

Preparing Teachers to Use Technology with Young Children in Classrooms

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The national focus on excellence in education is commendable, *Leave No Child Behind* and the possibilities for classrooms of tomorrow. The National Educational Technology Standards (NETS) for Teachers-Students and developed by the NETS Team-National Educational Technology Standards Writing Team and the Preparing Tomorrow's Teachers U.S. Department of Education programs share this vision (<http://www.iste.org> and pt3.org). Today, the focus is on getting schools and teachers ready to teach in new ways that will ensure all children in America have the opportunity to learn with the integration of technology. Not very many teacher educators or teachers would argue with a vision for high quality and developmentally appropriate school programs for young children. However, to reach this goal in the 21st century teacher educators, teachers, and opinion leaders must be clear about the meaning behind the idea of getting schools and teachers ready, knowing technology, changing roles and the relationship to high quality and what constitutes developmentally appropriate education for young children, especially when it comes to technology in early childhood education classrooms.

- What implications do the increasing power of computing and changes in software development have for teacher education?
- How can teachers ever hope to keep up with technological change in order to be able to use it masterfully in their classrooms?

- At what point do teachers become responsible for their own continued technological education?
- What role should school technological specialists play that they are not playing now?
- Is there a difference between knowing technology and knowing what technology is good for children?

This article is a reflective and practical analysis of National Education *Goal 1: Ready to Learn* and implications for teachers in today's and tomorrow's teacher education programs and classrooms in a technological environment. The argument is that for effective technology integration in early childhood education, educators, teachers, policymakers, and parents must first face themselves as learners in a technological age. This means to understand the nature of changes in teaching practices, new education and technology standards, how young children can learn in this new technological environment, and the empowering potential of new technologies, and the relationship this all has to what constitutes an appropriate early childhood education program.

NATIONAL EDUCATIONAL GOAL: READY TO LEARN

When it comes to keeping up with technological changes, the National Educational Technology Standards provides important guidelines for gauging our effort to revise curriculum and instructional environments (iste.org, National Education Goals Panel [NEGP], 1995; National Educational Technology Standards [NETS], 2000). Five years ago, the Ready to Learn Goal stated: *By the year 2000, all children in America will start school ready to learn.*

Specific Objectives

- All children will have access to high-quality and developmentally appropriate preschool programs that help prepare children for school.
- Every parent in the United States will be a child's first teacher and devote time each day to helping such parent's preschool child learn, and parents will have access to the training and support parents need.
- Children will receive the nutrition, physical activity experiences, and health care needed to arrive at school with healthy minds and bodies,

and to maintain the mental alertness necessary to be prepared to learn, and the number of low-birthweight babies will be significantly reduced through enhanced prenatal health systems (NEGP, 1995).

The 1997 Education Digest showed that preprimary education for children 3 to 5 is growing with over 50% of children reported attending preprimary programs full-time. From 1991-1997, the proportion of children being served in programs for students with special needs grew rapidly (NCES 98-015, 1997). From 1994-1995, 27% of young children 3-5 were placed in resource rooms, 23% in separate classes, only 45% in regular classes. Visual impairments and specific learning disabilities made up the highest proportion of children in these special placements, which is a trend that has continued to grow in our schools for the last 10 years. The good news is that in 1995, more than 80 % of children 3-5 were read to or told a story by a parent of family member sometime during the week. The *Condition of Education Report 1997* showed a trend that parents and caretakers outside school are increasing literacy activities with young children—those enrolled in school and those who are not in formal education programs seemed as likely to engage in literacy activities (NCES 97-388, 1997). The latest report, the *Condition of Education, 2002* indicated that Enrollment rates for children 3 to 5 in early childhood education programs were higher in 2001 than in 1991. Black and White children enroll in early childhood education programs at higher rates than Hispanic children. Since 1991, as reported in 1997, over 50 % of children 3 to 5 were enrolled in preschool-type programs. Reportedly in 2002, enrollment remained around 56 % of school age children who have access to or attended preschool programs.

White children have continued to be more likely to participate than Hispanic children are. In 2001, 64 % of Black children ages 3–5 attended such programs, compared with 40 % of Hispanic children. While poor children are less likely than non-poor children to participate in center-based programs, the differences in participation rates between children from poor and non-poor families are lower (p. 67).

This data is important because the education of young children is highly linked to social-cultural and economic context of their environment. New instructional and assistive technologies may hold the potential to level the playing field for many children despite the issue raised about using technology with young children and how it might affect healthy minds and bodies. Clearly, the health of young children will have a significant impact on their readiness to learn and so will experiences that they have at home with parents who must be prepared as the first teacher to address both the child's

learning and developmental needs. When considering the role of technology, these factors could play a critical role in the technology decision, which can enhance the children's capacity to learn and support a healthy beginning and association in the world.

However, as educators have continued to debate the idea of what constitutes a developmentally appropriate educational program, the focus to improve early childhood learning has turned towards getting schools, parents, and teachers ready to teach in a way that ensures all children in America will learn as the only way to reverse this trend of special placements versus getting the child ready. Although assistive technology has played a major role in helping many children the role of technology is not included in educational programs for young children on a large-scale. The question is, will teachers and parents continue to show improvement in educating young child without some integration of technology? Not very many teacher educators or teachers would argue with a vision for preparing our children to learn through high quality teaching and what constitutes developmentally appropriate school programs? What will children learn and who decides? Are there specific and predetermined outcomes?

