Assessing the Impact and Effectiveness of the Advanced Technological Education (ATE) Program

Survey 2003: ATE Program Status and Trends

by

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EXECUTIVE SUMMARY

Survey 2003: ATE Program Status and Trends

The Advanced Technological Education (ATE) program is a federally funded program designed to educate technicians for the high-technology fields that drive our nation's economy. As stated in its guidelines, this program ". . . promotes improvement in technological education at the undergraduate and secondary school levels by supporting curriculum development; the preparation and professional development of college faculty and secondary school teachers; internships and field experiences for faculty, teachers, and students; and other activities."[1]

This report presents results from the fourth annual survey[2] of ATE *projects.*[3] Intended as a means to provide evidence of the work of ATE projects and centers, this survey is part of larger effort to evaluate the ATE program. Findings from this survey are expected to be useful to NSF staff in preparing their annual GPRA[4] reports and making programmatic decisions. ATE *projects* are likely to use survey results to learn about the activities and findings of other *projects* and to serve their own improvement needs.

ATE has approximately 220 active *projects*. Of these, the 139 active *projects* that had completed at least 1 year of their grant funding period at the time of the survey in early February 2003 were asked to participate. Each *project's* principal investigator was asked to respond personally or assign another person(s) to respond for the respective *project*. Ninety-two percent (128) completed and submitted survey responses within the prescribed time frame (February-April 2003).

Consistent with previous years, the 2003 survey contained nine sections. Six sections aligned directly with the stated program purposes of materials development, professional development, program improvement, and associated collaborative efforts with business and industry. Each *project* completed those sections that matched project efforts. All *projects* were asked to complete three sections: (a)

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[1] For complete program guidelines, please refer to the ATE Program Solicitation on the Web at <http://www.ehr.nsf.gov/ehr/due/programs/ate/>.

[2] The first survey was conducted in May 2000. Subsequent surveys have been conducted in February of 2001, 2002, and 2003.

[3] The term "project" has double meaning for the ATE program. NSF uses the term to refer to all entities that receive funding; it also refers to smaller awards within the ATE program. The ATE program labels its largest and most complex projects as centers. To provide clarity in referencing these groups, the term projects (unitalicized) will refer to the smaller grants, centers will refer to the subgroup of larger grants, and *projects* (in italics) will be used to refer to the full group of projects and centers.

[4] Government Performance Results Act. For current information about NSF's response to this requirement, see its Web page at <http://www.nsf.gov/od/gpra/>.

basic information–confirmed general *project* information collected from other sources (e.g., name of principal investigator and the nature and duration of grant), (b) monitoring–addressed the NSF program staff's efforts to monitor the *projects*, and (c) principal investigator (PI) overview–addressed several overarching and general *project* issues.

Evaluation indicators were developed based on a general ATE program model. Items from one or multiple survey sections comprise each indicator (see Appendix B). The evaluation team rated each indicator on two dimensions—*current* program status and program trend. Figure 1 depicts the ATE program model and provides summary ratings for each set of evaluation indicators on the two scales.

