

>> STANDARDS TO ADDRESS LITERACY NEEDS OF STUDENTS AND INFORM TEACHER EDUCATION PROGRAM DEVELOPMENT PRACTICES

Merging Technology and Language Arts

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Introduction

Students in today's schools are different from students of generations past. Vastly expanding capabilities of technology have impacted learning styles and preferences of students of the 21st century. Consequently, when new teachers enter the profession, many of them find their comfort zones--their personal, familiar learning styles--very different from those of their students. Demands on the use of technology in education, which include ethical use of technology, are apparent in the models seen in classrooms.

The current dispensing of education incorporates interactive electronic communication and multimedia application to serve students' needs. This creates challenges for teachers. While they want and hope to capitalize on the multimedia/multimodal learning styles of their technology-savvy students, teachers scramble to find appropriate resources to support their students in learning meeting academic standards. They yearn to enable their students to meet grade level benchmarks, and consequently, many teachers seek dynamic programs and methodologies to augment their instruction. In addition to these challenges, teachers who are committed to including students with special needs confront another level of complexity. When students are unable to meet grade level expectations, teachers are held accountable for their lack of progress and success in learning.

Using technology in literacy teaching

In the 21st century, there has been an obvious shift in teachers' responsibilities and skills expectations. To deliver effective literacy instruction, teachers must possess adequate knowledge of innovative instructional practices, as well as skills that incorporate new technological literacy approaches; they must be well prepared to use technology for literacy instruction.

Watts-Taffe, Gwinn, Johnson, and Horn (2003) examined the literacy-technology practices of three first-year teachers.

The authors' findings raised important issues for literacy teacher educators, such as providing pre-service teachers with an adequate knowledge base in literacy instruction through technology integration. Watts-Taffe et al. emphasized the importance of professional development of teachers, particularly in literacy and technology integration. Due to rapid changes in this area, the authors also addressed the crucial role fellow teachers and formal mentors play in advocating technology use in classrooms. Many believe it is crucial to reconceptualize the thinking about teachers' practices of technological literacy, and update literacy methods courses to enhance teachers' professional development (Labbo and Reinking 1999, Leu, Mallette and Karchmer 2001, Watts-Taffe et al. 2003).

In Nixon's (2003) review essay of *Teachers and Techno-Literacies: Managing Literacy, Technology and Learning in Schools* (Lankshear, Snyder, and Green), and *Silicon Literacies: Communication, Innovation and Education, The Electronic Age* (Snyder), she presented serious issues regarding teaching and learning literacies and noted educators must be well informed about literacy-technology. In Nixon's reviews, she noted the significant contributions of Lankshear, Snyder, and Green to the theory and information base required for incorporation of new information and communication technologies. Nixon highlighted the authors' focus as a shift in instructional practice from *conventional* to *non-conventional* strategies, wherein teachers become disseminators of education, and students become producers of knowledge. She advocates for teachers who follow new methods and practices of literacy teaching and learning in and out of the classroom, including holistic practices involving teachers, students, and family members.

According to findings of the National Reading Panel (2005), there are positive results from infusing technology into literacy instruction. The NRP report suggested word processors and hypertext (highlighted text that links to definitions or related

text) may be useful in augmenting reading instruction. However, the report stresses the importance of carrying out more research in this area.

Technology use by students with special needs

Increasing attention has been given to the utilization of technology in teaching individuals with special needs. The integration of computers and adaptive devices are commonly seen in today's general and special education classrooms. Some common technologies are similar to those used by nondisabled students. For example, Alfaro (1999) reported the effectiveness of the Waterford Early Reading Program, a well-researched program that integrates technology instruction with phonics, and meaningful text and activities. In Alfaro's study, the skill levels of a majority of low performing primary grade students struggling with reading significantly improved with the utilization of this integrated program.

Other technologies, known as *assistive technologies*, are used exclusively by students with disabilities. In the United States (US) and United Arab Emirates (UAE), assistive technologies are routinely utilized by students whose disabilities benefit from such use. Assistive technology is defined by the Individuals with Disabilities Education Act (IDEA) Amendments of 1997 [Part A, Sec. 602(1)], and parallels the definition offered by the Technology-Related Assistance for Individuals with Disabilities Act (2004). These acts describe assistive technical services as "any piece of equipment that is used to increase, maintain, or improve the functional capabilities of a child with a disability" (29 U.S.C. 2201).

