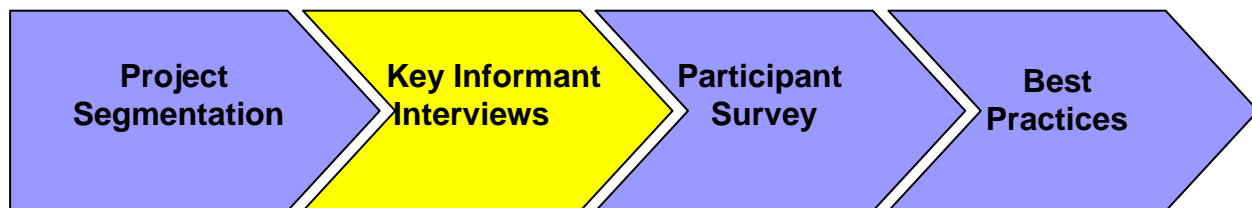**Evaluation of professional development Efforts of ATE Projects and Centers**
Phase II Report

Consistent with the overall goal of the current study to examine in detail the nature of various professional development efforts and activities and to assess the value obtained through participating in such activities, a four phase study approach is being implemented. This report details the results of Phase II: Key Informant Interviews.

Project Segmentation	Key Informant Interviews	Participant Survey	Best Practices

Phase II was designed to accomplish four things: (1) validate the classification of projects along two key dimensions—linkage and scope of activity as described in Phase I; (2) conduct telephone interviews based on the A-E-I-O-U evaluation model with a principal investigator for each of the projects selected in Phase I; (3) collect "evidences" of program implementation and effectiveness; and (4) elicit names of program participants to serve as the basis for the next phase of the study.

Telephone Interview Methodology

We contacted each principal investigator (or a designee) and scheduled a one hour telephone interview. We sent a list of the questions (a pared down version of the actual protocol) to be asked of each interviewee well in advance of their interview so that they would be prepared to answer all the questions (see Attachment 1 for a copy of the list of questions). At the scheduled time, we called the interviewees and verified that they had the time to complete the interview and then we would proceed.

The actual protocol that was used included the list of questions for the interviews plus some additional prompts and information (see Attachment 2 for a copy of the entire interview protocol). We began the interview by thanking the interviewees for their time and participation. We then reminded the interviewees of the process used to select them for participation. We also informed them that the information obtained would be aggregated and reported only in that form. Finally, we informed the interviewees that we were NOT tape-recording the interview but would do our best to take comprehensive notes of the discussion. After covering all the questions, we then asked the interviewees to send us copies of any materials that may have been discussed in the interview such as evaluation reports, questionnaires, agendas, curriculums, etc. We also asked the interviewees to send us e-mail addresses of participants (preferably electronically) so that we may contact them in the next phase of the study.

Validation of Project Classification Process

We wanted to determine the validity of the classification process used to categorize the projects based on the linkages and professional development activities. As detailed in the Phase I Report, we used a rigorous segmentation process to select the 12 projects for further investigation. We decided that it would be worthwhile to validate the information from the 2003 ATE Survey on which the project selection was based specifically with respect to professional

development activities and linkages between materials development and/or program improvement. Table 1 shows the desired number of projects interviewed from each cell based on responses to the 2003 ATE Survey.

Table 1: Number of Projects Interviewed From Each Cell

		Linkages			
		High	Medium	Low	**Total**
Professional development activity Points	High	n = 4	n = 2	n = 2	8
	Medium	n = 2	n = 0	n = 0	2
	Low	n = 2	n = 0	n = 0	2
	Total	8	2	2	12

Validation of Professional Development Activity Classification

Prior to each interview, the responses provided via the survey for each project were entered into the interview protocol, and each response in the survey was validated on a one-to-one basis by asking the principal investigator if the number for each item was correct. Only 3 of the 12 investigators indicated that all of the numbers provided via the survey were correct with respect to number and types of professional development activities, the number of participants involved, and the variety and basis for any type of follow-up activity. Table 2 presents the reported number of activities and participants via both the survey and the telephone interview.

Table 2: Comparison of Professional Development Activities and Participants by Data Collection Technique

Project	Conferences		Wkshops		In-service Courses		Intern-ships		Online Courses		Other		Total Number of Participants	
	S	I	S	I	S	I	S	I	S	I	S	I	S	I
A			1	1			0	2	4	4	1	6	19	72
B	2	2	4	8	2	0							300	395
C			2	4									51	103
D	5	5	7	50	1	1							569	700
E			0	2	2	0							7	22
F			1	1	1	1							55	55
G	1	3	0	4	2	0							87	290
H	6	6	10	10	60	60			100	100			100	100
I			10	44	1	110					40	20	55	200
J	1	1	8	8	2	2	1	1	1	1			363	363
K	1	1	1	4									40	225
L	2	4	2	1									85	160

Key: S = Survey; I = Interview (shaded); numbers in red indicate a difference between survey and interview values for that column

It should be noted that a number of principal investigators commented on the difficulty in completing some of the questions on the annual ATE survey. Specifically, with respect to answering the questions regarding involvement in materials development and/or program improvement, many of the respondents were unsure of the time frame in question. They were

not sure if they should respond based on the calendar year or the NSF fiscal year (July 1–June 30). Perhaps some of this confusion accounts for the differences in responses between the survey and interview. In the interview, we asked the participants to use the NSF year.

Table 3 presents the comparison of stated follow-up activities and operating capacity between the 2003 ATE Survey and the telephone interviews with principal investigators.

