



Meaningful Technology Integration in Early Learning Environments

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Technology and Young Children Interest Forum Members

Meaningful Technology Integration in Early Learning Environments

As more early childhood programs use computers, Internet access, and other digital technologies, teachers often look for examples of adapting and integrating these new technologies to enhance children's learning. With this in mind, in this column we look at technology use in a classroom at a university demonstration preschool/kindergarten in a southeastern U.S. city. This example illustrates the integration of a variety of current and emerging technologies into a project-based curriculum. Some, like the digital whiteboard and the document camera, require significant financial support, but others, such as the digital camera and e-mail, are more affordable.

Ms. Evan and Ms. Green teach 28 children, ages 4 and 5, who spend two years in their classroom. The classroom also has two assistants, graduate students from the College of Charleston, South Carolina, early childhood program. The university provides the classroom technologies and technical support and ongoing professional development for the teachers.

Classroom environment

Looking around the classroom, one can see evidence of technology integration to promote and document learning. Digital photographs of the children and their fami-

lies line the walls. The two teachers document children's block building throughout the year with digital photos. The children use two laptops and a desktop computer,

with Internet connections, and a printer. Digital microscopes, recorders, microphones, headphones, and cameras are in different learning centers within children's reach, while some centers, like the dramatic play area and the library, are free of digital tools. Technology enrichment and integration extend beyond the classroom to communication with families. The class has a Web site, with access restricted to families, that is updated frequently. Teachers' weekly e-mails to families complement the

traditional class newsletters.

The children are involved in a long-term investigation of bones, fossils, and dinosaurs. During choice time, they engage in center activities related to their study. Their teachers walk around and provide technical assistance, ask questions, discuss possible solutions, offer materials, and direct traffic. In the paleontology lab, where the sand table has been converted to a dig site, children are excavating—breaking apart fossils plaster-cast by the teachers and trying to classify chicken bones and plastic dinosaurs they find. They use magnifying glasses, a digital microscope, and a child-friendly document camera (see the description on p. 49) to

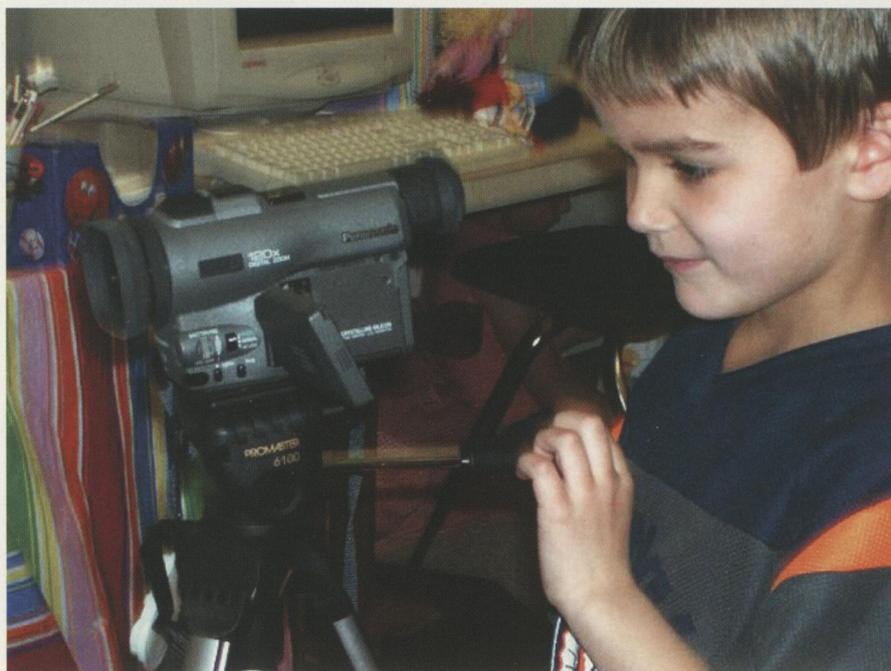
On Our Minds is a new column in which members of NAEYC Interest Forums discuss topics of interest to early childhood practitioners. It will appear in *Young Children* three times a year—in January, May, and September. NAEYC Interest Forum members share a common area of concern related to the NAEYC mission. Look for the next column, on mentoring, from the Student Interest Forum in the January 2009 issue of *Young Children*. To join an Interest Forum, NAEYC members can log in to their membership profile at www.naeyc.org/members/member.asp and click on **Subscribe to an Interest Forum**.

facilitate close observation of details from multiple perspectives. To represent their findings, some children save and print magnified still images from the camera. Others hand-draw the fossils with colored pencils or use the Kid Pix drawing software on the classroom computer.

In the multimedia book-making center, children work individually and collaboratively on writing and publishing nonfiction books inspired by their recent archaeological discoveries. They can create four kinds of books: (1) traditional paper-and-pencil books with drawings and handwritten text; (2) multimedia books containing scanned images of children's drawings and audio files of the child telling the story; (3) computer printouts of stories typed by a teacher from children's dictation; and (4) blended stories featuring a combination of child-written text and dictated text written by a teacher on printed digital photographs taken by the child. The kind of book children choose to make depends on their skills, the content, and their personal preference.

In the research center, a small group of children works with Ms. Evan to explore the differences between carnivores, omnivores, and herbivores. After consulting several books, the children want to look for more information on the Internet. Ms. Evan uses a portable interactive whiteboard, which is a touch screen and projection system connected to the computer (described on p. 50.) Together she and the children decide which keywords to search for. Ms. Evan guides the children to age-appropriate Web sites on the topic. With her help,

The kind of book children choose to make depends on their skills, the content, and their personal preference.