Assistive technology (AT) varies from low- to high-technology devices, and in the last decade, changes in computer technology have occurred in their quantity and their quality. Today's computers and software are more complex and sophisticated than those of a decade ago. Access to computers within classrooms has grown by leaps and bounds. Technology now provides students and teachers with a wealth of opportunities, from interacting and communicating globally to serving as a tool to bypass or replace an absent or impaired ability.

Raskind (1995) explained that assistive technology (e.g., speech recognition systems, which convert spoken language to computer text) assist individuals with difficulty in writing. Poplin (1995) also emphasized that some persons with learning disabilities possess other abilities and talents, such as visual arts and music, which technology might potentially accentuate and nurture.

Technology has enhanced opportunities for learning, communication, and social interaction of persons with learning disabilities (Alliance for Technology Access 1994). They now commonly access intervention programs that provide remedial instruction in reading and writing, employing technology-based tutorial or drill-and-practice applications.

In their discussion of speech synthesis and proofreading efficiency, Raskind and Higgins (1995) suggest an adequate contemplation of the consequences of *how* technology is used with individuals with learning disabilities. The authors discussed the utilization of technology from the frameworks perspective of applied ethics, recognizing there will continue to be an ever-increasing rate of technology use.

Some tools, such as audiotapes, compact discs (CDs), radio, videos, televisions, computers, and electronic-based reference "books" are technological alternatives that can offer learners individualized activities and informative feedback. Ready access to networks and the Internet also provide resources to enhance and challenge learners in new ways.

Lewis (1998) reviewed research supporting the effectiveness of technology to empower persons with learning disabilities. He underscored the importance of advocating technology to address the importance of equal access of technology to all

learners--particularly individuals with disabilities, who should have enhanced access due to barriers that may be imposed by their disability. Lewis stated, "Any technology is worthless if its potential users are denied access to it" (23). Literacy skills, such as reading, writing, and spelling, are dominant academic concerns of individuals with learning disabilities. It is in these particular aspects of literacy skill development that students who struggle with literacy learning may find common needs, which may be well supported by the use of technology.

Johnson and Hegarty (2003) designed a project identifying specific advantages and disadvantages of web-based learning for adults with disabilities. The authors found that all students were able to access websites related to their interests *with support*. However, the researchers concluded success in using web-based learning depends on individual students' skills and needs, and must be customized accordingly.

In their literature review on technology-based practices of secondary students with learning disabilities, Maccini, Cagnon, and Hughes (2002) found three promising practices for educating students with learning disabilities: (a) hypertext and hypermedia software programs; (b) videodisc instruction with contextualized learning; and (c) multimedia software. The authors recommended programs for systematic instruction in a) use of technology to enable students to operate the technology-based system, and b) how to navigate through hypermedia. However, Maccini et al. stressed the critical need for more research on state-of-the-art technology, particularly in the area of developing problem-solving skills. They suggest such research will help teachers learn more about the impact of technology on problem-solving skills of students with learning disabilities. Overall, Maccini et al. conclude there is a promising effect from the utilization of technology with students who are labeled as learning disabled.

The emphasis on students' achievement in the standards-based language arts curriculum has exacerbated the need for instructionally effective and monetarily efficient reading and writing programs that incorporate technology. Multiple and simultaneous layers of instruction and instructional design have pointed to the need for this educational transformation. However, one must ask, "What constitutes an effective program?" To answer this question and to identify desirable models, the researchers devised a survey to examine current practices in their respective geographic regions. These will be discussed in the following section.

Background

The use of technology and teaching practices of the teacher education programs at UAE University and Cal State San Marcos are aligned. Their collaboration has evolved as a result of a partnership formed by the two institutions to share best practices and strategies for teacher credential programs.

