

Early Childhood Teacher Preparation and Technology Integration: The Arizona State University West Experience

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Over the past 6 years, Arizona State University West (ASU West), located in Phoenix, Arizona, has developed an Early Childhood program that features curricula based on the National Education Technology Standards for Teachers (NETS-T; International Society for Technology in Education [ISTE], 2000), National Technology Standards for Students (NETS-S; ISTE, 2000), and the Arizona Teaching Standards. We have provided support for change through (a) faculty development, (b) curriculum revision, and (c) technology friendly field placements. This support for change has led to an Early Childhood program in which 100% of the faculty integrate technology into their teaching, and graduates are better prepared to use technology in their future classrooms.

This article is designed to describe how the ASU West early childhood pre-service teachers are prepared to use technology within inclusive settings. The article begins with a brief characterization of the campus and the teacher education students. Next is the underlying program philosophy and guiding principles that support the program efforts. Following the program philosophy is a fuller description of the specific program practices that led to systemic technology integration. Where appropriate, sample artifacts and program media will be displayed to further enrich the narrative descriptions. The article concludes with a description of lessons learned and the strategies we are employing to sustain and expand upon the initiative.

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ARIZONA STATE UNIVERSITY WEST AND OUR TEACHER EDUCATION PROGRAM

ASU West is an urban commuter campus established 16 years ago. Today, 6,000 students are enrolled, with roughly 800 in teacher education. Many of our students are older than traditional students, predominantly female, and about 20% are members of minority groups. Additionally, roughly 60% of the teacher education students at ASU West are first generation college bound. Each semester, approximately 25 students are admitted to the College of Education (COE) Early Childhood program at the beginning of their junior year. Most of our students matriculated at one of five community colleges located in the metropolitan area for their freshman and sophomore years, at which time they completed their lower division arts and sciences courses. Only 2 years ago did the university begin enrolling freshman and sophomore level students into lower division course work.

Programs in the ASU West COE are fully accredited by the North Central Association of Colleges and Schools (most recent accreditation was received in spring 2000). Graduates from the ASU West Elementary Education with an emphasis in Early Childhood Professional Teacher Preparation Program receive K-8 certification through the Arizona Department of Education.

The COE is guided by eight program goals focusing on instruction for diverse learners, the role of teaching, value of cultural heritage, implementing ethical behavior, pursuit of personal and professional goals, effective use of content knowledge, effective use of communication skills, and the effective use of information and technology resources to impact student learning. This last goal was the driving force that led to the integration of technology within the Early Childhood program.

Six years ago the COE established a Technology Committee and began to require all students at orientation to sign up for and learn to use university email and First Class conferences for threaded discussions. Since 1999, a Preparing Tomorrow's Teachers to Use Technology (PT3) grant has provided the resources to enable us to implement a well-planned and cohesive effort to ensure that students experience good models of technology-infused teaching in (a) their COE classes and, (b) their field placements. This was deemed important, because needs data gathered for the PT3 grant application demonstrated that only 22% of faculty were "frequently" or "always" infusing technology into their teaching (Lewallen, 1998).

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These efforts have changed our curriculum and the way our faculty teach and have assisted our school district partners in the creation of model K-12 technology-infused classrooms.

These technology initiatives within the COE have been supported by aggressive implementation of the campus-wide Information Technology Strategic Plan. Currently, there are 523-networked computers available on campus and two airport wireless areas to support student use; 85% of all computers, multimedia projectors, and software licenses are less than 3 years old. Approximately 75% of all classrooms have presentation computing stations installed, with the goal to equip all classrooms within the next 3 years. Virtually 100% of the campus classrooms have Internet and video (TV/satellite) connections. Teaching facilities include three mobile computing carts, each with 15 wireless laptops available for classroom use; three Windows labs and two Macintosh labs that we share with other colleges; two teaching classrooms with seven computer group stations around the perimeter of the room; and three early childhood teaching spaces with three to six computers to simulate the elementary classrooms graduates will see in local schools. Finally, the campus has established technical support for faculty coordinated through a campus-wide HELP desk and six computing support personnel housed in the academic units. Technology support and access for students is available through Technopolis, a computing commons.

As cited earlier, the COE has, within its strategic plan, a goal to move toward full technology integration within its curricula and classrooms. To support this initiative, all faculty and staff are provided with multimedia computers with Internet access in their offices. All COE dedicated classrooms have computing presentation stations fully wired with Internet and TV/satellite connections. There is sustained and ongoing faculty training in technology integration. Since 100% of our students have computers at home and approximately 65% have Internet access, the COE faculty members have greatly expanded the use of email and electronic online class discussions using the Blackboard web-based class support system through the MyASU portal. All COE students receive free email and training in using the portal during the first week of their first semester in our Professional Teacher Preparation Program.

