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ABSTRACT

The Illinois State Board of Education partnered with two outside groups, the National Computational Science Alliance (NCSA) and the North Central Regional Technology in Education Center (NCRTEC), to provide staff development, along with technological software, hardware, and support, to improve 6th graders' performance in the areas of mathematics, science, and reading. The project involved teachers, administrators, and support staff from diverse public and private schools that contained students of low socioeconomic status, had high transfer rates, and large percentages of students receiving special education. Participants received 5 days of training in the engaged model of learning and in the use of specific modeling software. Participant communication was enhanced through e-mail and other web-based technologies. Teachers planned, implemented, and evaluated action research projects at their schools that involved students in collecting data and highlighted a real problem. Performance assessment measures were utilized to gauge project merit. Feedback from participants was used to improve future efforts at local school sites in achieving state and local standards related to data collection, representation, and interpretation. Evaluation activities produced confirming evidence for each of the three major goals (helping students achieve high academic standards, providing staff development opportunities for teachers, and establishing community collaboration among participating 6th graders). An executive summary is appended. (Contains 13 references.) (SM)

EXTEND THE LEARNING

ACHIEVING HIGH ACADEMIC STANDARDS (AHAS) PROJECT

ANNUAL REPORT OF FINDINGS

AUGUST, 1999

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This project was funded by an Illinois State Board of Education Technology Literacy Challenge grant.

PROJECT COMPONENTS

Project Overview

The Illinois State Board of Education has partnered with the National Computational Science Alliance (NCSA) and the North Central Regional Technology in Education Center (NCRTEC) to provide staff development training along with technological software, hardware and support to improve the performance of over 1000 sixth grade students from across the state in the areas of mathematics, science and reading. The project involved teachers, administrators, and support staff from eight public school districts and three private schools from thirty-eight different classrooms and eight distinct regional communities.

The ISBE provided about $250,000.00 to fund the project in FY99 through a competitive Technology Literacy Challenge grant request for proposal process. The grant monies provided staff development training, on-site support and actual technological software and hardware for teacher and student use.

The classrooms selected for the project contained students reflecting the attributes of low socioeconomic status, high mobility rates in transferring both in and out of school, and a large percentage of students receiving special education services. The program participants were provided five days of training in the engaged model of learning and in the use of specific modeling software (i.e. both Stella and Model-It). Communication among participants was enhanced through the use of e-mail and other web-based technologies.

Teachers were asked to plan, implement and evaluate an action research project at their school involving students in collecting data and information on a real world problem of choice. Projects completed included: energy audits in which students devised ways to decrease the cost and consumption of electrical energy; a recycling project designed to manage student use of paper and related implications for saving trees and reducing local landfill waste; and, a collaboration with a local park district to monitor and improve the water quality of a recreational lake.

Performance assessment measures were utilized to gauge the merit and worth of the project. Feedback from the program participants was utilized to improve future efforts at local school sites in improving student performance in achieving state and local standards related to data collection, representation and interpretation.

Participants

The AHAs project involved 8 public school districts and 3 private schools from around the state. 38 sixth grade participated from the various schools. The schools were selected based upon a matrix of student attributes that included low SES, mobility rate, along with bilingual and minority representation. These characteristics were selected to address the ability of varying and unique student populations to achieve the Illinois Learning Standards through the use of technology.

Listed below are the districts and school participants, followed by a chart displaying just some of the population attribute characteristics.

Aurora East School District #131
- Our Lady of Good Counsel School

Belleville School District #118
- Union School

Carpentersville School District #300
- Carpentersville Middle School

Cahokia School District #187
- Centerville Elementary School

Crystal Lake School District #47
- Hannah Beardsley Middle School
- Lundahl Middle School
- North Middle School

Mt. Vernon School District #80
- Dr. Andy Hall School

Palatine School District #15
- St. Colette School
- St. Thomas School
- St. Theresa School
- Virginia Lake School

Wabash School District #348
- North Middle School

Student Population Attribute Data

District	School	Hispanic	Black	Low Income	LEP
Belleville	Union	0.5%	27.5%	43.1%	0.0%
Carpentersville	Middle	37.8%	10.7%	34.2%	26.1%
Cahokia	E. Morris	0.7%	57.6%	73.3%	0.0%
Cahokia	Centerville	0.0%	87.1%	73.0%	0.0%
Crystal Lake	North	3.8%	0.1%	9.3%	0.0%
Crystal Lake	Lundahl	2.0%	0.9%	3.3%	0.0%
Crystal Lake	Beardsley	5.8%	0.7%	8.3%	1.2%
Mt. Vernon	Andy Hall	2.2%	26.8%	48.0%	0.0%
Palatine	Virginia Lake	30.5%	10.3%	32.4%	13.2%
Wabash	North	0.0%	1.0%	33.6%	0.0%

Project Goals

The partnership of ISBE, NCSA and NCRTEC sought to create a technology rich environment in each of the participating schools to foster and facilitate student attainment of high standards in mathematics, science and reading. To this end, the partnership committed itself to the continual and on-going staff development of teachers in the latest technologies, and to the creation of model curricular materials for teacher and student use and implementation.