Table 3: Comparison of Follow-Up Activities and Operating Capacity by Data Collection Technique

Project	Type of Follow-Up Activities Employed by Project										Operating Capacity	
	Personal Contacts		Surveys		Newsletter		Letter/ E-mail		Other			
	S	I	S	I	S	I	S	I	S	I	S	I
A	x	x	x	X	x	x	x	x	x	x	0 -25%	26-50%
B			x	X	x	---	x	x			51-75%	26-50%
C							x	x			51-75%	51-75%
D			x	X	x	x					0-25%	0-25%
E	x	x					x	x			76-100%	76-100%
F	x	x	x	X			x	x	x	x	51-75%	51-75%
G	x	x	x	x			x	x	x	x	76-100%	76-100%
H			x	x							76-100%	76-100%
I	x	x					---	x	x	x	76-100%	76-100%
J	x	x	x	x	x	x	x	x			76-100%	76-100%
K			---	x							76-100%	76-100%
L	---	x					---	x			51-75%	76-100%

Key: S = Survey; I = Interview (shaded); numbers in red indicate a difference between survey and interview values for that column

Validation of Activity Score Classification

Based on the large percentage of values that differed between the survey and subsequent interviews, we decided to recalculate the professional activity scores and subsequent classification using the **original criteria** as described in the Phase I Report.

In the original sample of 12 projects, recoded professional activity scores had a range of 16 with a minimum value of 7 and a maximum value of 23. These scores were obtained by summing the recoded scores from the following variables:

- Number of professional development opportunities
- Number of individuals participating in those opportunities
- Number of follow-up methods formally used by each project
- Number of types of support typically provided by the various projects/centers to the participants
- Percentage of opportunities operating at full capacity (i.e., 100% of available seats occupied in the various opportunities)

As described in the Phase 1 Report, the distributions of professional activity scores in the original group were divided roughly into thirds based on point totals. The top third were considered to have "high" professional activity. The middle third were considered to have "medium" professional activity. The bottom third were said to have "low" activity.

Using the same variables as above with the values obtained from the interviews and the original recoding process, we recalculated the professional activity scores. The new professional activity scores had a range of 10, with a minimum score of 10 and a maximum of 20. We then compared the group assignments (i.e., high, medium, low) based on the survey data with new assignments based on data from the interviews. Only 2 of the 12 projects had a change in assignment category. One project moved from the high professional activity range to the medium professional activity range. This change was due to a reduction in the number of follow-up activities reported and in the percentage of operating capacity. The other project changed from the medium professional activity range to the high professional activity range. This change was attributed to the fact that the reported number of participants attending activities supported by the project nearly doubled between the survey and the interview.

Validation of Degree of Linkage Classification

Next, we compared the responses to the survey items regarding potential linkages (as described in the Phase I Report). Specifically, we were interested in validating whether stated activities regarding materials development and/or program improvement were consistent across the survey and interview with respect to relationships with professional development.

Table 4 presents the comparison of stated linkages between the 2003 ATE Survey and the principal investigator telephone interviews.

Table 4: Comparison of Degrees of Linkages by Data Collection Technique

Project	Degrees of Linkages		Reason for Change
	Linkage per SURVEY Results	Linkage per INTERVIEW Results	
A	Low	Low	
B	High	Medium	No longer involved in materials development
C	High	High	
D	High	Medium	No longer involved in materials development
E	High	High	
F	Medium	High	Involved in materials development (e.g., manuals)
G	Low	Low	
H	High	Medium	No longer involved in materials development
I	Medium	Low	No longer involved in materials development
J	High	High	
K	High	High	
L	High	High	

As shown in Table 4, the degree of linkages for 7 of the 12 projects was consistent across data collection techniques with respect to degree of linkages (shaded cells above). Three projects (B, D and H) had indicated on the survey that they were involved in both materials development **and** program improvement (i.e., high degree of linkage) but indicated via the telephone interview that they were involved only in program improvement. Two of the projects were involved in materials development at the time of the survey but are no longer involved in that activity. The third project did some initial curriculum development and adaptation but ceased that activity due to funding cuts. Note that for purposes of classification, being involved in program improvement would classify that project **only** as a medium degree of linkage. Of the

two remaining projects, one project (F) had been classified as a medium linkage based on its survey responses but would now be considered a high linkage based on the telephone interview. In this case, this project adapted its curriculum based on course needs and now conducts materials development including manuals on Dreamweaver, digital editing, and customized laboratory manuals. The final project (I) was classified as a medium linkage based on its survey responses but would now be considered a low linkage based on the telephone interview because that project now is involved neither in materials development nor in program improvement. Project I is now involved only in professional development.

Although not every project is involved in materials development, 9 of 12 principal investigators commented on the strong, positive relationship between materials development and professional development. Many reported they are intimately linked and have a major impact on how the professional development is conducted.

With respect to program improvement, 9 of the 12 projects indicated that grant monies and specific efforts have been used to improve their respective instructional programs. Types of program improvements included adding specific IT content (e.g., computer security), establishment of Future Teachers Clubs, establishment of an Education Department within a community college, establishment and recognition of industry standards in the biotech industry, and the launching of 7 new technology institutions.

The 9 projects that have invested in program improvement think there is a key relationship between program improvement and professional development. One principal investigator described the relationship as professional development being the KEYSTONE for program improvement. Another investigator suggested that professional development provides the vision (or tools) for program improvement.

Reviewing the Project Classifications

Given that there were changes between the survey responses and the telephone interview, we thought it was necessary to review the interaction of the linkages to the professional development activity points. Table 5 presents a recasting of Table 1, reflecting the changes in information obtained from the telephone interviews with respect to either change in activity points and/or linkages.