Frequently readiness to learn is connected to children's reading and literacy skills. Using reading as an example, a review of selected early education standards revealed that many standards described a developmentally appropriate program as one that was supported by teachers who knew and understood that effective instruction integrates attention to the alphabetic principle with attention to the construction of meaning and opportunities to develop fluency. More importantly, the teacher should be able to demonstrate a clear understanding of the interrelationships among the dimensions of a balanced reading program. A balanced reading program was described as one that provided an educational program that focused on:

- Phonemic awareness—the skills and knowledge to understand how phonemes, or speech sounds are connected to print.
- Decoding unfamiliar words embedded within continuous text and in isolation.
- Fluency—the ability to read at a rate that supports comprehension of text.
- Background information and vocabulary to foster reading comprehension.
- Comprehension—the development of appropriate active strategies to construct meaning from print.
- Development and maintenance of a motivation to read.
- Reading to learn (State of Tennessee, 2002).

Additional emphasis was placed on the teacher's ability to demonstrate an understanding of how children develop reading and literacy skills before they begin formal instruction and how instruction should proceed to help all children learn to read and write. While these are ideal goals, the discussion bypassed the potential role of culture or technology in the early learner education program. By providing educators and teachers with appropriate preparation and access to resources, technology can provide to build expanded and empowered learning communities. Parents can communicate through the Internet with teachers and other parents about similar issues surrounding learning and teaching young children. Information about prenatal health and the relationship to children's development is found in chat rooms, medical sites, educational sites, and through professional contacts with experts. Considering the diversity in today's classroom, which now expands inclusive education, it appears clear that teachers should be asked to demonstrate their understanding about the importance of social cultural factors along with technology to meet special needs of young learners (<http://www.state.tn.us/sbe/proposedreading.htm>).

To reach new educational goals in the 21st century educators and policymakers must have a clear idea of what is meant by getting schools and teachers ready and developmentally appropriate, especially when it comes to technology in the classroom. Although, access to technology is desirable for children to learn in the age of technology, it may not always be appropriate. David Thornburg (1997) stated:

On this point, I agree. Children need to play with their peers. Children need to be in the company of caring adults. Children need to play with clay, mud, sand, paint, and ideas they make up in their own minds. I have no problem at all with their conclusions. What I DO have a problem with is the assertion that computer use in school is designed to take the place of these other activities. I have never visited a school where children were not engaged in physical play, art, and adult contact, even when these schools are loaded to the gills with high-tech! Properly used, technology just becomes another powerful tool for learning. But the assertion...is that we have abandoned human contact for virtual worlds (Thornburg, 1997, p. 1). Available: <http://www.pbs.org/teachersource/thornburg/thornburg1000.shtm>.

Discussion about getting children to learn is not a new concept. In fact, school staff and parents have spoken of children's "readiness" for years. What is new is the attention on technology and how it is changing teaching preparation, practice, and the profession for all levels. Yet, when it comes to what teachers and children really need to have a good school experience,

ideas are quite different. Teacher educators, teachers, and opinion leaders know that children are learning from birth, long before they start school. However, when children enter classrooms the context of the learning and the concepts that they learn change in important ways.

Conflicting views exist about the new teaching with technology standards as they continue to drive teaching standards in over 70% of states. For this reason, the standards have gained a great deal of attention. In the meantime, other issues have emerged in national debates such as public versus private schools; vouchers or no vouchers; technology or no technology; “basic skills” versus arts; curriculum of the past versus curriculum of the future; academic versus vocational education, digital education divide versus digital equity and so on. Moreover, within each of these debates there is an even more in depth discussion about what teachers should be required to know and do in relation to technology infusion in the learning and teaching process.

Also, for the last 10 years, education has increasingly focused on the importance of teachers’ performance and why it matters in relation to student learning and development (Wenglinsky, 2000). Nevertheless, most policy makers, opinion leaders, teachers, educators, or administrators have likely questioned what constitutes masterful teaching and why it matters in this digital learning age.

Teachers Can Become Masterful Users of Technology in Their Classrooms

Despite increasing technological changes, the plan is to breathe life into the theme of tomorrow’s classrooms for early learners and issues that relate to technology, teaching, and learning that teacher educators, teachers, and parents must address to benefit all students, and especially young children. Despite access to technology in classroom, the teacher’s performance, understanding of children and how they learn, which includes preparation to teach, matters the most. To expand this dialogue eight reflective questions are mentioned to expand consciousness about the complexity of education and technology decisions for teaching young children.

1. How do teacher educators, teachers, and opinion leaders define what teaching performance is relevant when technology is introduced into the formula of high quality early childhood learning?
2. How will teacher educators, teachers, and opinion leaders know high quality learning and teaching when they see it?

3. How do teacher educators, teachers, and opinion leaders measure student outcomes and teacher performance?
4. How can teacher educators, teachers, and opinion leaders capture and replicate these best practices?
5. Will high quality teaching look the same in all environments?
6. How will the conditions of teaching determine which standards are relevant as criteria for judging high quality teaching, learning, and outcomes?
7. What implications will essential conditions for teaching with technology have for the implementation of standards from one school to another and in the home?
8. Who will take responsibility for new assessments, evaluating teacher performance, and providing appropriate professional development?

