Alliance+

Lessons Learned from the Development and Implementation of an Internet-in-Education Professional Development Program

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Introduction

The Alliance+ Project is a five-year, U.S. Department of Education program that provides hands-on Internet training for kindergarten through 12th grade teachers in Arizona, Florida and Ohio. Stevens Institute of Technology's Center for Improved Engineering and Science Education (CIESE) has partnered with the Polaris Career Center in Ohio and the League for Innovation in the Community College in California to provide this extensive training program. Now in the second year of the program, CIESE has successfully begun to train teachers on how to integrate Internet technology into their classroom curricula by working closely with faculty at Cuyahoga Community College in Ohio, Miami-Dade Community College in Florida, and Maricopa Community College in Arizona.

The Alliance+ Project has set the goal of training over 9,000 teachers in Cleveland, Miami, and Phoenix on the use of the Internet in science and mathematics education. To accomplish this, CIESE has developed an extensive training program for K-12 educators called the *Savvy Cyber Teacher*ä that consists of 10 three-hour hands-on workshops. The training program is being implemented using a two-tiered turnkey training model in which community college faculty (Core Team Trainers) train cadres of K-12 educators (Mentor Teachers) in the 30-hour graduate-level course. These mentors then train classroom teachers (Mentee Teachers) in their schools and districts.

In addition to the 30-hours of training, mentors support mentee teachers in the implementation of Internet-based projects in their classrooms and, in turn, receive support from the community college faculty for their mentoring efforts. Furthermore, school and district administrators are involved in orientation and planning meetings to ensure support for classroom implementation.

Besides the training program itself, a range of print and electronic support materials, including Internet-based classroom projects, have been developed. This paper will discuss the unique content of this training program, how the program materials were developed, the implementation issues associated with the program and the lessons learned thus far from this national teacher-training program.

Program Overview and History

For years everyone from President Clinton to school superintendents have touted the importance of using the Internet in education. Educators often react to this by asking the same questions, "Why should I use the Internet instead of a textbook, CD-ROM or the library? What benefit will it bring to MY students that these resources do not already provide?" The answers to these critical questions lie at the heart of the *Savvy Cyber Teacher*ä training program.

The basis for the Alliance+ project work dates back to 1994 when CIESE began a three-year, $2.9 million National Science Foundation project called, the New Jersey Networking Infrastructure in Education

(NJNIE) project. Through this project, CIESE pioneered the use of the Internet in K-12 mathematics and science classrooms with 3,000 educators from over 700 schools throughout the state of New Jersey. At the beginning of NJNIE, our staff (a group of former classroom teachers and university scientists) started by investigating how the Internet could be used for teaching and learning. As we discussed the issue with experienced educators, it became clear that they saw the Internet as a gigantic research library that gave students access to endless volumes of information.

As we delved further into the question, we learned that schools already had plenty of library-based resources that were playing this role and that these were, in fact, quite effective. This realization forced us to question why students should use the Internet to conduct research in the first place when they could use a CD-ROM, textbook, or encyclopedia to perform the same investigation faster, cheaper and more effectively. It soon became clear to us that although the Internet *could* be used as a pure research tool, there were much more compelling applications of this unique technology which most educators were not exploiting. These "unique and compelling" applications went far beyond simple library style research and held the potential to enrich student learning many-fold. Now, almost six years later, we have defined four "unique and compelling" applications that form the foundation of the *Savvy Cyber Teacher*ä training program. They are as follows:

- **Use of the Internet as a *Communications Tool***: The Internet can be used to communicate with experts in various fields or with peers in other classrooms around the world via web-based collaborative projects.

- **Use of the Internet to collect *Real Time Data/Information***: Students now have access to the same information that was accessible only by scientists just a few years ago. Examples of this data includes real time weather satellite images, data from ships at sea, hourly air quality readings, and images from the Hubble Space Telescope.

