences.

The question is not whether technology affects children, but how can we scaffold children's experiences in ways that create positive effects on their development? The home and school of today are enriched by many elements of electronic media and technology tools that increase opportunities for communication. These tools can be used in positive ways, such as in the first part of the classroom scenario, to support student development. This depends on the manner in which teachers and parents provide developmentally supportive and appropriate experiences while being cognizant of the need for children to experience all the tools of their world. By using a framework, such as the one presented in this article, teachers can use ongoing self-reflection to move closer to the successful use of technology with young learners.

References

- American Academy of Pediatrics Committee on Nutrition (2003). Prevention of pediatric overweight and obesity. *Pediatrics*, 112(2), 424-430.
- American Academy of Pediatrics Committee on Public Education (2001). Children, adolescents, and television. *Pediatrics*, 107, 423-426.
- Anderson, C. A., Berkowitz, L., Donnerstein, E., Huesmann, R.L., Johnson, J., Linz, D., Malamuth, N., & Wartella, E. (2003). The influence of media violence on youth. *Psychological Science in the Public Interest*, 4, 81-110.
- Anderson, C. A., Carnagey, N. L., & Eubanks, J. (2003). Exposure to violent media: The effects of songs with violent lyrics on aggressive thoughts



and feelings. *Journal of Personality and Social Psychology*, 84, 960-971.

Anderson, D. R., Pempek, T. (2005). Television and very young children. *American Behavioral Scientist*, 48(5), 505-522.

Boltman, A. & Druin, A. (2001). *Children's storytelling technologies*. Proceedings of the American Educational Research Association. Retrieved January 27, 2007, from <http://www.cs.umd.edu/local-cgi-bin/hcil/rr.pl?number=2001-25>.

Brooker, L. & Siraj-Blatchford, J. (2002). Click on miaow!: How children of three and four years experience the nursery computer. *Contemporary Issues in Early Childhood*, 3(2), 251-273.

Buckleitner, W. (2008, February 22). "Beanie Babies Updated With a Web Connection." *The New York Times* (0362-4331), p. 7.

Carnagey, N. L., Anderson, C. A., & Bartholow, B. D. (2007). Media violence and social neuroscience: New questions and new opportunities. *Current Directions in Psychological Science*, 16, 178-182.

Carr, M., (2001). Let me count the ways: Analyzing the relationship between the learner and everyday technology in early childhood. *Research in Science Education*, 31, 29-47.

Certain, L., Kahn, B. A., & Kahn, R. S. (2002). Prevalence, correlates, and trajectory of television viewing among infants and toddlers. *Pediatrics*, 109, 634-642.

Christakis, D. A., Zimmerman, F. J., DiGiuseppe, D. L., & McCarty, C. A. (2004). Early television exposure and subsequent attentional problems in children. *Pediatrics*, 113, 708-713.

Dennison, B. A., Erb, T. A., Jenkins, P. L. (2002). Television viewing and television in bedroom associated with overweight risk among low-income preschool children. *Pediatrics*, 109, 1028-1035.

Downes, T. (2002). Blending play, practice and performance: Children's use of the computer at home [Electronic version]. *Journal of Educational Inquiry*, 3(2), 21-34.

Downes, T. (2005). Using computers at home and at school: Children's views and perspectives. In J. Mason & T. Fattore (Eds.), *Children taken seriously: In theory, policy and practice* (pp. 164-171). London: Jessica Kingsley.

Faith, M. S., Berman, N., Heo, M., Pietrobelli, A., Gallagher, D., Epstein, L. H., Eiden, M.T., & Allison, D. B. (2001). Effects of contingent television on physical activity and television viewing in obese children. *Pediatrics*, 107, 1043-1048.

Fisch, S. (2004). *Children's learning from educational television: Sesame Street and beyond*. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Fleming, M. J., & Rickwood, D. J. (2001). Effects of violent versus nonviolent



video games on children's arousal, aggressive mood, and positive mood. *Journal of Applied Social Psychology*, 31, 2047-2071.