Teachers and Continual Growth in Technological Education to Meet New Standards

Suggested strategies for encouraging teachers to be more responsible include the idea that teachers receive grades and performance-based report cards like students, which would be available to the public and to parents (Bush Education Plan, 2001). Teacher educators, teachers, and opinion leaders can ask many questions. What they think, know, or believe about classrooms of tomorrow and the skills teachers will need is critical to decision-making about what teachers teach and children learn. Perhaps a more relevant question is, do members of the system begin to redefine high quality performance in new complex learning environments? Perceptions about performance, standards, and the word matters may take on different meanings in both theory and practice. Tables 1-3 are an exercise designed to engage thinking in constructing standards statements.

Table 1
Thirty Words Often Used to Represent the Concept of “Performance”

Execute	Get something done	Succeed	Fulfill	Abide by
Conform	Be traditional	Do the accepted thing	Accomplish	Achieve
Act in accordance with the rules	Meet the terms	Submit	Play the game	Be conventional
Practice	Routine	Habit	Carryout	Follow
Toe the line	Act honestly	Follow the rules	Complete	Make
Put in practice	Apply	Observe	Do	Obey the rules

Do the words carry the same meaning, attitudes, and perceptions for all individuals as they are connected with standards statements?

Now let us look at the word standards.

Table 2
Thirty Words Often Used to Represent the Concept of “Standards”

Ideals	Doctrine	Moral values	Events	Attitudes
Principles	Main beliefs	Moral code	Routine	Behavior
Ideas	Thinking	Deeds	Procedures	Conduct
Values	Philosophy	Moral principles	Practice	Lifestyle
Viewpoints	Ideology	Ethics	Actions	Manners
Trials	Structure	Measures	Activities	Performance

Now let us look at the word “matters.”

Table 3
Thirty Words Often Used to Represent the Concept of “Matters”

Be valid	Be applicable	Substance	Carry some weight	Bothers
Affect	Be relevant	Material	Having a bearing	Count up
Count	Be significant	Apt	Make an effort	Effort
Pertain	Be appropriate	Stuff	Make a difference	Have an effect
Relate	Be fitting	Suitable	Change things	Tally
Concern	Be important	Trouble	Be of importance	Tot up

Interactive Activity

How many performance-based statements can you make using the words from Tables 1-3 to represent behaviors or abilities teachers are expected to demonstrate to show what they know or are able to do in the classroom with technology? This exercise was designed to give you an idea of just how complex the question of defining high quality teacher performance can be, pending the child, teacher, institutional, social, and various economic environmental conditions.

Technology, Teachers, and Classrooms Today

Today if teacher educators, teachers, or opinion leaders were to walk into any school, for example, they might find many persons who agree that computers are powerful tools for teaching young children, but who have deep differences in pedagogical approaches. One group might favor computers as tools for decontextualized drill and practice. Others might see these

computers as multimedia systems capable of opening doors for creative expression and higher-order thinking skills. Is either group right or wrong (Thornburg, 2000)?

While it is easy for educational technologists to pick a topic at random and put down a few words expressing a viewpoint about technology and standards, it is important to remember that beyond our dialogue lie the teacher, children, and youth our institutions serve in a *world of reality*.

KNOWING TECHNOLOGY AND KNOWING WHAT TECHNOLOGY IS GOOD FOR CHILDREN ARE TWO DIFFERENT IDEAS

Children's Developmental Needs Must Come First

A child on the way to school is unaware of the controversies surrounding institutions and classrooms. The child assumes that family, school, and community have carefully planned a safe and conducive environment in which much time preparing for life's adventures beyond school will take place.

Subsequently, viewed through the eyes of those served who perceive teachers and teacher educators as the knowledge passageway for their future and life's work, one can begin to conceptualize ways that performance matters in early childhood education classrooms. More importantly, it becomes essential that are our ideas as educators about defining high quality education and how to provide our children with the best educational experiences possible are brought to the forefront in education and policy debate arenas.

This forefront is important to find solutions to restructure Early Childhood Education (ECE) programs and to clearly define what constitutes the best educational experiences possible for young children in a digital age. What do teacher educators, teachers, or opinion leaders believe is the purpose of education? What is our vision of how technology can help achieve our purpose in classrooms to meet the needs of all learners? Thus, inevitably as these questions are pondered, our vision must expand thinking about students and teachers as learners. The fact that teacher educators, teachers, or opinion leaders do not have a clear and common grasp of responses to these questions is, in part, the problem when it comes to understanding and accepting the standards movement and the structure of early childhood education in our today's schools. A noted educator and policymaker once asked the question that if we did not have today's schools would we create today's schools (Carroll, 2000).

Young Children Have Special Needs in Inclusive Learning Environments

To help schools and communities achieve the readiness goal, the recent attention to Individuals Disabilities Education Act provisions (IDEA 97, P.L. 504) and assistive technology for inclusion principles recognize the importance of drawing together the best-informed thinking of experts about what it means to be ready to learn. Simply put the act, SEC. 602 defines:

1. Assistive technology device means a device or any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of a child with a disability and;
2. Assistive technology service means any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device. Available: <http://www.ed.gov/offices/OSERS/Policy/IDEA/>

Interdisciplinary groups across content areas have voiced a need to collaborate and articulate a broader concept of readiness and the role that technology can play in creating a free and appropriate education for all learners, especially those with special needs. Incongruously, in 1997 an early childhood development document, *Reconsidering Children's Early Development and Learning: Toward Common Views and Vocabulary*, identified at least five major areas. Together the concepts represent the core of children's school readiness with or without technology: (a) health and physical development; (b) emotional well-being and social competence; (c) approaches to learning; (d) communicative skills; and (e) cognition and general knowledge (Kagan, Moore, & Bredekamp, 1995).