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the group selects relevant information and pictures to print for the class encyclopedia.

The teacher and children decide they need to consult with an expert. They move to the communication center, where another group has been writing a thank-you note to the host of a recent field trip. Ms. Evan types as the children dictate an e-mail message to a local paleontologist who had visited their classroom. They ask him questions about the fossils they found and the eating habits of dinosaurs.

Understanding the classroom technology

Below is a brief discussion of four technologies the children have used in their long-term investigation of bones, fossils, and dinosaurs.

Digital cameras

Teachers and children alike often use digital cameras for documentation. Ms. Evan and Ms. Green take pictures of the children's ongoing project activities, field trips, and art projects. By digitally archiving children's works, they can create learning e-portfolios

to assess and illustrate children's progress, share with families, or pass on to the children's teacher next year.

In children's hands, digital cameras are a powerful learning tool. For example, children can take digital photos to document their learning interests and their favorite books, activities, and special friends. They can also create digital journals and storybooks using their photos. From their photos, the teachers can assess their understanding of certain concepts (for example, distinguishing pictures taken of living versus nonliving things). (For more on the use of digital cameras, see "Young Photographers" on pages 66–72 of this issue.)

Document camera and digital microscope

Document cameras (digital overheads, sometimes called "docucams") and digital microscopes magnify three-dimensional objects, facilitating more detailed exploration and easier collaborative viewing. In this classroom, the document camera provides illumination through lamps on adjustable arms, and the digital microscope features built-in lighting. Children use the tools to view objects from multiple

perspectives, angles, and magnifications. This helps facilitate their scientific investigations as well as develop perspective-taking ability and spatial awareness. Images or video from both devices can be captured and stored for printing, sharing, or exporting.

Internet

The Internet is a powerful research tool, but appropriate teacher guidance and modeling are essential for helping young children find information, think about it critically, and develop self-protection skills and a sense of efficacy. Ms. Evan and Ms. Green integrate the Internet with hands-on activities so the children can more easily understand concepts. For example, they might help the children locate their school and other neighborhood landmarks using Google Earth in combination with concrete, push-pin mapping.

There are search engines made exclusively for educational purposes. Find them by searching for the phrase "educational search engines" or go to webquest.org. When a topic, such as dinosaurs or fossils, is entered in an educational search engine, links to relevant Web sites are listed with brief descriptions.

Interactive whiteboard

An interactive whiteboard, which looks similar to a dry-erase wipe board, is a large digital touch screen that allows teachers to use the computer and Internet with small and large groups. Instead of a mouse, teachers and children operate the computer by touching the whiteboard itself. Whiteboards can be displayed on a floor stand or mounted to a wall. Using the whiteboard, groups of children can easily view Internet sites and open digital photos or dictate and write a story together. They use special pens to draw on the board, and their work can be saved as an image file and used later.

Purposeful learning with technology

Ms. Evan and Ms. Green's classroom illustrates how teachers can integrate a variety of existing and emerging technologies to support and facilitate children's learning. Close examination reveals that the following issues are key in purposeful and meaningful technology integration.

1. Digital technologies and technology-supported activities align well with a constructivist framework and curriculum that emphasizes learner-centered exploration and active meaning making. Ms. Evan and Ms. Green use project-based emergent curriculum, in which the children actively investigate meaningful questions (in this case, on dinosaurs and ecology) and use digital tools and other manipulative materials to explore and find answers. Classroom technologies can encourage engagement, active learning, creativity, and social interaction.

2. The choice of technology should be based on how well the tool serves classroom learning and teaching needs. Technology does not drive purposeful learning; teachers' intentional instructional planning does. For example, Ms. Evan sometimes chooses technology for its ability to enhance learning in significant ways, like when the children use the document camera to examine an object from multiple perspectives. Other times she uses technology when time is a consideration, such as when the children e-mailed the paleontologist instead of sending him a letter by snail mail.

3. Teachers must ensure opportunities for all children to participate and learn in the technology-rich environment. In this class, an array of traditional tools (such as paper and pencils, books, crayons) and digital technologies are placed in open spaces to encourage children to investigate and learn together rather than on their own. Software programs

like Kid Pix, with their easy-to-use features, such as pictorial guides, sounds, and speech commands, foster active thinking and interaction with the program and with peers.

It is important to consider the needs of children with limited access to technology at home as well as children with special needs, such as limited motor movement that may cause difficulty in using a mouse or pushing the button on a digital camera. Accommodations can be made through a touch-sensitive tablet or an adaptive device that takes the place of the mouse. Specially designed digital cameras allow children to take pictures by pressing an attached switch. Such devices allow children to use technology independently. (Teachers may choose to learn more about customized technology options and participate in online teacher workshops. Visit the Early Childhood Technology Integrated Instructional System at www.wiu.edu/ectiis.)

Conclusion

Technological tools can support a learner-centered and play-oriented early childhood curriculum and promote relationship building among children, families, and the wider community. Ms. Evan and Ms. Green's classroom offers a glimpse into developmentally appropriate use of technology to create purposeful learning experiences for young children. Of course, many programs do not have access to costly technology, but most do have more common technological tools like e-mail and digital cameras for providing meaningful hands-on experiences for children.

There are endless possibilities for technology integration in the early childhood classroom. What can you imagine? Join us online at the Technology and Young Children Interest Forum and continue this discussion by logging on to www.techandyoungchildren.org.