



Early Childhood Building Blocks

Computers: Tools for Intentional Teaching and Learning

Cindy Bewick

Coordinator of Early Childhood Education, Kalamazoo Public Schools,
Kalamazoo, Michigan

Suzanne Thouvenelle

Child Development Specialist, Head Start Knowledge Information &
Management Services, Alexandria, Virginia

INTRODUCTION

Sylvia and Aisha are in the classroom computer center, each using the mouse and keyboard at her own computer. Janesha, Erin, and Quinnah stand next to their seated friends.

Erin: "Hey, what are you making? That looks like my house."

Sylvia: "Nope, this is my house and my grandma's house."

*Aisha: "I can make mine look just like yours," and she electronically mimics Sylvia's picture.
"See, look at this!"*

The teacher kneels down beside the youngsters. "What would be another way to make a house that looks like Sylvia's?"

Janesha: "I'm building one with blocks."

Quinnah: "I'm painting a picture of a house."

Erin: "I'm writing a story about my house. I can talk about who lives there and what we do."

Teacher: "Wow, those are three different ideas. Can you think of others?"

The children who are standing move to different centers in the classroom.

Sylvia: "Here, Erin. I printed two pictures of my house, one for your story and one for my journal."

What do we see in this scenario? We see a classroom outfitted with computers that are child-friendly and that are an integral part of the classroom. We see a teacher who asks questions that prompt children's thinking, understands that the computer fosters social-emotional development, links what the children are doing on the computer to other activities the children can do in the room, and addresses multiple standards across learning domains in holistic ways. And we see children who are active learners, understand the basics of computer use, create original ways to express their ideas, and show the benefits of intentional teaching.

Technology is part of the daily life of many children and teachers. Often, even the youngest child has basic knowledge about technological tools such as CD players, computers, digital cameras, iPods, and DVDs. Public schools, libraries, and community organizations frequently offer computer access. The growth in new or enhanced products is exploding.

Due to the recent emphasis on early learning standards and related research, this Building Blocks brief focuses on classroom computers and the teaching-learning process. Early childhood teachers often wrestle with the joys and challenges of technology. They want to be on the cutting edge, and yet they struggle to appropriately integrate computers into the learning experiences they create for young children. In fact, although many preschool and kindergarten classrooms have computers, often teachers do not use them (Cuban, 2001).

RATIONALE

Most recent research on educational uses of computers focuses on older students and academic uses in school. The limited studies that are available about young children and computers suggest that computers:

- Act as a catalyst for social interaction (Clements, 1999)
- Promote positive and frequent conversation with other children and adults (Davidson & Wright, 1994)
- Support writing development of emergent writers (Yost, 2003)
- Enhance early literacy skills, such as letter recognition (Trawick-Smith, 2003)



The research also shows that early childhood teachers who use computers effectively with children:

- Are intentional in their introduction, use, and support of technology (Epstein, 2007)
- Integrate experiences across domains of development (Haugland, 1995)
- View computers as instructional tools, similar to other tools like markers, paper, scissors, and glue (Clements, 2002; Tsantis, Bewick, & Thouvenelle, 2003)
- Make active decisions about what happens with computers in their classrooms (Yost, 2003)

- Organize the learning environment in ways that foster access to and integration with other learning resources (Specht, Wood, & Willoughby, 2002; Thouvenelle & Bewick, 2003)
- Learn best by experimenting and collaborating with other teachers (Bewick & Kostelnik, 2004; Darling-Hammond & McLaughlin, 1995)

These findings underscore the importance of purposeful planning in the use of technology within early childhood settings. They highlight how teachers are an essential part of the formula for successful learning with computers.