Research shows that a child may be very strong in one or two of these areas and quite weak in others. Technology can help to expand the physical, social, and emotional functionality of young children under the appropriate conditions. This mixed bag of when to use what technology and children's readiness is evident when the diversity of children's needs relative to those five areas are considered as a part of the schools' responsibility. Some stakeholders are aware and some are not of what the experts on children's development emphasize in early childhood education and about the use of technology. The problem resides in response to the question, what technology will best help this child learn and develop, physically and emotionally? Alternatively, is this child ready to learn? Neither question will ever be a simple yes or no or A/B solution.

Unfortunately, young children cannot be tested and have a readiness quotient accurately computed for each child. Such testing would not provide an accurate and fair picture of children's actual prospects for succeeding in school. In part, this is because a young child's responses are very likely to differ with slight changes in the wording and associated materials or software programs. Further, in the early childhood years, children vary a great deal, with normally developing children growing in different ways and at different paces. Not only do children develop differently, but they also develop in spurts; mastering something today using one software program that was impossible yesterday is quite normal, so that a child's performance in the learning process on Monday may be quite different from what it would be even on Friday. Therefore, teacher educators, teachers, or opinion leaders must be very careful when it comes to assessing performance when technology is introduced into the formula.

So trying to pinpoint a child's readiness for a specific use of technology at a single point in time might appear to be handy, but is not wise and could prove detrimental to the learning process and outcomes. It would be even unwise to base big decisions—such as whether or not a child should enter kindergarten—on such a use of technology, like selecting colors and assessing fine motor skills. Despite our eagerness to ensure that children get a good education and experience new technologies, teachers need to be wary of classifying four, or five-year-olds based on performance on software programs.

Early Intervention: Assessment versus Testing

Assessment is different from testing. Assessments are designed to guide learning and development. On the other hand, tests are used to measure the results of assessment, learning, and teaching. Therefore, as opinion leaders debate performance matters and lifelong learning for teachers, they are really saying that teachers do make a difference each time they enter the classroom to work with children. In education, this practice is sometimes referred to as good practice, best practice, or promising practice.

Teacher educators cannot suddenly prepare students or teachers for a test or a performance assessment if the curriculum and instructional strategies (methods) have not done something in that direction to prepare the individual. Assessment should not be an event—it must be an ongoing part of learning and teaching in and out of the classroom. Standards are examples of suggested practices that provide a roadmap to keep us from getting lost. Does it mean teacher educators or teachers cannot deviate or explore other roads? The response is absolutely not. Teachers are after all, also research-

ers. Are they not?

To get a clear picture of children's readiness, teachers must take a close look at learners as individuals, and that look must draw on multiple sources of information rather than relying on a single assessment or use of technology software package. Teachers need to be trained to talk to parents and other caregivers; teachers need to talk with the child; and teachers need to observe the child in various contexts before making a decision about the appropriateness of a specific technology. These are not quick and easy ways to learn about children or the best use of technology in the classroom. Nevertheless, they are necessary to get a full and accurate view of each child without becoming dependent on the technology.

Further, when teachers consider children's readiness, they must be armed with new knowledge about how to capture a full and realistic picture of their learning and development in technological classroom environments. To do this, teachers and teacher educators need to better understand the five dimensions that research shows contribute significantly to children's success in the learning process in schools, at home, and in classrooms. The following descriptions were taken directly from *Getting an Early Start in School* (National Education Goals Panel, 1997, p. 3-10).

Health and physical development

Healthy children enjoy a robustness that allows them to engage actively and vigorously in the full range of life experiences. Alert and energetic, they are able to give their full attention to learning experiences. When children do have health problems, treatment is essential to prevent harmful effects on children's school preparedness and success. In many cases, children with disabilities or chronic health problems are able to use their other strengths to compensate for the difficulties they experience from a potentially limiting condition. Children's health—which is repeatedly linked to school performance by a growing body of research—is clearly an important thread in the complex fabric that is “school readiness.”

Emotional well-being and social competence

Children's school experience is more positive and productive when they have a sense of personal well-being, grounded in stable, caring relationships in their early lives. Unhappy, fearful, or angry children are preoccupied, unable to give their full attention and engagement to learning experiences. A solid base of emotional security and social competence enables children to participate fully in learning experiences and form good relationships with teachers and peers. In build-

ing and maintaining such relationships, key social skills are: respecting the rights of others relating to peers without being too submissive or overbearing, being willing to give and receive support, and treating others as one would like to be treated. To the extent that children develop these social skills and attitudes, they function better in the school setting.

Approaches to learning

Just as we adults approach our lives and work in different ways, children vary widely in their approaches to learning. Some children are intellectually playful and open to new learning tasks, while others are more deliberate and slower to experiment or take on new challenges. Following through on difficult tasks is natural to some children but foreign to others. Some children are far more reflective than others are.

