

Technology Innovation Challenge Grant Program Final Report

Alliance⁺ Improving Professional Development through Technology
www.k12.science.org/alliance

Executive Summary

This executive summary provides information on the purpose, scope, implementation, and results of the Alliance+ Improving Professional Development through Technology project (Alliance+: Award #R303A980063), a five-year (October 1, 1998 - December 31, 2003) \$9.28 million Technology Innovation Challenge Grant (TICG). Progress in achieving stated objectives, effectiveness of the project in meeting the purposes of the program and the effect of the project on participants being served by the project are highlighted. Partners included: the Center for Improved Engineering and Science Education at Stevens Institute of Technology (CIESE); the Polaris Career Center in Ohio; the League for Innovation in the Community College in California; three community colleges (Cuyahoga Community College in Ohio, Miami-Dade Community College in Florida, and Maricopa Community College in Arizona); Bank Street College of Education and 71 participating school systems in Cleveland, Miami and throughout Arizona. The external evaluator is from The Lawrenceville Group (formerly Harcourt Educational Measurement).

Purpose

The purpose of the grant was to demonstrate a model for wide-scale teacher training in technology-supported delivery of rigorous core content using community college and K-12 collaborations. Building on a model originally implemented in New Jersey by the Stevens Institute of Technology Center for Improved Engineering and Science Education (CIESE) and begun under a National Science Foundation Networking Infrastructure in Education (NIE) grant (award # RED94-54719), linking community colleges and neighboring K-12 schools, Alliance+ was aimed at teacher training and wide-scale implementation in the areas of science, mathematics and other core subjects, through innovative and effective technology integration to enhance student learning and support higher levels of achievement.

Scope and Implementation Model

Through a two-tiered turnkey training effort, initial training and orientation was provided by CIESE at Stevens Institute of Technology to a core group of community college faculty at Maricopa, Miami-Dade¹ and Cuyahoga Community Colleges, who then provided training and follow-up support to mentor K-12 teachers in their respective communities. Mentor teachers in turn trained “mentee” classroom teachers within their home school districts. Focusing on Internet-based curriculum resources and communications tools to deliver science, mathematics, and other core content, the Alliance+ partnership impacted over 7,300 teachers and an estimated 405,000 students.

¹ Miami-Dade Community College began offering a four-year baccalaureate degree in teacher education in 2003 and has since become Miami-Dade College.

Savvy Cyber Teacher[®] (SCT), an intensive 30-hour, hands-on graduate-level course, developed and piloted through the Alliance+ program, enabled faculty, teachers, and administrators to receive technology training in the context of core content and problem-based instructional approaches utilizing Internet-based "real time" data and global telecollaborative projects that integrated science, mathematics, language arts, and social studies learning objectives.

Results

Results from an external evaluation conducted by Harcourt Education Measurement showed that Savvy Cyber Teacher[®]-trained educators: felt better prepared to teach problem-solving skills; spent less time lecturing; reported improved ability to teach complex concepts; were better able to conduct small group learning activities; could more easily implement cooperative learning approaches; and were better able to effectively manage diverse learning styles.²

Additional studies by Harcourt Education Measurement, showed that 86% of classrooms that participated in an evaluation of the SCT program demonstrated noteworthy gains in the science and mathematics learning objectives being tested (Yepes-Baraya, 2002). A 2004 study by Yepes-Baraya showed Teachers' assessment of their own technology skills increased from an overall average of 2.8 in 2001 to 3.0 in 2003 (Table F1). In 2001, the only skills reported as *advanced* were those associated with the use of e-mail. In 2003, word-processing and web-browsing skills, in addition to e-mail, were reported as *advanced*. Other skills showing improvement from 2001 to 2003 were presentation skills and those involved in the use of instructional software. Similarly, Teachers' assessment of their students' technology skills paralleled their own self-assessment, but the reported averages were in every case lower by at least one point. For example, the reported averages were 2.4 (vs. 3.9 for teachers) for word processing, 2.3 (vs. 4.0 for teachers) for e-mail, and 1.6 (vs. 2.6 for teachers) for collaborative projects.