There were three main goals of the project. They focused on helping teachers to use both engaged learning strategies and modeling software with students, and to provide action research opportunities to aid in school improvement planning.

Other goals of the project dealt with the development and dissemination of instructional materials for use with other students across the state, facilitating communication about curriculum planning through web-based technologies, and the development of an accountability system to measure the extent to which student indicators of success and program activities resulted in attainment of stated instructional goals.

The three stated AHAs project goals and some of the major project activities related to each of these goals are stated below:

Goal 1: Help students achieve high academic standards in math, science and reading.

Project Activities

- form a leadership team of representatives from each of the participating schools to serve as a steering committee for the project,
- create a school leadership team to oversee local project activities,
- agree upon local student indicators of success for the project,
- provide teachers with training on engaged learning, and
- have teachers plan and implement an engaged learning and technology rich learning project.

Goal 2: Provide staff development opportunities for teachers to develop, implement and evaluate technology-rich reality-based learning projects.

Project Activities

- provide background information, group training, and individual support for teachers to gain expertise in engaged learning,
- provide training for teachers in utilizing internet telecommunication,
- provide teacher training in action research and performance-based assessment measures, and
- have teachers and staff share findings through collaborative planning.

Goal 3: Establish community collaboration between participating 6th grade students.

Project Activities
- provide training for teachers in utilizing internet telecommunication,
- enable teachers to share via websites and e-mail, and
- model ways for teachers to utilize these internet telecommunication strategies as part of the classroom curricula.

Engaged Learning

Each of the staff development sessions provided teachers with information and opportunities to investigate and experience the instructional process known as engaged learning. This pedagogical strategy has been found to increase the active engagement of students during instruction. For this reason, it was chosen as a way for teachers to help students reach high standards of instruction. The engaged learning models have strong research support for the improvement of teaching and learning (Conrad 1996; Roth, 1994; Shuell, 1990).

The engaged learning model enables teachers to address student outcomes, define activities to engage the learner; select instructional strategies and determine performance assessment measures in a systematic planning process to ensure student learning.

Teachers were asked to develop and implement an engaged learning unit as the culminating activity of this project. All of the teachers successfully utilized the engaged learning model with their students of varying backgrounds and abilities. The Illinois learning Standards were utilized as benchmarks to gauge successful implementation of the engaged learning units.

Action Research

The grant provided teachers participating in the project with a day's training in action research. The action research model allows for classroom teachers to collect information about specific problems of teaching and learning, evaluate the information gathered, and then utilize the information to improve their instructional practice.

Action research differs from other forms of educational inquiry in that the researcher is also the classroom practitioner. Thus through action research teachers act as researchers in the classroom, gathering evidence and making judgments in an attempt to reflectively improve a practice of teaching and learning (Sagor, 1992; Schon, 1983).

The action research model often uses a cycle of phases to ensure proper implementation. These phases are: 1) defining a problem of choice, 2) gathering information about the problem, 3) planning a strategy of intervention, 4) collecting classroom information and evidence about the intervention, 5) making judgments and inferences about the data collected, and, 6) refining the practice based upon the evidence.

Performance-based Assessment

Criterion-referenced testing (CRT) has been popular with educators for many years since it allows the alignment of assessment measures with instructional goals. In this way teachers and school districts have the ability to define and articulate a successful level of student performance to indicate mastery or attainment of a given outcome or objective. Whenever a teacher assesses what has been taught in the classroom, criterion-referenced testing is being used.

CRT's blend nicely with projects of school improvement and curricular alignment at the school and district level for they continue to allow teachers to select indicators of success that are real and meaningful to student learning. In the past decade, a new form of criterion-referenced testing (i.e. performance-based assessment) has become an acceptable standard of practice within the educational community.

Performance-based assessment often allow students to demonstrate what they know about a particular topic or subject and to show how it can be used or applied. This concept of what we want students "to know and do" is at the heart of standards-based assessment. Besides knowledge and performance, students can also portray their beliefs and attitudes about a subject also know as disposition.

