TeachSmart® Research Basis

Making the Connection: The Power of Educational Technology in the Early Childhood Education Setting

Lilla Dale McManis, Ph.D.

Research Director, Hatch Early Learning

Table of Contents:

Setting the Stage: How Young Children Learn

While physical, social/emotional, and cognitive functioning make up the three primary developmental domains, educators know these are interrelated in complex ways. Due to this, all the domains need attention because each influences the other. One good example is that children's early experiences are linked to their impulse management and social skills. When a child has self-regulation and can relate well to others, he or she can more fully benefit from an educational setting. This can then allow for growth in the cognitive domain. Research shows that understanding and attending to such links between domains is needed for high quality learning and development.

The landmark report "Eager to Learn: Educating our Preschoolers" highlights that young children are better able to learn than current practices sometimes allow. An educational preschool experience with the goal of preparing children for kindergarten means including more academic areas such as letters and counting, as well as helping to build traits like being inquisitive, persistent, and independent. It is possible to motivate young children to learn concepts on their level by building on their natural eagerness to learn. Combining child-directed discovery along with direct teacher instruction on basic pre-academic skills such as vocabulary, language, and math supports the most effective learning for young children.

Two recent large meta-analyses, one in literacy and one in mathematics, underscore the importance of these in a powerful manner. The U.S. Congress asked that a review of research be conducted to examine the implications of instructional practices used with children from birth through age 5. To address this gap in the knowledge base, the National Early Literacy Panel (NELP) was convened. The National Early Literacy Panel released its results in 2009 finding that that conventional reading and writing skills that are developed in the years from birth to age 5 have a clear and consistently strong relationship with later conventional literacy skills. Additionally, six areas representing early literacy skills or precursor literacy skills had medium to large predictive relationships with later measures of literacy development. These not only correlated with later literacy as shown by data drawn from multiple studies with large numbers of children but also maintained their predictive power even when the role of other variables, such as IQ or socioeconomic status (SES), were accounted for. These six areas include:

- Alphabet Knowledge (AK): Knowledge of the names and sounds associated with printed letters
- Phonological Awareness (PA): Ability to detect, manipulate, or analyze auditory aspects of spoken language (including the ability to distinguish or segment words, syllables, or phonemes), independent of meaning
- Rapid Automatic Naming (RAN) of letters or digits: The ability to rapidly name a sequence of random letters or digits
- RAN of objects or colors: The ability to rapidly name a sequence of repeating random sets of pictures of objects (e.g., "car," "tree," "house," "man") or colors
- Writing or Writing name: The ability to write letters in isolation on request or to write one's own name
- Phonological Memory: The ability to remember spoken information for a short period of time.

Mathematics education has risen to the top of the national policy agenda as part of the need to improve the technical and scientific literacy of the American public. There is particular concern about the chronically low mathematics and science performance of economically disadvantaged students and the lack of diversity in the science and technical workforce. Particularly alarming is that such disparities exist in the earliest years of schooling and even before school entry. Recognizing the increasing importance of mathematics and encouraged by a decade of success in improving early literacy, the Mathematical Sciences Education Board of the Center for Education at the National Research Council established the Committee on Early Childhood Mathematics. The majority of support for this study was provided by the U.S. Department of Health and Human Services, ACF, and Office of Head Start among other sponsors.

The committee found that, although virtually all young children have the capability to learn and become competent in mathematics. In fact, well before first grade, children can learn the ideas and skills that support later, more complex mathematics understanding. There is expert consensus that two areas of mathematics are particularly important for young children to learn: (1) number, which includes whole number, operations, and relations, and (2) geometry, spatial thinking, and measurement.

Using Intentional Teaching Approaches with Young Children

Numerous longitudinal preschool interventions have found lasting and positive effects for children when the programs are of high quality and allow for both teacher- and child-directed learning. The following section outlines key evidence-based practices and features that represent such programs.

Program Features. Several features of preschool programs are connected to school readiness. The social relationships between teachers and children, and the nature of the classroom environment, contribute to effective learning for young children. For example, these programs have:

- A great deal of reading occurring,
- One-on-one teaching,
- Functional and environmental print displayed for children,
- The presence and use of planful lessons,
- Materials for play available that support literacy, and
- Opportunities for children to have meaningful experiences firsthand.

Teacher Practices. One of the best solutions for children being better prepared for school is for preschool teachers to be intentional in instructional practices for children. One example of an evidence-based approach to effective learning is through bringing in the three 'P's of Purposeful, Planful, and Playful©. The three 'P's work in the following way: Before choosing an activity, teachers will always first ask, "What is the purpose of this?" The answer should be:

- It builds one or more of the skills necessary for school readiness,
- It expands and builds on children's current level of understanding, and
- It encourages the understanding of new information that has direct links to what children will need to succeed in kindergarten.

