Conceptual Framework and Organizational Structure of Alliance+: A National Model for Internet-in-Education Professional Development

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Overview

The conceptual framework and organizational structure of the Alliance+(plus) program are presented. Alliance+ brings a technological university, a national community college organization, community colleges from three widely separated metropolitan areas and the school systems from those cities together in a five year effort to provide technology-in-education training for 10,000 teachers.

The Challenges

Alliance+ was undertaken as a large-scale national teacher training model as a solution to two fundamental problems that confront American educators:

1. The need to accomplish transfer of “best practices” from a small group of localized innovators to a larger national or global community of teachers; and

2. The task of providing ongoing support for these large numbers of teachers on the implementation of the “best practices” in a city, county or province.

Both of these problems must be solved with high quality programs at affordable cost.

These challenges are of critical importance for all educational innovations but are particularly severe for technology-based applications in pre-university settings. The vast majority of teachers are not prepared to quickly gain mastery over new artifacts and systems and to integrate those new technologies into classroom practice. Some of the hurdles that are uniquely associated with technology-based innovations include the following:

- Since technology is constantly changing, teachers are frequently challenged with mastering the intrinsic characteristics of the new technology itself. The time required for this can easily be one year.

- A teacher who masters a new technology must then explore how this technology can be used in classroom practice and as a tool to facilitate student learning. This period of exploration can take an additional year.

- Finally, a teacher who masters the new artifact or system and understands its pedagogical potential, must then create new classroom materials and strategies. In many cases the advantages inherent in the new technology are best exploited through project-oriented, student-centered activities. For most teachers, these modes of teaching are new and require acquisition of new skills and the development of new sensitivities, attitudes and methods of classroom practice. Coming to grips with these challenges and refining new approaches can require yet another year!

This three year developmental process has severe limitations: one is that few teachers have the vision and insight needed to independently create new approaches. For those who do, it is unlikely that they will be provided the time and support needed for such extended curriculum development efforts by a local school system. Even if they are successful, after three years there is a good chance that the technology itself will be replaced with something that is vastly superior.

Since Alliance+ is dealing with Internet, the program must grapple with yet another challenge. While most computer-based techniques can be categorized as “tools’ for teachers or students, the Internet creates a new environment for learning that potentially encompasses all segments of society and all instrumentation that can be digitized. In dealing with the Internet, teachers are not merely learning techniques, they are entering into a new culture, new ways of learning and new ways of communicating.

The cultural transformation inherent in this process engages teachers in continuous learning and adaptation. Introduction of Internet into schools requires more than participation in a finite number of workshops, but immersion into a community of users. There is no fixed time period for this process. Rather it will be ongoing. Since there is no end in sight for the development of Internet technology, there will be no end in sight for the adaptation process. It is critical that Internet-related training be structured to engage teachers in a stable supportive infrastructure.

With this perspective, we re-examine the original questions. Given a small cadre of early innovators who have gained insight, understanding and experience with the new capabilities of Internet technology - how can this expertise be disseminated widely and how can large numbers of teachers in a given locale be provided with appropriate training and essential continuing support?

Background

Alliance+ is a model for teacher professional development that reaches teachers who are thousands of miles apart, but which provides face-to-face workshops and support as well as tools, resources and assistance through distance communications.

At the center of Alliance+ is a group based at the Center for Improved Engineering and Science Education (CIESE) at Stevens Institute of Technology. Stevens is a small private technological university that was founded in 1870. It is located in New Jersey on the left bank of the Hudson River across from mid-Manhattan in New York City. While Stevens does not have teacher education programs, it has been an innovator in applications of computers and information technology in the education of scientists and engineers for more than twenty years. For example, in 1982, Stevens required all of its engineering degree candidates to own a personal computer that was used in the instructional program. CIESE was established by Stevens in 1988 to bring this computer-in-education expertise to teachers and school systems.