Factors enhancing sustainability include the hiring of a technology integration specialist dedicated to the COE, the establishment of a technology budget, and a 3-year cycle of hardware and software replacement for all faculty

members. Finally, all new COE faculty hires must have, as part of the desired job qualifications, technology integration knowledge and skills.

THE EARLY CHILDHOOD PROGRAM AND ITS UNDERLYING PRINCIPLES.

The technology integration is embedded in an Early Childhood program that prepares students to enact professional roles that will positively impact the developmental and educational needs of children from birth through 8 years of age. Child centered in its approach, it offers professional education in the following:

1. The design of environments that are intellectually stimulating and challenging to young children, and that promote curiosity and resourcefulness (Branscombe, Castle, Dorsey, Surbeck, & Taylor, 2000).
2. Modes of relating to young children that are nurturant and supportive of their well being and that promote social competence (Katz & McClellan, 1997).
3. Curriculum and instructional methodologies that are culturally and linguistically sensitive and appropriate for meeting the language, learning, and affective needs of a diverse population enrolled in urban and rural schools (Branscombe et al., 2003).

This program remains true to the Early Childhood program principles, while integrating technology in ways consistent with developmentally appropriate practices. The faculty works hard at supporting the programmatic standards of the National Association for the Education of Young Children (Bredekamp & Copple, 1997). The ASU West Early Childhood program has been implementing selected ISTE/NCATE Basic Teacher Preparation standards (ISTE NETS Project, 1993) since 1996. However, the incorporation of NETS-T integration in the Early Childhood program was completed in December 2000. In January 2001, the core Early Childhood faculty implemented the standards. Further, it should be noted that the implementation is a recursive cycle, that is, faculty members are continuing to further their knowledge of technology and instruction and are adding new and more sophisticated uses of technology each term. Three cohorts of students (25 in spring 2001, 25 in fall 2001, and 25 students in spring 2002) have participated in the full implementation. The spring 2001 group graduated in December 2002.

PROGRAM SPECIFIC STRATEGIES

Faculty and administrative leadership provided both the pressure for change and support for change. Pressure for change was provided through the vision of informed leaders such as our dean and department head and the adoption of the NETS-T. And support for change was supplied through faculty workshops and technology integration specialists providing classroom support and modeling and a PT3 grant that provided additional resources.

The Early Childhood and support faculty currently involved in this award winning program are as follows: Dr. JoAnn Hino, Language Arts and Reading; Dr. Christine Nucci, Math/Science and Classroom Organization and Management; Dr. Sally Hurwitz, Social Studies and Creative Arts; Ms. Cathy Kirk, Early Childhood Curriculum Design; Dr. Thomas Haladyna, Classroom Assessment; Dr. Michael Kelley, Early Childhood Development; Dr. Keith Wetzel, Computers in Teaching; Dr. Kathy Harris, Classroom Adaptations for Special Needs Children; Matthew Milliron, Technology Support Analyst located in the College of Education; Mia Kim Williams and Mary Odom, Technology Integration Specialists, PT3 Project; and, Helen Padgett, PT3 Project Manager.

During 2000 and 2001, faculty participated in a variety of workshop and professional development experiences (see the [appendix](#) for a more detailed outline). First, faculty members have learned to use technology in their disciplines. For example, faculty used technology for instructor activities, such as constructing curriculum maps using Inspiration software. This serves as a model for preservice students in the course. Also, faculty have included technology-rich assignments in their courses, requiring students to create electronic presentations, incorporate digital still images, use software applications, and produce digital video. Second, within early childhood education the faculty met regularly to develop a detailed curriculum plan for the systematic teaching of technology objectives that are sequenced and seamless throughout each program. As a result faculty modified their courses to integrate technology into (a) instructor activities, (b) the student objectives, and (c) student assignments.

Professional development workshops for faculty offered a variety of technology training, arranging from Desktop Basics and MS Office to Web-Page Development and content specific software or technology-based learning strategies (see Figure 1).



Figure 1. Faculty member exploring technology.

During each workshop, appropriate technical skills were presented; faculty explored and practiced implementation strategies. All Early Childhood faculty members participated in technology integration workshops during the past two summers. One-on-one follow up support was provided to facilitate implementation.

