Technology and Young Children:
A Review of Literature

Alexandra E. Appel, Ed.D
Chloe O'Gara, Ed.D[1]

Interest in using personal computer technology as an instructional medium with young children is growing around the world. Many parents, teachers, and even national governments[2] are convinced that early interaction with technology stimulates learning and gives children a head start on success in the technological world of the future.

This article reviews current research on developmental issues and the use of technology in learning environments for 4, 5 and 6-year-old preschool children. The reviewers are cognizant of the controversy revolving around whether the developmental needs of children are best met when technology is introduced into the learning environment. However, since that technology is now prevalent in the social contexts of many young children, tracking best practice guidelines for the introduction of technology into early learning environments is a necessity for early childhood development professionals and educators. The goal of this brief review is to inquire how current practices address developmentally appropriate learning, and to review guidance on how best to use computers with young children.

Developmental Concerns

In April 1996, the National Association of Young Children (NAEYC) adopted a position statement highlighting seven key areas of developmental concern (See "Technology and Young Children: A Position Statement of the National Association for the Education of Young Children" in this Issue of *TechKnowLogia*):

♦ Professional judgment by the teacher is required to determine if a specific use of technology is age appropriate, individually appropriate, and culturally appropriate (pg. 1).
♦ Used appropriately, technology can enhance children's cognitive and social abilities (pg. 2).
♦ Appropriate technology is integrated into the regular learning environment and used as one of many options to support children's learning (pg. 2).
♦ Early childhood educators should promote equitable access to technology for all children and their families. Children with special need should have increased access when this is helpful (pg. 3).
♦ The power of technology to influence children's learning and development requires that attention be paid to eliminating stereotyping of any group and eliminating exposure to violence, especially as a problem-solving strategy.

♦ Teachers, in collaboration with parents, should advocate for more appropriate technology applications for all children (pg. 5).
♦ The appropriate use of technology has many implications for early childhood professional development (pg. 5).

Advantages with Caution

Current literature supports claims that appropriate computer use will stimulate language development, social and emotional development and fine and gross motor skills among preschool age children (Early Connections, 2001; Scoter, Ellis & Railsback, 2001). Proponents of technology argue children should have the opportunity to engage with the advantages technology offers.

Two themes of concern run through this literature. The first is *socialization and language opportunities*. The environment should be set up to maximize social interaction of young children at and around the computer (this will be a familiar note to those who have followed research on television viewing). Equal access can be a challenge, one that requires careful and creative planning, monitoring and intervention. Providing ample space around the computer learning center and grouping chairs together will enable children to work together.

The second major theme running through the literature is *software*. There is an important distinction between active and passive use of software technology. An Early Childhood Education (ECE) program environment should support the active use of technology. At issue is finding the best way to use software to gain identified early childhood programmatic goals.

Exploration and manipulation of the environment are essential ingredients in appropriate ECE settings. Software should be open-ended, with music, sound, and colors to invite many learners and learning styles. The software should be interruptible and give children quick feedback so they remain interested. Young children must be in control of the pace yet encouraged to explore, use imagination and problem solve. Interactive, bright, cheerful, imaginative software images should be easy to manipulate yet stimulating enough to offer problem solving challenges. The software needs to allow decision making, experimentation, risk taking, and problem solving. Software should be used in the context of a complete curriculum, well integrated and encouraging the active

use of imagination. Screen time should be limited; especially when the overall total daily time that the young children spend watching TV and videos is taken into consideration.

Further research is needed to investigate how children working together at the computer learn cooperative play; are children engaging in another variation of parallel play? Do short attention spans and distinctive learning styles evolve from interacting with constantly flashing images and animated graphics?

Provisions must be made to meet the development needs of childhood. A solid ECE program investigates key questions:

- Will the activity benefit the child, or will it replace a more meaningful learning activity?
- When socializing young children into the world of technologic learning are the other important developmental needs of childhood being met?
- Is the technology developmentally appropriate, consistent with how a child develops and learns and with the child's current developmental stage?

Questions for Development Theory

Gauging how well children are thriving in a technologically rich environment raises profound questions for child development theory as well as practice. For example, Piaget showed us that part of the business of childhood is to take objects and construct theories of how they work (Piaget, 1960). When "objects" were simple mechanical things, the task of deconstructing and reconstructing was merely physical. However, in the early 1970's, with the introduction of technology, a significant change in the way children understand and perceive "objects" occurred. According to Turkle: "The answers to the classical Piagetian question of how children think about life are being renegotiated as they [questions] are posed in the context of computational objects that explicitly present themselves as exemplars of *artificial life*." (1998, pg. 2)

Children's understanding of computational objects - the representation and the reconstruction of a machine - now embodies the construction of "sort-of-alive" with properties of emotion and psychology as criteria for aliveness. An example of an activity that embodies "sort-of-alive" is *Furby*, a virtual pet adaptable for preschool children.

Implications of the theoretical construct of "sort-of-alive" as an important aspect of early childhood development in the technologic/information age is beyond the scope of this short summary article. Further research is called for in future investigations.

Successful Application

David Dwyer, Director of Educational Technologies for Apple (2001) emphasizes three points for successful implementation of technology into the learning environment:

- the use of technology must be a routine part of the learning environment on a daily basis;
- desired outcomes must be clear; and
- professional development is crucial for success.

Technology is not going away. Parents, policy makers, entrepreneurs and idealists actively promote its use with young children. Early childhood educators must be well trained to meet the demands of technology in early learning environments.

Now if only we knew how to train them… it always comes back to people for the healthy development of young children.

References

Dwyer, D. (2001). Conversations. The futures channel. Apple Computers.

---. (2001). Early connections: Technology in early childhood. Educational Technology Consortium; Northwest Regional Educational Laboratory's Child & Family Program.

Furby ®, is property of Tiger Toys/Hasbro, Inc. Tamagotchi ®, is property of Bandai. GigaPets ®, are property of Tiger Electronics.

---. (1996). Technology and young children – Ages 3 through 8: Position statement. National Association for the Education of Young Children. D.C.

Morris, J.L. (2000). Kid pixs. http://www.uvm.edu/~jmorris

Piaget, J. (1960). The child's conception of the world. Totowa, N.J.: Littlefield, Adams.

Turkel, S. (1998). Cyborg babies and cy-dough-plasm: Ideas about self and life in the culture of simulation. In Cyborg Babies: From Techno-Sex to Techno-Tots, Davis-Floyd & Dumit (eds.). New York: Routledge.

Van Scoter, Ellis & Railsback. (2001). How technology can enhance early childhood learning. Technology in early childhood. Educational Technology Consortium; Northwest Regional Educational Laboratory's Child & Family Program.

[1] Dr. Alexandra Appel is Senior Research Associate with Caliber, Fried & Sher Associates. Chloe O'Gara is Vice President and Director, Ready to Learn Center, Academy for Educational Development. AED's Ready to Learn Center integrates health, education, and nutrition to improve early childhood care and development in developing countries. For more information: www.aed.org/readytolearn or call 202-884-8261.

[2] As part of a government initiative to make Egypt competitive in the global marketplace, the government of Egypt is equipping all new kindergartens with a PC dedicated solely to children 4 and 5 years old. In many of the schools, there is only one other PC for the rest of the primary grades.