Lasting Impact

The Alliance+ model created a training and support infrastructure by building capacity and supporting implementation among the partner institutions. Colleges of teacher education in each of the three sites supported community college faculty teaching of the SCT course by granting the equivalent of two graduate credits. At the outset of the project, attempts were made to encourage and entice colleges of education to adapt and adopt SCT for their own coursework; however, these collaborations had limited success. Over the course of the grant, the expanding role of community colleges in teacher education became apparent. This realization has led to a \$1.5 million award from the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology (PTE) grant program to create a community college-level training program for faculty who teach preservice teachers.

² Mario Yepes-Baraya, The Student Impact Study (SIS) of the Alliance+ Project, 2003

The Alliance+ Project demonstrated a model for widescale teacher training in technology-supported delivery of rigorous core content using community college/K-12 collaborations. The success of the Alliance+ program in Cleveland, Miami and Phoenix substantially strengthened ties among these school systems, community colleges, and colleges of teacher education. Current work involving all three partner institutions in the PT3 grant project builds upon SCT in the area of higher education. PT3 will serve to strengthen and further develop relationships, skills and knowledge regarding institutionalization of faculty and teacher development programs, and demonstrates the commitment the partners share for this process.

In addition, a National Science Foundation award is pending to spread use of these materials to independent colleges of teacher education (#035261) in partnership with the Council of Independent Colleges.

Through SCT training, teachers' instructional practice, evidenced through more frequent and sophisticated use of technology to promote inquiry-based content knowledge was strengthened along with instructional approaches in science, mathematics, language arts, social studies, and other subjects through use of powerful, Internet-based lesson activities modeling project-based learning approaches.

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Progress in Achieving Stated Objectives

The goal of the Alliance+ project was to prepare teachers in Arizona, Florida, Ohio, and across the country to integrate technology into the curriculum in innovative, effective ways to enhance student learning and support higher levels of achievement. Project objectives and resulting progress are discussed below:

1. *To train teachers in the use of “unique and compelling” Internet applications in K-12 science curricula by providing students with hands-on opportunities to explore a wide range of science concepts and topics using real-time data and interactive resources.*

Faculty and administrators from the three community colleges: Maricopa Community College in Arizona, Miami-Dade College (MDC) in Florida, and Cuyahoga Community College in Ohio, participated in intensive training on the Alliance+ model, goals and objectives, including effective delivery of the Savvy Cyber Teacher® professional development training program.

Through SCT training, faculty, teachers, and administrators gained proficiency in using web browsers, email, search engines and directories, and web page development in the context of rigorous core content and problem-based instructional approaches utilizing curriculum materials which focused on “unique and compelling” Internet resources to integrate science, mathematics, language arts, and social studies learning objectives. In all, approximately 7300 K-12 educators have participated in Savvy Cyber Teacher® training through the Alliance+ and related projects.

“Unique and compelling,” a term coined by CIESE which denotes educational applications that cannot be replicated using other tools or technologies, and those that generate significant educational benefits. Such applications are those that utilize the unique power of the Internet to teach concepts and principals in core content areas through: 1) access of real time data (e.g. online live weather or earthquake data); 2) global telecollaborations among students in the form of shared knowledge and online communications, such as threaded discussions, online chats and shared databases; 3) student web publishing with the power to motivate students and enhance achievement by providing an authentic audience; and 4) the use of primary source materials to enrich students’ understanding of science in the context of historical, social, and personal impact.

The Savvy Cyber Teacher® program is a 10-part, 30-hour professional development experience. (See appendix for detailed SCT course syllabus and curriculum project descriptions). This hands-on, face-to-face teacher professional development program emphasized core subject matter content, presented in an inquiry-based mode; technology skills, including web-page development and use of software tools; collaborative learning; and constructivist approaches to instruction.

- 2. To help teachers deepen their own understanding of science, mathematics, and other interdisciplinary content areas.*

The SCT professional development program contains curriculum materials rich in core content, delivered in an interdisciplinary context. SCT instructional methods and approaches enable teachers to master learning objectives in an inquiry-based design, much the way their students would, thus deepening their own understanding of science, mathematics, and other interdisciplinary content areas.