The AHA project facilitated the development of performance-based measures to assess student learning and provided practice in these procedures through implementation of both the engaged learning and action research training modules. Various methods for collecting student performance data are always available for teacher use. Project participants were encouraged to utilize a combination of two or more of these data collection methods at any given time. Multiple assessments of student performance provided further evidence of student achievement and strengthened the performance-based assessment procedure. Some broad categories and specific kinds of acceptable performance-based indicators of student success are listed below (Rudy, 1999):

TEACHER OBSERVATION
(e.g. protocol rating sheet; checklist; videotaped lesson); actual observation of students by teacher during the activity related to previously established criteria

TEACHER REFLECTION
(e.g. teacher judgement; anecdotal records; journal); judgments and comments made about a student's performance and/or level of understanding after an activity/episode has been completed based upon previously stated criteria

TEACHER ARTIFACT
(e.g. course syllabus; problem-based learning activity; home web page; attendance record); item of record produced by the instructor utilized during the teaching and/or learning activity/episode based upon predetermined criteria for student performance

STUDENT REFLECTION
(e.g. student journal; structured interview; survey); self-assessment and appraisal of performance and/or level of understanding (prior student training, practice and discussion of assessment criteria is necessary to use this procedure)

STUDENT ARTIFACT
(e.g. contents of a portfolio; lesson plan; essay; criterion-referenced test; group project); assessment completed based upon review and analysis of student's actual work; items produced through participation in specific learning activities; assessment criteria must be established prior to evaluation of materials; portfolio must be available for future reference and data verification (i.e. may be stored on CD-ROM, computer diskette, etc.)

PEER REVIEW
(e.g. observational checklist; performance rating sheet; feedback from an observer); peer assessment/appraisal of another student's performance and/or level of understanding (prior student training, practice and discussion of assessment criteria is necessary to use this procedure)

Modeling Software

An integral part of the project involved the training of program participants in the use of modeling software. The AHAs project provided teachers of sixth graders with two days of training at the NCS site in Excel spreadsheets, Model-It software and Stella software. These software applications were utilized for their capabilities in aiding in data collection and interpretation, along with the distinct use of the Model-It and Stella software to provide models of electrical and other systems selected for development as an engaged learning unit. Studies indicate positive impact on student learning when modeling software has been implemented in classroom settings to address solutions to real world problems (Soloway et al, 1997).

Besides training, staff received the hardware and software necessary to utilize these unique technologies in their classrooms and school districts. Videotapes were also provided for teachers to refresh their training as needed at their home sites. The videotapes included methodologies for: 1) use of Excel software for data collection and analyses of budgets, 2) use of the Model-It software to predict system effects of a given problem of choice, 3) use of the Stella software helpful in conducting a prescribed energy audit and capable of adaptation to other problems and settings, and 4) introduction in the creation of web-based home pages, e-mail communications, and other internet-based technology uses.

Technological Resources

During a planned workshop, program participants were trained by the NCSA staff in using NetFusion to create web-based home pages for their home school. This

internet technology allowed teachers to open e-mail accounts to communicate with other project teams across the state, and with ISBE, NCSA and NCRTEC program staff. This software also extended internet capabilities to the classrooms of each of the sixth grade teachers for use within the project and in other instructional areas of choice. Additional support help and training was provided for project teams at their home schools as needed for successful implementation of school-based web pages, internet access, and e-mail communication. The varying hardware and related software necessary for each participating school to implement this phase of the project was provided by grant funds on an as needed basis.

Student Projects

Many of the above mentioned project goals, components and activities were addressed through development and implementation of an energy project at each of the participating schools. The energy project was used as a model unit for teachers to emulate since it incorporated the engaged learning, action research and performance-based assessment aspects of the project with easily accessible and state of the art technology.

In some cases the energy project did not meet the curricular needs of the particular school, so it was altered to align with current school standards (i.e. became an environmental project involving recycling of community waste products or ensuring the quality of local water).

A typical project required students to:

- determine a relevant school research project,
- study various project parameters in depth,
- use modeling software to test possible intervention strategies,
- carry out and monitor strategies through software modeling,
- prepare a report of findings, and
- present results to various community audiences.

EVALUATION

Program Evaluation

The evaluation portion of the grant assesses the extent to which each of the program goals has been met and also indicates corresponding merit and worth of the stated goals. Sometimes the evaluation activities were formative in nature, taking place during the actual implementation phase of the grant project and providing feedback for program improvements. Other evaluation techniques were strictly summative, occurring at the end of the project and providing commentary about merit and worth of the program (Worthen & Sanders, 1987).

Ensuring that evaluation activities address both formative and summative aspects of the program being studied is an actual strength of the design of the project and the evaluation study.

Confirming Evidence

The evaluation plan utilized a confirming evidence approach to gauge program effectiveness, and provide insight and understanding for continued planning of the partnership activities for the duration of the project. For example, each program goal and research question addressed in the evaluation plan were studied both formatively and summatively, thus providing feedback on current program efforts and also provide recommendations for addressing long-term planning of specific issues and concerns (Patton, 1990).

Each program goal was said to have been achieved or met by *Confirming Evidence*, if and when multiple data measures confirmed same. Program goals and research questions which produced conflicting or differing pieces of data measures were said to have produce *Mixed Evidence*, and were deemed inconclusive. *Disconfirming Evidence* was the term used when multiple data measures verified that program goals have not been successfully met (Rudy, 1999).