Although the phrase “approaches to learning” as an umbrella term for individuals’ attitudes, habits, and learning styles has only recently been adopted by educational researchers, the concept is not new to anyone who knows children. We cannot help but see that children’s school success, like adults’ effectiveness in the workplace, depends not simply on academic skills but also on motivation, learning style, and habits and attitudes.

Communicative skills

Through language, children are able to learn and communicate many things, from finding out how people in other countries live, to telling school friends about something that happened at home. In the course of their communication with teachers and peers and eventually in reading and writing, children construct understandings and acquire knowledge related to various school subjects. Language proficiency has long been recognized as a key predictor of school success, and it is important to emphasize that skills of communication go far beyond vocabulary or grammar. Moreover, research has begun to document the wide variations in how children show their language competence, partly as a function of the differing cultural and linguistic experiences they have had.

Cognition and general knowledge

To live is to learn, and by the time, children enter school, they have already taken major steps in becoming competent learners. They are learning to observe and to note similarities and differences; they are developing skills of solving problems and of asking questions. By this age, children have also acquired many ideas about their natural and social world. They may think about where the rain comes from, why things live and die, and how cars move. Such skills and ideas, reflecting an array of experiences in the early years, are what help make children ready to acquire the wealth of knowledge and information that they can draw on in new learning situations (p. 3-10).

In considering the five dimensions that contribute to school preparedness, the expectation is not that all children will be 100% ready on all dimensions before entering school. Rather, the goal should be to focus attention on children's early lives, from the prenatal period to kindergarten, and to be aware that children's development is nourished in the everyday doings in the day-to-day play and exploration of their daily lives. The role of technology should be to expand and enable all children to participate in this type of play and socialization as a part of the learning process (Piaget, 1962; Vygotsky, 1962).

Supporting children in play and learning, answering their questions, fostering their physical health, creating an understanding of and appreciation for, individual and cultural diversity, and provoking their curiosity are all dimensions of nurturing children's learning and development is all a part of how new reform standards advocate technology's role in learning and teaching.

Any school or classroom technology plan developed by teachers for teachers or administrators must be committed to ensuring that all children and families are supported in nurturing children's early learning and development. Technology in education encourages schools to take a close look at all children from the outset and teacher educators must restructure programs to prepare teachers to create classroom and learning environments that meet children's diverse needs and nurture their development throughout all the years of formal schooling in a technological age.

Some educators, policymakers, and citizens feel that drill and practice, integrated learning systems and longer school years are the answer; and others feel that processed based technologies do a finer job of building students as independent learners. The reality is, they all may be doing well given the student, teacher, circumstances, and the conditions in the classroom.

Expanding the Role of School Technological Specialists as a Course of Action

A course of action (COA) approach is traditionally called *process-based*. Clearly stated, it refers to the use of data or information to drive decision-making. In all of the mulling over the standards, teachers and parents must take the time to explore whether there are several ways that technology standards may efficiently contribute to improving the teaching and learning performance of teachers and young learners.

Technology specialists must be more than the latest college graduate “geek” to help teachers use technology to effect learning. Notice I said “learning,” because this is what teacher educators, teachers, or opinion leaders are in reality asking teachers to do—become learners again and use technology to improve student learning. Teachers must begin to assess their knowledge, skills, and abilities in reference to the new guidelines for teaching with technology. Then teachers must make a decision whether or not they are ready to address any deficiencies that impede their teaching with the new technologies. This does not mean policymakers and opinion leaders are asking teachers to become computer programmers, but they must understand the inner workings of technology and be able to facilitate the learning process in a classroom equipped with technology. Leaving the computers in the box until the next update is not a solution to keeping up with the latest and the greatest.

Once this process of technology integration begins to occur, the system must be ready to maintain and assess the conditions necessary to help prepare the teacher to move in that direction consistently and over time. Increasingly, technology coordinators are asked to take on this role. As a result both an institutional and Professional Learning Plan (PLP) emerges for the teacher. Learning to teach with technology is an ongoing and evolving process through several stages of development. There are a number of successful models for assessing and tracking this process (e.g., Halls & Loucks Concerns-based Adoption Model [C-BAM], Apple Classrooms of Tomorrow [ACOT] Stages of Development, Pittman Stages of Revolving Development [P-SORD]).

Why is this so important? What does it have to do with standards? Teaching performance is identified as a key factor to providing a good education for all learners. In other words, the standards movements makes two basic assumptions about essential ingredients: (a) that exploring new instructional strategies will help connect professional development to new standards and (b) assessing teaching performance based on student learning that

result from the strategies will help teachers and policymakers define high quality teaching performance.

By connecting learning and teaching outcomes of both teachers and students to the similar standards, consistent information is available to address expectations and criteria that policymakers advocate as representative of high quality teaching. In the process, this information may provide data and new types of assessments that extend beyond student test scores to determine when and how student learning and opportunities increase. On the other hand, teacher educators and teachers must also learn to connect the technology standards to the expectations of standardized tests in schools.

Numerous tests are no longer the traditional recall of facts and information. Young children are now assessed on their thinking skills. New tests and assessments include scenarios and simulations that require young learners to make judgments by extrapolating information. This means using evaluation, analysis, and synthesis skills at an early age. Many teachers feel that with standards, these new expectations are clear—others feel confusion and frustration. Yet, some feel secure within themselves as reform teachers and move ahead very quickly through the stages of development to innovation.