CIESE has been providing training programs for teachers and outreach assistance to school systems on applications of computers and networks in teaching mathematics and science in elementary, middle and high school programs.

In 1994 CIESE received a $2.9 million grant from the U. S. National Science Foundation to assist schools throughout the state of New Jersey on applications of Internet in science classrooms from kindergarten (5 and 6 year olds) through 12th grade (17 and 18 year olds). In that four-year project CIESE had opportunities to provide training workshops to approximately 3,000 teachers from more than 700 school buildings in New Jersey.

The question of how to use Internet most appropriately in instruction was of constant concern. We worked collaboratively with teachers on the analysis of potential classroom applications. We also visited and consulted other programs throughout the United States. What we found was that many educators were content with Internet applications that were essentially archival in nature. While the Internet is a vast library resource, we believe that its greatest potential lies in its interactivity and its ability to bring (in science education) real-time data into classrooms.

We, therefore, concentrated on accessing Internet-based curriculum resources that empowered students at all age levels to "do" science instead of hearing about science. Many of our materials can be examined at our web site at http://www.ciese.org. We have also published articles that describe this approach (*Web Adventures in K-12 Science,* Technos Vol. 6 No. 4, Winter 1997).

As we approached the later stages of the National Science Foundation project, we realized that we had acquired expertise that was not widespread. To gain perspective, one should remember that the Netscape company was incorporated in November of 1994. As we speak atAERA in 2000, Netscape has been a product for less than six years! Yet graphical user web browsers are now used by scores of millions of people worldwide. The challenge for CIESE was how might we engage in dissemination of our experience and expertise to teachers and school systems that were not within easy travel distance from our campus.

Rationale for the Model's Design

While the techniques of distance learning can be helpful, it is the experience of CIESE that inexperienced teachers who are being presented with professional development programs on applications of new technologies need face-to-face workshops. They require personal attention from an individual or a group with whom they can consult on an ongoing fashion.

One option was that of interactive video. In past years CIESE produced more than 30 hours of satellite video broadcasts on applications of software in mathematics education to teachers throughout the United States. While these programs included documentary television segments of real classroom experience as well as discussion and question and answer sessions, teachers were quite clear in requesting face-to-face hands-on workshops as an essential learning experience.

Another option was online instruction. We have also met with many teachers who have opportunities for online instruction via Internet, but who are not ready for that mode of acquiring new ideas and techniques. While there are large numbers of teachers who do participate in online courses, the vast majority of teachers need more direct and personal learning experiences that involve mastery of hardware and software in locations where they can interact with others and have assistance in working with materials that are being presented in their courses.

While it may appear that most teachers are ready for online instruction, it is useful to examine the numbers involved. If about 3 per cent of teachers are ready to take advantage of online learning, then in the United States, which has about 3 million teachers, there would then be nearly 90,000 teachers in that category. While this is a small percentage of all teachers in the United States, it is a large absolute number, and can easily convey the illusion that most teachers can profit from online learning.

It is our contention that in order to create a nation whose schools can deal effectively with technology, at least 20 percent of the teachers need to be trained. Therefore, in the United States at least 500,000 teachers require face-to-face instruction.

In some cases, school systems themselves will be able to provide the required instruction and support. However, it is the experience of CIESE that most school systems in the U. S. are too small to be able to grapple effectively with these challenges of technology-in-education. We also find that the large school systems are either too bureaucratic or too bogged down with social and behavioral problems to be successful in this arena. While state agencies could help meet this need, it has been our experience that the most effective strategy is to have the nation's strong cadre of higher education institutions manage these educational programs.

A model for meeting these needs is one in which materials are produced and organized for national distribution at a technically-sophisticated research university and then implemented at regional resource centers. It must be emphasized that the production of materials must take place through close collaboration with teachers and schools. All materials must be tested and proven effective through use in classrooms.

Another factor which strengthens this design formulation is the fact that higher education institutions, especially those with engineering and computer science departments, are close to the evolution of technology itself. Those institutions are optimally positioned to anticipate changes that are constantly evolving.

