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Technology and Young Children

Teaching Curriculum with Technology: Enhancing Children's Technological Competence During Early Childhood

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INTRODUCTION

Emerging technologies hold promise for improving student achievement and teacher quality. Evidence that diverse uses of technology in early childhood curricula show measurable differences in student achievement and teacher quality compels educators to find ways to support both children's and classroom teachers' technological development. This study addressed the question "In what ways can early childhood teachers successfully enhance young children's technological competence?"

Calls crescendo for educators to demonstrate a sound understanding of technological knowledge and skills that resonate with curriculum. While striving to meet the National Educational Technology Standards ([NETS-S] Informational Society for Technology in Education, 2000a; [NETS-T] Informational Society for Technology in Education, 2000b), classroom teachers need support to integrate technological tools into their teaching practices. This article unfolds in four sections. We begin by offering some reflections through the lens of teacher educators on the scholarship of computer-assisted learning and teaching with young children. This discussion highlights the mammoth challenge (Pan, Koskela, & Lyons, 2001) for finding effective ways for classroom teachers to integrate technological knowledge and skills that resonate with curriculum and enhance young children's technological learning. Then, we present five examples of classroom teachers' experiences of teaching with technology that offer young children opportunities to develop and demonstrate technology competence. Next, three assertions are posed that emerged from a within-case analysis of these examples. In the concluding section, we inform the reader of the contributions of this study to early childhood education and suggest further research questions.

TECHNOLOGY AND EARLY CHILDHOOD EDUCATION

Five propositions emerged from a synthesis of the research that examined the use of technology with Pre-K through grade three students (Haughland, 1999; National Association for the Education of Young Children [NAEYC], 1996). First, appropriate use of technology affords young children opportunities for socialization and language development (Bhargava & Escobedo, 1997; Liu, 1996; NAEYC, 1996; Rhee & Bhavnagri, 1991; Wright & Shade, 1994). The potential benefits of social interaction at the computer are grounded in the design and setting up of the learning environment, whether it be in a classroom, a child-care center, or a home. For example, placing chairs or a bench at a computer station provides enough space for at least two children to work and stimulates social sharing and cognition. All children should be given equitable opportunities to engage in learning tasks that are enhanced by technology (Furger, 1998). Further, Bowman and Beyer (1994) highlight "active use of technology" that supports children as decisionmakers, creators and solvers of new problems, and directors of software.

Second, developmentally appropriate software that is infused with current curriculum encourages children to explore, use their imagination, and solve problems (Boone, Higgins, Notari, & Stump, 1996, Johanson, 1997; NAEYC, 1996). Research supports the selection

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of software that allows children to decide pace and direction, and contains sound, voice, and music (Talley, Lancy, & Lee, 1997). Other beneficial software characteristics include: open-ended learning tasks with animated routines and directions that can be paused and resumed, or halted, and swift feedback to children in order to nurture their interest.

Third, technological tools enhance the development of attention span in young children. Specifically, studies by Guthrie and Richardson (1995) and Talley et al. (1997) concluded that children were intrinsically motivated to use computers. These researchers claimed that children spent longer and more focused sessions at the computer than they did in other noncomputer-related activities. Also, researchers have pointed out that care needs to be taken with the selection of lively, animated multimedia titles. Although such software may increase children's attention span, caution needs to be exerted in any conclusion that such attention purports better learning. In a study that explored the use of children's literature in different formats (animated CD-ROM, nonanimated CD-ROM, and adult reading the book to a child), Okolo and Hayes (1996) established that children spend four times as much time "reading" the book in the high-animation situation. However, students who read the book with an adult obtained the highest scores on comprehension questions. Okolo and Hayes have suggested that when such animated software is used, teachers must adopt pedagogical practices that closely monitor children's use of software and offer substantive guidance.

Fourth, young children with special needs benefit from multiple uses of technology (Behrmann & Lahm, 1994). For example, assistive technologies such as alternative keyboards, PowerPads and Touch Windows can support children with special physical needs. Children with language disabilities and autism (Johanson, 1997) were afforded opportunities that advanced verbal, nonverbal, and social interactions.