Early Childhood faculty evaluated the technology components present in their courses. Additionally, the program outcomes were aligned to state teaching standards, NETS-T, and NETS-S. Finally, the program faculty with help from the PT3 support personnel, created a matrix that defines the evidence that students need to demonstrate proficiency in competencies (see Table 1 for an edited version of the matrix). The matrix addressing all NETS-T is available at <http://www.west.asu.edu/pt3/awards/documents/ECNETS.pdf>



A unique element of the Early Childhood program is involvement of third semester Special Education preservice teachers in the design and development of integrated curricula with second semester Early Childhood preservice teachers. This model employs a consultation framework, whereby the special education students serve as consultants to the early childhood students in adapting curriculum for special needs children. Throughout the

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semester, these students used threaded discussions to post the curriculum unit they were creating and discuss adaptations for special needs children. This model has proven to be quite effective for students in both programs (see Video 1 for a student's discussion of collaboration).

[Donna & Michael, Link the video1.rm to the words "Video 1" and also to the Clip_1a.gif]

As a result of these efforts, technology integration has taken on three forms among ASU West Early Childhood faculty members. First, faculty members use technology for instructor activities such as PowerPoint, Inspiration, digital video, and online discussion groups. This serves as a model for preservice students in the various courses. Second, faculty have included technology-rich assignments in their courses, requiring students to create electronic presentations, incorporate digital still images, and use software applications (View Video 2 to see a preservice student explaining use of a software program in a lesson).



[Michael & Donna, Link video2.rm to the words "Video 2" as well as to the Clip_2a.gif]

Third, faculty members require students to create curricular units that incorporate K-3 student use of technology to accomplish lesson objectives (see unit example at <http://www.west.asu.edu/pt3/awards/documents/airwater/openunit.pdf>). During field experiences students implement the units. Finally, all Early Childhood graduating students create electronic portfolios showcasing their accomplishments via teaching artifacts.

However, this process was not without difficulty. During spring 2001, students showcased their portfolios using a web editor. This was a frustrating process for students, requiring considerable time and effort. Early Childhood faculty members could not sustain the e-portfolio development using the web editor without extended support by tech specialists. The following semester, a decision was made to implement the e-portfolio process using *Acrobat Writer*. Although this solved some of the problems, it still was time intensive, and students needed much support to complete their portfolios. Both students and faculty members thought that the e-portfolio process was important and worthwhile. Consequently, the faculty reviewed and selected

a web-based system that made portfolio development easier. During Spring 2002, faculty and students piloted TaskStream (<http://www.TaskStream.com>), a web-based course support system to develop and share their e-portfolios. The early childhood faculty and students found through the TaskStream pilot study that they could create e-portfolios without extensive technical support. These web-based e-portfolios demonstrate accomplishment of departmental outcomes, state certification standards, and ISTE NET-T standards.

FIELD EXPERIENCE STRATEGIES FOR STUDENTS THAT MEET THE NETS-T STANDARDS.

We worked with the ASU West Child Development Center (CDC) (<http://www.west.asu.edu/cdc/>) to create technology friendly classrooms, and most Early Childhood preservice students complete a required practicum experience in one of these classrooms, in which they teach lessons that include technology use by children. Dr. Kelley, Chair of Elementary Education, serves on the faculty oversight committee of the CDC and works closely with Dr. Paul Miller, Chair of Social and Behavioral Sciences, and Ms. Cathy Kirk, Director of the CDC, to coordinate practicum experiences for the early childhood students. The Early Childhood faculty members regularly meet to plan technology-rich experiences for the early childhood students to implement with the 3-, 4-, and 5-year-old children in the center. Some of these experiences include storybook preparation using *Kid Pix* and *Kidspiration*, using digital cameras and word processing programs to prepare class newspapers, and using digital cameras to document children's artwork and projects for assessment purposes.

Second, we invite our preservice students to participate in workshops with their practicum mentors. Five partner school districts in cooperation with ASU West helped develop strategies to address the lack of technology friendly K-3 school sites as internship placements. The second strategy, Practicum Plus, helped existing K-3 teachers learn to use technology in their classrooms. Here, preservice students and their mentor teachers attended classes prior to and during the practicum semester that assisted them in the development of curriculum units integrating technology (see Figure 2).



Figure 2. Mentor learning with two preservice students.

The preservice students, with the collaboration of their mentor teachers, then implemented these technology-rich units during their practicum experience. The units will be published on Arizona Learning Interchange, a searchable web-based site.

The third strategy was to take highly skillful technology using teachers and help them become model classrooms for interns, student teachers, and other teachers and administrators. Forty Arizona Classrooms of Tomorrow Today (AZCOTT) were established through a partnership with K-12 school districts. Two of the AZCOTTs are early childhood classrooms. AZCOTT teachers participated in over 90 hours of professional development classes focusing on the infusion of technology into the curriculum. These teachers created Units of Practice (UOPs) that use a standards-based curricular framework. The AZCOTT teachers produced a CD-ROM to showcase best practices and the UOPs that were created (visit an AZCOTT at http://ali.apple.com/ali_sites/ali/exhibits/1000071). Next year the units will be available at the Arizona Learning Interchange. In addition to using the units as models for student unit planning, our faculty members take students to do group observations in their classrooms.