- **Use of the Internet to *Publish Students' Work***: Teachers and parents already publish students' work on school walls, in school newspapers, on home refrigerators, and at special events to motivate students and demonstrate that their work is meaningful. They can now use the technology to take this fantastic student motivator one step further and publish their work online where the whole world can see it, comment on it, and interact with the students about it.

- **Use of the Internet to find *Unique Sources of Informat*ion**: This might be a diary, letters or original manuscripts kept by a historical figure or famous author which are only available on the Internet or a web site where you can use your zip code to find out who your Congress person is, how he or she voted and the details of specific bills.

Since it is these types of unique and compelling Internet applications that offer students the opportunity to engage in real and meaningful scientific and interdisciplinary investigations, CIESE has undertaken to develop, implement, and manage a number of collaborative and real time data projects for the Alliance+ Project. These classroom projects are used in the *Savvy Cyber Teacher*ä course to illustrate the concepts behind unique and compelling Internet applications that form the foundation for this national teacher training program.

Material Development Process

The Alliance+ grant called for the development of three different versions of the course, one for elementary level, another for middle school and a third for high school as well as additional Internet-

based classroom projects for each grade level span. Although the core focus for these materials came from our experience in the NJNIE project the materials themselves had to either be created from scratch or redesigned specifically for use in the *Savvy Cyber Teacher ä* course. This development process has been a dynamic one, evolving along with the project as new needs were identified and additional resources became available. The following describes both the training material and curriculum material development process.

Training Materials

Phase One

The initial phase of materials development was targeted at the middle school level since this represented the largest group of teachers who were to be trained during the first year of the project. The process began with a lead CIESE staff member developing a draft of one of the 10 three-hour workshops. This was done using MS Word and MS PowerPoint with the goal of creating a set of rough materials that could then be reviewed, edited and re-developed into the first version of the middle school level materials (designated Version 1.0). Once this first draft was completed a team of three CIESE staff was selected with each staff member assigned to further develop three or four workshops. After approximately two months of work the entire CIESE team assembled over a period of several days to review the work that had been done and decide on a final format for the materials as well as the content of each workshop. Once these final decisions were reached a senior CIESE staff member drafted the final set of Version 1.0 Middle School Level *Savvy Cyber Teacher ä* materials. These materials consisted of the following components:

- Workshop Leader's Guide - Detailed notes on how to deliver the training program.
- PowerPoint Slides - Presentation slides used to illustrate key concepts.
- *Savvy Cyber Teacher ä* Handbook - Reference guide for entire course for use by workshop participants during training.
- Homework Assignments - Short assignments aimed at developing skills beyond those covered in the workshop.
- Workshop Web Pages - Individual workshop web pages that contained all of the links needed for each workshop as well as supplementary materials.
- Project Listservs - Email-based mailing lists set up to communicate with the teachers after training had been completed.
- Online Glossary - Web site where teachers could look up common Internet-related terms.

Since the official grant notification came only days before the official project start date, we had to complete the material development process within four months in order to be ready for the first round of teacher training. Although this was enough time to generate Version 1.0 of the Middle School Level materials we had to release these with the understanding that changes would be necessary as we learned what worked and what did not.

Phase Two

Soon after the release of Middle School Level Version 1.0, development work began on the Elementary Level Version 1.0 training materials. Given the fact that much of the Middle School Level materials were general in nature and could be used with elementary level teachers the decision was made to develop new materials for only those workshops that were grade level specific. In order to develop high quality, grade-appropriate materials for the elementary level, a partnership was formed with Bank Street College of Education, which specializes in early childhood development. Through this partnership it was possible to

develop a robust set of elementary training materials as well as two new Internet-based elementary classroom projects. These new classroom projects were important supplements to the existing middle and high school classroom projects that CIESE had developed in past years under the NJNIE project.

Phase Three

As both the Middle School Level Version 1.0 and Elementary Level Version 1.0 materials were used it became clear that a major overhaul was needed to correct some fundamental problems with both the format as well as the content of the existing materials. It was decided that before moving onto the development of the high school level materials that it would be necessary to first correct these problems and release a new Version 2.0.