Last, the role of the classroom teacher and the learning environment determine how effectively technological tools, curriculum, and standards support children's learning (Guthrie & Richardson, 1995; Murphy & Thuente, 1995). Teacher educators should support professional development that enables doable and meaningful changes in how teachers use technology in their teaching. The focus must be on learning to teach with technology rather than learning about technology. Support for this notion was found in Willis and Mehlinger's (1996) review of literature on information technology and teacher education. They asserted, "Most pre-service teachers know very little about effective use of technology in education and leaders believe there is a pressing need to increase substantially the amount and quality of instruction teachers receive about technology" (p. 978). This is not surprising given the United States Office of Technology Assessment (U.S. Congress, 1995) has reported that technology was not a central component of teacher preparation programs in most colleges of education. A summary of the key findings stated, "Most technology instruction in colleges of education is teaching about technology as a separate subject, not teaching with technology across the curriculum. Seldom are students asked to create lessons using technologies or practice teaching with technological tools" (p. 165). Clearly, there is a need to integrate technology into teacher preparation, as well as job-embedded professional development.

METHOD

The method of research adopted in this project was collaborative action research (Nodie Oja & Smulyan, 1989). Over a period of 15 weeks, eight university faculty and classroom researchers posed questions, collected and analyzed data, and generated themes about integrating technology into classroom practice. A multiparticipant (five) design was employed (Merriam, 1998). The purpose was to generate rich information through and analyses that were reiterative and contiguous. Collaborative efforts between the university and teacher researchers established the data collection process and nurtured the data analysis. To this end, the "classroom teachers' voices" (Cochran-Smith & Lytle, 1993) resonate throughout each case. One of the researchers (Gimbert) was responsible for a within-case analysis and validating the assertions with the participants. Further, findings were validated by a second and external researcher (Cristol) who was responsible for a triangulation of data through a member check (Patton, 1990).

In the next sections, we present five examples that illustrate how early childhood teachers integrated technological tools with curriculum in ways that enhanced young children's learning. In each case, a teacher's experience of "teaching with technology" offered young children opportunities to develop and demonstrate the Pre-K–2 technological competencies (listed in the appendix). In each case, grade teams of teachers assessed the outcomes of the unit to ascertain whether or not each student surpassed the school district technology standards. According to the National Educational Technology Standards and performance indicators for Teachers (NETS-T, 2000b), Pre-K–12 teachers should be able to plan and design effective learning environments and experiences that are supported by technology. To do so, teachers need professional development opportunities that focus on learning methods and strategies for integrating technological tools with curriculum to maximize student learning. Additionally, the NETS-T purport that teachers should continually evaluate professional practice in order to make informed decisions about the use of technological tools as means to support children's learning. Last, classroom teachers should use technology to communicate and collaborate with peers, parents, and the larger community in order to nurture student learning. These examples show how early childhood teachers introduced technological skills, structured activities to reinforce these skills, and designed culminating learning tasks that asked students to demonstrate their technology competencies as defined by the performance indicators for technology-literate students in grades Pre-K–2 (Informational Society for Technology in Education, 2000a]. As readers peruse these examples, they are encouraged to consider these questions: How did teachers orchestrate lessons that built young children's technological skills, confidence, and competence? And, in what ways did teaching with technology better support children's learning?

ANIMALS IN THE WILD FOR PRESCHOOLERS

The first example (Technology profile performance indicators: 1, 2. 3, 4, 8, and 9; Informational Society for Technology in Education, 2000) focuses on a preschool curriculum unit that explored wild animals through photographs, video clips, and sounds on an animals CD-ROM. Preschool students identified kangaroos, penguins, lions, and other wild animals through multimedia technology.

During these three lessons, the classroom teacher, Matt, recruited an early childhood preservice teacher, a university teacher educator, two parents, and a teacher's aide to guide children at computer stations. Two to three chairs (or a bench) were placed at each computer. Supervising adults talked with the children while they were at the computer and explained what was happening. Adults guided each child, who selected images of animals and created a collage using photographs and graphics from a database of Internet images that the teacher collated. An early childhood curriculum requires preschool teachers to design learning tasks that develop children's readiness skills and offer early literacy experiences. Hence, after making the animal collages, children dictated a story to an adult who typed this into the computer. Alternatively, some children narrated their stories into a tape recorder and played it back for others in the class to hear (Fig. 1).