Consistent with their common vision to transform public education, researchers from the US and the UAE collaboratively developed a research project to examine the use of technology in teaching language arts. In their research, they hoped to identify ways in which the emphasis on standards has informed the use of technology in public school teaching and learning and home literacy practices. Subsequently, as teacher educators, the researchers sought to identify models for merging technology and language arts standards to complement the literacy needs of school-age children. They hoped their findings would lead to essential reconstruction of teacher education curriculum and program development. As Casey (1998) suggests, "Trust the teachers who know how children really learn, and provide children with the 21st century tools they need for success" (26).

In California, there are specific standards in each content area of instruction (language arts, mathematics, social science, and science). Additionally, many teacher educators also infuse technology standards, visual and performing arts standards, and standards for teacher performance (a.k.a. Teacher Performance Expectations, or TPEs) into their curriculum, seeking to prepare new teachers with the breadth of skills and strategies necessary to be successful in preparing their own students for success.

The International Society for Technology in Education (ISTE) has published standards for technology use by students, teachers, and administrators. These standards have been adopted, adapted, or referenced for students or teachers in 46 of the 50 states in the US, and in the UAE (ISTE 2005). The UAE University (UAEU) is implementing the ISTE standards for both teachers (students) and faculty. The UAEU College of Education offers a core course, *Education Technology*, which targets the ISTE standards in its course goals. In Special Education, there is also a course, *Computer Application in Special Education*. Public schools in the UAE do not teach computer classes at all. Technology resources vary greatly from one Emirate to another. In some Emirates, some schools do not have any computers whereas in other Emirates (e.g., Dubai), it is common to find computer labs and computers in most classrooms. Depending on the Emirate, most special education teachers in the UAE schools have some access to computers and may have a special center or room for computers to be used by students with disabilities. There is an overall shift in the Emirates toward more use of technology in classrooms.

The purpose of the researchers' collaboration was to investigate teachers' utilization of technology to support Pre-K-Middle School development of language arts skills in their respective geographic regions. They were particularly interested in how technology is used to support struggling learners (both in general and special education) and the teachers who teach them. They were also interested in discovering commonalities in approaches used in their regions. This paper will present an analysis of the data collected in a pilot study, models identified for use of technology in language arts classrooms, and a discussion of how the researchers will proceed and implement their findings. Through their work, the researchers were aware of the potential impact technology could provide and the barriers and challenges that might be faced.

In one example from the literature, Baumbach, Christopher, Fasimpaur, and Oliver (2004) explain how handhelds can be used by students to brainstorm and organize ideas in the areas of reading, writing and research and how teachers can use the devices to assess student learning quickly and easily. Barriers such as ample professional development and budget restrictions are issues in implementing these effective activities.

In another example, Casey (1998) examined the use of the Writing to Read program, which uses computer audio to reinforce concepts. Casey found "children with technology support left kindergarten and first grade as writers and readers. Even with these phenomenal results and parent and teacher support, this program was largely ignored by many content to continue to wage the battle of phonics vs. whole language and who feared the inclusion of technology in the classroom" (p. 26). The researchers agree with Casey's suggestion: "It is time to end the Reading Wars, trust the teachers who know how children really learn and provide children with the 21st century tools they need for success" (26).

Methodology

In 2005, following the examination of the literature for current

best practices, the researchers collaboratively conceptualized their research design. During formative stages, they communicated with each other via email to develop a survey appropriate for both global regions—the US and the UAE. The survey was disseminated to teachers during a three-month pilot study.

Survey

The survey questions were designed to identify teachers' utilization of technology to support Pre-K-Middle School development of language arts skills. Responses to survey questions would provide data on how technology was being used to support struggling learners and their teachers. The survey included a demographics section and 36 questions related to the use of technology to support literacy learning. Likert and open-ended questions were included to gather both qualitative and quantitative data.

Target population

One target population was teachers in three school districts in southern California. Approximately 125 surveys were distributed in the districts' elementary and middle schools. Approximately 60 surveys were completed, returned, and subsequently analyzed to identify current trends and use of technology for language arts learning.