Table 5: Recast Number of Projects

		Linkages							
		High		Medium		Low		Total	
Professional development activity Points	High	4	4	2	1	2	3	8	8
	Medium	2	1	0	2	0		2	3
	Low	2	1	0		0		2	1
	Total	8	6	2	3	2	3	12	12

Key: Black Numbers = Original Design; Red Numbers = Recast Numbers

The primary impact of the information received via the telephone interviews is that the some of the linkages that we believed existed between professional development and either materials development and/or program improvement are not supported by the projects. Although we are somewhat disappointed that our model was not thoroughly supported, the reality is that only 2 projects fall out of the shaded area above that defined our target audience. Seven of the 12 projects did not change cells. Overall, the implications of these changes are minimal since the

criteria were used for selection purposes and the changes are not significantly different ($\chi^2 =$ 3.25*; p>.05). *Note: Chi-square was calculated using Yate's Correction.

A-E-I-O-U Evaluation Results

Simonson's (1997) **A**ccountability, **E**ffectiveness, **I**mpact, **O**rganizational Context, and **U**nanticipated Consequences Model was utilized to examine initial data within this phase.

Accountability

Accountability addresses concerns such as the goals of the program, how well participants match the target audience, what types of activities are taking place, what components of the program were actually implemented, and what additional skills or content areas (if any) were addressed.

   Goals of projects. The goals of the respective projects varied somewhat. Based on their responses, some principal investigators view their activities and goals as more compartmentalized while others view their goals and activities as much more integrated. For example, 5 principal investigators indicated their goal was to increase the capacity or quality of the community college faculty to teach by

- Improving the quality of the faculty through improved curriculum
- Teaching technology to meet the needs of agriculture faculty
- Increasing the capacity to teach the new technology curriculum implemented in the last few years
- Introducing a specific technology to faculty in different departments
- Elevating the teaching (by community college faculty) of math theory for junior high students

Four other principal investigators indicated that their primary goal was to increase the number of qualified individuals in the workforce by

- Increasing the number of minority (American Indian) workers in the technology work force (especially information technology and systems)
- Focusing on the preparation of technicians for the biotech industry (from manufacturing to research)
- Increasing the number of process technicians available in the workforce to support the regulatory process used in oil & gas, refining, chemical, pharmaceutical, food processing, power generation, water treatment, brewing, and paper production industries
- Developing a curriculum to train technologists, lead operations technologists, and postprocessing technologists in rapid prototyping

Two other projects focused on the preparation or improvement of elementary teachers by

- Offering an Associate of Arts Degree in teaching elementary education that includes preprofessional experience which meets NCATE standards
- Helping elementary teachers learn more content in the areas of science and technology (specifically solar energy) and to match preservice students with elementary teachers to serve as mentors

Finally, the stated goals of the last project encompass many of the goals of the other projects:
- To increase the number of faculty with appropriate degrees or certifications
- To increase the number of technology students
- To establish articulation agreements between various institutions
- To increase the number of graduates in technology
- To decrease the number of unfilled technology positions in the region where the institute is located

As can be seen by the stated goals above and the target audiences identified by the projects (see below), the manner in which investigators view and define professional development operationally varies significantly. Eight of the projects have goals consistent with a focus on developing faculty, teachers, and educators. These programs view professional development as the final outcome. Four are focusing on providing education and training to meet specific needs (such as shortages in manpower), not necessarily in developing educators per se. They view professional development as an intermediate step toward a different outcome such as increasing the number of technicians.

Target audiences. Table 6 presents the number of specific populations that are the primary and secondary target audiences for the twelve projects.

Table 6: Target Audience by Populations

Population	Target Audience*	
	Primary	Secondary
Elementary School Faculty	1	1
High School Faculty	2	2
Community College and 2 Year Technical School Faculty	9	1
4 Year College/University Faculty	1	2
Future Primary/Secondary Teachers	1	0
Individuals in Technology Workforce	2	1
College Students	2	0

*Note. The number of primary audiences exceeds 12 because some projects have more than 1 primary audience

Most projects draw their participants locally (from the county or state in which they are located) although one program supports nine states and another draws its participants nationwide.

Half of the projects indicated that their participants came from their respective primary target audience 100 percent. However, the average percentage of time that the professional development participants matched the primary target audience across the 12 projects was 86 percent.

Professional development effort. Principal investigators were asked what proportion of their effort in implementing their project was accounted for by actual professional development activities. The responses ranged from 25 to 95 percent with a mean of 65 percent and a median of 67.5 percent. Other activities include recruiting participants, grant administration, managing articulation agreements, and marketing activities.

Stated curriculum. Nine of the projects indicated that they have a slated curriculum to support their professional development activities. In some cases, the curriculum was an outgrowth of a needs assessment. In other cases, the curriculum was developed as a result of standards being set. In one case, the investigator(s) wrote learning outcomes for what students needed to know. The outcomes became the basis for the associate degree in teaching elementary education. This was the first degree of its kind to be recognized in the country and which allows transfer among schools. The degree is for teachers aides and is consistent with the "No Child Being Left Behind" legislation.

Articulation agreements. Of the 12 projects, only a few operate with formal articulation agreements with other institutions. Generally, faculty are expected to meet certain requirements and there is an inherent assumption that faculty are qualified. But for the most part, faculty attendance at professional development activities as a component of an articulation agreement is not the case. In one case, the establishment of a standard degree eliminated the need for articulation agreements. One project in the biotech industry noted that the articulation agreements with which it deals are state-specific. In California, there are 108 different articulation agreements because there are 108 community colleges.