In addition to building content knowledge, SCT training sessions contain modeling and implementation strategies with profound effects on teacher behavior and pedagogy, documented previously in the results from an evaluation conducted by Harcourt Education Measurement³ and documented in the Yepes-Baraya draft (2004).

- 3. To prepare teachers to share their training experiences with other schools and colleagues by becoming technology leaders and mentors.*

The Alliance+ project implemented a two-tiered turnkey training model, which included core team trainers from community colleges providing training and support to lead or “mentor” teachers in neighboring school districts. These mentors then worked in pairs to provide training to classroom teachers in their school district. This model was supported by highly elaborated versions of training materials, a “Mentor Teacher Handbook” that included specific instructions and detailed resources for delivering effective training, as well as a “Classroom Teacher Handbook” that included all materials covered in the program.

The Yepes-Baraya online survey draft (2004) showed the evolution and maturity of Savvy Cyber Teacher-trained teachers over time. It stated, “The percentage of teachers reporting changes in their instructional practices increased considerably from 2001 to 2003 (Table G1). While on average 53% of the teachers in 2001 reported making changes in different types of instructional practices as a result of participation in Alliance+ activities, 77% did so in 2003. About two-thirds (66%) of respondents stated they are spending *more* time with individual students and *less* time lecturing the whole class. About three-quarters (75%) said they are better able to present complex material to their students and better able to teach problem solving and/or critical thinking. About 85-87% stated being more comfortable with students working independently and doing small group activities.”

- 4. To encourage teachers to explore, use, and develop Internet applications as instructional tools beyond the formal training period by providing follow-up support.*

Teachers were encouraged to explore, use, and develop Internet application as instructional tools beyond the formal training period. In Arizona, an “Implementation

Specialist Model” was introduced. Former classroom teachers were placed in a mentor/consultant role in order to provide additional classroom and program support.

To further leverage program implementation, teachers were given the opportunity to apply for “Fast Track” grants, awarded through the Arizona State Department of Education to provide stipends for follow-up and proof of implementation. Fast track grants were highly successful in assuring and extending classroom implementation of SCT Internet enhanced instruction.

Materials developed through the Alliance+ project are presently being used in each of the partner regions, with project leadership transitioning into a self-sustaining mode. An Alliance+ list serv, hosted, managed and maintained by CIESE, promotes and supports an online community of teachers who continue to be impacted through the project. Ongoing training efforts within K-12 school districts in the partner communities are being implemented and new opportunities continually pursued.

5. To involve teachers in all aspects of the professional development process - from planning through evaluation.

Teachers were involved in all aspects of the professional development process from SCT program development to training and implementation. Partner feedback on the beta version of the SCT workshop series led to the release of version 1.0 for the middle and elementary school levels in year one of the Alliance+ project. Subsequent user assessment and feedback led to the development of version 2.0 at the elementary and middle school level. By year three, version 2.0 of the high school level was developed, which significantly enhanced and improved upon initial versions of SCT. Each level was differentiated through embedded curriculum materials appropriately targeted and explicitly linked to Arizona, Florida, and Ohio state content standards.

Teachers were also intricately involved in the SCT program evaluation. Summative and formative evaluations included an online self-assessment tool (at local and project management levels); classroom observations; teacher surveys; and, a variety of other assessment instruments, including focus groups and case studies.

In addition to user input on the development and evaluation of SCT training materials, partners were able to adapt and adopt the implementation model to meet specific needs of their respective locals, as described above.

Thus, as a K-12 training program for teachers in instructional technologies, the project’s objectives were successfully met . As a professional development model viable for national replication, the stated objectives and achievements made were as follows:

1) To offer effective training geared to the specific academic and developmental needs of elementary, middle and high school teachers and their respective students.

This goal was achieved through the extensive development and beta-testing of the three differentiated levels of SCT training materials (including Mentor Trainer materials and Classroom or “Mentee” materials), geared toward elementary, middle and high school teachers and the students they teach. Each level included embedded curriculum content materials, tied explicitly to state content standards along with addressing national science and technology standards.