The second target population was teachers from one school district in the UAE. Sixty-five surveys were distributed to public elementary schools (grades 3 to 5) and kindergartens in AL-Ain, a city in the Abu-Dhabi Emirate. Thirty-four surveys were returned and 6 surveys were eliminated from analysis due to incomplete responses or illegible writing.

Findings

Data from the surveys were compiled according to question type. The demographic and Likert responses were coded and entered into a spreadsheet for compilation and analysis. Responses to open-ended questions were reviewed, and themes were identified. The keywords were then coded to further develop the themes and identify common strands. The data were summarized for each question. The researchers reviewed the data to identify important findings.

California

In the pilot study, respondents to the survey in California taught in grades kindergarten through 8th. Although three school districts were surveyed, the majority of the respondents were from one district, and their class sizes ranged from 20-32 students. Ninety percent of the respondents had students who were English learners, and 80 percent worked with students who had met state criteria for inclusion in special education. Twenty percent of the teachers had participated in at least 120 hours of professional development on educational technology provided through the Improving Learning for All Students through Technology (ILAST) grant.

Teachers were asked about their use of technology in reading and written language instruction and activities. More than half responded with *limited* or *none*. When asked to describe their uses of technology in their language arts, the following programs and specific uses were provided: SuccessMaker, Read 180, Accelerated Reader, AlphaSmarts, word processing, internet research, Inspiration, PowerPoint, Microsoft Word, poetry, phonics games, word processing, investigations and studies, research-based projects, and stories on compact disks.

In response to the amount of time technology was used for daily instruction, respondents noted the median number of minutes was 90, with a range of zero to more than 180

minutes. In terms of availability of technology, more than 50% of the respondents indicated there was limited or minimal technology available. Seventy percent reported strong administrative support at their schools for technology use, which included a) purchase of tools for learning, such as *World Book* (an online encyclopedia) for research, the Knowledge Box, United Streaming; b) equipment (e.g. desktop computers and portable laptops); and c) training and staff development release time.

Those who reported no support indicated a) programs were unavailable, b) training was not provided, b) emphasis on technology in language arts was not commonly seen, and d) funding in the school budget to purchase classroom technology was lacking. Although some classrooms had some technology, there was limited use due to low numbers of computers in the classroom and limited technology support.

When asked their perception regarding the effectiveness of their use of technology in language arts instruction, approximately 40% of the respondents considered their instruction improved or more effective with the use of technology. Comments from teachers worth noting include:

"[Technology gives] students another individual medium in which to learn and be assessed."

"...good reinforcement of skills..."

"[Technology] helps ELD students."

"Writing has come alive."

"[Technology] made writing possible for students [in special education]."

Regarding improvement in student learning, more than 50% of the teachers felt their students' learning was improved due to utilization of technology. Teachers reported using tutorial programs, practice, and individualized attention have led to student improvement in language arts. Access to Internet and Spell Check, and motivating and engaging phonics games that reinforce concepts have also led to improvement. Teachers also reported the use of word processing and SuccessMaker, increased their students' independent learning skills, and students were working more collaboratively with classmates. Overall, teachers reported technology had supported student learning, and reinforced skills and skill development for English learners.

More than half of survey respondents believed technology had changed how they teach, explaining how their learning activities incorporated more centers, so every student could access a computer everyday. As one teacher reported, using technology "supplemented instruction, [making] projects... come alive." Many teachers intend to a) use more technology in lesson presentations; b) develop lesson plans requiring technology use; c) use technology and multimedia-based instruction and assignments to extend lessons and projects beyond traditional models; and utilize easy-to-access visual aids to demonstrate and enhance concepts for their students.

Teachers reported varied access to technology as follows:

1. Eight-nine percent indicated they had at least one computer in their classroom, but only 82% used computers in language arts.
2. Thirty-two percent had access to a computer lab, but only 22% used the labs with their students.
3. Eighty-seven percent had word processing software available in their classroom, but only 59% used it in language arts.
4. Twenty-six percent had access to word processors, such as AlphaSmarts.
5. Nineteen percent had access to video projection devices in their classroom.