These are the teachers who genuinely care about learning and believe they intrinsically know from years of teaching what is important, what should be measured, and how. Now, there are diverse groups of teachers developing and teaching multidisciplinary curriculum in teams. Each has an idea about standards, a comfortable level, and plan for how he/she will address the issue of standards once they are in their own classroom.

Developing Young Self-Directed Learners

Teachers need the opportunity to evaluate and reflect on their own scientific understanding and ability to teach children how to become self-directed learners. Before teachers can do this, or help their students do this, they must understand the new rules of the power and educational standards driving the goals for student learning. The ability to self-assess understanding is an essential tool for self-directed learning.

Through self-reflection, teachers clarify ideas of what they are supposed to learn and teach. They begin to internalize the expectation that they can learn technology and the science of teaching with technology. Developing self-assessment skills is an ongoing process throughout a teacher's career, becoming increasingly more sophisticated and self-initiated as they progress. "When teachers treat students as serious learners and serve as coaches rather

than judges, students come to understand and apply standards of good scientific practice” (National Science Education Foundation, 2000).

There are many related issues and beliefs that teachers and administrators must address in the restructuring effort that must take place in our schools and in our thinking. It infers that the successful implementation of new teaching standards is conditional on the infrastructure or support system in the school. Many conditions that educators believe are essential seem to be missing in professional development and create barriers for teachers who want to understand and integrate such technology standards identified by the National Educational Technology Standards (NETS) group and others. Therefore, early childhood education classrooms sometimes take on a different meaning because conditions for identifying appropriate use of technology cannot be realized in a cost effective fashion.

- Classrooms will become borderless walls of electronic communities of learning bringing together many people with different interests, cultures and age groups.
- The ability to locate and access information will become a powerful skill for competing in the new job market and in society.
- Credentials will be temporary requiring ongoing learning, training, and development.
- Schools will be smaller and more specialized in the curriculum offered.
- Fewer courses will be taught and the emphasis will be on productivity and technical expertise.
- Diversity will grow but groups will seek ways to preserve their cultural identities as they engage in more faceless interactions that will connect many different lifestyles.
- The idea of mastery of knowledge and information will eventually become passé.
- Computers in classrooms, homes, and small hand-held devices will become common tools in the world of education.

In addition, there are many children who have done well in public and private schools without technology, and many who have done well with technology. There will probably be children and teachers in the future who will do well with primarily online instruction, although it is too early to speculate on this growing mode of education. However, consider if you will the benefit of teaching tools like the following animations at: <http://www.innerbody.com/htm/body.html>

Conversations between a teacher and students about assessment tasks and the teacher’s evaluation of performance provide students with necessary

information to assess their own work. In concert with opportunities to apply it to individual work and to the work of peers, that information contributes to the development of students' self-assessment skills. By developing these skills, students become able to take responsibility for their own learning.

Training Teachers as Researchers to Ensure Equity

The number of children in special placements continues to grow. Teachers must be prepared to evaluate equity in the classroom to ensure all children are provided with the opportunity to learn. In addition, when teachers explore they must learn to develop concept-mapping abilities to look at relationships between the many variables in the classroom when it comes to digital learning and teaching. Teachers must be more cautious about using shortcuts or new roads believed to get them to the same point as others but without the benefit of research-based information to support their decision-making. Our educational system has often done a poor job in teacher education in distinguishing relationships between teaching, testing, and assessing learning outcomes, social-cultural contexts of learning and teaching. Because of this, teachers often get confused about how to improve practice in a digital age.

Therefore, as educators learn to share and report what they find in the journey towards unexplored territory, perhaps a better understanding of the change process will result. The standards are *guidelines for exploring the use and infusion of technology into learning and teaching*. The results will vary from one school to another. However, teacher educators, teachers, or opinion leaders must come to some consensus on interpretation of what these standards mean in our schools and in classrooms when it comes to teacher performance.

As policymakers and opinion leaders choose to look at standardized test scores alone, there are schools that are doing poorly in communities where there are excellent public schools, classroom, programs, and teachers in the same district. The fact is, in the United States, due to the highly decentralized nature of the school systems, urban or suburban—many are neither better nor worse than the other when it comes down to data that report school progress and teacher performance.

In fact, many suburban and rural schools are so strapped for resources that they lack many educational tools that are taken for granted in some of early childhood programs in the urban schools. Furthermore, to emphasize the importance of visiting different school environments, David Thornburg (2000) suggested,

Drop by your child's school and look at the wall maps. See how many still have the USSR emblazoned across that former region of Asia. See how many computers are older than the children who use them are. See how many books are in the school library, and what their acquisition policy is. In my experience, the results do not vary much from public to private schools, except that private schools seem to me to have more antiquated technology (Thornburg, 2000).

Why Technology Integration Looks Different in Classrooms and Schools

Accordingly, different schools have varying resources, quality of technology tools, classrooms, and teachers. However, based on a recent study commissioned by the Cincinnati Youth Collaborative on schools and community access to technology in Cincinnati, it appears a deeper issue is how our schools use technology tools (Pittman, Community Access to Technology Study, 2001; SchoolNet Data, 2001).

An educational research team of graduate students and a teacher educator-researcher visited nine public schools a few miles apart from each other in a large urban community. Several had a lot of technology, and the others only had a few computers for students to use, mostly old or refurbished. Based on the student to computer ratio, one school in particular would seem to be far ahead of the other. However, closer examination of the data revealed that the computer-rich school was using these tools for decontextualized drill and practice, while the school with little technology was using the technology to have students engage in project-based learning with peers in other countries, schools, and the community.