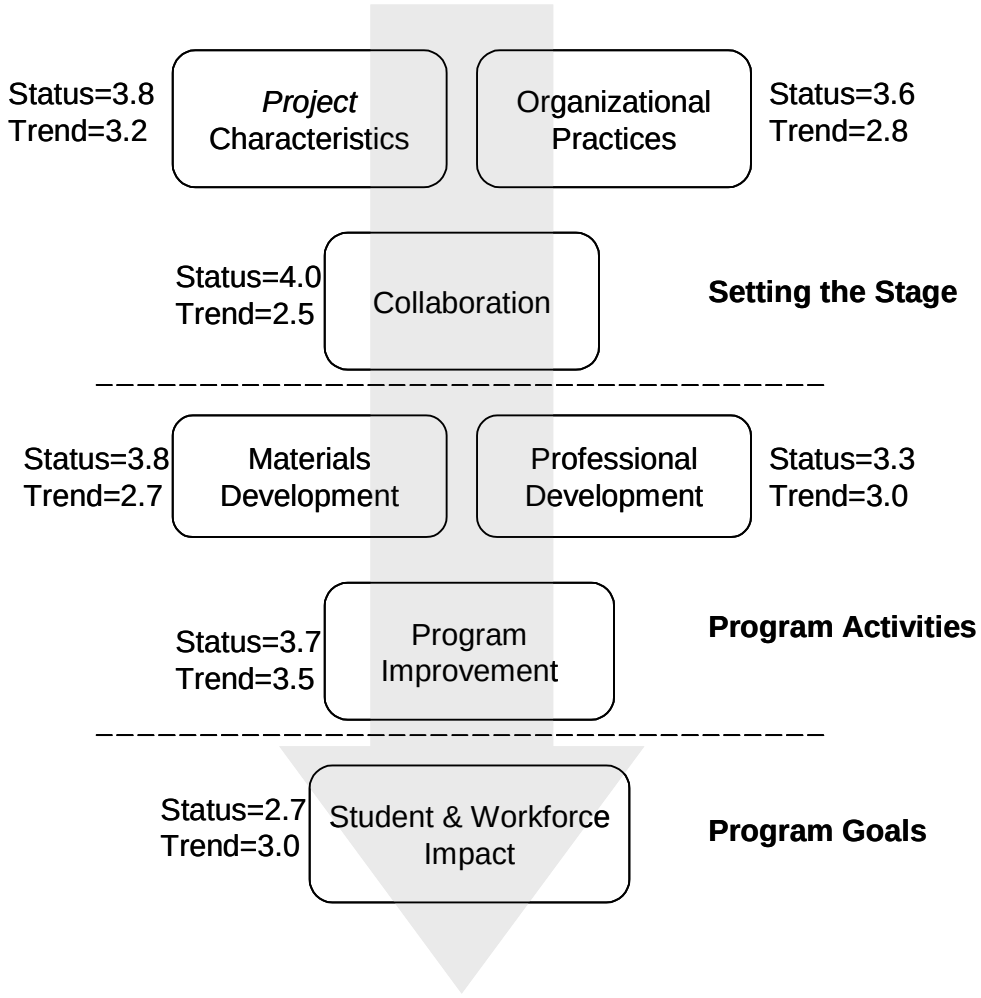

Figure 1: ATE Program Model and Summary of Evaluation Indicators

Note. The *status* scale is 5=excellent, 4=good, 3=average, 2=mediocre, and 1=poor. The *trend* scale is 5=strong improvement, 4=improving, 3=stable, 2=declining, and 1=strong decline.

In interpreting the indicator ratings, two comments should be considered:

1. Current program *status* ratings reflect survey data from 2003 only and do not reflect performance over a four year period. By design, these ratings provide our assessment of ATE's status as of 2003.

2. The *trend* rating is intended to highlight improvement (or decline) in key program areas. This rating reflects movement in the indicators across all 4 survey years and may foreshadow future performance. It is important to note that a trend rating of 3.0 (i.e., stable or no change) should not be perceived as negative. In, fact, this may be a positive finding in cases where current performance is strong (i.e., the program has been consistently strong in a given area over time).

Overall Assessment

As Figure 1 shows, 2003 survey results indicate that ATE is a strong program, its performance has been stable, and we expect it will continue to be successful in the future.

The ATE program does a good job of *setting the stage* for success. The *projects* funded by ATE are consistent with the program's federal mandate; NSF staff serves/monitors these *projects,* and the *projects* in turn apply sound organizational practices. ATE *projects* are also strong collaborators. These results are consistent with previous years, yielding a stable trend.

There are two primary concerns in this area: (1) the small number of *projects* that engage in workforce assessment and (2) a declining trend in the number of collaborations with other ATE *projects* and external institutions.

ATE is strong in each of the *program activity* areas. Program improvement results are particularly positive—the current status of these indicators is strong and there is a positive trend, suggesting that results in this program area will continue to be strong in the future. Professional development efforts are strong and stable. Materials development activity is strong, but slightly declining—this trend is consistent with stated ATE program intentions to reduce the emphasis in this area.

Results pertaining to *program goals* show that ATE is serving a large number of students, but that efforts to recruit and retain underrepresented groups could be improved. Recruitment and retention efforts are reflected in the stable demographic composition of students in ATE programs.

Conclusions

The following conclusions are based on the evaluation indicators developed from the annual survey.

1. **ATE is being implemented as designed**. In 2003, approximately 220 *projects* were being funded through the ATE program. Of the 128 that responded to this survey, 86 percent were projects, 12 percent were centers, and 2 percent were articulation partnerships. Articulation partnerships reflect changes in NSF program guidelines that call for partnerships between 2 and 4-year colleges designed to facilitate the progress of students from one level to the next.