- Funk, J. B., Buchman, D. D., & Germann, J. N. (2000). Preference for violent electronic games, self-concept and gender differences in young children. *American Journal of Orthopsychiatry*, 70, 233-241
- Garrison, M., & Christakis, D. (2005). *A teacher in the living room? Educational media for babies, toddlers and preschoolers [Electronic version]* (Research Study; Report). Menlo Park, CA: Kaiser Family Foundation.
- Goldberg, A., Russell, M., & Cook, A. (2003). The effect of computers on student writing: A meta-analysis of studies from 1992–2002. *Journal of Technology, Learning, and Assessment*, 2(1), 1-52.
- Healy, Jane M., (2004). Early television exposure and subsequent attention problems in children. *Pediatrics*, 113, 917-918.
- Hill, S. (2004). Children of the new millennium: Digital literacies. Paper presented at the *Computers in Education Conference*, Adelaide, Australia.
- Hindo, B. (2007). Toys with A Second Life. *Business Week*. Retrieved September 20, 2008, from Academic Search Complete database.
- International Society for Technology in Education. (2007). *National educational technology standards for students: Second edition*, Washington, DC: ISTE.
- International Society for Technology in Education. (2008). *National educational technology standards for teachers: Second edition*. Washington, DC: ISTE.
- Kaiser Family Foundation. (2006). *The media family: electronic media in the lives of infants, toddlers, preschoolers and their parents*. Retrieved November 8, 2006 from <http://www.kff.org/entmedia/upload/7500.pdf>
- Kaiser Family Foundation. (2005). *A teacher in the living room?* Retrieved January 26, 2006 from <http://www.kff.org/entmedia/upload/7427.pdf>
- Labbo, L. (2005). Young children learn about literacy in the virtual world. *Language Arts*, 82(4), 295-295.
- Landhuis, E., Poulton, R., Welch, D., & Hancox, R. (2008). Programming obesity and poor fitness: the long-term impact of childhood television. *Obesity*, 16(6), 1457-9.
- Li, X., Atkins, M. S., & Stanton, B., (2006). Effects of home and school computer use on school readiness and cognitive development among head start children: A randomized controlled pilot trial. *Merrill-Palmer Quarterly*, 52(2), 239-263.
- Li, X. & Atkins, M. S. (2004). Early childhood computer experience and cognitive and motor development. *Pediatrics*, 113, 1715–1722.
- Linebarger, D.L. & Walker, D. (2005). Infants' and toddlers' television viewing and language outcomes. *American Behavioral Scientist*, 48,



624-645.

- Lomangino, A. G., Nicholson, J. & Sulzby, E. (1999) The influence of power relations and social goals on children's collaborative interactions while composing on computer. *Early Childhood Research Quarterly*, 14(2), 197-228.
- Marsh, J. (2004). The techno-literacy practices of young children [Electronic version]. *Journal of Early Childhood Research*, 2(1), 51-66.
- McGee, L. M., Richgels, D. J., McKenna, M. C., Labbo, L. D., Kieffer, R. D., & Reinking, D. (2006). Can Technology Support Emergent Reading and Writing? Directions for the Future. In *The International handbook of literacy and technology* (Vol 2) (pp. 369-377). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Mitchell, D., & Dunbar, C. (2006). Learning and development in the nursery setting: The value of promoting emergent information and communications technology skills. *Child Care in Practice*, 12(3), 241-257.
- Moran, K. C. (2006). The Global Expansion of Children's Television: A Case Study of the Adaptation of "Sesame Street" in Spain. *Learning, Media & Technology*, 31(3), 287.
- Moses, A. (2008). Impacts of television viewing on young children's literacy development in the United States: A review of the literature. *Journal of Early Childhood Literacy*, 8(1), 67-102.
- National Association for the Education of Young Children (1996). Position Statement: Technology and young children—Ages three through eight. *Young Children*, 51(6), 11–16.
- NAEYC Technology and Young Children Interest Forum Members (2008). Meaningful technology integration in early learning environments. *Young Children*, 63(5), 3.
- Nir-Gal, O., & Klein, P. (2004). Computers for cognitive development in early childhood- The teacher's role in the computer learning environment. *Information Technology in Childhood Education*, 1, 97-119.
- Olgun, P., Bayhan, P., & Yelland, N. (2002). A study of pre-school teachers' thoughts about computer assisted instruction. *Contemporary Issues in Early Childhood*, 3(2), pages 298-303.
- Paik, H., & Comstock, G. (1994). The effects of television violence on antisocial behavior: A meta-analysis. *Communication Research*, 21, 516–546.
- Plowman, L., & Stephen, C. (2007). Guided interaction in pre-school settings. *Journal of Computer Assisted Learning*, 23, 14-26.
- Plowman, L. & Stephen, C. (2005) Children, play, and computers in pre-school education. *British Journal of Educational Technology*, 36(2), 145-57.
- Portnuff C. & Fligor B. J. (2006). *Sound output levels of the iPod and other MP3 players: is there potential risk to hearing?* Paper presented at the