Fig. 1.

Additionally, Matt created tape recordings of animal sounds that provided an opportunity for these children to develop aural skills as well as to verbalize responses. Students practiced listening skills by participating in class discussions that stimulated thinking about the science and social issues related to these animals. Children brainstormed questions such as, Where do these animals live? What do they eat? How do these animals move? How do these animals interact with each other? How do we care for and protect these animals? Further, the teacher videotaped the lesson's activities to share with parents and posted digital images of the children's work on the preschool's Web site.

PLANTS FOR KINDERGARTNERS

Kindergarten children benefit from technology when technological tools are integrated into learning tasks that allow children to work at their own pace with adult support (Bowman & Beyer, 1994; Wright & Shade, 1994). The second example (Technology profile performance indicators: 1, 2. 3, 4, 8, and 9; Informational Society for Technology in Education, 2000a) documented a series of lessons in which kindergarten children used painting tools: pencil, line, color palette, and eraser. Under the direction of a preservice teacher (Jennifer), the classroom teacher, a parent, and a teacher educator from the school-university partnership guided small groups of children through steps in a science-inquiry task. Three computers were set up in the classroom and used as activity centers for learning (also referred to as learning stations). To accomplish the activities, the children employed Kid Pix™ (Broderbund Software, Inc., 1994–1998) painting application, a software program that allows pictures to be drawn, slide shows to be created, and books to be produced and shared with classmates and family (Fig. 2).

In this series of lessons, the teacher incorporated the development of painting skills with basic computer skills: turn on the computer, log onto the server, and shut down the computer. Children created and printed drawings of plants they learned about in the curriculum unit *Living Things* and labeled the parts of their plants. Continuing the learning experiences of the preschool curriculum, the kindergartners, teacher, and adults worked on readiness and early literacy skills. With the guiding adults' help, the children recorded a statement about their plant and shared their drawings and findings with the rest of their classmates (Fig. 3).

Fig. 2.

FIRST-GRADERS AND PUPPETRY

With the present push to integrate technology and curriculum, it is important for educators to remember that embedding technological tools and instructional practices does not automatically meet standards of learning and enhance children's achievement. Educators should ask, how technological tools enhance students' achievement as they undertake the processes involved in learning (Lewis, 1999). The third case (Technology profile performance indicators: 1, 2, 3, 4, 5, 6, 7, 8, and 9) details first-graders' experience with a WebQuest titled *The World of Puppets* (developed by Cathy Jennings, Valley of Enchantment Elementary, Rim of the World School District). Specifically, a WebQuest is an inquiry-based series of lessons that supports K–2 students' learning and technology competency (Dodge, 1997a, 1997b). This case describes how a first-grade teacher redesigned and implemented a school district curriculum unit with the specific purpose of using the World Wide Web to enhance children's learning about puppetry (Fig. 4).

Deb discovered this WebQuest on Bernie Dodge's (1997b) Web site and adapted various parts to use with her first-grade students. *The World of Puppets* used authentic tasks to motivate students to collate, analyze, and transform online and offline information. While some classroom learning activities use technology in an ad hoc fashion, a Web Quest seamlessly integrates technological tools (online and offline resources, and software) into instruction.

Deb designed eight whole-class mini lessons and follow-up group activities that exposed the children to

Fig. 3.

Fig. 4.

puppets and plays of different cultures. In this WebQuest, Cathy Jenning suggested questions that Deb followed as she and the first-graders explored Banraku puppets from Japan, Water Puppetry from Vietnam, and Shadow Puppetry from Indonesia: How would you describe these puppets? What makes these puppets different from other puppets you've seen? How are these puppets made? What are they made of? Why do you think they made the puppets this way? How are the puppets operated? What music or storytellers are used with these puppets? What kinds of stories do these puppets tell? This visual and performing arts unit is connected with social studies objectives and explored world cultures through their puppetry. The Internet experiences in these lessons were designed to be teacher-directed whole-class experiences. The final learning tasks of the unit were making puppets, writing a play for those puppets (using the computer to word process), and presenting a puppet show in groups of four children. Deb videotaped the children's puppet shows, and parents were invited to the culminating performances (Fig. 5).