Because of the scale of the project and the wide range of teachers involved it was important that we involved representatives from all levels of the project in this round of material development. Therefore, Material Review Committees (MRC) were formed in each city to assist with creation of Version 2.0. Each MRC consisted of three Mentor Teachers, three local representatives (state Department of Education staff, USI staff, etc.) and one project staff member. This team was charged with the responsibility of supplying initial feedback on the first version of the materials, reviewing draft materials once they were developed, and ensuring that the classroom projects met the needs of their local school systems. The feedback from the MRC in combination with informal comments collected on site visits and project meetings, allowed the CIESE team to develop a comprehensive set of improvements that would be built into Version 2.0.

Once the necessary changes were identified a plan was created that dealt with the material development work in two stages. The first stage, which is currently nearing completion, is focused on all of the issues that relate to the format of the training materials. These are issues such as page layout, format for a new presentation aid, and the general organization of the Workshop Leader's Guide. The second phase, due to start in mid-2000, will be focused on content related issues. It is expected that the final Version 2.0 materials will be ready for release in the fall of 2000.

Online Classroom Projects

More and more curriculum resources for teachers are springing up on the web daily. Typing in a search string for just about any subject area will yield a vast number of resources. Additionally, there are numerous educational clearinghouses or portals to help teachers locate appropriate curriculum material for a particular subject area or grade level. Close inspection of this material will show there are numerous lesson plans, curriculum guides, activities, and even lab suggestions for K-12 teachers to view, adapt, and use in their classrooms. However, there are fewer collections of appropriate scientific inquiry projects available for teachers and students to use. Very few online curriculum projects incorporate the use of real time data and information. Similarly, although many Internet-based collaborative projects exist, few focus on students collecting, sharing, and analyzing experimental scientific data.

CIESE has developed a number of Internet-based curriculum modules that seek to fill that void. The focus has been on developing projects for which the Internet provides the means for communicating real experimental results with other project participants or accessing real time information previously only available to scientists and researchers. Developing an Internet-based project that engages students in real scientific inquiry is not a simple process. It involves extensive research of the topic, imaginative development of appropriate lessons and activities, and identification of important lesson plan components such as objectives, curriculum standards, and assessment tools. CIESE selects topics for project development based on the following criteria and guidelines.

Projects will:

- Use data or information not readily available through other means

  Often the availability of relevant online data or the extent to which a project lends itself to collaboration will dictate the specific project topic for development. It is easier to find a source of data or information and then develop a project around it than to select a topic for project development and hunt for appropriate data and resources to support it.

- Enable students to share experimental results with others

  It is useful for students to share experimental results with other project participants if the combined results will help students in their analysis of the problem. Sending information to other students just as an activity in itself is not necessarily a meaningful endeavor.

- Promote inquiry science learning

  Projects should promote a high level of scientific inquiry. Students should be encouraged to note all observations and develop hypotheses. They should look for answers to real problems and not just conduct a cookbook style experiment.

- Target at least one general subject area and the associated grade level(s)

  Teachers teach at many different levels and in many different ways. What might be appropriate for a 9^{th} grade general science class might also be appropriate for an advanced middle school physical science class. Projects should span a number of different grade levels and subject areas, with the teacher ultimately deciding whether a particular project is appropriate for his or her class.

- Satisfy national, state, and local standards

  With teachers being held accountable to teach to national, state and local standards, it has become increasingly important to identify the standards satisfied by the project. Although standards vary from state to state and sometimes from town to town, identification of the applicable standards for each of the Alliance+ training sites serves to give those teachers an idea of the value of the project for their classroom use. This is especially important when teachers engage in projects that may take a number of days or weeks to implement in their classrooms. They need to be able to justify the time spent on these projects, and being able to demonstrate that the projects meet many of their required standards goes a long way in ensuring parent and administrative support.