STRUCTURING THE LEARNING ENVIRONMENT

It is easy to overlook this step since your mind may be jumping ahead to how the children can use the computers. You'll need to think carefully about your computer center—where you'll place it and how your children will use it. The best location may need additional electrical outlets or special types of furniture. Here are some suggestions:

- Locate computers in the classroom or early childhood setting so there is access to adequate electrical outlets, but be careful to keep the cords from crossing doorways or causing other trip hazards.
- Use child-sized chairs and tables. To ensure proper ergonomic positioning for young children, be sure that the computer monitor is at eye level, that there is a 90 degree bend in the elbow when the child uses the mouse or the keyboard, and that the child's feet don't dangle because the chair is too high.

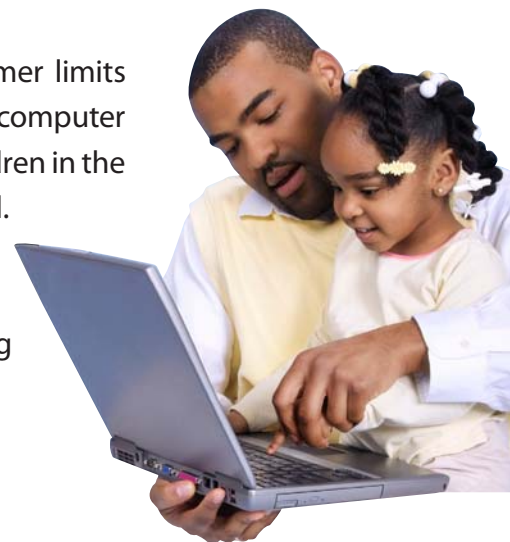


- Include two computers and a shared printer to facilitate social interaction.
- Consider potential safety and security issues. Locate computers so that they are away from messy areas of the classroom—avoid placing computers near the sink, sand table, or play-dough area. Use locking mechanisms to fasten computers to desktops or the tabletop.
- Include books and manipulatives at the computer center that link to the content of software programs. For example, small geometric blocks are a concrete representation that may facilitate the creation of a structure that can then be re-created on the computer screen. Children can experiment by arranging shapes in graphic patterns that can be re-created using the software.

Many picture books also can be easily integrated with software and will provide children with motivational interest and ideas about using software. Try reading *Mouse Paint* or *Harold's Purple Crayon* before children use paint or drawing software. Books such as these offer children examples of ways they might approach using the computer as a medium for representational experiences.

- Provide other learning centers with books and materials that relate to the content of software programs.

- Avoid setting time limits on computer use. We've found that using a timer limits children's involvement and creativity with software. Many teachers open the computer center during arrival and departure times. At these times, there are fewer children in the classroom, and so access to computers is not an issue and wait time is minimal. During learning center or choice time—when all the children are participating—some teachers report that it's easier to manage the computer center when a sign-up sheet is used or access to the center is limited by placing two chairs in front of each computer.
- Select quality software programs (see below).



CHOOSING QUALITY SOFTWARE PROGRAMS

Software is your most critical computer decision. Use a decision-making process similar to what you would use when purchasing other types of classroom materials. Inexpensive programs may not meet student needs or your instructional goals. Look for software programs that:

- Support your curriculum's goals and outcomes.
- Extend content and experiences at the computer to other domains of learning.