2) *To support state and local curriculum standards and frameworks through the training.*

Training materials were created and implementation was designed to address specific curriculum content and classroom needs of elementary, middle and high school teachers. By identifying and supporting state and local curriculum standards and frameworks through the training, participating teachers were able to achieve high levels of satisfaction and success regarding training objectives and classroom implementation. All curriculum materials developed by CIESE have explicit links to the relevant state and national content standards in science, mathematics, and educational technology.

3) *To create a training and support infrastructure that can have a systematic impact by reaching out to teachers at every school within a district.*

The Alliance+ model created a powerful training and support infrastructure by reaching out to teachers at every school within the partner districts. Capacity was created within participating schools through establishing relationships with the community colleges, training mentor teachers, and providing ongoing support for classroom teachers. This has proven to have lasting systemic impact, beyond the scope of the original project (see *The Effect of the Project on Participants Being Served by the Project*).

4) *To develop a model that is responsive to local needs while at the same time readily adapted by virtually any school district or locality.*

The purpose of the grant was to demonstrate a model for wide-scale teacher training in technology-supported delivery of rigorous core content using community college and K-12 collaborations. Local successes, adaptations and implementation models have been noted above. Sharing this professional development model with other school districts and localities has led to additional program implementation beyond the initial scope of the grant.

Maricopa Community College worked with a diverse collection of schools consisting of 67 school districts, including 13 elementary and one regional high school district in central Phoenix, and rural school districts serving the Apache, Navajo and Pima reservations. Large distances between districts necessitated a change in the model, with a “traveling” core team trainer visiting remote sites.

Miami-Dade College implemented the original Alliance+ model most closely. Community college professors trained by CIESE served as core trainers for the two

participating school districts: Miami-Dade County Public Schools (MDCPS), the fourth largest school system in the nation, and the Archdiocese of Miami. Fourteen middle school mentor teachers conducted classes at the elementary schools in their sending districts. MDCPS provided mentee classes for 385 elementary and middle school teachers. In addition, the Miami region introduced an “Administrator Training Program,” where principals were trained and awarded with a technology-rich infrastructure to further extend the program in their schools.

Cuyahoga Community College worked with three school districts: Cleveland Municipal School District, East Cleveland Public Schools, and the Catholic Diocese of Cleveland Schools. Core trainers conducted mentor and mentee training in the partner districts. A core trainer from the Polaris Career Center conducted cross-district classes. Teachers of all grade levels throughout the three districts were trained with SCT, with efforts focused primarily on K-8. A parent involvement and training component was also initiated. Collaborations with several institutions of teacher education (Cleveland State University and Baldwin Wallace) matured through the Alliance+ project and helped to facilitate the integration of SCT resources into the curriculum of pre-service education in Cleveland.

5) To share this professional development model with educators, and policy makers across the country through and extensive dissemination effort.

The Alliance+ project has had extensive and wide-ranging dissemination over its five-year implementation. The Alliance+ model, Savvy Cyber Teacher® programs, and “unique and compelling” curriculum materials have been featured at numerous national conferences, including:

- the League for Innovation in the Community College’s Conference on Information Technology and “Innovations” conferences (1998-2003)
- the National School Boards Association Technology Conferences
- the National Education Computing Conference
- the Florida Education Technology Conference
- the Society for Information Technology in Teacher Education Conference
- the Education Commission of the States Summit on Community Colleges’ Role in Teacher Preparation Conference
- the National Association of Community College Teacher Education Programs Conference
- as well as dozens of state and regional technology, science, and educational conferences in the partner sites.

Articles about these curriculum materials and the training programs have appeared in national publications such as *THE Journal*, *Learning and Leading with Technology*, *Converge*, and *Momentum* magazine, as well as numerous local newspapers and community publications.

In addition to conferences and publications, two professional CD-ROMs have been produced by the League for Innovation to describe the Alliance+ project, model, and

benefits; and to describe the results of a 2003 Student Impact Study. In addition, partners also created CD-ROMS highlighting project accomplishments and the Alliance+ project's impact on each region. The video documentary "What If Someday..." produced by Maricopa Community College won a "Telly" award in its category.