Triangulation

A method of data collection used by many researchers to ensure accurate findings is called triangulation. Basically, triangulation requires that multiple data measures (i.e. minimally three distinct measures) be used to produce evidence related to each of the questions studied or addressed in the evaluation plan (Miles & Huberman, 1984; Denzin & Lincoln, 1994).

This variety and multiplicity of data measures strengthens the validity and reliability of any conjectures ultimately made about progress made toward achieving the program goals. The evaluation plan integrated triangulation with the confirming evidence approach as the base of all evaluation activities.

Latest findings from the research community support a mix of qualitative and quantitative data sources when conducting program evaluation research (Frechtling & Sharp, 1997). A mix of qualitative and quantitative data were collected to assess the impact of the AHAs project activities upon attainment of program goals.

Performance-based Data

Criterion-referenced testing (CRT) has been popular for many years since it allows teachers and school districts to define and articulate a successful level of student performance to indicate mastery or attainment of a given outcome or objective. In the past decade revised forms of CRT's (i.e. performance-based measures) have become accepted standards of practice.

Performance-based assessment often allows students to demonstrate what they know about a particular topic or subject and to show how it can be used or applied. This concept of what we want students "to know and do" is at the heart of standards-based assessment and has been implemented successfully in many local school improvement programs.

For the AHAs project, several broad categories of performance-based assessment measures were utilized. These measures included: teacher artifacts exemplified by curriculum planning documents; student artifacts such as student work and student led presentations; teacher judgments gathered through group and individual feedback techniques, and teacher observations of student performance while working with the modeling software during the engaged learning units.

Evaluation Standards

The American Evaluation Association, a professional organization dedicated to implementation and advancement of state of the art evaluative techniques in various settings, has created Program Evaluation Standards. These benchmarks for evaluators are used to ensure that evaluation provides accurate, valid and reliable information that meets the needs of the intended stakeholders. It will be the duty of the evaluator to ensure that these Standards are fully implemented and utilized as appropriate for the purposes of this study. Major themes of the Program Evaluation Standards include the utility, feasability, propriety, and accuracy of the evaluative activities.

Documentation & Instrumentation

Several broad categories of data measures were utilized in data collection and data analyses. Again both qualitative (i.e. performance-based) and quantitative measures of both teacher and student performance were utilized. Data from each of the above categories was reported in this evaluation section as it pertained to one or more of the project goals.

Qualitative measures used to gauge project activities were:

- teacher artifacts (e.g. engaged learning planning documents; action research plans),
- student artifacts (e.g. samples of student work; student presentations),
- teacher judgement (e.g. focus-group feedback collected from teachers), and

- observation (e.g. NCSA staff observing teacher and student use of technology).

Quantitative measures included:

- student performance on Illinois Standards Achievement Test (ISAT), and
- local assessment measures used in school improvement planning (SIP).

Interpretation & Analyses

Again, triangulation of all program goals and research questions resulted in multiple data measures. The confirming evidence approach produced documentation verifying one of the following findings for each item of analyses: Confirming Evidence; Mixed Evidence; or, Disconfirming Evidence.

This approach was utilized with all qualitative and quantitative data for it is appropriate and provides the information needed to inform the various stakeholders (Joint Committee on Standards for Educational Evaluation, 1981). Additionally, if and when quantitative data was analyzed, an appropriate and suitable statistic of choice was also utilized per accepted guidelines published and accepted by the research community.

Evidence of Claim Statements

The grant proposal stated 11 distinct claim statements involving student performance, teacher performance, or technology utilization. Each of these claim statements was reviewed in light of documentation and data gathered through both the formative and summative phases of the evaluation. Multiple data sources were collected and appropriately analyzed for each of the claim statements. Judgements about the claim statements were then made based upon the collected evidence.

Summary Chart 1 (found on page 16 of this report) lists the 11 intended claim statements posited to be achieved by successful completion of the grant activities along with a judgement about the related evidence.

Student Performance Claims

Claims 1 & 2 relate to student performance. Evidence reviewed for these claims included the following documentation:

- IGAP & ISAT student assessment data,
- teacher designed performance-based assessments,
- focus group feedback of teachers,
- portfolios of student work, and
- student developed internet web sites.

Student assessment data of ISAT was not available for review at the time of this evaluation (due out November, 1999). For this reason the term mixed evidence was used to describe student performance in Claim 1. It could be that ISAT data will support this claim in the future.

Regarding claim 2, multiple pieces of evidence support the claim that students have indeed demonstrated understanding of the Illinois Learning Standards.