- Include multidisciplinary lessons and activities whenever possible

  Project-based learning permits students to immerse themselves in an authentic learning environment in which they study many topics related to one specific project or theme. Topics of study may be individual lessons in a real world context. Often, CIESE's projects are centered around one specific science topic but then incorporate math, language arts, and social studies activities related to the topic.

Two topics that were selected for development as part of the Alliance+ project this past year included weather and environmental habitat. CIESE focused the project development effort at the elementary grade level since this was the level that additional training material was needed. It was determined that the

topic of weather would be incorporated into a real time data module since there is a wealth of real time weather information available online. *The Wonderful World of Weather* project resulted from this decision. Subsequently, the topic of environmental habitats was fully developed into a collaborative project entitled *Square of Life: Studies in Local and Global Environments*. CIESE determined that both of these projects would be appropriate for young students who may not necessarily have a good understanding of the world around them. By investigating weather phenomena and environmental habitats around the world as well as in their own backyards, young students could learn about the natural world around them while engaging in real scientific inquiry methods.

Each of the Internet-based projects developed by CIESE includes the project's main goals and objectives, implementation schedule, step-by-step instructions, a variety of additional research questions, references to the appropriate national and state curriculum standards, a description of the equipment and resources needed to do the project, and a number of additional resources for teachers and students, including online experts, online discussion areas, and suggestions for hands-on activities.

Both the *Wonderful World of Weather* and *Square of Life: Studies in Local and Global Environments* projects followed the format described above. However, it was found that elementary teachers, unlike other grade-level teachers, had more use for step-by-step teacher instructions and less use for student instructions. Subsequently more detail was included in the teacher lesson plan web pages, with versions available for downloading and printing at the convenience of the teacher. For teachers who didn't need all the details, abbreviated versions of the instructions and lesson plans were made available.

Implementation Issues

As one can imagine, there are many implementation challenges that come with directing a national Internet-in-education teacher professional development program in three cities across the United States. In addition, teachers face equally difficult challenges when they return to the classroom and begin to use the Internet-based projects and materials to which they have been introduced in training. The Alliance+ project has developed new resources, projects and policies to effectively deal with these implementation issues. The following outlines these in detail.

Savvy Cyber Teacher™ Training Program

Quality Control

Of all of the implementation challenges associated with the training program itself, the most critical is that of quality control. In order to have an impact on students in the classroom it is vital that we are able to provide high quality training to each "tier" of trainers (Core Team, Mentor Teachers and Mentee Teachers). With a project of this scale, maintaining high quality at all levels requires constant monitoring and support from both the local and national level. The physical distance that separates Stevens Institute from the implementation sites presents unique challenges that call for unique solutions.

Early in the initial startup phase of the project we realized that relying on paper-based evaluation tools and registration procedures would not meet the needs of such a large-scale program. It was decided that we would develop a set of web-based evaluation forms that would be completed by Mentor and Mentee Teachers at the conclusion of each three-hour workshop. The data from these evaluation forms would then be saved on our server at Stevens, analyzed automatically, and re-posted to the web for review by various project staff. This real time feedback system has allowed us and the project coordinators in each city to monitor the quality of training as it is taking place rather than days or weeks later when paper-based evaluation forms would normally be sent in for review. This capability has meant that the project coordinators have been able to spot problems that have developed during one workshop and before the

next workshop is held they have effectively dealt with it by either meeting with the trainer or assisting them via email. As a result of having capability we have been able to maintain a very high level of quality of instruction in all of our workshops even though they take place at locations throughout the United States.

Besides using this system, known as the DataFeed System for evaluation purposes it is also the primary registration system that we use to monitor the teachers who are trained and the courses that are being offered. All of the teachers who go through training complete an online registration form that records who they are and where they teach. In addition, trainers are required to register the course they will be conducting, including the dates and locations for each workshop. Having this online registration system has not only simplified the process of tracking project participants but has also had the additional benefit of improving our capabilities for supporting the trainers. For example, at one point in the project we had some key web sites go offline temporarily without any advance notice. Within minutes we were able to pull up all of the courses that were being held at the time that might be impacted by the technical problems. We were then able to call each of trainers and suggest alternative sites to use for that night's workshop.