DINOSAURS IN A PRIMARY CLASSROOM

In the next example (Technology profile performance indicators: 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10; Informational Society for Technology in Education, 2000a), a team of preservice and inservice teachers planned activities that used technological tools for a first-grade science unit, *Prehistoric Life*. This case illustrates how a classroom teacher met the national science standards, the objectives of a mandated science unit, and the school district's technological competency requirements for first-graders. While she had followed the requirements for a particular science unit for many years, Judi, a veteran primary-grade teacher, considered, How can I guide first grade students to ask questions about scientists' knowledge of dinosaurs and help them to answer their wonderings by using technological tools?

Fig. 5.

Judi believed that a science curriculum should present opportunities for students to use the scientific process to ask and answer their diverse wonderings and simultaneously develop their technological skills. After reading about Hall's (1998) framework for integrating scientific inquiry into curricula, Judi used seven steps to plan the unit: identify main ideas and experiences on a topic *; search for activities with potential for investigation *; change activities into explorations; introduce a series of explorations *; shape children's ideas and questions into questions for investigation; consider the problems for fair-test potential; and organize the children to plan, carry out, and interpret investigation *. Specifically, Judi identified the steps that supported the use of technology (*) by both the teachers and the children. For the purposes of coplanning and coteaching, she enlisted the assistance of her preservice teacher, fellow members of the primary teaching team, and her university colleagues. Part of this process involved searching for activities with potential for investigation that infused technology. Further, Judi explored the Internet for Web sites that gave appropriate information for first-graders about the selected "mystery dinosaurs." Classroom access via two computers linked to the Web-supported the inclusion of such Web sites for the children's exploration. Finally, Judi guided her team to design and implement learning activities and assessment tasks that meet the National Science Standards (National Research Council, 1995) and the NET-S for Students (Informational Society for Technology in Education, 2000a).

An example of a technologically enhanced task was the culmination activity for this unit. Students worked in paleontology teams to unravel clues from a dig site, used scientific inquiry to discover the name of their mystery dinosaur, and organized their findings into technology-enhanced presentations. As a means of enhancing the children's learning and of assessing their technology competencies, Judi and her preservice teacher organized the children in their paleontology teams to author slide shows using Kid Pix™ (Broderbund Software, Inc., 1994–1998). Rather than focusing merely on what was learned, the tasks required children to emphasize the process they used to determine the identity of their mystery dinosaurs.

Over the course of this 6-week unit, Judi introduced the children to the software, Kid Pix™ (Broderbund Software, Inc., 1994–1998). Consequently, the children were desensitized to the "bells and whistles" of this particular software before engaging in the main task. The next phase of planning was low-tech—a paper-and-pencil task. Each child in the group was responsible for designing one to two slides. This included selecting the digital photos they planned to use, identifying background colors and designs, writing captions, and scripting the narration associated with each slide. In order to access enough computers to allow 46 children to work in groups to construct their slide shows, five computers were relocated into one of the first-grade classrooms for a day. A veteran teacher and a preservice teacher facilitated a lesson with half of the group, while the other children worked on their slide shows. The two groups exchange activities mid-day. In the slide show production group, teams of children, each facilitated by an adult, worked over a 3-hour period to construct their projects. Completed slide shows incorporated multiple forms of media (Informational Society for Technology in Education, 2000a), including text, images, and sound. University faculty provided support that ranged from converting digital images to the proper format for use in Kid Pix™ to working with small groups of children to develop their slide shows (Fig. 6).

On the final day of the unit, parents were invited to attend the slide show presentations. As they shared their creative works with their peers, teachers, university faculty, parents, and other members of the school community, students explained the information they have gathered and analyzed (Informational Society for Technology in Education, 2000a). These audience members were very impressed with the children's explanations of how they determined the identities of their mystery dinosaurs, as well as how they designed their slide shows. Shared comments from the adults expressed surprise that first-grade students are capable of using technological tools to demonstrate their learning (Fig. 7).