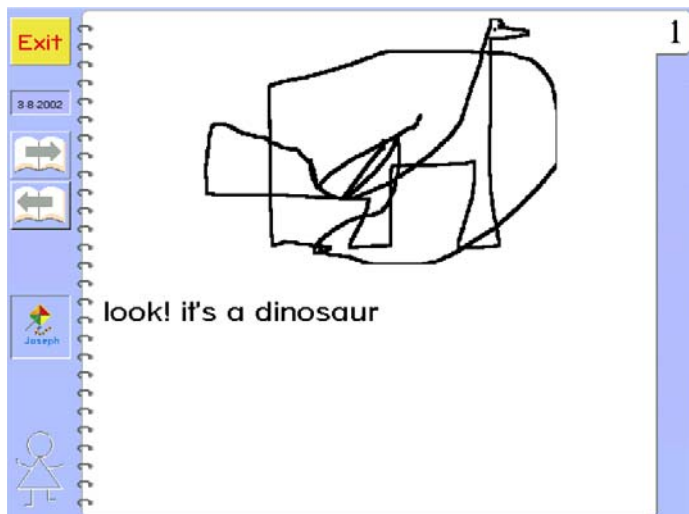


- Include features that help you collect children's work, follow progress, and share results with families.
- Allow operation with little adult help.
- Reflect diversity. Characters should represent variety in age, gender, and ethnicity.
- Are nonviolent.
- Help children compose, read, and publish their own stories.
- Provide a meaningful context and accurate information.
- Allow problem solving, exploration, and discovery versus strict drill and practice.
- Encourage rich vocabulary development.
- Support math concepts such as grouping, one-to-one correspondence, counting, geometry, and ordering.
- Support science concepts, such as matching adult animals with their young or sorting objects by size and shape.
- Develop phonemic awareness and apply phonetic skills.

INTEGRATING LEARNING STANDARDS

When you fully introduce software and begin to use the computer as a tool, you can address learning across multiple domains of development, and you can review samples of the children's work to assess their understanding of concepts articulated in state learning standards. The following examples illustrate how computers offer children opportunities to make meaningful connections across curriculum areas. As you will see, the children demonstrate an integration of skills and abilities.

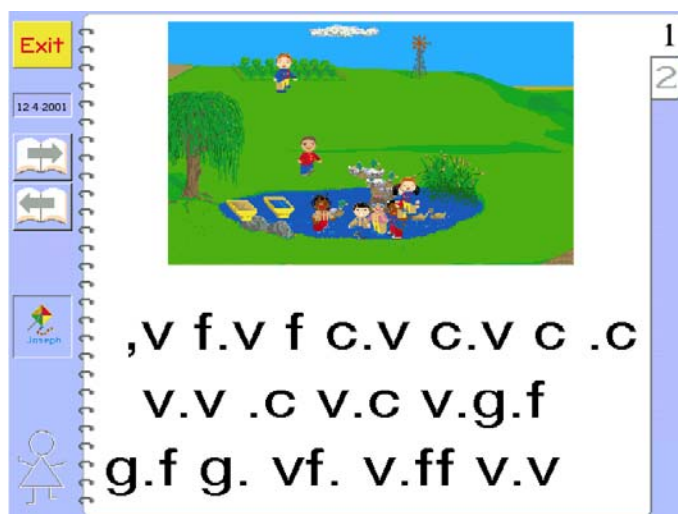
Joseph (Age 4)



Thoughts about the picture:

- *Motor coordination improves—moving from scribble to more control.*
- *Sharing and representing ideas are important. The teacher takes story dictation—she types exactly what the child says.*

We can assess a child's level of skill and knowledge of concepts across several domains of development. For example, when we type exactly what the child—in this case, Joseph—says, many early literacy concepts are practiced, including awareness that print conveys meaning and print is read from left to right and top to bottom (print awareness). Further, as Joseph exhibits more control over the mouse, he progresses from scribbling to smooth moves (*fine motor skills*).

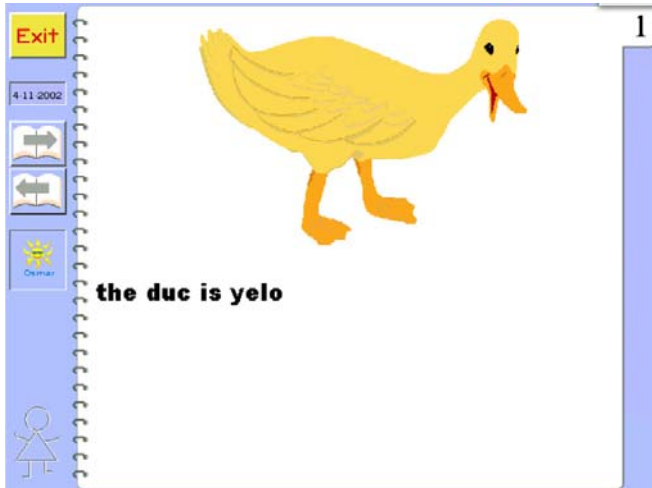


Thoughts about the picture:

- *Here we see the development of fine motor control. This is equivalent to controlled scribbling with a crayon—the repeated letters show the ability to intentionally repeat keystrokes—patterns emerge, and pictures show more detail.*

Joseph exhibits increased fine motor control and visual discrimination (*early building blocks of writing and reading*). He can recognize and select the same letter from the alphabet letters and symbols on the keyboard as he creates a pattern of repeated letters and periods (*math: recognize and duplicate a simple sequential pattern*).

Osmar (Age 5)



Thoughts about the picture:

- The stylized sentence demonstrates Osmar's formula for writing—Osmar uses known words and phonetic spellings.
- Words are separated by spaces, but there's no evidence of capitalization or punctuation.

Osmar is beginning his journey into composition. At first it's simple: He writes what he sees—"the duc is yelo." Notice that the grammatical aspects of writing are not yet evident. Later he expands his writing to include personal events and punctuation.

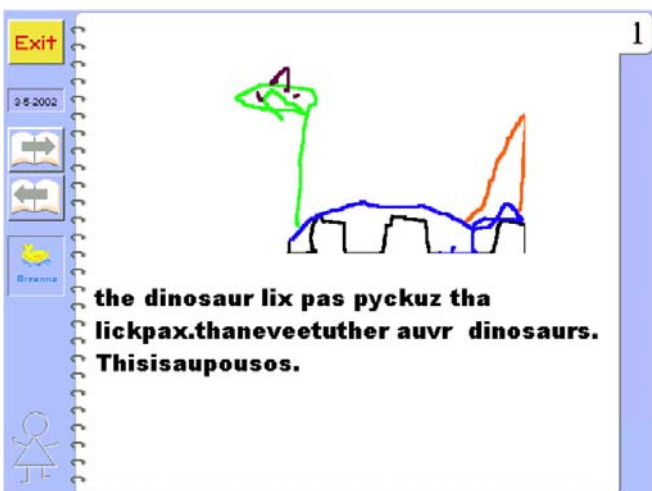


Thoughts about the picture:

- Osmar identifies letters with sounds he hears, and writes a story.
- He begins to use punctuation marks appropriately, although in this example, there is no space between words.
- Osmar demonstrates transitional writing—words are represented by the beginning, middle, and ending consonants.

Osmar demonstrates developmental spelling. He uses letters to represent sounds. His picture shows his gains in control over the mouse and in the selection of available tools within the software.

"the barber cuts my hair."



Thoughts about the picture:

- Letter-sound correspondence.
- Uses punctuation and separates words with spaces.
- Developmental writing—many words are represented by sounds of letters including vowels, consonants, and blends.

"The dinosaur likes us because they like us. They never eat other dinosaurs. This is an austrosaurus."

STANDARDS

When you integrate computers as tools that support children's learning, you can easily address your state and local learning standards. Review your plans to use computers, and then examine children's portfolios with the previous examples in mind. You may be surprised by how the children's work reflects their integration of learning across different domains or curriculum areas.

CONCLUSION

All teachers want to increase children's positive school outcomes. As teachers, we support learning through play using the children's natural curiosity and exploration. We pose questions and challenge children's thinking with increasingly complex experiences. Technology can help pave the way to academic success and enhanced school outcomes when teachers and children understand and use computers as tools versus rewards for good behavior or activities to keep them busy.



National Educational Technology Standards for Students

Pre-K
Indicators

Kindergarten
Indicators

Grade 1
Indicators

Grade 2
Indicators

1. Creativity and Innovation - Demonstrate creative thinking, construct knowledge and develop innovative products and processes using technology.

Pre-K–2 Benchmark

Illustrate and communicate original ideas and stories using digital tools and media-rich resources.