The school principal was looking for strategies to help teachers allow students to send multimedia files and reports around the world, the teacher was helping students put a human face on the study of geography using Encarta and other sources from the Internet. The long-term impact of this type of project was likely to be far greater than that 30 minutes spent blasting aliens by getting the right answer to a decontextualized math or reading problems for some students.

Performance in Education Matters

As a nation, a city, a school district, a school building, a classroom, or a teacher, all stakeholders must be dedicated to ensuring that all children receive the best educational experiences possible, apart from school location

or the social-cultural circumstances. Schools, both public and private, and homes, are all places where learning takes place (as are libraries, museums, parks, and even shopping malls).

Therefore, teachers must understand and know how to access and make the best use of technology resources (hardware and software) and places, as authentic teaching tools and active learning channels. The deeper debate about standards for ECE must continue to revolve around these issues to improve performance.

CONCLUSIONS

Teacher educators, teachers, or opinion leaders must not get preoccupied with the complexities of the National Educational Technology standards for teachers and students or any particular set of standards. However, it is important that they continuously focus on getting schools ready for children to learn—and that means competent, caring, and technologically aware teachers and parents (NCATE, 2001).

Teacher educators, teachers, or opinion leaders must engage and insist on teaching conditions that allow us to teach with technology and not just about it. Using yesterday's methods and entertaining revolving dialogue on nonessential issues about standards leave important dialogue lacking. This will leave children behind in a world moving at a lightning strike pace. As stated in the opening of this article, not very many teacher educators or teachers would argue with a vision for preparing our children to learn through high quality. The response to what constitutes developmentally appropriate school programs will have to come from the grassroots levels.

These decisions must be based upon the ultimate goals of education in democracy and the role of people as individuals. What will children learn and who decides? The response to this question rests with parents, teachers, teacher educators, community leaders, and so many others now that technology is making learning available anywhere, any time, and any place. Are there specific and predetermined outcomes? Yes, there are, but they are based on the social context of classrooms, schools, homes, and communities, and what learning and thinking is valued at in those settings.

Frequently, readiness to learn and appropriateness are concepts connected to the reading and literacy skills of the child. Increasingly, the research focus is on the importance of social conditions and cultural values in the development of these abilities. As we review the use of technology in early childhood education, consider the whole child not just in today's world, but in also in tomorrow's world.

SUMMARY

In reviewing the highlights of this article, an attempt was made to address the questions that were set out in the beginning. The implications for the ever increasing power of computing and changes in software development have for teacher education is that there are many children who have done well in public and private schools without technology, and many who have done well with technology. There will probably be children and teachers in the future who will do well with primarily online instruction, but that will not mean that it is always appropriate.

Appropriate must be defined within the principles of democracy and the role of individuals in that democracy in the 21st century. Teachers must work with young children to become critical thinkers. The educational program must consider the whole child and not just the academic skills. Young learners need to learn how to communicate in today's world. Finally:

- Teachers will never be able to keep up with technological change to be able to use it masterfully in their classrooms and nor should they try. Teachers need to keep informed and become knowledge producers versus consumers but must not focus too seriously on becoming computer technicians, but must be computer and technologically literate for effective communication.
- Teachers become responsible for their own continued technological education when they make the commitment to enter the profession. Teachers must understand that teaching and learning have changed. Knowledge is no longer stagnant but ever changing. Learners are not vessels; they are questioning individuals who have access to more information and technology tools as resources than ever in the history of education. Teachers must be willing to take on new roles as learning partners and facilitators of knowledge building, in this new arena.
- School technological specialists must be able to provide both curriculum and technological support to teachers and educators as a resource. Simply showing up to trouble shoot the computer or Internet connection is no longer adequate. Teachers need tech specialists to function as learning and teaching partners with the ability to demonstrate effective uses and strategies for the classroom and instructional management; introduction to safety features to protect children in cyberspace as they venture into space that is foreign to many parents, educators, and policymakers.

- There is a difference between knowing technology and knowing what technology is good for children. First, few of us ever know the technology, but experience it in different ways and at different levels. To understand the effective use of technology with children, one must first understand children and how they learn—what constitutes readiness to learn and how technology can be used in the process. These are different disciplines and therefore, have relatedness and a built in interdependency. Knowing what is good for children requires pedagogical knowledge. I can teach children without knowing children, but it more difficult to develop software without knowledge of children and how they learn.

RECOMMENDATIONS

To jumpstart thinking about integrating and building a standards-based teaching and learning framework, try this suggested reflection:

Imagine that you were designing an educational technology system or plan from scratch. Based on the needs of today's society and communities, what subject areas would you teach young children? How would you teach it? What subjects that you or your school currently teaches would you consider dropping or radically changing if you could? When and how should learning take place for teachers in their school, community, and homes? (For example, do schools really need a summer vacation so that urban teachers and young children can help with the crops?) How should teachers keep "on-top" of how technology is being integrated in their content areas and pedagogical practices in the classroom?

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APPENDIX

OTHER PUBLICATIONS FOR PARENTS, EDUCATORS, AND POLICYMAKERS REFERENCED IN *GETTING A GOOD START IN SCHOOL*, THE NATIONAL EDUCATION GOAL PANEL (JANUARY, 1997).

