

***A position statement of the
National Association for the Education of Young Children
Technology and Young Children—Ages 3 through 8***

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Technology plays a significant role in all aspects of American life today, and this role will only increase in the future. The potential benefits of technology for young children's learning and development are well documented (Wright & Shade 1994). As technology becomes easier to use and early childhood software proliferates, young children's use of technology becomes more widespread. Therefore, early childhood educators have a responsibility to critically examine the impact of technology on children and be prepared to use technology to benefit children. Market researchers tracking software trends have identified that the largest software growth recently has been in new titles and companies serving the early childhood educational market. Of the people who own home computers and have young children, 70% have purchased educational software for their children to use (*SPA Consumer Market Report 1996*).

While many new titles are good contributions to the field, an even larger number are not (Haugland & Shade 1994). Early childhood educators must take responsibility to influence events that are transforming the daily lives of children and families. This statement addresses several issues related to technology's use with young children:

- (1) the essential role of the teacher in evaluating appropriate uses of technology;
- (2) the potential benefits of appropriate use of technology in early childhood programs;
- (3) the integration of technology into the typical learning environment;
- (4) equitable access to technology, including children with special needs;
- (5) stereotyping and violence in software;
- (6) the role of teachers and parents as advocates; and
- (7) the implications of technology for professional development.

Although now there is considerable research that points to the positive effects of technology on children's learning and development (Clements 1994), the research indicates that, in practice, computers supplement and do not replace highly valued early childhood activities and materials, such as art, blocks, sand, water, books, exploration with writing materials, and dramatic play. Research indicates that computers can be used in developmentally appropriate ways beneficial to children and also can be misused, just as any tool can (Shade & Watson 1990).

Developmentally appropriate software offers opportunities for collaborative play, learning, and creation. Educators must use professional judgment in evaluating and using this learning tool appropriately, applying the same criteria they would to any other learning tool or experience. They must also weigh the costs of technology with the costs of other learning materials and program resources to arrive at an appropriate balance for their classrooms.

1. In evaluating the appropriate use of technology, NAEYC applies principles of developmentally appropriate practice (Bredekamp 1987) and appropriate curriculum and assessment (NAEYC & NAECS/SDE 1992.) In short, NAEYC believes that in any given situation, a professional judgment by the teacher is required to determine if a specific use of technology is age appropriate,

individually appropriate, and culturally appropriate. The teacher's role is critical in making certain that good decisions are made about which technology to use and in supporting children in their use of technology to ensure that potential benefits are achieved. Teachers must take time to evaluate and choose software in light of principles of development and learning and must carefully observe children using the software to identify both opportunities and problems and make appropriate adaptations. Choosing appropriate software is similar to choosing appropriate books for the classroom—teachers constantly make judgments about what is age appropriate, individually appropriate, and culturally appropriate. Teachers should look for ways to use computers to support the development and learning that occur in other parts of the classroom and the development and learning that happen with computers in complement with activities off the computer. Good teaching practices must always be the guiding goal when selecting and using new technologies.