   ATE makes the majority of its awards to 2-year colleges (70 percent in 2003). This is consistent with the position of Congress that 2-year colleges play a vital role in the educational fabric of the United States.

   ATE continues to make grants to *projects* that address nearly 20 different technology fields. Information technology, multidisciplinary programs, and manufacturing technology are the most common areas of emphasis for *projects*.

   These findings demonstrate that the program is being implemented as intended—an ATE strength.

2. **ATE *projects* are heavily engaged in the primary program work categories.** In 2003, 87 percent of *projects* reported collaborating to meet their *project* goals, 77 percent reported materials development activity, 81 percent reported professional development activity, and 66 percent reported engaging in program improvement for at least 1 educational level (secondary, associate, or baccalaureate). Overall, half of all *projects* reported activity in each of the 4 program areas. Four *projects* did not report activity in any area.[5]

   The vast majority (92%) of *projects* engaged in program improvement do so at the associate level. One in four *projects* reported program improvement at two levels (secondary and associate OR associate and baccalaureate); eight projects reported engaging in program improvement at all three education levels. This finding is important in the context of ATE's increasing emphasis on articulation partnerships. More *projects* are engaged in activities that promote articulation of students to higher education levels (e.g., high school to 2-year college) than are funded as articulation partnerships.

[5] A review of the project abstracts for these awards indicated that these projects are engaged in program activities and may simply have elected not to complete all the survey sections.

3. **The program is impacting a large number of students through program improvement efforts.** In 2003, ATE *projects* reported offering 523 different programs at 824 locations. These programs included 4,381 courses; 68,450 students (585 students per project) enrolled in at least 1 ATE-funded course during the past 12 months. This impact represents an increase of nearly 120 students per project from 2002, but it is lower than the number of students impacted in 2000 (675 students per project) and 2001 (1,763 students per project).[6]

   Trends suggest that ATE-funded programs are growing. *Projects* reported detailed enrollment information for one ATE-funded program. At the associate level, where most funding is directed, enrollment grew at an adjusted rate[7] of 75 percent for the selected ATE-funded programs.

   Survey results also show that ATE-funded programs are reaching students who are already employed as technicians. In 2003, 28 percent of students enrolled in selected programs (5,748 of 20,452) were employed as technicians prior to enrollment. More students are completing the ATE-funded programs than leave the programs (i.e., drop out) prior to completion. Of those who complete the programs, two-thirds start or continue employment as technicians and one-fourth continue STEM education.

4. **ATE *projects* are successfully establishing collaborative relationships with other types of institutions and with other ATE *projects*.** Eighty-seven percent (111 of 128) of ATE *projects* reported information about their collaboration activities in 2003. "Collaboration" was defined as a relationship with another institution or group that provides money or other support. Of the *projects* collaborating, 95 percent (106 of 111) reported collaborating with at least one of the following types of institutions—businesses, educational institutions, public agencies, or other types. Similarly, 71 percent (79 of 111) reported collaborating with other ATE *projects* for at least 1 purpose, including, but not limited to materials development, professional development, and best practices for development and sharing of products. These collaborations are consistent with ATE program guidelines, which encourage, but do not require, that ATE *projects* collaborate to reach their goals.

5. **Collaborative relationships result in substantial supplemental project funding.** In 2003, 85 percent of *projects* collaborating (94 of 111) reported receiving in-kind support from at least 1 source and 61 percent of *projects* collaborating (68 of 111) reported receiving supplemental monetary support

[6] Two significant outliers were reported that impact these results. In 2000, one project reported serving 21,000 students and in 2001, one project reported serving 75,000 students.