Once these answers are in place, the next step involves careful planning, which will incorporate activities and materials that are purposeful but playful for young children, and that support both guided instruction and free play. This includes such areas as:

- Selecting activities that take advantage of the overlap between language, literacy, and math skill domains,
- Identifying fun phonological awareness games to use when transitioning children from one activity to another,
- Being sure books, materials, activities, games, and conversations are engaging and playful, and
- Teachers using a scaffolding approach when working with children to broaden capacities and skills.

More about Scaffolding. Scaffolding sets up a positive and meaningful interaction between the child and the teacher. With foundations in well established educational theory and practice (for example, Vygotsky's Zone of Proximal Learning; and Differentiated Learning for individualized instruction), scaffolding allows for teachers to build on each child's interests and level of functioning in order to develop skills. After a teacher models for the child, then she or he can guide the child in reproducing the behavior, determining along the way if the skill should be presented more simply or in a more advanced manner for the child, and finally seeing the child carrying out the target end behavior on their own. Children can learn very effectively when an adult scaffolds the instruction. This also helps children progress from being "other-regulated" (the teacher) to "self-regulated" as their attention, cognitive, language, and motor skills advance.

Overall, being "multi-faceted" is the new role of the preschool teacher. Teachers become organizers of the environment, facilitators, managers, and scribes for children as they play and explore with materials and activities. While doing so, the child-directed learning will add to the teacher-directed activities. This leads to a successful balance for optimal learning.

The Key Skill Areas for Kindergarten Readiness

Research has identified the critical skills preschoolers need to master to be successful in kindergarten:

Oral Language: It is important for preschoolers to build vocabularies that tell them about the world. They need to learn to use language to make relationships, develop categories, and solve problems.

Phonological Awareness: Using sounds in words to process spoken language is essential for successful reading later on. Young children need to become sensitive to hearing and using sounds in words.

Print Knowledge: Knowing the units of print (letters, word) and being able to connect the letter with the sound it makes forms another important foundation for successful reading; along with having a basic understanding of book and print concepts.

Math: Young children need to know that numbers show how many, describe order, and are used to measure. For geometry, early concepts mean recognizing shapes, directions, and locations; and their relationships. Classification and using information to ask and answer questions are early data analyses concepts. Preschoolers can have exposure to algebra as they learn about patterns; and that patterns represent relationships.

The Place of Assessment in Early Childhood

Assessing and teaching are highly and necessarily connected. When children are assessed as part of the teaching-learning process, teachers are able to learn what each child can do, and determine what he or she is next ready to learn. The National Education Goals Panel has developed principles and recommendations for early childhood assessments. Similar to the purpose of scaffolding discussed above, early childhood teachers can use formal and informal assessments to establish what children already know and understand, what things could be understood with more practice and experience, and what things are too difficult without providing additional support.

Assessments of children's learning can also be utilized by teachers for feedback on their own teaching practices in order to modify curriculum, adapt instructional activities, and fine-tune classroom routines to be the most effective possible.

The Role of Technology in Educating Young Children

It is well established that three and four year olds need a strong focus on cognitive development along with attention to their social/emotional development to be ready for kindergarten. Technology can play a key role in this preparation. Experts confirm that preschool age children are developmentally ready and able to benefit from instruction with technology. The use of educational technology is now known to have a major, positive impact on the social, emotional, language, and cognitive development of children. It is recommended that many opportunities be given during the preschool years for exploration using technology tools in a playful, supportive environment. Researchers further agree that a number of technology applications have the potential to support and extend learning in the young child through their unique capability to provide excellent instruction in these important developmental areas that are critical for educational success. For example, research has found that preschoolers, who used computers with supporting activities for key learning goals, had more gains than children without computer experiences. Among others, these included gains in knowledge, long-term memory, verbal skills, problem solving, and manual dexterity.

Powerful Technology: The TeachSmart® Solution

The TeachSmart Solution is an interactive, hands-on technology system with tools that help both learners and educators. The Solution comes with a computer, Interactive Whiteboard with a Projector or a LCD Display, screen recording software, and hundreds of research- and classroom-tested learning strategies and activities. It is the most efficient and effective tool in education today because it enables educators to provide interactive learning environments in today's 21st century classrooms. Educators can have confidence in the integrity of the TeachSmart Solution with research- and classroom-tested instructional content package provided in this product.

The TeachSmart Solution is so complete that it can be used all throughout the instructional day. It makes gaining knowledge and skills fun for children while cutting down the teachers' work considerably. With one touch educators can create digital portfolios, documentation for assessments, and show what is being taught daily.

Many exciting features include:

- Screen Recorder can show the child physically using an activity while also hearing the child explain his/her thought process.
- To be most effective, delivering educational content must be tied to knowing that children are learning and mastering the key preschool skills. TeachSmart includes a wide selection of assessment activities already designed and connected with skill areas. Teachers will also be able to develop their own customized progress monitoring and assessments.
- A powerful feature is that children's individual work and progress can be shared with the child and with parents. Children can benefit from seeing their own work samples as evidence of their growth and progress. For parents, documentation of their child's work in the context of conferences or evaluations allows them to learn about the curriculum and to have knowledge and expectations about their child's performance that are appropriate. This makes them feel more a part of their child's education and will encourage parent involvement, which research shows is strongly connected to children's success in school.