NIHL in Children Meeting, Cincinnati, Ohio. Available at:
www.hearingconservation.org/docs/virtualPressRoom/portnuff.htm

- Ramos, E. M., James, C. A., & Bear-Lehman, J. (2005). Children's computer usage: Are they at risk of developing repetitive strain injury? *Work, 25*(2), 143-54.
- Rideout, V. J., Vandewater, E. A., & Wartella E. (2003). *Zero to six: electronic media in the lives of infants, toddlers, and preschoolers*. Menlo Park, CA: Kaiser Family Foundation.
- Roberts, D. F. & Foehr U. G. (2008). Trends in media use. *Future of Children, 18*(1), 11-37.
- Southern Early Childhood Association. (2004). Supporting learning with technology in the early childhood classroom: A position statement of the Southern Early Childhood Association (Report). Little Rock, AR: Author.
- Shields, M. K. & Berham R. E. (2000). Children and computer technology: Analysis and recommendations. *Future of Children, 10*(2), 4-30.
- Siu, K. & Lam, M. (2005). Early childhood technology education: A sociocultural perspective. *Early Childhood Education Journal, 32*(6), 353-358.
- Thompson, D. A. & Christakis, D. A. (2005). The association between television viewing and irregular sleep schedules among children less than 3 years of age. *Pediatrics, 116*, 851-856.
- Tsantis, L. A., Bewick, C. J. & Thouvenelle, S. (2003). *Exposing some common myths about computer use in the early years*. Retrieved September 1, 2008 from <http://www.journal.naeyc.org/btj/200311/CommonTechnoMyths.pdf>
- Vandewater, E., Bickham, D. & Lee, J., (2006). Time well spent? Relating television use to children's free-time activities. *Pediatrics, 117*(2), pp.181-191.
- Vandewater, E., Rideout, V., Wartella, E., Huang, X., Lee, J., & Shim, M. (2007). Digital childhood: Electronic media and technology use among infants, toddlers and preschoolers. *Pediatrics, 119*, 1006-1015.
- Vernadakis, N., Avgerinos, A., Tsitskari, E., & Zachopoulou, E. (2005). The use of computer assisted instruction in preschool education: Making teaching meaningful. *Early Childhood Education Journal, 33*(2), 99-104.
- Wright, J. C., Huston, A. C., Murphy, K. C., St. Peters, M., Pinon, M., Scantlin, R. & Kotler, J. (2001). The relations of early television viewing to school readiness and vocabulary of children from low-income families: The early window project. *Child Development, 72*(5), 1347-1367.
- Yelland, N. (1999). Technology as Play. *Early Childhood Education Journal, 26*(4), 217-220.
- Zachopoulou, E., Tsapakidou, A., & Derri, V. (2004). The effects of a



developmentally appropriate music and movement program on motor performance. *Early Childhood research Quarterly*, 19(4), 631-642.

Zimmerman, F., Christakis, D., & Meltzoff, A. (2007). Associations between media viewing and language development in children. *Journal of Pediatrics*, 151(4), 364-368.