Faculty skills targeted. All but 2 projects indicated that their professional development activities included some type of faculty development skills. Specific noncontent skills provided by the other projects include these:

- Teaching how to successfully conduct online classes through the sharing of best practices
- Teaching hands-on approaches to using curriculum materials
- Teaching faculty how to successfully teach via the "inquiry mode" approach (5 E's – Engage, Explore, Explain, Extension, Evaluate)
- Encouraging peer mentoring and cooperative learning
- Team dynamics
- Communication skills in mathematics including listening, questioning, and reflecting
- Teaching strategies and learning styles
- Faculty effectiveness in the classroom including effective facilitation and classroom management

Effectiveness

The key focus of effectiveness is how well a particular project or program was implemented. It typically addresses participant reactions to training, some assessment of learning, and whether or not some type of learning transfer from training to the job has occurred.

When asked how well they think their professional development efforts have been implemented, all replied well or extremely well. A variety of different evidences were suggested to support their position, e.g.:

- Participant evaluations from workshops and written evaluations from internships
- Evaluations collected by an external evaluator
- Informal feedback from Teacher Education chairs
- Growth in attendance over time
- Additional funding obtained
- Percentage of attendees implementing action plans following mathematics workshop
- Percentage of faculty that participate in the program (75%)

- Stated intentions to implement curriculums in the future

We asked the principal investigators to send us copies of any documentation that would substantiate their position on the effectiveness of their respective projects. All 12 projects sent something. Table 7 presents a list and description of the various materials submitted as evidence of effectiveness.

Table 7: Evaluation Effectiveness materials Received

Project	Type of Evidence	Description
A	Raw data and a compilation of the evaluation of a seven section workshop on Information Technology for Teachers (n = 12)	Average rating of usefulness and quality across all sessions was 4.4 out of 5
	Compilation of written comments from an internship experience at a large international corporation	When asked if they would participate again, a typical response was "Unequivocally, yes. Not only was this first opportunity very worthwhile, I can see a significant value in keeping teachers and curriculum developers in tune with the needs and day-to-day operation of industry on a continuing basis. "
B	Faculty development Workshop Planning Guide	Detailed description of the workshop logistics. Includes pre-/ postassessment activities to document any positive impact of the workshop. Also describes a workshop evaluation.
	63-page, bound Annual Evaluation Report for April 23, 2002 – March 14, 2003	Details the evaluation efforts for one annual conference, seven workshops, curriculum development and capacity building. Includes methodology, recommendations, instruments, goals, and special topics
C	Workshop agenda	1 day workshop focusing on math and science
	Outline used for a science activity	3 page outline
	Series of e-mails and written comments regarding various workshops	Very positive feedback
	Draft of workshop plan to create Future Educator of America clubs	Includes agendas and rationale
	Plan of action for course revisions at 8 community colleges	From all new to minor revisions
D	A partial evaluation report of a center workshop	Describes in detail the demographics of the participants attending, employment and employee satisfaction (both very high), and discussion of future data collection efforts
	Copies of evaluation instruments for first and last day of workshop	Rather comprehensive instruments
	Evaluation summaries	Consistently good ratings
E	18-page Annual Evaluation Report for June 1, 2001–May 31, 2002	Detailed description of project and activities, curriculum models, demographics of participants, enrollment numbers, results of pre-/ postcourse survey, detailed participant ratings, and suggestions for improvement
	22-page Annual Evaluation Report for June 1, 2002–May 31, 2003	Detailed description of project and activities, curriculum models, demographics of participants, enrollment numbers, results of pre-/ postcourse survey, detailed participant ratings, and suggestions for improvement.

Project	Type of Evidence	Description
F	Summative evaluation results for 3-4 day workshops including participant comments	Ratings are consistently high
	Future Needs Assessment Survey Instrument	Respondents are asked to identify by name Web sites they have developed and to describe specific action steps employed since attending the workshops
	Dreamweaver Instruction Manuals (2)	Includes detailed instructions and activities
	Very detailed Science Laboratory Manual	Includes benchmarks and grade expectations for skill attainment for elementary students
	Digital Video Manual	Descriptions of how to incorporate video (especially how to edit) into education
G	Evaluation results from 4 regional conferences	Ratings were consistently good to excellent across all 4 regions.
	Teacher Preparation Summer Institute Evaluation Report	Evaluated the content presented (math manipulatives and resources) and included participant comments (which were generally very favorable)
H	Formative Report – External Evaluation Review dated April 15, 2003	Evaluated the first year of activity including assessment of center's accomplishments relative to its five goals. Outcomes were examined relative to faculty, students, and overall program.
	Report on-site visitations to 10 community colleges	Overview of the comments made by the community college officials interviewed.
I	Link to Teaching Project Web site	Web site includes information on mission statement, the teaching project itself, press office, Teachers Circle, pilot sites partnering, curriculum, Native American resources, frequently asked questions, how to get involved, and shopping.
J	25-page formal evaluation report prepared by an external evaluator dated March 2003	Reports on progress of center in achieving its goals (Overall strong progress). Also includes a number of recommendations.
	35-page formal evaluation report prepared by an external evaluator that summarizes the accomplishments of the first 3 years	Summarizes achievements and recommendations on a goal by goal basis.
K	20-page return-on-investment study	Examines how companies view their investment when hiring technicians with an AA Degree in Process Technology.
L	Workshop agenda	5-day workshop focusing on rapid prototyping technology
	Descriptions of various technology software	Describes software and training
	Written comments	Very positive feedback

Opportunities for networking. Every project indicated that networking was integral to its program. In a couple of cases, networking was a stated goal for the project such as an opportunity to network and learn practical applications. In other cases, principal investigators told us that networking was the basis for some of their workshops. One project uses networking as a type of needs assessment in order to provide industry an opportunity for input and feedback on what content should be presented.