What Makes TeachSmart® So Appropriate for Early Childhood?

TeachSmart is highly suitable for early childhood classrooms because it allows the children a connection between learning and technology in fun and engaging ways. It is essential that teachers in all early childhood settings have the right technology to assist them in meeting these goals for the children in their own classrooms. The technology and instructional content combines the educational theories of Piaget and Vygotsky. Using the Interactive Whiteboard component of the Solution, children will be able to construct their own knowledge while exploring on their own or with the guidance of a facilitator (Piaget). The teacher is engaged directly with the child for rich language, stimulation, and scaffolding to assist and strengthen the child's capabilities (Vygotsky). Early childhood classrooms should encourage playful activities that are purposeful. TeachSmart provides that important balance between discovery and intentionality.

TeachSmart is a powerful tool of choice for striking this balance. It provides the teacher with already designed and tested research-based strategies and activities that can be used with just a touch. The strategies and activities, which are playful, engaging, and purposeful; are in the important skill areas of pre-literacy, language, math, social studies, and science; and are tied into national pre-k standards and the findings of the National Early Literacy Panel and the National Research Council Committee on Early Childhood Mathematics, which further strengthens the early childhood program and outcomes for the children they serve.

In the busy early childhood classroom, teachers need to know that the strategies and activities they plan for their children are developing cognitive and social/emotional skills. This includes basic skill building as well as remediation or enrichment. For example, TeachSmart also allows teachers to create their own strategies and activities. This enables them to build on their children's interests and increase the number of valuable "teachable moments". The strategies and activities that come pre-loaded can serve as excellent models for teachers to develop their own customized activities and strategies.

What does TeachSmart® "Look Like" When Implemented in the Early Childhood Classroom?

TeachSmart will assist preschool teachers to teach "smarter" not harder. In essence it serves as a type of co-teacher to engage young children in fun, motivating, and developmentally appropriate strategies and activities that are based on scientific research. The Interactive Whiteboard or Display component in particular supports this goal through displaying information visually, being able to keep and improve lessons, see children's work immediately, and the vast opportunities to explore knowledge. TeachSmart can quickly be customized to an individual child or group of children based on their learning styles, functioning levels, and interests. Children with special needs and children learning English as a second language are well supported as well with the system.

The best use of educational technology depends on linking tested strategies, activities, and lessons in a meaningful way with curriculum and standards. The entire TeachSmart Solution does this almost effortlessly for the early childhood teacher. This is because Hatch has provided the correlations with pre-kindergarten standards and key curriculum areas, and designed strategies and activities that come pre-loaded on the system showing these connections. This allows teachers to get started right away and to quickly see benefits for their children.

Sources

Landry, S. & James Baker Institute for Public Policy, Rice University. Copyright, 2004. *Effective Early Childhood Programs: Turning Knowledge Into Action*.

Eager to Learn: Executive Summary. 2000. (Eds) B.T. Bowman; S.M. Donovan; & S.M. Burns. National Research Council. Washington, DC: National Academy Press.

National Early Literacy Panel. (2009). Developing Early Literacy: Report of the National Early Literacy Panel. Washington, DC: National Institute for Literacy.

National Research Council. (2009). *Mathematics Learning in Early Childhood: Paths Toward Excellence and Equity.* Committee on Early Childhood Mathematics, Christopher T. Cross, Taniesha A. Woods, and Heidi Schweingruber, Editors. Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

Haugland, S.W. 2000. What role should technology play in young children's learning? Part 2. Early childhood classrooms in the twenty-first century: Using computers to maximize learning. *Young Children* 55 (1): 12–18.

Murphy, K., DePasquale, R., McNamara, E. 2003. Meaningful connections: Using technology in primary classrooms. Beyond *the Journal: Young Children on the Web*.

Clements, D.H. 1994. The Uniqueness of the Computer as a Learning Tool: Insights from Research and Practice. (Eds) J.L. Wright & D.D. Shade. *Young children: Active learners in a technological age*, pp. 31-50. Washington, DC: National Association for the Education of Young Children.

Hall, T. 2002. *Differentiated instruction.* Wakefield, MA: National Center on Accessing the General Curriculum. Retrieved April 25, 2008 from http://www.cast.org/publications/ncac/ncac_diffinstruc.html

National Education Goals Panel. 1998. *Principles and Recommendations for Early Childhood Assessments.* Washington, DC: U.S. Government Printing Office.

Christenson, S. & Sheridan, S. 2001. *Empirical Base for Family Involvement.* New York: Guilford Press.