The Key Role for Community Colleges

In the United States we have an extraordinary opportunity to develop regional resources centers for teacher professional development on applications of technology in instruction at community colleges. There are about 1,000 community colleges and there is at least one institution within commuting distance of 90% of the American population. These colleges provide two years of post secondary school education as well as many continuing education courses and special education programs for adults.

More than one-half of all students enrolled in post secondary education in America today are attending community colleges. Some students are enrolled in transition programs that will prepare them to enter the third year of a four-year college program and some are enrolled in terminal two-year programs for associate degrees in fields such as engineering technology, medical technology and culinary arts, among others.

The Alliance+ Model is one in which the CIESE group at Stevens Institute of Technology trains faculty and staff at community colleges who, in turn, provide continuing education and follow-up support for teachers in school systems in their region. Some of the advantages of this arrangement include:

- Community colleges are more teaching-oriented than four-year schools which usually place higher priority on faculty research and publication records than on teaching.

- Community colleges are focused on supporting their immediate geographical region. They are usually funded to provide education for individuals in a particular region and are seriously committed to this pursuit.

- Because they are organized by region, with no competitor within in their own region, they are more likely to collaborate with other institutions since they are free of rivalries.

- Community colleges have many programs to help students in secondary school make the academic transition to higher education. They are familiar with the secondary school curriculum and provide remedial courses and review courses for students who did not perform well in secondary school. Through programs of this sort, many community colleges have established working relationships with local school systems and have become familiar with their culture and mores.

- Community colleges also engage in education that is highly focused on the workplace and have strong sensitivity to the needs of working professionals. Community colleges have vast experience with continuing education of adult learners and have also implemented extensive programs of workplace training through direct contracts with corporations and government agencies.

It is surprising that community colleges have not been more active in providing continuing education for teachers. Perhaps they have been standing aside from that market in deference to colleges of teacher education. But experience shows that colleges of teacher education are generally not eager to undertake such field-centered programs. This is especially true in the domain of technology where many of the colleges of teacher education have not yet become proficient themselves. In contrast, in many cases, community colleges are leaders in the use of technology in their academic and outreach programs.

Alliance+ Organization

A crucial aspect of this model is the high level of partnership and collaboration by the League for Innovation in the Community College. The League is the premier organization in the United States devoted to creation and dissemination of new programs that strengthen the role of community colleges as centers of educational and training services to meet local needs. The three community colleges participating in the project are included among the 20 institutions who hold full membership in the League. There is a tradition and organizational context for their collaboration in common pursuits.

Not only is participation of the three community colleges in Alliance+ coordinated by the League, but the League is in a strategic position to bring knowledge of this project to the full cadre of community colleges located throughout the country.

While materials development and dissemination are centered in higher education institutions, Alliance+ is fundamentally a school system project. A leadership role is held by the Polaris Career Center, a regional vocational-technical school district in Middleburg, Ohio and implementation is pursued jointly with the leadership of the school systems in each of the participating metropolitan areas. Liaison with school districts is maintained by the community colleges located in each region.

The level of school system commitment to Alliance+ is demonstrated in financial contributions that they have made to this program. The five year award from the U. S. Department of Education for this Technology Innovation Challenge Grant (Grant #R303A980063) is $9.3 million. Funds allocated by the partners toward the program total $11.8 million of which $9.6 million is from the participating school systems. These school systems are expending resources to cover the costs for teacher participation in the program, as well as costs for their own staff who will serve as mentor teachers and program administrators.

These figures demonstrate a tangible commitment to a program that is highly valued by the participating school systems in Arizona, Florida and Ohio. In each case, educational leaders in those states report that Alliance+ is providing vital training that brings applications of technology together with curriculum innovations and that such training and assistance is not available locally.