Current information. We asked the investigators how current the information is that they are presenting in their professional development activities. Ten of the 12 projects indicated that the content is state of the art and/or cutting edge. This is not surprising, given that much of the content is technology-driven. Several projects have established relationships with major technology icons including Cisco, Microsoft, and Boeing. The two projects that did not indicate that their content was current were two teacher preparation projects. They indicated that some

of the theories and principles that they are teaching have been around for several years (such as learning styles) but have not been incorporated into community colleges until recently.

Most/least effective aspect. The most/least effective aspect of each project varied greatly across the projects. This is not surprising given the diverse nature of the 12 projects. Table 8 presents the most effective and least effective aspect of each project.

Table 8: Most/Least Effective Aspect of each Project

Project	Most Effective Aspect	Least Effective Aspect
A	In terms of numbers and impact – curriculum development tools and process, which allows one to create or modify a new curriculum	No longer offer online courses
B	As indicated by the end-of-course evaluation, in all 8 workshops the technical understanding of content had the greatest positive change.	Preworkshop needs assessment – should be earlier (perhaps part of registration)
C	Hands-on activities reinforcing the inquiry mode of learning	Some Education Department chairs were afraid to force the inquiry learning mode on their courses because of lack of understanding
D	Offering the training to high school teachers – had 50 new teachers take the training	Marketing the Technology Center to business and industry – they are NOT teaching it; they are using it – different audience
E	Faculty from other disciplines using the geospatial Technology in their research	Any type of follow-up activity. Participants get busy and fail to provide feedback
F	Witnessing teachers actually performing science experiments	Digital editing – it had to be replaced with digital photography
G	Witnessing long-term change. Math and technology are being institutionalized. There are dissemination of ideas and the establishment of support groups.	One day (regional) workshops are too short to be effective; 6 days in the summer is much more effective
H	Support provided by the center. Each college can customize the curriculum based on the unique needs at its institution.	No hard data yet on effect in classroom but have an increase in number of students and in the number of women retained
I	Electronic portfolio workshop – faculties are using what they learned	Cradle Board preservice - Current teachers need more time to work it into their existing curriculum; they view it as a separate curriculum, not something that should be integrated.
J	Summer Fellows Institute, which draws people from around the country to participate for one week	NA
K	Buy-in and structure of annual conference – 40 community colleges have formed 6 regional alliances and the center supports it.	Online workshops have not been successful
L	Being asked by major companies to develop custom curriculums on rapid prototyping	Need to do a better job of screening participants to ensure that they have the necessary CAD modeling skills before attending the workshops

Use of external evaluator. Eight of the projects indicated that they use an external evaluator on a regular basis to evaluate their professional development activities. In one case, an external evaluator was slated to participate in the project but funding was cut. In another case, following their most recent annual report it was recommended that they engage an evaluator, and they intend to do so. One project indicated that it does its own evaluation primarily via a survey. One project admitted that it did not have an evaluator and did not conduct any type of formal evaluation of its project. The principal investigator claimed that she did not realize that an evaluator was necessary, but commented in the interview that she now recognizes the value of evaluation.

Impact

The key focus of impact is determining if the program makes a difference. Components typically include identifying what policies and procedures changed as a result of the study and/or if a return-on-investment (ROI) could be demonstrated.

For purposes of this study, impact focused on the ability to empirically demonstrate academic growth, improvement in teaching, or progress in faculty development as a result of professional development efforts. Table 9 presents the articulated impacts in terms of direct outputs and changes in policies and procedures.

Table 9: Types of Impact

Project	Direct Outputs	Changes in Policies/Procedures
A	Establishing new curriculums; goal is that new curriculums will lead to some individuals being qualified or fulfilling some requirements for certification as a professional technician	New curriculum is being taught at host community college and is being marketed around the state
B	Each school is required to submit an impact evaluation report for their school.	NA
C	In order to address capacity problem at 4 year schools (especially in Medical Technology), some students are taking their last two years of schooling at the 2 year college. Note: This is possible due to the partnership arrangement.	A number of 4 year colleges are changing their requirements because of the success of the Associate Arts Degree. Previously, all professional training ONLY took place in the last 2 years of college; now it takes place in the first 2 years
D	Increase in the number of students being certified	NA
E	Number of projects being initiated using the new geospatial technology	Acquisition of new partner (a graduate school); original target was community college, then a four year university; now have a graduate school on board.
F	Observation of content being used in the classroom (such as teaching language skills through science) Requests for science content by teachers never previously involved in science Resurrection of science fairs in Florida	Likely result in the establishment of an Education Department in a community college where a department does not currently exist
G	Raising of standards by requiring participants to "present back" what they learned	Addition of Math Theory classes to curriculums
H	Significant jump in number of student enrollments Increase in the number of students of color (diversity) Feedback from site visits indicates a significant increase in faculty being energized and excited about the technologies.	Colleges have developed "early alert systems" to intervene and get students back on track. Colleges have developed more systematic progress for students.
I	Observation that faculty are integrating the skills into their teaching Requests for materials to be presented again (and again) – especially the Cradle Board presentation) Faculty are using technology (SMARTBOARD)	Significantly more collaboration among schools
J	Launch of two new biotech programs in other states (Utah, Florida)	Initially there were no centers but soon there will be regional chapters of Bio-Link

Project	Direct Outputs	Changes in Policies/Procedures
K	Focus on faculty development Timing of tests Costs Program exit assessment Glossary Design of participant materials	Selected process-related systems at certain community colleges have changed.
L	Last year the number of high school students enrolled in this program increased from 15 to 50.	NA

Return on investment. Although many principal investigators were intrigued by the idea of conducting some type of return on investment study on the impact on their respective project, only one has done so to date. The project (K) conducted a study to assess the perceived and actual return on investment of nine companies that hire process technicians with an Associate Degree in Process Technology. Although this study was not focused directly on professional development per se, it is definitely a step in the right direction. Professional development is not viewed in isolation but as a component of the overall strategy of having trained professional s.