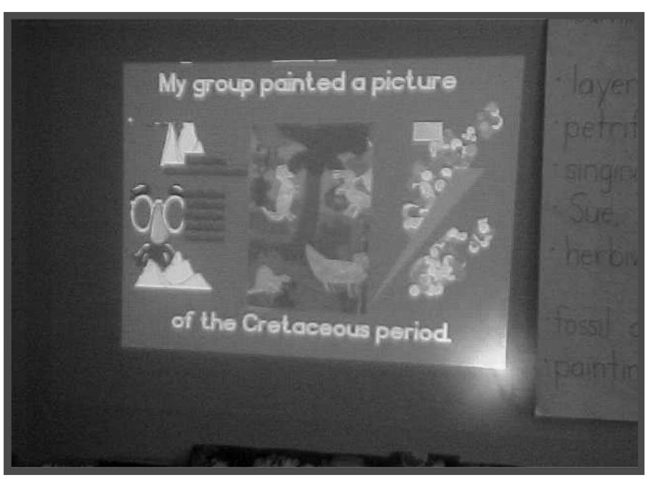

Fig. 6.

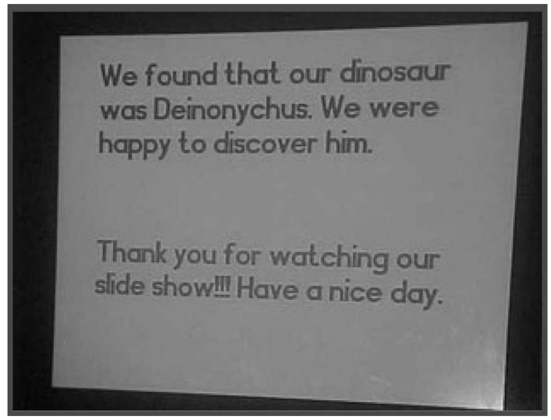

Fig. 7.

Classroom teachers often struggle with ways to effectively and efficiently use limited numbers of computers in a classroom. Judi strategically planned the use of available technological resources for the learning activities. This example demonstrates how a class of 23 first-graders working in teams can successfully accomplish learning tasks with only two computers in the classroom.

TECHNOLOGY AND MATHEMATICS COMPETENCIES AND SECOND-GRADERS IN A COMPUTER LABORATORY

This last example (Technology profile performance indicators: 1, 2, 3, 5, 7, and 9, Informational Society for Technology in Education, 2000) describes how a teacher developed technological skills to integrate a mathematics unit and a technological tool, the software product Kid Pix(tm) (Broderbund Software, Inc., 1994–1998), to enhance her second-grade students' mathematical learning (Informational Society for Technology in Education, 2000b). Cathy asked, How can I integrate computer activities into the math curriculum for second grade?

Cathy, who has taught first grade in the State College Area School District (SCASD) for 20 years, looped to second grade with her class. Motivation for Cathy's efforts stemmed from her anxiety with using computers to support her teaching. Concurrently, Cathy needed to increase her own comfort level with technology and teach the school district's second grade technology competencies (Fig. 8).

Fig. 8.

Cathy recognized the importance of carefully structuring the technological resources at her fingertips in conjunction with the context of the learning activities (Informational Society for Technology in Education, 2000b). In the beginning of the school year, Cathy scheduled computer laboratory time (35 IMSC computers) each week during her math period. Initially, Cathy spent a great deal of energy working with the computer on her own and with a university faculty member (who mentored her) as she prepared for each teaching period. The goal for herself and her students was to be able to use-independently and effectively-the technology competencies in any situation.