Teacher Performance Claims

Claims 3, 4, 5 & 6 relate to teacher performance. Evidence reviewed for these claims included the following documentation:

- use of teacher developed engaged learning modules,
- teacher use of interactive software,
- construction of teacher designed performance-based assessments,
- implementation of action research projects,
- focus group feedback of teachers,
- establishment of community partnerships,
- focus group feedback of teachers,
- portfolios of student work, and
- student developed internet web sites.

Regarding claims 3-6, multiple pieces of evidence support the claim that teachers have indeed designed curricula and implemented instructional units directly relating to the Illinois Learning Standards. Thus, confirming evidence exists to support these claims.

Technology Claims

Claims 7, 8, 9, 10 & 11 relate to the design and implementation of technology to improve both teacher and student performance. Evidence reviewed for these claims included the following documentation:

- direct observation of teacher and student use of technology,
- teacher designed instructional units,
- teacher artifacts created through utilization of technology,
- student products resulting from technology,
- focus group feedback of teachers,
- portfolios of student work, and
- student developed internet web sites.

Claims 8-11 are fully supported by confirming evidence. Claim 7 has produced mixed evidence due to the lack of technology support and various hardware limitations inherent to specific school sites and districts. This is not a reflection of the project as much as it is the state of equal access to technology by all students across the state.

Confirming evidence is found top support 9 of the 11 claims originally posed by the grant, with the 2 remaining claims producing mixed evidence. Please note that no claims produced disconfirming evidence, thus concluding that all claims were realized to some extent, with the vast majority (9 of 11 = 82%) of the claims being fully achieved.

Summary Chart 1: Claim Statements

Claim	Students will:	Confirming Evidence	Mixed Evidence	Disconfirming Evidence
1	achieve high standards in mathematics, science and reading.		√	
2	demonstrate understanding of standards in mathematics, science, and reading that had been previously inaccessible to them.	√		

Claim	Teachers will:	Confirming Evidence	Mixed Evidence	Disconfirming Evidence
3	use engaged learning models that incorporate appropriate technologies.	√		
4	develop and use performance-based assessments aligned with the Illinois Learning Standards.	√		
5	plan, carry out and evaluate action-based research projects.	√		
6	establish school partnerships within the community and globally.	√		

Claim	Technology will:	Confirming Evidence	Mixed Evidence	Disconfirming Evidence
7	be connective, ubiquitous, interconnective, and designed for equitable use.		√	
8	be designed for user contributions and collaborative and engaged learning projects.	√		
9	demonstrate engagibility.	√		
10	be use friendly, fast, available for training and support, and have the ability to provide immediate feedback.	√		
11	demonstrate functionality through diverse tools, media use and authoring support designed to help students achieve standards.	√		

Evidence of Completion of Objectives

Summary Chart 2 (found on page 18 of this report) documents the three major goals described in the grant proposal and related objectives. Again the extent to which goals and objectives were successfully met or achieved was directly linked to the evidence provided.

Regarding Goal 1 and student achievement, all 3 objectives were found to be supported by confirming evidence. The evidence included: teacher artifacts, student artifacts, teacher judgement, and observation.

Goal 2 relating to professional development of staff was also fully supported by confirming evidence. Each of the 4 objectives met the necessary criteria by: teacher artifacts, teacher judgement and observation.

Goal 3 of the grant involved the establishment of community partnerships by teachers. Confirming evidence produced positive verification of Objective 1 related to Goal 3, but not for Objective 2. Again the hardware and technological support issues at the local sites resulted in conflicting or mixed evidence for Objective 2.

Evidence of Goal Attainment

Summary Chart 3 (found on page 19) examines the issue of attainment for stated grant goals. Three goals were developed and posed as indicators of success for the AHAs project. Confirming evidence exists that all three goals have been fully realized as originally written in the grant proposal.

Teachers have help students achieve high academic standards as evidenced by : student artifacts , student performance, teacher artifacts, and teacher judgement. Thus, Goal 1 has been realized.

Goal 2 provided staff development opportunities for teachers evidenced by: observation, teacher artifacts, student artifacts, and teacher judgment. Again, confirming evidence exists to verify this goal.

Community partnerships were the focus of Goal 3. Evidence such as, teacher artifacts, student artifacts and teacher judgment verify that these partnerships have been established. Goal 3 is also deemed to possess confirming evidence.

It can be said that 100% of the goals have been realized through the implementation of the Project AHAs grant activities. Not all objectives were completely realized, nor did all original claim statements come to fruition. This is to be expected with the size and scope of this grant project. But when taken as a whole, the goals of the grant have been verified through use of multiple performance-based assessment measures.