2. Used appropriately, technology can enhance children's cognitive and social abilities. Computers are intrinsically compelling for young children. The sounds and graphics gain children's attention. Increasingly, young children observe adults and older children working on computers, and they want to do it, too. Children get interested because they can make things happen with computers. Developmentally appropriate software engages children in creative play, mastery learning, problem solving, and conversation. The children control the pacing and the action. They can repeat a process or activity as often as they like and experiment with variations. They can collaborate in making decisions and share their discoveries and creations (Haugland & Shade 1990). Well-designed early childhood software grows in dimension with the child, enabling her to find new challenges as she becomes more proficient. Appropriate visual and verbal prompts designed in the software expand play themes and opportunities while leaving the child in control. Vast collections of images, sounds, and information of all kinds are placed at the child's disposal. Software can be made age appropriate even for children as young as three or four. When used appropriately, technology can support and extend traditional materials in valuable ways. Research points to the positive effects of technology in children's learning and development, both cognitive and social (Clements 1994; Haugland & Shade 1994). In addition to actually developing children's abilities, technology provides an opportunity for assessment. Observing the child at the computer offers teachers a "window" onto a child's thinking. Just as parents continue to read to children who can read themselves, parents and teachers should both participate with children in computer activities and encourage children to use computers on their own and with peers. Research demonstrates that when working with a computer children prefer working with one or two partners over working alone (Lipinski et al. 1986; Rhee & Chavnagri 1991; Clements, Nastasi, & Swaminathan 1993). They seek help from one another and seem to prefer help from peers over help from the teacher (King & Alloway 1992; Nastasi & Clements 1993). Children engage in high levels of spoken communication and cooperation at the computer. They initiate interactions more frequently and in different ways than when engaged with traditional activities, such as puzzles or blocks. They engage in more turn taking at the computer and simultaneously show high levels of language and cooperative-play activity. Technology extends benefits of collaboration beyond the immediate classroom environment for children in the primary grades who can already read and write. With the potential of access to the Internet or other on-line "user friendly" networks, young children can collaborate with children in other classrooms, cities, counties, states, and even countries. Through electronic field trips in real time or via diskette, children are able to share different cultural and environmental experiences. Electronic mail and telecommunications opportunities through the

Internet facilitate direct communication and promote social interactions previously limited by the physical location of participating learners.

3. Appropriate technology is integrated into the regular learning environment and used as one of many options to support children's learning. Every classroom has its own guiding philosophies, values, schedules, themes, and activities. As part of the teacher's overall classroom plan, computers should be used in ways that support these existing classroom educational directions rather than distort or replace them. Computers should be integrated into early childhood practice physically, functionally, and philosophically. Teachers can accommodate integration in at least five ways:
 - Locate computers in the classroom, rather than in a separate computer lab (Davis & Shade 1994).
 - Integrate technology into the daily routine of classroom activity. For example, a teacher might introduce musical rhythm with actions, recordings, and a computer used as an electronic rhythm-matching game. The children then would work in small groups with the computer program serving as one of several learning centers.
 - Choose software to enrich curriculum content, other classroom activities, or concepts. For example, the program in the computer learning center might allow children to invent their own rhythms that they could simultaneously hear played back and see displayed graphically. They could edit these rhythms on the computer, hearing and seeing the changes.
 - Use technology to integrate curriculum across subject matter areas. For example, one group of children used the computer to make signs for a restaurant in their dramatic play area (Apple Computer Inc. 1993). The rhythm program helps children connect mathematical patterns to musical patterns.
 - Extend the curriculum, with technology offering new avenues and perspectives. For example, exploring shapes on the computer provides opportunities to stretch, shrink, bend, and combine shapes into new forms. Such activities enrich and extend children's activities with physical manipulatives.

4. Early childhood educators should promote equitable access to technology for all children and their families. Children with special needs should have increased access when this is helpful. *Educators using technology need to be especially sensitive to issues of equity.* A decade of research on the educational use of computers in schools reveals that computers maintain and exaggerate inequalities (Sutton 1991). Sutton found gender, race, and social-class inequalities in the educational uses of computers, which Thouvenelle, Borunda, and McDowell summarize below.
 - Girls used computers in and out of school less often than did boys.
 - African American students had less access to computers than did White students.
 - Presence of computers in a school did not ensure access.
 - Teachers, while concerned about equity, held attitudes that hindered access—they believed that better behaved students deserved more computer time and that the primary benefit of computers for low-achieving students was mastery of basic skills (i.e., drill-and-practice software).
 - Richer schools bought more equipment and more expensive equipment. (1994, 153–54)

These findings identify trends that, unchecked, will almost certainly lead to increased inequity in the future. Early childhood educators must find ways to incorporate technology into their classrooms that preserve equity of access and minimize or even reverse the current trends. For example, anecdotal reports indicate that preschool-age boys and girls show equal interest in computers, but as they grow older girls begin to spend less time with computers than do boys. There are a number of ways educators can proactively work to maintain girls' interest in computers and technology:

- (1) consider girls' interests and interaction styles when selecting and evaluating software for classroom use; (2) model the use of the computer as a learning and productivity tool and invite children, especially girls, to observe and assist them in the work; and (3) promote equity by offering special times for "girls only" use of computers, which permits girls to explore the computer without having to directly compete with boys (Thouvenelle, Borunda, & McDowell 1994). Considerations of equity in curriculum content require qualitative judgments. For example, research evidence indicates that children who are economically disadvantaged have less access to computers at home and at-home access is related to attitudes and competence (Martinez & Mead 1988). If schools wish to provide equity to children of low income families, with respect to their confidence and competence concerning computer learning, these children need to be provided more in-school computer access (Sutton 1991). And that access must be meaningful, moving beyond rote drill-and-practice usage. Preschool-age children spend time in a variety of diverse settings (e.g., homes, child care centers, family child care), which further complicates the issues of equity and access. Some of these settings have considerable access to technology while others lack the very basics. The more early childhood educators believe in the benefits of appropriate use of technology at the preschool age, the more responsibility we bear in ensuring equity and access to this important learning tool.
 - (2) *Efforts should be made to ensure access to appropriate technology for children with special needs, for whom assistive technologies may be essential for successful inclusion.* For children with special needs, technology has many potential benefits. Technology can be a powerful compensatory tool—it can augment sensory input or reduce distractions; it can provide support for cognitive processing or enhance memory and recall; it can serve as a personal "ondemand" tutor and as an enabling device that supports independent functioning. The variety of assistive-technology products ranges from low-tech toys with simple switches to expansive high-tech systems capable of managing complex environments. These technologies empower young children, increasing their independence and supporting their inclusion in classes with their peers. With adapted materials, young children with disabilities no longer have to be excluded from activities. Using appropriately designed and supported computer applications, the ability to learn, move, communicate, and recreate are within the reach of all learners. Yet, with all these enhanced capabilities, this technology requires thoughtful integration into the early childhood curriculum, or it may fall far short of its promise. Educators must match the technology to each child's unique special needs, learning styles, and individual preferences.
5. 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. *Technology can be used to affirm children's diversity.* Early childhood educators must devote extra effort to ensure that the software in classrooms reflects and affirms children's diverse cultures, languages, and ethnic heritages. Like all

educational materials, software should reflect the world children live in: It should come in multiple languages, reflect gender equity, contain people of color and of differing ages and abilities, and portray diverse families and experiences (Derman-Sparks & A.B.C. Task Force 1989; Haugland & Shade 1994). *Teachers should actively select software that promotes positive social values.* Just like movies and television today, children's software is often violent and much of it explicit and brutally graphic, as in most of the bestselling titles for the popular game machines. But, often, violence is presented in ways that are less obvious. In all of its forms, violence in software threatens young children's development and challenges early childhood educators, who must take active steps to keep it out of their classrooms (see the *NAEYC Position Statement on Violence in the Lives of Children* 1994). Some software programs offer children the opportunity to get rid of mistakes by "blowing up" their creations—complete with sound effects—instead of simply erasing or starting over. As a metaphor for solving problems or getting rid of mistakes, "blowing up" is problematic. In the context of a computer software experience, it is more troubling than in the context of television or video. Children control the computer software, and, instead of being passive viewers of what appears on the screen, with the computer they become active decision makers about what takes place on the screen. Software programs that empower children to freely blow up or destroy without thought of the actual consequences of their actions can further the disconnection between personal responsibility and violent outcomes.

Identifying and eliminating software containing violence is only one of the challenges facing early childhood educators. A related, opposite challenge is discovering software programs that promote positive social actions. For example, software has the potential to offer children opportunities to develop sensitivities to children from other cultures or to children with disabilities. Much could be done to help children develop positive responses to cultural and racial diversity by offering software programs that enable children to explore the richness within their own and different cultures.