- | | | | |
|---|--|---|--|
| <ul style="list-style-type: none"> • Create and print drawings, pictures or stories. | <ul style="list-style-type: none"> • Identifies word processing software as a tool for writing. | <ul style="list-style-type: none"> • Identify, discuss and demonstrate graphing software terms (e.g., graphs, patterns, displays). | <ul style="list-style-type: none"> • Type words and/or sentences. • Insert images (e.g., photos, drawings, symbols). |
|---|--|---|--|

2. Communication and Collaboration - Use digital media and environments to communicate and work collaboratively.

Pre-K–2 Benchmark

2A. Engage in learning activities with learners from multiple cultures through e-mail and other electronic means.

- | | | | |
|---|---|--|--|
| <ul style="list-style-type: none"> • Work cooperatively when other children are present at the computer. | <ul style="list-style-type: none"> • Work cooperatively when other children are present at the computer. • Use teacher selected Internet resources to identify, explore and discuss responsible computer use. | <ul style="list-style-type: none"> • Use word processing software as a tool to enter numbers, words and phrases. • Collaborate with teacher and classmates to send a class e-mail message. | <ul style="list-style-type: none"> • Create group slide presentation with teacher and classmates. • Send email to a classmate (teacher & school discretion). |
|---|---|--|--|

Pre-K–2 Benchmark

2B. In a collaborative work group, use a variety of technologies to produce a digital presentation or product in a curriculum, area.

- | | | | |
|---|---|--|---|
| <ul style="list-style-type: none"> • Help other students use software or computer tools. • Create design or drawing that can be replicated by others. | <ul style="list-style-type: none"> • Identify basic word processing terms (e.g., menu bar, cursor, file, open, save). • Help other students use software or computer tools. | <ul style="list-style-type: none"> • Recognize, discuss and cite various types of resources as a class. | <ul style="list-style-type: none"> • Create story or other digital presentation with classmates. |
|---|---|--|---|

National Educational Technology Standards for Students

Pre-K Indicators

Kindergarten Indicators

Grade 1 Indicators

Grade 2 Indicators

3. Research and Information Fluency - Apply digital tools to gather, evaluate and use information.

Pre-K–2 Benchmark

Identify, research and collect data and propose a developmentally appropriate solution.

- | | | | |
|---|---|--|---|
| <ul style="list-style-type: none"> • Ask questions and share ideas with peers and adults when using computers. • Use manipulatives to display data from software program (eg., inch cube pattern match printed graphic design from computer). | <ul style="list-style-type: none"> • Participate as a group and locate information in developmentally appropriate resources. • Identify the Internet as a source of information. • Use graphing software as a class to display data. • Discuss characteristics of multi-media (e.g., text, sound, images) as a class. | <ul style="list-style-type: none"> • Use computer to independently accomplish a purpose, complete a task or solve a problem. • Use multi-media software to illustrate words/phrases/ concepts. | <ul style="list-style-type: none"> • Discuss and use resources for class multi-media project. • Change an existing multi-media story to include student narration, writing, and illustration. |
|---|---|--|---|

4. Critical Thinking, Problem Solving and Decision Making - Plan and conduct research, manage projects, solve problems and make informed decisions using digital tools

Pre-K–2 Benchmark

Independently apply digital tools and resources to address a variety of tasks and problems.

- | | | | |
|--|--|--|--|
| <ul style="list-style-type: none"> • NA | <ul style="list-style-type: none"> • NA | <ul style="list-style-type: none"> • NA | <ul style="list-style-type: none"> • Use teacher-selected Internet resources to locate, discuss and compare information as a class. • Explore strategies for evaluating Websites with the teacher. |
|--|--|--|--|

5. Digital Citizenship - Understand cultural and societal issues and practice legal and ethical behavior related to technology.

Pre-K–2 Benchmark

Demonstrate the safe and cooperative use of technology.