CONCLUSIONS AND FUTURE STRATEGIES

Although some have critiqued the use of technology with primary grade children (e.g., Alliance for Childhood, 2001; Cuban, 2001), we have addressed their objections directly and have modeled a developmentally appropriate approach to the infusion of technology in early childhood classrooms. These models of technology integration have resulted from the systematic professional development experiences provided to faculty, coupled with increasing expectations for preservice teachers to incorporate and demonstrate the NET-T standards within their coursework.

To date, 100% of our Early Childhood faculty members integrate technology in teaching, and our students feel well prepared to integrate educational technology in the grade or subject they will teach. During the past 2 years we have surveyed our student teachers asking them, "How well prepared do you feel to integrate educational technology in the grade or subject you teach?" The mean was based on a 4-point scale: 1 = *not at all prepared*, 2 = *somewhat well prepared*, 3 = *moderately well prepared*, and 4 = *very well prepared*. Our students rated themselves a 3, or *moderately well prepared*, overall. Feeling prepared is important because students participate in many classrooms in which technology is used uniquely. For example, in classroom organization, students use a computer program to design the layout of their future classroom (see student layout example at <http://www.west.asu.edu/pt3/20-1.pdf>). In the curriculum course, Early Childhood majors communicate with Special Education majors using threaded discussions to discuss and plan adaptations for children with special needs.

We believe that we compare favorably to others. Strudler and Wetzel (1999) visited four teacher education institutions thought to be exemplary in their preparation of future teachers to use technology and found that about half of their faculty integrated technology in their teaching, and each institution struggled to find technology-rich field placements for their students. Our innovations have filled together many of the pieces of the technology integration puzzle. Our accomplishment is the establishment of a culture that values the preparation of students to be strong teachers who also integrate technology in instruction. In the COE Early Childhood program, the pressure for technology integration across the curriculum is like the wind at the faculty's back and we believe that our innovations are sustainable and that our progress will continue.

Indeed, these efforts have dramatically influenced the direction of the ASU West COE. Effective spring 2003, the ASU West COE will begin using a proprietary web-based system entitled TaskStream to facilitate the building of electronic lesson plans, curricular units, and portfolios for all COE students. Moreover, TaskStream's web-based tools allow faculty members to track the work of students across all semesters of their program and across a variety of academic content standards, technology standards and certification requirements. Thus, what began as a modest, award winning effort to integrate technology into the Early Childhood program, has now obtained widespread college support that will impact over 200 preservice teachers per semester and the thousands of pupils that they will influence in the years ahead.

References

- Alliance for Childhood. (2001). *Fool's gold: A critical look at computers in childhood*. Retrieved January 2003 from: http://www.allianceforchildhood.com/projects/computers/computers_reports_fools_gold_contents.htm
- Branscombe, N.A., Castle, K., Dorsey, A.G., Surbeck, E., & Taylor, J.B. (2000). *Early childhood education: A constructivist perspective*. Boston: Houghton Mifflin Co.
- Branscombe, N.A., Castle, K., Dorsey, A.G., Surbeck, E., & Taylor, J.B. (2003). *Early childhood curriculum: A constructivist perspective*. Boston: Houghton Mifflin Co.
- Bredenkamp, S., & Copple, C. (Eds.). (1997). *Developmentally appropriate practice in Early Childhood programs (Rev. ed.)*. Washington, DC: National Association for the Education of Young Children.
- Cuban, L. 2001. *Oversold and underused: Computers in the classroom*. Cambridge, MA: Harvard University Press.
- International Society for Technology in Education. (2000). *National educational technology standards for students—Connecting curriculum and technology*. Eugene, OR: Author.
- International Society for Technology in Education. (2000). *National educational technology standards for teachers*. Retrieved January 2003, from: http://cnets.iste.org/teachers/t_book.html
- ISTE NETS Project. (1993). *ISTE/NCATE basic teacher preparation standards*. Retrieved February 19, 2003, from <http://cnets.iste.org/ncate/>
- Katz, L.G., & McClellan, D.E. (1997). *Fostering children's social competence: The role of the teacher*. Washington, DC: National Association for the Education of Young Children.