The school district's curriculum focused students' learning on "how technological tools can be used to solve practical mathematics problems" (State College Area School District, 1994, p. vi). Cathy examined the second-grade math levels cards that listed standards for seven areas of mathematical learning, including problem solving, systems of numeration, integer operations, rational numbers, measurement, geometry, and data analysis. She identified math standards that could be met and skills that could be practiced through lessons delivered in the computer lab. This excerpt details an example of Cathy's planning:

> Our math focus was whole number operations, level 7. The first standard that I developed a computer lesson for was: Write the fact families for 2 subsets consisting of objects up to 18. Again, Kid Pix™ operations provided the perfect avenue to practice this standard. The second standard we worked on was: Solve addition and subtraction equations, 11–18, incorporating horizontal and vertical notation. The computer lesson I planned asked students to use Kid Pix™ to write an addition equation using any numbers between 1 and 9, use the stamp tool to represent the equation, save, and print. (Interview, November 2001, p. 7; Fig. 9)

As a result of this experience, Cathy identified benefits for students' learning. First, students practiced and reinforced math skills. Second, learning activities offered opportunities for the children to develop and demonstrate the technology competencies required of second-graders. And, there was a bonus: the children enjoyed using the computers and were always enthusiastic about the lessons taught in the laboratory.

IMPLICATIONS FOR PRACTICE

A look across the landscapes of early childhood development and educational technology offers informative stories about how classroom teachers support the growth of young children's technological competencies. This collaborative research elicits new understandings for teacher educators and administrators responsible for coordinating professional development for preservice and inservice early childhood teachers. Three assertions were amassed from our collaborative research.

Assertion One

Learning to teach with technology in early childhood classrooms requires a process of mutual support between classroom teachers, university faculty, children, parents, and other adults. As they shared technology resources and developed expertise, classroom teachers, university faculty, and children generated technological achievements. In each case, teachers specifically identified professional sharing and collegial support *in the*

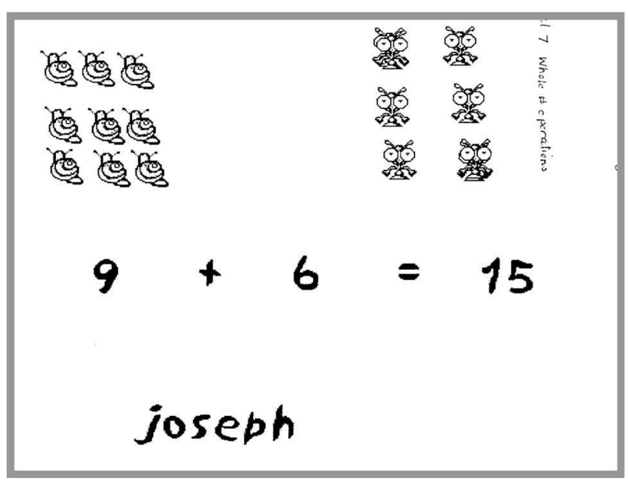

Fig. 9.

classroom as essential inputs for their development. The teachers committed to learning more about technology and were willing to build a collaborative understanding of how best to support their own and children's technological competence. University faculty and school administrators need to make similar commitments in terms of time and funding to support teacher's learning. School-university partnerships offer opportunities for university faculty and teachers to work together in classrooms with children on a daily basis.

In reflecting on their experiences, teachers claimed that young children learning to use technological tools to create and solve teacher-directed activities need the support of an active adult role model, rather than a passive by-stander. This implies that all adults in the classrooms require a level of technological competence that enables them to stimulate children's thinking as technological tools are integrated with curriculum.

Assertion Two

In each case, classroom teachers found some aspect of infusing technology to be problematic. This prompted them to focus on a particular part of the curriculum and/or their teaching and assessment practices with the ultimate goal of enhancing their students' achievements. While Matt was conversant with preschoolers' capabilities, he wanted to know if independent work at a computer with an active adult as a role-model enhanced his children's learning. Likewise, Jennifer was frustrated with her management of the classroom computer primarily as a reward for children who completed their work early. Rather than using the computer as a time-filler or for "busy work" for some children, Jennifer used the computer as a tool for curriculum activities. Deb's successful experiences with using software for small groups of children prompted her to integrate information from the World Wide Web through whole-class instruction. Since most Web sites contain much information that surpasses first-grade reading levels, Deb was hesitant about the outcomes for children's learning. Judi was dissatisfied with the expected approach to teaching a science curriculum unit. Last, Cathy envisioned an enhanced learning environment for her students if she could develop the necessary competence to infuse mathematics skills and technology.