Effectiveness of the Project in Meeting the Purposes of the Program

Demonstrated success in teacher pedagogy and student achievement as a result of the training implemented during the Alliance+ project has been well-documented in past evaluation reports and described in the attached 2004 Yepes-Baraya online teacher survey study. The effectiveness of the project in meeting the purposes of the program has been described above. Program effectiveness was also achieved through several successful technology innovations, instituted in response to the need to manage a large-scale nature of the project. The use of Internet-based real time and telecollaborative-based projects to improve teaching and learning in science, math and technology integration in K-12 has already been highlighted. Additionally, the use of web-based and other technological tools to manage a large scale project, such as: video-conferencing, data feed tools for user input and administrative monitoring, threaded discussions, live chats, list serves and other online community features facilitated the successful implementation of the program.

The Effect of the Project on Participants Being Served by the Project

The Alliance+ model created a training and support infrastructure by building capacity and supporting implementation among the partner institutions. Colleges of teacher education in each of the three sites supported community college faculty teaching of the SCT course by granting the equivalent of two graduate credits. At the outset of the project, attempts were made to encourage and entice colleges of education to adapt and adopt SCT for their own coursework; however, these collaborations had limited success. Over the course of the grant, the expanding role of community colleges in teacher education became apparent. This realization has led to a \$1.5 million award from the U.S. Department of Education's Preparing Tomorrow's Teachers to Use Technology (PTE) grant program to create a community college-level training program for faculty who teach preservice teachers.

Through the PT3 grant, 33 community colleges will be impacted over the next three years. A faculty training program, the Savvy Cyber Professor, will be a cooperative effort of the three community colleges to develop a blended-mode training program to prepare community college math, science and/or educational technology faculty to develop and use unique and compelling college level curricular materials for math, science and educational technology classes in year one and two pre-service required teacher courses. This effort is a direct result of outcomes learned through the Alliance+ project.

Conclusion

The Alliance+ Project demonstrated a model for widescale teacher training in technology-supported delivery of rigorous core content using community college/K-12 collaborations. The success of the Alliance+ program in Cleveland, Miami and Phoenix substantially strengthened ties among these school systems, community colleges, and colleges of teacher education. Current work involving all three partner institutions in the PT3 grant project to build upon SCT in the area of higher education, will serve to strengthen and further develop relationships, skills and knowledge regarding institutionalization of faculty and teacher development programs, and demonstrates the commitment the partners share for this process.

In addition, a National Science Foundation award is pending to spread use of these materials to independent colleges of teacher education (#035261) in partnership with the Council of Independent Colleges.

Through SCT training, teachers' instructional practice, evidenced through more frequent and sophisticated use of technology to promote inquiry-based content knowledge was strengthened along with instructional approaches in science, mathematics, language arts, social studies, and other subjects through use of powerful, Internet-based lesson activities modeling project-based learning approaches.

At the inauguration of the Alliance+ project in 1998, emphasis of the Technology Innovation Challenge Grants was on effective use of technology in the classroom and on innovative applications of technology. It is clear that Alliance+ has met both of these standards. However, with the introduction of *No Child Left Behind* (NCLB), the measures of success shifted to include greater impact on student achievement and on teacher quality. As the draft online teacher survey (Yepes-Baraya, 2004) documents, both student impact and teacher competencies were positively impacted as a result of the Alliance+ project. Improved teacher mastery of Internet-based tools and resources and their meaningful application in the classroom was achieved through successful technology innovations developed and improved upon throughout the Alliance+ project. Progress made in achieving the Alliance+ stated objectives is evident along with the effectiveness of the project in meeting the purposes of the program. Through successful dissemination of SCT in partner states, positive steps toward institutionalization, and building upon the existing partnership through the PT3 grant, the effect of the project on participants served by the project has been shown.

In addition to the perceived need to continue work with community colleges, CIESE continues to develop relationships that will bring Savvy Cyber Teacher® professional development materials and the Alliance+ model directly to local school districts both in the New York metropolitan area and on the national level and in several Latin American countries. The impact of this investment will continue to have wide-ranging and substantial benefits, both in the original partner regions, and around the country and around the world.