Summary Chart 2: Grant Objectives

Goal 1	Help students achieve high academic standards in math, science and reading.	Confirming Evidence	Mixed Evidence	Disconfirming Evidence
Objective 1	Identify math, reading and science standards that are difficult for students to achieve.	√		
Objective 2	Carry out 5 full day technology-rich interdisciplinary learning workshops for 6th grade teachers.	√		
Objective 3	Implement engaged learning and technology-rich projects.	√		

Goal 2	Provide staff development opportunities for teachers to develop, implement and evaluate technology-rich reality-based learning projects.	Confirming Evidence	Mixed Evidence	Disconfirming Evidence
Objective 1	Plan and implement reality-based, technology rich, interdisciplinary units.	√		
Objective 2	Help teachers become more technologically literate.	√		
Objective 3	Teachers will learn how to plan and carry out action based research projects.	√		
Objective 4	Consortium districts and private schools will work collaboratively to plan for ongoing and sustained professional development.	√		

Goal 3	Establish community collaboration between participating 6th grade students.	Confirming Evidence	Mixed Evidence	Disconfirming Evidence
Objective 1	Involve diverse representation in community partnerships.	√		
Objective 2	Develop an internet-based system for districts to share engaged learning projects.		√	

Summary Chart 3: Project Goals

Project AHAs Goals		Confirming Evidence	Mixed Evidence	Disconfirming Evidence
1	Help students achieve high academic standards in math, science and reading.	√		
2	Provide staff development opportunities for teachers to develop, implement and evaluate technology-rich reality-based learning projects.	√		
3	Establish community collaboration between participating 6th grade students.	√		

Statement of Findings

Based upon the review of the evidence presented the following *claim statements* can be made regarding the AHAs project:

Students have:
- met or exceeded high standards in mathematics, science and reading, and
- have demonstrated understanding of the related Illinois Learning Standards.

Teachers have:
- successfully used engaged learning principles in instructing students,
- developed and implemented performance-based assessment measurement procedures,
- aligned curricula with the Illinois Learning Standards,
- planned and implemented an action research model, and
- established collaborative community partnerships for their students.

Technology has:
- been implemented equitably among school districts,
- been designed to foster communication within and among school districts,
- demonstrated engagability by both teachers and students,
- been introduced through group and individual training, and
- provided diverse tools and media to support student achievement.

Some of the teacher artifacts used to verify these findings and claim statements were: engaged learning units, performance-based assessments, action research models, and locally developed internet web sites.

Student artifacts included student portfolios and student presentations conducted with PowerPoint software, along with student use of modeling software.

Technology performance indicators included: improved technological literacy of teachers and students, focus group feedback, random observations, e-mail surveys, technology training, website development, specific software printouts such as graphs and energy models, and student-led presentations to students, faculty and boards of education.

Summary of Findings

It can also be said that 100% of the schools involved successfully utilized technology to improve student performance as measured by various performance-based assessment standards. The AHAs program has proven that a technology rich classroom can be used to improve student performance in the collection, interpretation, and analyses of data. The project also confirms that students of varying abilities, disparate socioeconomic levels and learning styles can all benefit by integrating classroom teaching and learning with various technologies.

Next Steps

Continued work is needed in developing and refining appropriate learning technologies to be used by adolescent learners within various subject domains. Much more staff development and training is necessary to ensure teacher comfort and expertise in utilizing and implementing the latest learning technologies within individual schools and communities. Additional hardware and software is warranted to ensure equal access by all teachers and all students to the latest technological innovations, and to communicate and share information electronically with others engaged in the standards-based improvement of schools.

Future Directions

The Achieving High Academic Standards (AHAs) Project exemplifies the collective wisdom and hard work of a number of individuals and organizations from across the state of Illinois. The project was impactful due to the leadership exhibited by the Illinois State Board of Education, the National Computational Science Alliance (NCSA) and the North Central Regional Technology in Education Center (NCRTEC). Thirty-eight classroom teachers from eight school districts and three private schools now have the tools to extend the learning of their students.

The project was successful because it set high standards and put in motion the steps necessary to carry out and achieve its goals, objectives and claims. It was designed to positively impact the professional growth of teachers, reform curricula, and ultimately improve student learning through the consistent and varied use of technology. This is just one success story of many that highlights the efforts of collaborative partnerships ensuring that students can and do achieve the Illinois Learning Standards.