[7] The adjusted growth rate accounts for the increase in number of projects engaged in program improvement at the associate level. In 2003, 77 projects reported program improvement at the associate level, up from 48 in 2002. In absolute terms, ATE impact increased 181 percent based on an increase in enrollment in selected programs from 7,267 to 20,452.

from at least 1 source. The combined total of monetary and in-kind support received by all reporting ATE *projects* was nearly $21 million. This figure represented a sharp increase from 2002 levels but was still lower than the amounts received in 2000 ($30 million) and 2001 ($36 million).[8]

6. **ATE *projects* are using evaluation to guide program activities, but there is still a significant gap in information about the quality of project products.** We view informed feedback to *projects* and the ATE program as central to maintenance of a strong program. Overall, three levels of feedback should be considered. First, *projects* should solicit and use high-level feedback to guide operations. There are two key ways in which such feedback is obtained—evaluation and advisory board involvement. Ninety percent of *projects* reported using an external evaluator, an internal evaluator, or both types of evaluators in 2003. *Projects* reported that the evaluations are useful, but not necessarily essential to their projects; evaluations reportedly provide about half of the evidence of program outcomes. Similarly, 76 percent of *projects* reported using some type of advisory committee to help guide project work. A significant proportion (43 percent) of these committees are national committees, which is consistent with NSF expectations that large projects and centers form a National Visiting Committee (NVC) to provide assistance and oversight for their work.

   Second, *projects* should gather reactions to their materials, professional development offerings, and technician preparation courses. There is evidence that *projects* collect this type of feedback *to some degree*. For example, more than half of *projects* engaged in professional development report that students and faculty "learned a lot" or that students were "enthusiastic," which contributed to learning. Similarly, *projects* reported that the vast majority of workshop participants were "satisfied" with the program. This feedback is important and can provide an initial gauge of quality.

   Third, *projects* need strong measures of quality and student impact. In materials development, *projects* pilot test materials, but they generally do not field test materials. In professional development, follow-up with participants is generally weak and as such, there is little evidence to support claims that ideas are being fully incorporated into the classroom and are positively impacting students. In program improvement, *projects* provide little follow-up with graduates and cannot fully explain what happens to individuals who complete (or fail to complete) their programs.

   Overall, this demonstrates that as evaluation and quality assurance tasks become more rigorous, fewer *projects* conduct the activities.

[8] We believe that the supplemental funding trend described above is due at least in part to the generally stagnant U.S. economy and the impact of the 9-11 attacks. Two results of the 9-11 attacks were (1) reductions in travel and discretionary business expenditures (e.g., training) and (2) shifting charitable giving toward human needs.

7. **NSF monitoring is a positive program influence but could do more to ensure *project* level accountability.** *Projects* have the opportunity to participate in a number of different monitoring activities (e.g., site visits to NSF, PI meetings, regular phone and e-mail contact) each year, and evidence suggests that participation in these activities is a positive program influence. *Projects* that participated in various monitoring activities reported that (1) NSF was more responsive to their needs, (2) site visits and evaluations were more helpful, (3) NSF facilitated collaboration between ATE *projects*, and (4) NSF had an accurate understanding of their specific *project* needs.

   Projects may conduct site visits to NSF or host NSF visitors. In 2003, 57 percent of *projects* reported at least 1 face-to-face visit with NSF personnel. Forty percent of *projects* reported 2-4 phone calls with NSF, two-thirds of *projects* reported more than 4 e-mails, 40 percent reported that NSF staff read and reacted to a submitted report, and 60 percent reported attending at least 1 meeting with other ATE principal investigators. Overall, 73 percent of *projects* reported at least 1 type of contact with NSF—8 percent reported no contact.

   We personally have experienced the substantial positive reinforcement of good practices that NSF program officers provide to *project* staff and the encouragement to produce high quality results. Our personal experiences are strongly validated in survey results. These findings, however, also reveal an important area of concern—1 in 5 *projects* receives no reaction to or feedback on project reports. We further suspect that the proportion of *projects* receiving no *written* feedback on reports is even higher.

8. **ATE is not improving the diversity of the workforce.** Improving diversity is an implied program objective as shown by references throughout the program guidelines.[9] For example, National Centers of Excellence are expected to establish plans for "the recruitment, retention, and placement of students, especially students from groups underrepresented in STEM fields." Similarly, articulation partnerships that focus on teacher preparation in 2-year colleges "should aim to increase the number, quality, and diversity of prospective K-12 science, mathematics, or technology teachers . . . "

   Nationally,[10] almost 60 percent of community college students are females, although the proportion of female students in technical education programs is

[9] Source: Advanced Technology Education (ATE) Program Solicitation, NSF 01-52. Available online at <http://www.nsf.gov>.