- | | | | |
|--|--|---|---|
| <ul style="list-style-type: none"> • Keep foreign materials (e.g., play dough, water, paint, small toys) away from equipment surfaces and openings. • Begin to state and follow rules for using the computer. • Follow simple directions to use the computer. | <ul style="list-style-type: none"> • Follow classroom rules for computer use. • Perform a variety of operational tasks including turning computer on and off, opening and closing software programs, saving work, dragging objects and creating folders. | <ul style="list-style-type: none"> • Discuss ownership of computer created work. | <ul style="list-style-type: none"> • Recognize rights of individual's ownership of created work. |
|--|--|---|---|

National Educational Technology Standards for Students

Pre-K
Indicators

Kindergarten
Indicators

Grade 1
Indicators

Grade 2
Indicators

6. Technology Operations and Concepts - Demonstrate understanding of technology concepts, systems and operations.

Pre-K–2 Benchmark

6A. Communicate about technology using developmentally appropriate and accurate terminology.

- | | | | |
|---|---|--|---|
| <ul style="list-style-type: none"> Name technology components (e.g., printer, screen, keyboard, CD). | <ul style="list-style-type: none"> Identify and demonstrate purpose of computer, mouse, keyboard and printer. Locate and use letters, numbers and special keys on keyboard. Identify and discuss terms and concepts (e.g., Internet, online, digital information). | <ul style="list-style-type: none"> Identify and discuss visual uses of technology. Identify and discuss safe and appropriate behaviors online. | <ul style="list-style-type: none"> Identify reasons why safe online behaviors are important. |
|---|---|--|---|

Pre-K–2 Benchmark

6B. Demonstrate the ability to navigate in virtual environments such as electronic books, simulation software and Websites.

- | | | | |
|--|--|---|---|
| <ul style="list-style-type: none"> Use computer with peer/adult help. | <ul style="list-style-type: none"> Independent log on to computer. Independent start and exit for software programs. | <ul style="list-style-type: none"> Use skill of right-clicking with mouse. Identify information in various formats. | <ul style="list-style-type: none"> Demonstrate correct keyboarding posture and finger placement for home row and upper/lower case letters. Identify available sources of information. |
|--|--|---|---|

Technology categories and benchmarks are adapted and reprinted with permission from National Educational Technology Standards for Students, Second Edition, © 2007, ISTE® (International Society for Technology in Education), www.iste.org. All rights reserved.

ADDITIONAL RESOURCES

Center on Instruction. Here you'll find a variety of resources including "Effective Literacy and English Language Instruction for English Learners in the Elementary Grades." www.centeroninstruction.org.

Early Childhood Learning and Knowledge Center. Sponsored by the Office of Head Start, this site includes the Head Start Performance Standards and links to state standards through the Early Childhood Development and Education section. <http://www.eclkc.ohs.acf.hhs.gov>.

Early Connections: Technology in Early Childhood Education. The Northwest Educational Technology Consortium and Northwest Regional Education Laboratory (NRWREL) joint project shares ideas about appropriate uses of technology for educators of young children. <http://www.netc.org/earlyconnections/techconnections.html>.

Early Connections: Technology Literacy Project. This Montgomery County (MD) Public Schools project focuses on integrating technology into K–2 instruction. www.mcps.k12.md.us/curriculum/littlekids.

International Reading Association. You can read the position statement on integrating literacy and technology in the curriculum and the early childhood position statement. The first is titled "Literacy Development in the Preschool Years"; the second is "Integrating Literacy and Technology in the Curriculum." <http://www.reading.org/resources/issues/positions.html>.

National Association for the Education of Young Children. The position statement on technology and young children—ages 3 to 8—is presented here. <http://www.naeyc.org/about/positions/pdf/PSTECH98.PDF>.

National Education Technology Standards (NETS) Project. The NETS Project describes what preK–12 students should know and be able to do as well as suggests curriculum ideas. <http://cnets.iste.org/>

Technology and Young Children Interest Forum. This website was established by the National Association for the Education of Young Children to share and discuss ideas and information regarding best practices. <http://www.techandyoungchildren.org/index.html>.