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APPENDIX

Additional Information

For additional information related to any aspect this project please contact:

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- **Dennis Rudy**, Indiana University South Bend (drudy@iusb.edu), program evaluation and performance assessment
- **Raul Zaritsky**, Senior Research Scientist, National Computational Science Alliance, (raulz@ncsa.uiuc.edu), modeling software and learning technologies

EXTEND THE LEARNING

ACHIEVING HIGH ACADEMIC STANDARDS (AHAS) PROJECT

EXECUTIVE SUMMARY
AUGUST, 1999

DENNIS W. RUDY, PH.D.
INDIANA UNIVERSITY SOUTH BEND

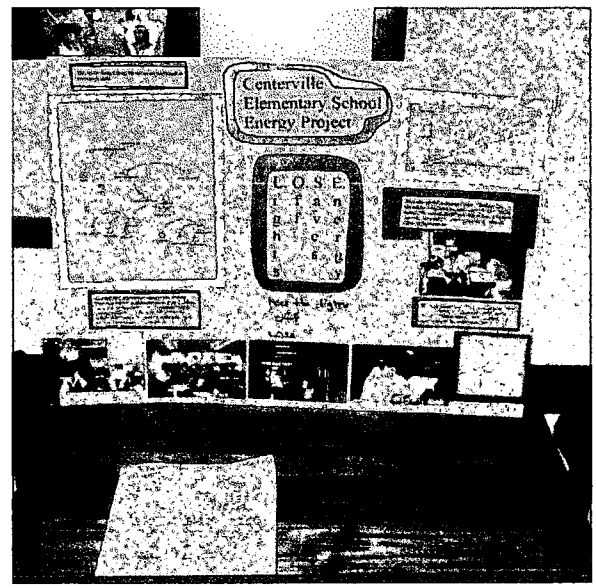
PROJECT OVERVIEW

The Illinois State Board of Education has partnered with the National Computational Science Alliance (NCSA) and the North Central Regional Technology in Education Center (NCRTEC) to provide staff development training along with technological software, hardware and support to improve the performance of over 1000 sixth grade students from across the state in the areas of mathematics, science and reading. The project involved teachers, administrators, and support staff from eight public school districts and three private schools from thirty-eight different classrooms and eight distinct regional communities.

The classrooms selected for the project contained students reflecting the attributes of low socioeconomic status, high mobility rates in transferring both in and out of school, and a large percentage of students receiving special education services. The program participants were provided five days of training in the engaged model of learning and in the use of specific modeling software (i.e. both Stella and Model-It).

Communication among participants was enhanced through the use of e-mail and other web-based technologies.

Teachers were asked to plan, implement and evaluate an action research project at their school involving students in collecting data and information on a real problem of choice (see one example below from Cahokia School District, Centerville Elementary School).



This project was funded by an Illinois State Board of Education Technology Literacy Challenge grant.

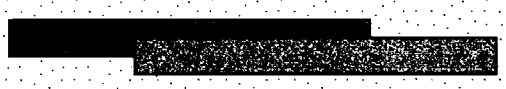
Projects completed included: energy audits in which students devised ways to decrease the cost and consumption of electrical energy; a recycling project designed to manage student use of paper and related implications for saving trees and reducing local landfill waste; and, collaboration with a local park district to monitor and improve the water quality of a recreational lake.

Performance assessment measures were utilized to gauge the merit and worth of the project. Feedback from the program participants was utilized to improve future efforts at local school sites in improving student performance in achieving state and local standards related to data collection, representation and interpretation.

CONFIRMING EVIDENCE

The evaluation plan utilized a confirming evidence approach to gauge program effectiveness, and provide insight and understanding for continued planning of the partnership activities for the duration of the project. For example, each program goal and research question addressed was reviewed and studied both formatively and summatively, thus providing feedback on current and past project efforts along with recommendations for addressing long-term program planning issues (Patton, 1990; Worthen & Sanders, 1994).

Each program goal was said to have been achieved or met by *Confirming Evidence*, if and when multiple data measures confirmed same. Program goals and research questions which produced conflicting or differing pieces of data measures were said to have produce *Mixed Evidence*, and were deemed inconclusive. *Disconfirming Evidence* was the term used when multiple data measures verified that program goals have not been successfully met (Rudy, 1999).



MULTIPLE ASSESSMENTS

A method of data collection used by many researchers to ensure accurate findings is called triangulation. This procedure requires that multiple data measures (i.e. minimally three distinct measures) be used to produce evidence related to each of the questions addressed in the evaluation plan (Miles & Huberman, 1984; Denzin & Lincoln, 1994). This variety and multiplicity of data measures strengthens the validity and reliability of any conjectures ultimately made regarding progress made toward achieving the program goals. The evaluation plan for this project integrated triangulation with the confirming evidence approach as the base of the evaluation activities. Latest findings from the research community support a mix of qualitative and quantitative data sources when conducting program evaluation research (Frechtling & Sharp, 1997).

PERFORMANCE-BASED DATA

Criterion-referenced testing (CRT) has been popular for many years since it allows teachers and school districts to define and articulate a successful level of student performance to indicate mastery or attainment of a given outcome or objective. In the past decade revised forms of CRT's (i.e. performance-based measures) have become accepted standards of practice.

Performance-based assessment often allows students to demonstrate what they know about a particular topic or subject and to show how it can be used or applied. This concept of what we want students "to know and do" is at the heart of standards-based assessment and has been implemented successfully in many local school improvement programs.