In addition to the DataFeed System the project has also put in place several policies aimed at dealing with the issue of quality control. One of the lessons learned early on in the project was that Mentor Teachers who were selected to participate in the program were not always aware of the tasks that would be required of them. Items of concern included the time needed to prepare for each workshop and how to register their courses in the DataFeed System. Those Mentor Teachers who became involved without fully understanding what was expected of them often did not prepare for the training they had to deliver and, as a result, their workshops suffered from quality problems. To remedy this situation we developed a set of Mentor Teacher responsibilities that the training sites, in some cases, have had the trainers sign before starting the project to ensure that they were aware of expectations. This has proven to be an important tool in controlling quality.

Finally, we have recently begun to request that Core Team Trainers and Project Coordinators conduct site visits to the workshops that are being run by new Mentor Teachers. During these visits the staff are able to assist the Mentor Teachers but they also can observe the effectiveness of the training session and the level of preparation of the trainers. In cases where Mentor Teachers are repeatedly unprepared for the workshops we have established a policy that allows the Project Coordinator to remove them from the project. This is only done in extreme cases but is necessary in order to focus the limited resources and funds in the project on those that are interested in fully participating.

Course Prerequisites

One of the most common implementation issues that has come up in each site is that of course prerequisites. Although the *Savvy Cyber Teacher*ä training program has been designed for novice Internet users it does assume a basic level of computer use and a background in science education. As we began to implement the first round of training we found that in many cases, despite the stated prerequisites, teachers of all proficiency levels were accepted in the courses. As a result the courses were often filled with teachers who possessed quite diverse levels of computer and science skills. It was not uncommon to find a course that had several advanced web designers enrolled along with several teachers who had never used a computer. This significant range in abilities created problems for trainers who found it impossible to meet the training needs of these different types of participants. In order to avoid these problems an explicit and extensive set of prerequisites was developed which outlined the skills teachers needed in order to take full advantage of the training program.

Mentor Teacher Support

Anticipating the implementation challenges that the Mentor Teachers would face preparing for and conducting training, we developed both online and offline support mechanisms. These were designed to supply Mentor Teachers with the assistance they would need to deliver high quality workshops.

One of the first online support mechanisms that was set up were the project listservs. These listservs provided us with a direct link to everyone engaged in or supporting training in each city. We used the listservs to post information concerning new Internet resources, changes to training instructions, and urgent alerts about technical problems with our servers or web site. This direct communication link has provided a critical support system that is vital for avoiding major implementation problems. Mentor Teachers have quickly learned the importance of regular monitoring of the listserv and checking for urgent notices just prior to workshops.

After releasing the first version of the materials we had not expected to make any changes until we released Version 2.0. Considering the dynamic nature of the Internet and web sites, this, was, in retrospect, a naï ve assumption. Almost as soon as the first version was distributed, one of the project's primary curriculum web sites radically changed its interface and organization. This made the instructions we had developed obsolete and created significant problems for Mentor Teachers who tried to use them. As a result of these types of challenges, we developed the Virtual Help Desk, a web-based system that allows us to post all of the changes we make to one easy-to-use web page. Mentor Teachers can access this site as they prepare for each workshop by using a simple "pull down menu" that easily identifies needed information. We have also added a FAQ (Frequently Asked Questions) section to the Virtual Help Desk. These systems have been invaluable tool in our scale up efforts as we aim to fully support the Mentor Teachers over the exponential growth of the project.