The specific model that we are implementing establishes a team of core trainers at each community college site. The core trainers are either community college faculty or staff. These core team members are trained directly by CIESE staff. The core trainers in turn are training lead teachers at school systems who are designated as mentor trainers. It is the mentor trainers who then provide workshops for the teachers in the school systems.

The training sequence can be summarize by the following flow chart:

Stevens Institute Team → Core Trainers → Mentor Trainers → Teacher Trainees

Implementation is taking place at three Alliance+ sites. We obtain a factor of approximately 10 in human resources in each transition. For example, Stevens trains 10 Core Trainers in an intensive face-to-face week of sessions; these 10 core trainers then train 100 mentor trainers, who in turn reach at least 1,000 teachers. The exact timing, scheduling and organization of these sessions varies from site to site. While this is a national program, the implementation is orchestrated and implemented locally.

Community college partners include the Cuyahoga Community College in Cleveland, Ohio, Maricopa Community College in Phoenix, Arizona and the Miami-Dade Community College in Miami, Florida. The three locations were chosen with a desire to have partners separated by large distances as a context for a meaningful test of a model that could be applicable on a national scale. Cleveland lies 675 kilometers to the west of Stevens, while Phoenix is 3,500 kilometers to the southwest and Miami is 1125 kilometers to the south.

A significant reason for the selection of these three locations for inclusion in Alliance+ is their level of need. Each of the three metropolitan areas is categorized as economically disadvantaged by federal criteria. In addition there are large numbers of families whose children in these schools are recent immigrants without a firm base in the United States and lacking knowledge of the English language. Phoenix has a large Mexican American population and Miami has many families from Central and South America.

The educational problems in the school systems are severe. Control of the Cleveland Municipal schools has recently been transferred to the mayor in a dramatic reorganization effort. The Miami-Dade Public Schools, the fourth largest in the United States, has an enrollment of about 350,000 students and is grappling with growth in student population of 10,000 per year. Educational development programs in these cities must take place with full cognizance of and sensitivity to cultural, social and political realities. Community colleges provide a viable base for success with these issues.

Alliance+ Materials and Systems

The goal of the program is to train at least 10,000 teachers in a 30-hour course on the use of Internet in science education in a five-year period. A concomitant goal is to engage teachers in a community of educators that will sustain and develop professional practice with Internet-based education. The grade levels that are being addressed are from Kindergarten through 12th grade. For this purpose, three separate curricula are being developed: at elementary, middle school and high school levels.

The 30 hours of hands on workshops are divided into 10 three hour sessions with the overall instructional program known as the *Savvy Cyber Teacher*™ (SCT) series. The SCT introduces teachers to the functionality of the Internet and its use in instruction in unique and compelling applications. SCT stresses real-time interactivity, acquisition of real-time data and opportunities for students of all ages to engage in the scientific process.

The outline for SCT and examples of curriculum applications can be reviewed at the CIESE web site: http://www.k12science.org by clicking on "Alliance" to examine project information and on "Curriculum" to examine Internet-based learning materials.

Details of the implementation and evaluation aspects of Alliance+ are presented in companion papers for this AERA presentation. Joshua D. Baron and Mercedes McKay have prepared an overview of lessons learned and implementation[1] and Mario Yepes-Baraya of ETS has prepared a presentation on evaluation[2].

As this five-year program evolves, it is certain that there will be significant changes as teachers become more adept in the use of the technology and as the technology itself undergoes change. At this stage, we see great enthusiasm for introduction of these approaches into classroom practice. We look forward to the coming years with high expectations for the evolution of exciting new educational environments.

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[1] Baron, J.D., & McKay, M. (2000). *Alliance+ project: Lessons learned from the development and implementation of an Internet-in-education professional development program.* Hoboken, NJ: Center for Improved Engineering and Science Education, Stevens Institute for Technology.

[2] Yepes-Baraya, M. (2000). *Lessons learned from the evaluation of Alliance+ -- An Internet-in-education professional development program.* Princeton, NJ: Educational Testing Service.