- Lewallen, G. (1998). *Report on the ASU West College of Education Technology survey*. Retrieved January 2000, from <http://coe.west.asu.edu/survey/>
- Strudler, N., & Wetzel, K. (1999). Lessons from exemplary colleges of education: Factors affecting technology integration in preservice programs. *Educational Technology Research and Development*, 47(4), 63-81.

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APPENDIX OUTLINE OF FACULTY PROFESSIONAL DEVELOPMENT EXPERIENCES

2000

- Three weeks of workshops during summer 2000; (for more information see <http://www.west.asu.edu/pt3/awards/documents/airwater/openunit.pdf>).
- Preparation of courses using Blackboard including syllabi, online links, and threaded discussions.
- Practicum Plus Early Childhood (EC) Workshop for preservice students and mentor teachers during summer 2000; (for agenda see <http://www.west.asu.edu/pt3/awards/documents/ECDP2000.pdf>).
- 2000-2001 Technology integration specialist, a permanent position located in the College of Education, worked with faculty modeling lessons and helping implement the technology rich lessons and assignments.
- Two-day workshop for EC students and faculty led by Nicola Yelland (see Figure 3), Co-Editor of Contemporary Issues in Early Childhood

(for description see <http://www.west.asu.edu/pt3/awards/documents/yelland.pdf>).



Figure 3. Dr. Nicola Yelland worked with faculty and students.

- Faculty completed NETS-T matrix for each EC student (see example of student's copy of the matrix at <http://www.west.asu.edu/pt3/awards/documents/ECSTSAMP.pdf>).
- Preservice students completed practicum in technology friendly classrooms at the ASU WEST Child Development Center (see Figure 4).



Figure 4. Preservice student guided children at the Child Development Center.

- Faculty submitted course portfolio documenting the ways they addressed the NETS-T in their courses. An alignment checklist is used to indicate progress toward meeting the standards (see checklist at <http://www.west.asu.edu/pt3/awards/documents/sy12000.pdf>).

2001

- Three weeks of workshops during Summer 2001 on campus (see schedule of workshops at the award website).
- Two EC faculty members participated in a week of the ACOT training for teacher educators.
- EC faculty members selected a technology goal for their annual reviews.
- One-day workshop for EC students and faculty led by Heidi Clevenger,

ACOT teacher (see lesson plan at <http://www.west.asu.edu/pt3/awards/documents/Clevenger2.pdf>).

- All student curriculum units became CD ROM based. Students used Acrobat to create a mini portfolio. Each student in the class left with a CD with all of the lessons created by the class. Each lesson included technology-enriched activities for children. (see a curriculum unit at <http://www.west.asu.edu/pt3/awards/documents/primates/ourunit.pdf>); Also, students shared their units at a curriculum fair (see Figure 5).



Figure 5. Students shared curriculum units at the curriculum fair.

- Preservice students studied early literacy through exchanging email letters with first grade e-buddies.
- Preservice students did group observation in second grade classroom of an Arizona Classroom of Tomorrow.
- First EC cohort graduates with electronic hiring portfolios that are web-based (see student portfolio at <http://www.west.asu.edu/pt3/awards/documents/TaraSmith/portfolio.html>);

- NETS-T Matrix was updated and completed with new cohort of students.
- Faculty submitted course portfolio documenting the ways they addressed the NETS-T in their courses. A reporting form was used to document progress toward meeting the standards. (See example at <http://www.west.asu.edu/pt3/awards/documents/sbrubric.pdf>).

Table 1
Early Childhood Integrated Program Matrix

Select Pre K-2 Students NETS Standards	What Early Childhood Preservice Teachers Need to Know and Do to Implement Pre K-2 NETS (NETS-T)	Early Childhood Program Implementation (ASUW Program)	Evidence and Artifacts of Preservice Teacher
1. Use a variety of multimedia and technology resources for directed and independent learning activities. (S1-I2) (AZ 3T-R1) (AZ 3T-F1, F3)	1a. Locate technology resources for use at the university and practicum sites. (II-C)	1a1. EMC 300 – students locate technology resources, i.e. Internet and software resources.	On-line Resources List in course portfolio
		1a2. SPF 401 - Student teaching seminar - student will survey the school site to locate resources available and procedures for using them.	Completed Technology Inventory
		1a3. ECD 404- students focus on the role technology plays in literacy development at their pre-K placement site	Completed Observation Report
	1b. Evaluate technology resources, i.e., software applications and internet sites, for accuracy and suitability. (II-C)	1b1. EMC 300- students evaluate a variety of internet sites and software for professional and instructional uses.	Completed Evaluation Forms in course portfolio
		1b2. ECD 404 students evaluate and integrate internet sites into various projects assignments.	Internet sites listed in Curricular Unit