- Barclay, K., & Boone, E. *Building a Three Way Partnership: The Leader's Role in Linking School, Families and Community*. New York: Scholastic Inc., 1991. A research-based book that offers specific, practical strategies for home-school communication, parent education, and volunteerism; also includes integrated approaches to assessment and an annotated bibliography of staff and parent resources.
- Boyer, E. *Ready to Learn: A Mandate for the Nation*. Princeton, NJ: Carnegie Foundation for the Advancement of Teaching, 1991. A blueprint for action for the readiness of all young Americans.
- Decker, L.E., Gregg, G.A., & Decker, V.A. *Getting Parents Involved in Their Children's Education*. 1994.
- American Association of School Administrators, 1801 North Moore Street, Arlington, VA 22209; 703-528-0700. A short book focusing on the strategies to initiate parent involvement and volunteerism in the schools, build partnerships between children's homes and schools, and provide learning activities at home for children and their families.

- Early Childhood Education and the Elementary School Principal: Standards for Quality Programs for Young Children.* 1990. National Association of Elementary School Principals, 1615 Duke Street, Alexandria, VA 22314-3483; 703-684-3345. Developed for and by principals, this book offers 28 standards for early childhood programs; suggests classroom settings and curriculum; and describes roles of the principal, staff, and parents.
- Every Child Ready for School: Report of the Action Team on School Readiness.* 1992. National Governors' Association, Hall of the States, 444 North Capitol Street, N.W, Washington, DC 20001-1512; 202-624-5300. This guide for policymakers identifies the factors that enhance school readiness; suggests benchmarks for states to use as interim measures in their progress towards achieving the goal of ensuring that every child is prepared to start school; and offers a sampling of state initiatives that have been implemented to work toward that goal.
- FairTests Publications. *Assessment of Young Children.* National Center for Fair & Open Testing, 342 Broadway, Cambridge, MA 02139; 617-864-4810. An annotated bibliography of books, papers, journal articles, and organizations and projects related to the assessment of children below grade three.
- Helping Your Child Get Ready for School.* 1992. Office of Educational Research and Improvement, U.S. Department of Education. ACCESS ERIC, 1600 Research Boulevard, Rockville, MD 20850; 1-800-USE-ERIC. One in a series of books on education topics relating to the National Education Goals, this parent-oriented guide discusses what school readiness is and provides examples of activities and interactions that help children get ready for school.
- Kagan, S.L. "Readying Schools for Young Children: Polemics and Priorities." Phi Delta Kappan, 1994. Phi Delta Kappa, 408 N. Union, P.O. Box 789, Bloomington, IN 47402; 812-339-1156. An article on the importance of policymakers confronting the polemics raised by past and present reform efforts, shedding ambivalence regarding the role of schooling in American society, and dealing head on with action priorities to enable schools and communities to prepare children effectively for school.
- Kagan, S.L., Moore, E., & Bredekamp, S. (Eds.) *Reconsidering Children's Early Development and Learning: Toward Common Views and Vocabulary.* 1995, June. National Education Goals Panel, Goal I Technical Planning Group Report 95-03. 1255 22nd Street, N.W, Suite 502, Washington, DC 20037; 202-632-0952. Full report upon which the information in this brochure is based; elaborates the five dimensions of children's early development and learning.
- Katz, L.G. "Readiness: Children and Their Schools." *The ERIC Review*, 1992. U.S. Department of Education. ACCESS ERIC, 1600 Research Boulevard, Rockville, MD 20850; 1-800-USE-ERIC. Readiness is the focus of this issue, which includes several useful articles, resources, and a reading list.

- Laying the Foundation for School Success: Recommendations for Improving Early Learning Programs.* 1992. Maryland Commission on the Early Learning Years, Maryland State Department of Education, 200 West Baltimore Street, Baltimore, MD 21201; 410-767-0100. Report of a two-year Commission study that looks at making children's early experiences responsive to their characteristics and building home-school-community partnerships that promote young children's school success.
- Moving America to the Head of the Class: 50 Simple Things You Can Do.* 1994. Education Excellence Partnership, 1615 L Street, NW, Suite 1100, Washington, DC 20036; 1-800-USA-LEARN. A brief booklet listing things that parent, employers, teachers, principals, administrators, and other concerned persons can do to promote children's readiness and help America reach the National Education Goals.
- Ready or Not: What Parents Should Know About School Readiness.* 1995, revised. Washington, DC: National Association for the Education of Young Children; 1-800-424-2460. A brochure to help parents in finding "ready schools" and giving their children a solid foundation for school success.
- Testing of Young Children: Concerns and Cautions,* 1988. National Association for the Education of Young Children, 1509 16th Street, N.W., Washington, DC 20036; 1-800-424-2460. For parents and teachers, a layperson's version of NAEYC's position statement on standardized testing of children ages 3 through 8.
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- Your Child Goes to School: A Handbook for Parents of Children Entering School for the First Time* (revised). 1995. Maryland State Department of Education, 200 West Baltimore Street, Baltimore, MD 21201; 410-767-0100. A booklet for parents that addresses common questions such as: "How do I handle opening day jitters?" "Will my child be tested?" and "What activities will help my child succeed?" How Should Classrooms of Tomorrow Be Different from What Look Like Today?