6. Teachers, in collaboration with parents, should advocate for more appropriate technology applications for all children. The appropriate and beneficial use of technology with young children is ultimately the responsibility of the early childhood educator, working in collaboration with parents. Parents and teachers together need to make better choices as consumers. As they become educated on the appropriate uses of technology, parents and teachers are more likely to make informed decisions and to make it known to developers of technology when they are unhappy with products. Working together, parents and teachers are a large consumer group wielding greater influence on the development of technology for young children. Following are specific recommendations for early childhood professionals as they advocate for more appropriate technology applications for all children.
 - Provide information to parents on the benefits and use of appropriate software.
 - Advocate for computer hardware that can be upgraded easily as new technology becomes available.
 - Encourage software publishers to make previewing of software easier for parents and educators.
 - Advocate for a system of software review by educators.
 - Promote the development of software and technology applications that routinely incorporate features that cater to the needs of learners with different abilities.

- Advocate for software that promotes positive representation of gender, cultural and linguistic diversity, and abilities. Software publishers should create a balance of programs that appeal to both boys and girls.
- Encourage software publishers to create programs that support collaboration among learners rather than competition. Fostering cooperative learning enhances the acceptance of the abilities of all learners.
- Encourage software publishers to develop programs that reflect appropriate, nonviolent ways to solve problems and correct mistakes.
- Develop formal and informal information sharing and support for teachers, parents, and appropriate organizations and community-based programs. Encourage free community access to technology through libraries, schools, and so forth.
- Support policies on federal, state, and local levels that encourage funding that supports equity in access to technology for young children and their families.

7. The appropriate use of technology has many implications for early childhood professional development. *As early childhood educators become active participants in a technological world, they need in-depth training and ongoing support to be adequately prepared to make decisions about technology and to support its effective use in learning environments for children.* To achieve the potential benefits of technology, both preservice and inservice training must provide early childhood educators with opportunities for basic information and awareness. These efforts must address the rapid proliferation and fast-paced change within the technology arena. Opportunities that emphasize evaluating the software in relation to children's development are essential. Institutions of higher education and other organizations and groups that provide preservice and inservice education have a responsibility to

- incorporate experiences that permit educators to reflect on the principles of early childhood education and how technology can support and extend these principles;
- give teachers concentrated time to focus on how best to use educational technology and to develop a plan for the use of educational technology in a school or early childhood program;
- provide hands-on training with appropriate software programs to assist teachers in becoming familiar and comfortable with the operation and features of hardware and software; and
- provide on-site and school-based training on effectively integrating technology into the curriculum and assessment process. At the classroom level, teachers need staff-development experiences (Kearsley & Lynch 1992) that permit them to
 - use teaching techniques that fully use the technology;
 - encourage parental involvement with technology;
 - match technology applications to the learning needs of individual children;
 - look for cross-curriculum/cross-cultural applications;
 - facilitate cooperative interactions among children; and
 - use technology to improve personal efficiency.

The potentials of technology are far-reaching and ever changing. The risk is for adults to become complacent, assuming that their current knowledge or experience is adequate. "Technology is an area of the curriculum, as well as a tool for learning, in which teachers must demonstrate their own capacity for learning" (Bredenkamp & Rosegrant 1994, 61). As teachers try out their new knowledge in the classroom, there should be opportunities to share experiences and insights, problems and challenges with other educators. When teachers become comfortable

and confident with the new technology, they can be offered additional challenges and stimulated to reach new levels of competence in using technology. *Early childhood educators should use technology as a tool for communication and collaboration among professionals as well as a tool for teaching children.* Technology can be a powerful tool for professional development. Software can provide accessible information and tools for classroom management, planning, and creation of materials. Telecommunications and the Internet can enable teachers to obtain information and new ideas from around the world and to interact with distant experts and peers. Early childhood educators can incorporate principles of cooperative learning as they assist distant peers in acquiring new skills; share curriculum ideas, resources, and promising practices; exchange advice; and collaborate on classroom and professional development projects. Providing training and support for access to services available via on-line networks and the Internet has the potential of opening the doors to worlds of additional classroom resources. With a responsive on-line system, mentors can assist novices in becoming more technology literate and more involved in actively using technology for professional benefits. As educators become competent users of technology for personal and professional growth, they can model appropriate use for young children.

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