The study consisted of a four-part survey. The first part included questions about the companies and how they hire and train process technicians. The second captured the costs associated with training newly hired process technicians. The third section explored hiring costs. Finally, participants were asked to compare the knowledge, skills, attitudes, and behaviors of process technician new hires having an associate degree to those without the degree.

The average number of process technicians hired by the 9 companies reporting data for 2001 was 55. Although they varied greatly, the average hiring cost per potential employee was $1,666. In most of the companies, the starting salary for an employee with an associate degree is slightly higher than one without a degree. In addition, possessing an Associate Degree in Process Operations substituted for as much as four years' processing experience.

Training for process technicians generally included a combination of self-paced and structured training. The average length of basic skills training is 77 hours with a range of 40-160 hours. Not every company reported training costs, but the average cost to train an individual was $21,636. Time to qualify is a key metric for process technicians. In about half of the companies, technicians with degrees qualified faster than those without. Many of those without degrees had substantially more experience.

Overall, these were the study findings:

- Degreed process technicians demonstrate an advantage in learning new concepts including job/task knowledge and safety
- Degreed process technicians tend to be better team players
- Degreed process technicians have the same advantage in certifying as those employees with three to five years' experience

The study did not quantify the return on investment dollars but focused instead on the benefits to the organization of hiring degreed technicians.

Organizational Context

Organizational context focuses on the structures, policies, or events in their organization or environment that either helped or hindered professional development efforts in accomplishing goals and objectives. We asked principal investigators just that. Some investigators listed only barriers or hindrances. Others listed only enablers or things that helped their situation. Others provided both. Table 10 provides the list of barriers and/or enablers relative to the organizational context.

Table 10: Barriers and/or Enablers

Project	Barriers	Enablers
A	Funding cuts Support is "in-kind' since they have to share resources with other departments. Economic climate in the state is poor and the landscape for IT professional s is currently not good	NA
B	NA	Faculty Planning development Guide Organizational structure of the partnership Definition of roles Communication between the colleges hosting the respective workshops
C	Traditional college approach to teaching science is with a 3-hour lecture and a 1-hour lab for a total of 4 hours credit. Their approach requires lab to be first, then explore and discuss, which requires different people to teach. This impacts teaching loads: 2.5 hours 3 times per week for labs and also puts a constraint on physical facilities.	The center has an Academic Resource Development unit, which helps to write grants. The center includes an accountant to manage any required reimbursements for workshop logistics and to help manage the grant.
D	One community college is a part of the state university so it is difficult to influence and coordinate what it does.	The center supports a statewide community college system consisting of 28 schools
E	NA	Administration support for articulation (seamless between community college and state university)
F	No additional sources of funding • Lack of clerical help (cut from grant) • One person = entire Education Department	Availability of resources
G	Support for travel by colleges and giving days off to attend training are very limited.	AMATYC is very supportive of effort.
H	Union agreements have interfered with training. Based on old model of K-12 collective bargaining agreement, if an external group pays tuition costs for training, training does NOT count toward grade improvement (i.e., pay increases). This causes a disincentive to get training.	NA
I	Grant funding was cut, but the objectives remained the same.	NA
J	Funding	Flat structure supports work distribution to be done regionally
K	Center supports 40 colleges and 10 industry partners = a lot of bosses; operates on different time schedules and senses of urgency	NA
L	Frustrated with NSF	NA

*U*nanticipated Consequences

We also asked investigators what important and unexpected changes (both positive and/or negative) have happened as a result of their professional development efforts. Some investigators listed only positive changes. Others provided both. Table 11 displays the list of unanticipated consequences.

Table 11: Unanticipated Consequences

Project	Positive	Negative
A	Developed a tool kit that works differently than was originally envisioned. It is much more credible.	Lack of participation was not expected. Expected some attrition but not as much as experienced
B	Networking, education alliances, collaboration of experts, ability to offer the workshop in different geographical locations promotes agriculture diversity, which will help ensure sustainable agriculture.	NA
C	Was able to provide funds to start new Future Teacher Clubs	Some older faculty stopped teaching science because they refused to change the manner in which they taught.
D	Expected only 20 percent of the participants to be high school students but got substantially more	State cutbacks caused some unexpected changes in programs and processes
E	70 percent of the faculty have responded to the program and are following through	Some individuals committed to the program and then quit – were not able to replace them
F	Creating a marketable degree consistent with "No Child Left Behind" legislation	Needs are overwhelming; more schools need to implement the program
G	Found students were more apt to study math, and many students are changing major to math Were only expecting small incremental changes to occur, but significant changes have occurred including adding of curriculums to schools and establishment of articulation agreements	NA
H	Quarterly meetings have emerged due to demand (only expected annual meetings) Built significant relationships Enthusiasm is growing	Tried to establish and maintain a discussion board but very poor participation
I	One college used this program to launch a 4 year IT program.	NA
J	Number of changes have occurred in biotech industry (biohazards, bioinformatics, genome sequenced)	NA
K	Did not expect amount of growth or industry support	NA
L	Support from industry and private sector	NA

Summary

The following is a summary of the major findings.