REFERENCES

Bewick, C. J., & Kostelnik, M. (2004). Educating early childhood teachers about computers. *Young Children*, 59(3), 26–29.

Clements, D. H. (2002). Computers in early childhood mathematics. *Contemporary Issues in Early Childhood*, 3(2), 160–181.

Clements, D. H. (1999). The effective use of computers with young children. In J. V. Copley (Ed.), *Mathematics in the early years* (pp. 119–128). Reston, VA: National Council of Teacher of Mathematics.

Cuban, L. (2001). *Oversold and underused*. Cambridge, MA: Harvard University Press.

Darling-Hammond, L., & McLaughlin, M. W. (1995). Policies that support professional development in an era of reform. *Phi Delta Kappan*, 76(8), 597–604.

Davidson, J., & Wright, J. L. (1994). The potential of the microcomputer in the early childhood classroom. In J. L. Wright & D. D. Shade (Eds.), *Young children: Active learners in a technological age* (pp. 77–91). Washington, D.C.: National Association for the Education of Young Children.

Epstein, A. S. (2007). *The intentional teacher: Choosing the best strategies for young children's learning.* Washington, DC: National Association for the Education of Young Children.

Haugland, S. W. (1995). Will technology change early childhood education? *Day Care and Early Childhood Education*, 22, 45-46.

Specht, J., Wood, E., & Willoughby, T. (2002). What early childhood educators need to know about computers in order to enhance the learning environment. *Canadian Journal of Learning and Technology*, 28(1), available at www.cjlt.ca/content/vol28.1/specht_etal.html.

Thouvenelle, S., & Bewick, C. J. (2003). *Completing the computer puzzle: A guide for early childhood educators.* Boston: Allyn & Bacon.

Trawick-Smith, J. (2003). *Technology for preschool project: Preliminary findings.* Presentation at Information Technology Conference held September 4 in Savonlinna, Finland.

Tsantis, L. A., Bewick, C. J., & Thouvenelle, S. (2003, November). Examining some common myths about computer use in the early years. *Beyond the Journal: Young Children on the Web.*

Yost, N. (2003). *Computers, kids and crayons: A comparative study of emergent writing behaviours.* Paper presented at the IFIP Working Group 3.5 Conference: Young Children and Learning Technologies, held at UWS Parramatta, Australia, in July 2003.

ABOUT THE AUTHOR

Cindy Bewick is the coordinator of early childhood education for Kalamazoo Public Schools in Kalamazoo, Michigan. She was a reluctant convert to using computers with young children. Dr. Bewick is now a strong advocate provided that teachers have ongoing professional development, integrate technology with the context of their curriculum and classroom, and use software that reflects how the youngest students learn. She has been an Early Reading First coordinator, Head Start education manager, and early childhood faculty member. Dr. Bewick is the coauthor of *Completing the Computer Puzzle: A Guide for Early Childhood Educators*.

Suzanne Thouvenelle is a child development specialist with the Head Start Knowledge Information & Management Services (HSKIMS). She is responsible for identifying and developing content for the Office of Head Start's Early Childhood Learning and Knowledge Center (ECLKC). One of Dr. Thouvenelle's areas of interest is working with early childhood educators in their efforts to integrate computer technology with the teaching-learning process. She collaborated with colleagues in developing the NAEYC position statement on using technology with young children and designed and implemented distance education courses at both the community college and graduate level. Dr. Thouvenelle is the coauthor of *Completing the Computer Puzzle: A Guide for Early Childhood Educators*.

FOR MORE INFORMATION

Contact Nancy Brannon at nbrannon@ohiorc.org or Nicole Luthy at nluthy@ohiorc.org. Visit <http://rec.ohiorc.org> to see the REC website. Also see other [Early Childhood Building Blocks](#).

A COLLABORATIVE PROJECT OF

 **ohiorc.org** Ohio Resource Center
for Mathematics, Science, and Reading