As most Internet users know, web sites are not as reliable as other traditional teaching tools such as a blackboard and chalk. For K-12 educators and trainers alike, having to deal with an unreliable technology can create significant barriers to success. In the Alliance+ project, Mentor Teachers often have no way of rescheduling workshops or postponing them, so when our server goes down it can create major problems. As a result, we have placed a completely redundant backup server online at a location off campus. Every night this backup server is updated to include the most current materials that have been placed on our primary web server. Mentor Teachers are then given access to this backup web server and can use it in case our primary site is down or responding slowly. This backup system has saved countless numbers of training sessions that would have been impacted on by unforeseen technical problems if not for the ability to switch over to the backup server.

Besides this range of online support systems we have also put in place a series of offline support systems that utilize the project staff who are working in each city. Project Directors and Coordinators in each location have set up local support teams of Core Team Trainers and Implementation Specialists who are available for a range of support activities. These include copying and distribution of training materials, onsite training support, classroom site visits, as well as phone support for those last minute questions and needs.

Use of Classroom Projects

The Internet-based projects that CIESE has developed improve with each new implementation. Projects that have started out as simple, one-page web sites have evolved into multi-page, content-rich, resource-laden web sites for classroom use. Since the web site is the main source of information for each project, it must include very detailed information so that all participants know exactly what steps to follow and what

is expected of them. However, it is equally important that information be presented in such a way as not to intimidate or scare off potential project participants, especially if they are new to using the Internet. Simple, easy-to-follow web sites are appealing to both new and experienced Internet users.

Implementing Internet-based projects poses challenges to even the most experienced project coordinator. Issues that CIESE has addressed include:

- How to attract participants

  All of the projects that CIESE has developed have been promoted extensively to the teachers involved in the Alliance+ project. Teachers are made aware of upcoming projects through the Alliance+ listserv where project announcements are posted on a regular basis. In these announcements, a short summary of the project is given along with the appropriate grade level and curriculum standards that are satisfied by the project. Potential participants are also provided a timeline for the project so they can anticipate how much class time the project will involve. Teachers can find out more about the available projects through the Alliance+ web site, their Mentor Teachers, or CIESE staff.

- How to integrate the project into the curriculum

  As stated previously, all of CIESE's projects identify the national, state, and local standards satisfied by the project. This helps teachers align the project lessons with their curriculum needs. Additionally, guidelines for how to implement specific projects are reviewed in related Alliance+ training sessions so that teachers feel at ease using some of the projects right away. Further, recommendations for classroom implementation are included on each project's web site. This may be in the form of detailed lesson plans or recommendations for using certain aspects of the project at different times, depending on the current topic of study. Also, assistance for how to integrate a specific project into a teacher's curriculum is provided by CIESE project leaders upon request.

- How to ensure that teachers are comfortable using technology

  In addition to reviewing certain projects during Alliance+ training sessions, teachers are given homework assignments that require them to use the Internet. Homework sessions may include posting a message to a listserv or discussion area, searching for relevant classroom material, or participating in a simple collaborative project. All of the instruction and homework is given in order to help teachers feel more comfortable using the technology. If teachers can be allowed to use certain components freely and without fear of making mistakes, they will be less apprehensive participating in other online projects.

- How to minimize Internet connectivity issues

  A recent detailed research study confirmed that having Internet access in the classroom is a key factor in teacher use of the Internet (Becker, 1999). From our past work under the NJNIE grant, CIESE is familiar with the frustration that lack of Internet access can cause teachers who are engaged in professional development training on the use of the Internet. Although recent studies have found that classroom connectivity is on the rise (National Center for Education Statistics, 2000), this convenient form of access still remains the exception rather than the rule. This is especially true in urban school systems where most of our training activities are focused.

  To combat this problem we have made classroom connectivity a prerequisite for participating in the Alliance+ training. This may seem restrictive but we have found that in order to take full advantage

of the training program, teachers must be able to return to their classrooms to practice and experiment with the technology. If they have to wait six months or longer for access many of the skills they learn will be forgotten and the training, time, and money invested will be wasted. In addition, all of CIESE's projects have been designed to be implemented in a one-computer classroom environment. Guidelines for how to make best use of this technology environment are provided in many of the project web sites as well as during relevant training sessions. Sections of lessons that can be done offline are identified and teachers are encouraged to use the Internet only when it is essential to that part of the project.