Accountability. Professional development is happening. There are different goals and target audiences and different perceptions of what actually constitutes professional development. The percentage of overall effort focused on what is defined as professional development is high.

Effectiveness. Overall assessment is mixed. Several projects have produced compelling evidence supporting their claims of effective implementation. Included in that evidence are sound empirical studies containing defensible information and data. A couple provided little compelling evidence of effectiveness. Their evidence supported their claims of implementation, but not necessarily of effectiveness.

Impact. Despite the fact that the effectiveness of a couple of programs is considered somewhat borderline, all projects reported impact and that their project is making a difference. Impacts included direct outputs such as number of faculty using newly acquired skills, number of students increasing, and new technologies being adopted. Additional impacts included changes in policies and procedures including adopting new curricula and establishment of departments.

Organizational context. A number of key factors were identified in terms of obstacles or barriers as well as enablers to accomplishing the goals or objectives of the various projects. Barriers included such things as funding cuts, organizational structures, and union agreements. Enablers included job aides, organizational support, and structures.

Unanticipated consequences. Projects incurred both positive and negative unanticipated consequences of their activities. Positive aspects included such things as program improvements through having participants teach back material, benefits of networking, and support from the private sector. Negative consequences included such things as lack of participation and faculty dropping out due to their reluctance to adapt new approaches or technologies.

Input to Phase III

In preparation for the participant survey to be conducted in Phase III, 7 of the 12 projects (so far) have provided lists of participant e-mail addresses. A Web survey will be developed and distributed via e-mail to all the participants for which we have addresses. The objective of Phase III is to solicit participant feedback on the implementation and application of the programs and activities they attended. It will seek to learn about the nature of information provided to them and the ways in which they use information and materials obtained. Questions to be asked include these:

- Did professional development facilitate implementation of ATE programs in new locations (e.g., at their college)?
- To what extent and level of effectiveness were participants able to implement the ideas and materials presented to them in workshops, conferences, and other professional development activities?
- How much and what is the nature of support given to participants in selected professional development situations?
- How much must participants contribute on their own behalf in order to participate in these programs?
- What role(s) do participant contributions play in implementation and adoption of new instructional ideas and materials?
- How sustainable do the participants believe the ideas and materials presented to them will be in their environment over time?

We will segment participants on a number of dimensions including project attended, their full time status (e.g., faculty, student, and workforce), and intended use of their newly acquired skills.

Attachment 1

List of Participant Questions

Evaluation of Professional Development Efforts of ATE Projects and Centers

Background:

How was I selected: Your project is 1 of 12 that was systematically selected for these key informant interviews. In selecting the projects, we examined 2 things—degree of linkages of professional development with materials development and/or program development or both (if any) and degree of professional development activities in terms of number of opportunities, number of individual participants, degree of participant support, and operating capacity. Based on responses to the 2003 ATE Survey, we selected 12 projects to reflect varying dimensions of linkages and activities.

Length of the Interview: We have not piloted our protocol, but we expect the interview to take about an hour or so.

Aggregated Findings: As described by Carl Hanssen in his e-mail message, only aggregated findings from this study will be reported to NSF. We will not identify any specific respondent with his or her responses.

Interview Procedure: We will begin with fairly broad questions and then get much more focused. We will be following a protocol that parallels the questions below, and the interviewer will be taking notes throughout the interview. The interviews will NOT be tape-recorded.

Overall Program as it Relates to professional development

1. What specific need does your overall project exist to meet?

    a. Why was this project initiated?

    b. What is the project's history? How long is the project supposed to continue?

    c. Target audience for the overall project? How is that different from the target audience for professional development activities?

    d. From where do you draw most of your professional development participants?

    e. What percent of the attendees constituted the target audience?

    f. What proportion of your effort on this project is taken up by professional development activities? _____

2. Confirm the following numbers:

Number of:

Conferences	_____
Workshops	_____
In-service Courses	_____
Internships	_____
Online courses	_____
Other	_____
Total number of participants	_____

Follow-up methods:

___ personal contacts ___ surveys ___ newsletters ____ e-mail/letter ___ other

Percentage of opportunities operating at full capacity: ____

Professional Development Related Activities

3. Describe any involvement in any materials development.

4. Describe any involvement in formal program improvement.

5. Describe any specific requirements under any articulation agreements for faculty to participate in any of your specific professional development activities.

6. Outside of specific content covered in your training, what specific faculty skills do your professional development activities target?

Professional Development Effectiveness

7. How well do you think your professional development efforts been implemented? What documentation or evidence do you have to support your position?

8. Which aspect (activity) of your professional development activities do you consider to be the **most** effective? What evidence do you have to support that?

9. Which aspect (activity) of your professional development activities do you consider to be the **least** effective? What evidence do you have to support that?

10. Describe any formal follow-up activities to your professional development efforts that you conduct.

Professional Development Impact

11. To what extent can any of the following be demonstrated as a result of your professional development activities: academic growth, improvement in teaching, or progress in faculty development?

12. Describe any type of return-on-investment study that has been conducted with respect to your professional development efforts.

Barriers/Enablers to Professional Development

13. What structures, policies, or events in your organization or environment helped or hindered your professional development efforts in accomplishing goals and objectives? Are there any additional sources of funding?

Unanticipated Consequences of Professional Development

14. What important changes happened as a result of the professional development efforts that were not expected? Have there been any serendipitous positive results achieved? How about negative results?

I would appreciate having access to existing evaluation reports, curriculum, agendas, questionnaires, etc.—anything that would provide additional information about your professional development activities that you believe would be beneficial to our effort.