For the AHAs project, several broad categories of performance-based assessment measures were utilized. These measures included: teacher artifacts exemplified by curriculum planning documents; student artifacts such as student work and student

led presentations; teacher judgments gathered through group and individual feedback techniques, and teacher observations of student performance while working with the modeling software during the engaged learning units.

FINDINGS & IMPLICATIONS

The evaluation activities have produced *confirming evidence* for each of the three major project goals (see chart below).

Program Goals
1) Help students achieve high academic standards in math, science and reading;
2) Provide staff development opportunities for teachers to develop, implement and evaluate technology-rich reality-based learning projects; and
3) Establish community collaboration among participating 6th grade students.

The following *claim statements* can be said of the AHAs project:

Students have:
- met or exceeded high standards in mathematics, science and reading, and
- have demonstrated understanding of the related Illinois Learning Standards.

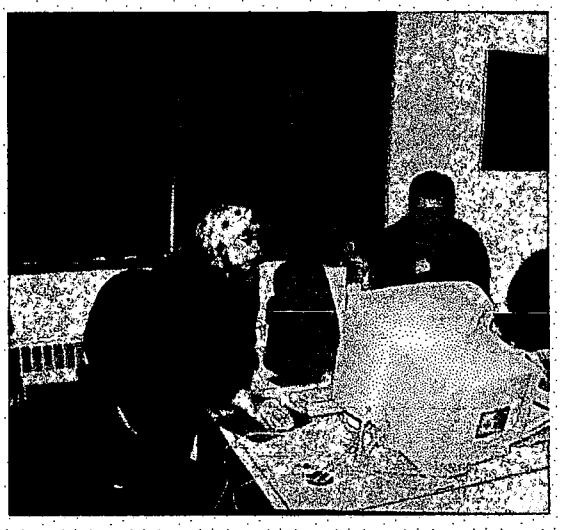
Teachers have:
- successfully used engaged learning principles in instructing students,
- developed and implemented performance-based assessment measurement procedures,
- aligned curricula with the Illinois Learning Standards,
- planned and implemented an action research model, and
- established collaborative community partnerships for their students.

Technology has:
- been implemented equitably among school districts,
- been designed to foster communication within and among school districts,
- demonstrated engagability by both teachers and students,
- been introduced through group and individual training, and
- provided diverse tools and media to support student achievement.

Some of the teacher artifacts used to verify these findings and claim statements were: engaged learning units, performance-based assessments, action research models, and locally developed internet web sites.

Student artifacts included student portfolios and student presentations conducted with PowerPoint software, along with student use of modeling software.

Technology performance indicators included: improved technological literacy of teachers and students, focus group feedback, random observations, e-mail surveys, technology training, website development, specific software printouts such as graphs and energy models, and student-led presentations to students, faculty and boards of education.



Digital photo of teachers engaged in learning to use the Stella modeling software taken during the November, 1998 two-day workshop conducted at the NCSA center in Champaign, Illinois.

NEXT STEPS

It can also be said that 100% of the schools involved successfully utilized technology to improve student performance as measured by various performance-based assessment standards. The AHAs program has proven that a technology rich classroom can be used to improve student performance in the collection, interpretation, and analyses of data. The project also confirms that students of varying abilities, disparate socioeconomic levels and learning styles can all benefit by integrating classroom teaching and learning with various technologies.

Continued work is needed in developing and refining appropriate learning technologies to be used by adolescent learners within various subject domains. Much more staff development and training is necessary to ensure teacher comfort and expertise in utilizing and implementing the latest learning technologies within individual schools and communities. Additional hardware and software is warranted to ensure equal access by all teachers and all students to the latest technological innovations, and to communicate and share information electronically with others engaged in the standards-based improvement of schools.

WANT MORE INFORMATION?

For additional information related to any aspect this project please contact:

- **Bill Conrad**, Associate Superintendent Learning Technologies, Illinois State Board of Education (wconrad@smtp.isbe.state.il), Principal Investigator Project AHA s
- **Dennis Rudy**, Indiana University South Bend (drudy@iusb.edu), program evaluation and performance assessment
- **Raul Zaritsky**, Senior Research Scientist, National Computational Science Alliance, (raulz@ncsa.uiuc.edu), modeling software and learning technologies

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Project AHAs Participating Teams

Aurora East School District #131
- Our Lady of Good Counsel School

Belleville School District #118
- Union School

Carpentersville School District #300
- Carpentersville Middle School

Cahokia School District #187
- Centerville Elementary School

Crystal Lake School District #47
- Hannah Beardsley Middle School
- Lundahl Middle School
- North Middle School

Mt. Vernon School District #80
- Dr. Andy Hall School

Palatine School District #15
- St. Colette School
- St. Thomas School
- St. Theresa School
- Virginia Lake School

Wabash School District #348
- North Middle School

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