Consequently, an impetus for these "new" and "old" teachers to develop technological competence stemmed from feeling comfortable with casting reasonable doubt on their own assumptions and teaching practices, as well as the knowledge and praxis of others (Cochran-Smith & Lytle, 1999). Teacher educators and administrators must create professional development opportunities that allow teachers to determine what best meets their technological needs. Rather than a "one-size-fits-all" approach toward technological proficiency, teachers need spaces and time to question curriculum and technology, and plan lessons that support and enhance children's technological learning.

Assertion Three

Collaborative teaching and learning between university faculty and classroom teachers is a vehicle for teacher professional development that results in real and meaningful changes in how teachers use technology in their classrooms practices. Early childhood teachers can successful enhance technological competency of young children by implementing curricula that seamlessly integrate technological tools into learning activities. Evidence of students' learning and teachers' professional development in these examples was substantive. In the process of integrating technological tools and curriculum, early childhood teachers' practical knowledge of how to infuse technology shifted from "apart" to "a part" of their teaching practices.

CONCLUSION

Significantly, this collection of cases suggests that the process of technology infusion transforms teachers' thinking and actions. While young children learn in meaningful ways, their teachers learn as well—in ways that will have a long-term impact on infusing technology into their curriculum and/or teaching practices. Early childhood teachers are offered support and encouragement to try different ways to infuse technology. These cases further our understanding of how we can develop and enhance technology competency of young children and early childhood educators' professional development as they learn to teach with technology.

Emerging from this study are questions for further exploration. Such challenges focus on issues that suggest the need for intensive and spiraling support for classroom teachers as they strive to meet the U.S. national performance indicators for technology-literate students, Grades Pre-K–2 (Informational Society for Technology in Education, 2000b), the criteria for appropriate use of technology as outlined by the NAEYC (1996), the National Educational Standards for Teachers (2000) and those for students (Informational Society for Technology in Education, 2000a). How can this process be sustained and shared to support more classroom teachers in their

Appendix A

Technology Profile Indicators for Young Children (PreK–2, ISTE, 2000).	National Association for the Education of Young Children (1996)
1. Use input devices (for example, mouse, keyboard, remote control) and output devices (for example, monitor, printer) to successfully operate computers, VCRs, and audiotapes. 2. Use a varietyof media and technology resources for directed and independent learning activities. 3. Communicate about technology using developmentally appropriate and accurate terminology. 4. Use developmentally appropriate multimedia resources (for example, interactive books, educational software and multimedia encyclopedias). 5. Work cooperatively and collaboratively with peers, family members, and teachers when using technology in the classroom. 6. Demonstrate positive social and ethical behaviors when using technology. 7. Practice responsible use of technology systems and software. 8. Create multimedia products with support from teachers and other adult supervisors and peers. 9. Use technology resources (such as writing and drawing tools, and logical thinking programs) to solve problems, and communicate and illustrate ideas. 10. Gather information and communicate with others using telecommunications with support from teachers, other adults supervisors, and peers.	Technology should: 1. be age-appropriate, individually-appropriate, and culturally-sensitive; 2. be used to enhance children's cognitive and social functioning; 3. be infused into the classroom curriculum to support children's learning; 4. eliminate exposure to violenc; and 5. NOT stereotype any group. Note: NAEYC's (1996) positiion statement highlights how classroom teachers can lobby for the development and distribution of appropriate-technological applications that support the performance indicators for technology-literate students in Grades Pre-K–2 (Informational Society for Technology in Education, 2000). Further, preservice and inservice early childhood teachers should technological skills in order to meet competencies of the National Educational Technology Standards and Performance Indicators for Teachers (2000).

efforts to infuse technology, curricula, and classroom management practices? In what other ways can teachers be afforded opportunities to support each as they develop technological competence? Likewise, how can young children be afforded experiences to support each as they develop technological competence?

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