Besides dealing with the implementation side of this issue we also take a proactive approach through a partnership with the Schools Online Foundation. Schools Online, a silicon valley based non-profit foundation, has been distributing WebTVs and now Internet-ready PCs to schools around the world for several years. Through our partnership with them we have been able to distribute over 160 systems to date and have plans to increase these numbers in the future. At the request of Schools Online we have targeted only the most needy school systems to receive these units. With programs of this nature and federal support such as the E-Rate program we hope to see this problem disappear over time.

Outcomes

Despite the numerous challenges of implementing a large-scale, geographically-distance, Internet-based teacher training program, the ultimate outcome is meaningful student engagement in real scientific inquiry using resources typically not available to them. This can often lead to students learning important skills and concepts that they might not otherwise learn. For example, in the collaborative project, *The International Boiling Point Project*, students conduct an experiment to determine which variable in the experiment (volume of water, heating device, room temperature, or elevation) has the greatest effect on the boiling point of water. By analyzing all of the data submitted by classes around the world they learn first-hand that elevation or air pressure has the greatest correlation to boiling point. Even though this experiment is relatively simple to carry out, students learn the importance of calibrating their thermometers, following exact procedures, and making precise measurements. They quickly realize that unless all students perform the experiment exactly the same way that there will not be any basis for comparing or analyzing their data. If students were performing this type of experiment in an isolated classroom environment, they might not give much consideration to some of these factors. However, by participating in a collaborative experiment in which many other students are relying on their data, it becomes a much more significant and meaningful exercise for them.

It is also this type of inquiry process that provides a realistic context for learning the scientific method and for developing problem solving and critical thinking skills. When students learn how to read and interpret real data they are not only learning skills that they can apply to other situations, but they begin to understand the significance of what they are learning. For example, young students using the *Wonderful World of Weather Project* investigate weather phenomena both locally as well as in other places around the world. Students focus on developing a basic understanding of how weather can be described by measurable quantities such as temperature, wind, and precipitation, which are skills they can use throughout their lives. Once students have learned basic weather concepts they can begin to explore why weather is different around the world and at different times of the year. Although it is not new for students to learn about weather and weather patterns, using the Internet to learn about this topic provides an exciting, relevant, up-to-date, and scientifically challenging learning experience for them.

Conclusion

Over the last four years the Internet has grown to become one of the most important technologies in our society. Through major federal, state and corporate initiatives almost all of the K-12 schools in the United States have been able to get connected to this amazing new educational technology. In order to reap the benefits of this significant national investment it is vital that we now engage in high quality teacher professional development initiatives aimed at teaching our nation's educators how to effectively use the Internet in their classrooms. The Alliance+ Project, through the *Savvy Cyber Teacher*ä training program, is now taking the first pioneering steps in this endeavor by supplying a national model for teacher training that focuses on "unique and compelling" Internet applications which go well beyond simple research activities and which tap into the true power that the Internet holds as a teaching and learning tool. The lessons learned from this large-scale project will be instrumental in designing future professional development programs that will be vital if this nation is to take full advantage of the national technology infrastructure that it has created. Only then will we, as a country, be ready and able to prepare our children to be productive citizens in this new age of information.

Companion papers for this AERA presentation have been prepared. Conceptual Framework and Organizational Structure of Alliance+: A National Model for Internet-in-Education Professional Development (Freidman, 2000) details design and management issues associated with the project. Lessons Learned From the Evaluation of Alliance+: An Internet-in-Education Professional Development Program (Yepes-Baraya, 2000) provides an evaluator's perspective on the main activities involved in the evaluation of the Alliance+ project.

More information about the Alliance+ project and examples of online classroom projects can be found at the CIESE web site: http://www.k12science.org by clicking on “Alliance” to examine project information and on “Classroom Projects” to examine Internet-based learning materials.

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