The third phase is to survey participants from all activities provided by any of the 12 projects interviewed. In order to do that, I need an electronic list of e-mails addresses of all your professional development participants for the last year.

Attachment 2

Complete Principal Investigator
Telephone Interview Protocol

Evaluation of Professional Development Efforts of ATE Projects and Centers

Key Informant Interview Protocol

Date: _____ Time: _____

Principal Investigator: _____

Telephone Number: _____

Sponsor: _____

Project Name: _____

NSF Award Number: _____

Linkage/Activity Category: ___ ___

Introduction: Thank you for agreeing to participate in this interview. As the e-mail from Carl Hanssen stated, we are conducting a targeted study regarding the nature of professional development efforts funded by ATE. We are also trying to assess the value obtained through participating in these various activities. These interviews are part of a larger research effort.

How was I selected: Your project is 1 of 12 that was systematically selected for these key informant interviews. In selecting the projects, we examined 2 things: degree of linkages of professional development with materials development and/or program development or both (if any) and degree of professional development activities in terms of number of opportunities, number of individual participants, degree of participant support, and operating capacity. Based on responses to the 2003 ATE Survey, we selected 12 projects to reflect varying dimensions of linkages and activities.

Length of the Interview: We have not piloted our protocol, but we expect the interview to take about an hour or so.

Aggregated Findings: As described by Carl Hanssen in his e-mail message, only aggregated findings from this study will be reported to NSF. We will not identify any specific respondent with his or her responses.

Interview Procedure: I would like to begin with fairly broad questions and then get more focused. I will be following a protocol and will be taking notes as we proceed. I will NOT be tape-recording our discussion. Do you have any questions or concerns before we begin? Okay, let's get started…

SEGMENTATION CRITERIA
(ACCOUNTABILITY)

15. I have read some background material regarding your program on the NSF Web site, but could you provide a concise description of the objectives and goals of your project:

What specific need does your overall project exist to meet?

      a. Why was this project initiated?

      b. What is the project's history? How long is the project supposed to continue?

      c. Target audience for the project? How is that different from the target audience for professional development activities?

      d. From where do you draw most of your professional development participants?

      e. What percentage of the attendees constituted the target audience?

      f. What proportion of your effort on this project is taken up by professional development activities? _____

16. Now, according to the 2003 Survey, the professional development component of your project consisted of…

_____ Conferences

_____ Workshops

_____ In-service Courses

_____ Internships

_____ Online courses

_____ Other

Is that correct? **Yes   No**

And across all opportunities, you had about _____ number of participants. Is that correct?   **Yes   No**

With respect to follow-up methods, you used (check all that apply):

 ___ personal contacts ___ surveys ___ newsletters ____ e-mail/letter ___ other

Is that correct?   **Yes   No**

Finally, you reported the percentage of opportunities operating at full capacity as ____. Is that correct?   **Yes   No**

PROFESSIONAL DEVELOPMENT

17.   Are you involved in any materials development?   **Yes   No**
Why or why not?
If yes, describe your effort.

18.   To what degree do you believe that materials development relates to professional development?

19.   Are you involved in any formal program improvement? **Yes   No**
Why or why not?
If yes, describe your effort.

20.   To what degree do you believe program improvement relates to professional development?

21.   Do you have a stated curriculum to support your professional development activities? If so, how was it developed?

22.   Are there any specific requirements under any articulation agreements for faculty to participate in any of your specific professional development activities?
If yes, please describe.

23.   Outside of specific content covered in your training, what specific faculty skills do your professional development activities target?

EFFECTIVENESS

24.   How well do you think your professional development efforts have been implemented? What documentation or evidence do you have to support your position?

a. What was the overall satisfaction of your participants with each component of your professional development activities?

b. As part of the professional development activities, is there any sharing of work experiences among the participants? What opportunities were there to establish/nurture networking among the participants?

c. How current is the information presented as part of professional development?

25. Which aspect (activity) of your professional development activities do you consider to be the **most** effective? What evidence do you have to support that?

26. Which aspect (activity) of your professional development activities do you consider to be the **least** effective? What evidence do you have to support that?

27. Describe any formal follow-up activities to your professional development efforts that you conduct.

IMPACT

28. To what extent can you demonstrate academic growth, improvement in teaching, or progress in faculty development as a result of your professional development effort?

a. What are some direct outputs of your professional development activities? What are some intermediate effects of your professional development activities?

b. What policies or procedures have changed as a result of your professional development effort?

c. Has any type of return-on-investment study been conducted with respect to your professional development efforts? If so, please describe.

29. What type of formal evaluation has been conducted on your professional development efforts? What were the results?

ORGANIZATIONAL CONTEXT
(Barriers/Enablers)

30. What structures, policies, or events in your organization or environment helped or hindered your professional development efforts in accomplishing its goals and objectives? Are there any additional sources of funding?

UNANTICIPATED CONSEQUENCES

31. What important changes happened as a result of your professional development efforts that were not expected? Have there been any serendipitous positive results achieved? How about negative results?

That completes all my questions. Thank you for your time. Is there any way that I can have access to existing evaluation reports, curriculum, agendas, questionnaires, etc.—anything that would provide additional information about your professional development activities that you believe would be beneficial to our effort?

As far as next steps, I will complete all the interviews and then produce a report aggregating all the data. That will constitute the second phase of this project. I will provide you a copy of the aggregated findings for review and comment before it is finalized.

The third phase is to survey participants from all activities provided by any of the 12 projects interviewed. In order to do that, I need an electronic list of e-mail addresses of all your professional development participants for the last year.