6. Forty-seven percent had access to multimedia.
7. Forty-seven percent used the Internet in language arts instruction.

When asked their familiarity with the National Educational Technology Standards (NETS), which are used in teacher education programs throughout the US, only 19% indicated they were familiar, while 37% were somewhat familiar, and 44% were not familiar.

United Arab Emirates

In this pilot study, teachers from the UAE were from one school district and taught in grades kindergarten through 6th. The respondents' class sizes ranged from 17-24 students. No respondents were special education teachers, but could have students with unidentified learning disabilities in their classes. Teachers reported varied access to technology as follows:

1. Twenty-six percent spend 90 minutes in instruction and activities related to core reading per week; Twenty-six percent spend 180 minutes.
2. Thirty-three percent reported limited use of technology in teaching reading and doing activities; Forty percent reported adequate use; Twenty-six percent reported more than adequate use.
3. Twenty-one percent indicated they spend 90 minutes weekly using technology in their language arts instruction; Fifty percent indicated they spend 1-2 hours; and thirty-seven percent indicated their students spend 40% of classroom time in technology-integrated language arts activities.
4. Thirteen percent indicated *limited or minimal* technology availability; Sixty-three percent reported *considerable*.
5. Eighty-seven percent reported *minimal or limited* administrative support. Some reported *adequate* support, indicating their provision of equipment (e.g., audiotapes, printers, OVT, computers, video) and technology technicians.
6. Seventy-five percent reported technology has positively changed their teaching. Some teachers' comments were:
"Now I have a variety of methods for teaching."
"Technology helps me to save time and effort."
"Technology provides me with various means of assessment."
7. Seventy-one percent reported technology helped their students to *some degree*. Some of their comments included:
"Technology encouraged and increased students' participation."
"[Technology] motivated students to learn."
"[Technology] encouraged students in self learning."
"[Technology] motivated students to search and learn."

Teachers reported varied access to technology including: computers (100%), printers (58%), Internet (21%), e-mail (17%), word processing (29%) and PowerPoint (58%). Seventy-nine percent reported use of computers; 29% use printers, 8% utilize the Internet, none use email systems, and 25% use word processing.

Discussion

The data provided by teachers gave researchers insight into what's happening for respective regions in language arts classrooms. It is interesting to note that the class sizes in the UAE were between 17 and 24 and in CA from 20-32. More than half of California respondents reported limited or no

technology being used in language arts compared with 1/3 in the UAE. In the UAE technology availability in the school district reporting was high (63% of respondents indicated considerable availability). In the California district availability was more limited (50% reporting minimal or limited). For Administrator support, the California district teachers felt they had strong administrative support (70%) where in the UAE district only 13% indicated this. In both regions there was evidence that the use of technology had positively impacted instruction and learning.

Further California analysis

Findings indicate the most commonly used technology in language arts learning is word processing. It is interesting to note that, although available, it is not always used. The technology model of using integrated learning programs to manage student learning was often reported. Examples of these programs include SuccessMaker and Read 180, which are widely used and reportedly effective according to those surveyed. Using Internet for access to resources outside the classroom was another common model widely reported by respondents. Programs such as Inspiration™ PowerPoint, and other education-specific software were also mentioned in responses.

Teachers seemed to feel their administrators were supportive of the use of technology. It should be noted that administrators in California are currently being trained in technology use, which may have led to this result. On the other hand, it was evident that the current budget crisis in California is impacting the availability of these resources.

The researchers set out to identify effective models being used in language arts classrooms. Following this pilot study, they now plan to modify their methodology and focus. They now know that in their teacher preparation programs, they need to focus more attention on literacy models that make a difference. They will take their preliminary findings to their colleagues and propose modifications to the literacy curriculum, so that effective models of practice will be infused in future iterations of relevant coursework. The researchers will continue their investigation by revising their survey and posting it online, in order to facilitate a more extensive investigation and easier manipulation of data.

Findings will further inform the community of teacher educators regarding the implications of technology integration to meet the needs of learners, and the pre-service curriculum emphasis and requirements of technology standards in teacher education programs. Using models identified in the report, the researchers plan to scientifically examine through a longitudinal study the actual derived benefits of the use of specified technologies in the development of language arts skills of school-age children and youth.

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