[10] These statistics were obtained from the American Association of Community College Web site. They are contained in Kent, A. P. (2000). Community college fall headcount enrollment by age and gender: 1997. In M. Patton (Ed.), *National profile of community colleges: Trends & statistics* (3rd ed.). Washington, DC: Community College Press. Available online at <http://www.aacc.nche.edu/Content/NavigationMenu/AboutCommunityColleges/Trends_and_Statistics/ EnrollmentInfo/Enrollment_Info.htm>.

likely to be lower. The proportion of females enrolled in ATE-funded programs is approximately 35 percent. National enrollment for African Americans, Hispanics, and Caucasians is 12 percent, 11 percent, and 65 percent, respectively. ATE projects report that 11 percent of students are African American, 12 percent are Hispanic, and 56 percent of students are Caucasian. With the exception of gender statistics, the diversity of ATE students compares favorably with national community college enrollment statistics.

Across years, however, data show that ATE has not *improved* the diversity of students in its programs; and there is no evidence to show that ATE is *improving* the diversity of the workforce. A key indicator for improving diversity is the degree to which recruitment and retention efforts specifically target underrepresented groups. The 2003 survey results show that many *projects* take no special actions to increase diversity. For example, 81 percent of *projects* reported using written materials to recruit students, and 74 percent reported using Web sites. In contrast, 58 percent used written materials and 50 percent used Web sites as tools to *specifically* recruit students from underrepresented group.

Recommendations

The 2003 survey results suggest two key areas for action. The first regards promoting diversity, the second regards quality assurance and associated feedback tools to improve projects.

The ATE program has consistently promoted recruitment and retention of students as a means to increase the diversity of the technician workforce. Given the flat across-years trend of survey results, we believe this area deserves renewed attention. We suggest consideration of several *project*-level actions/support:

1. Document best practices for recruiting and retaining students from underrepresented groups and disseminate these practices to current ATE *projects* and prospective grantees.

2. Require prospective grantees to include a plan in their proposals for improving diversity of enrolled students.

3. Provide technical assistance (e.g., workshops) to *projects* to help them develop methods for recruiting and retaining female and minority students. Such workshops should include a combination of *project* staff, college recruitment officers, and business/industry partners.

4. Encourage *projects* to establish performance targets in key program areas and monitor progress toward those targets. Key areas may include, but not be

limited to, enrollment of minority students and articulation of these students from the associate to baccalaureate levels.

5. Require *projects* to provide evidence of diversity-based actions and results as part of their annual reports.

6. Provide written feedback on diversity to principal investigators annually. We think this feedback will be most effective if provided in response to annual reports.

Concern for improving quality assurance in the ATE program is a recurring theme of our survey findings. The fact that ATE *projects* value interactions with NSF staff opens an important door for increasing the focus on assuring high quality of *project* products. Annual survey findings consistently find that *projects* employ evaluations and use them as a partial basis for determinations regarding product quality. Yet, the annual surveys also consistently show that *projects'* quality assurance efforts fall short of sound practice. Coupled to those *project* shortcomings, we also see what can be interpreted as a shortcoming in accountability assurance at the program level. To maintain and improve *project* and program quality we encourage consideration of the following points.

1. Continue to encourage *projects* to maintain close ties with NSF program officers, participate in PI meetings, and solicit input from NSF on *project* activities.

2. Establish clear expectations that *projects* gather and report evidence about the quality, implementation, and acceptance of *project* activities.

3. Provide written feedback to *projects* when they submit written reports. The value of written feedback is well established at NSF. It is used to especially good advantage in guiding the development of sound *project* proposals through feedback on preliminary proposals. We acknowledge that NSF program staff already have significant workloads, and we acknowledge the high costs of implementation and trade-offs that would result. However, we think it important that the program consider mechanisms to increase written feedback to *projects*, especially for annual reports. These reports can and should be a key tool for program improvement and program accountability.

   This recommendation may be accomplished through something as simple as having each program officer provide a list of *project* reports received, the date received, whether or not the *project* received a written response, and overall judgment of *project* progress along with evidence of efficacy for program emphases (e.g., diversity). Such reports would substantially increase the opportunity to identify program-based technical assistance needs and to establish and trace program effects.

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SECTION ONE INTRODUCTION

This report presents results from the fourth annual survey[11] of Advanced Technology Education (ATE) *projects.*[12] Intended as a means to provide evidence of the work of ATE projects and centers, this survey is part of larger effort to evaluate the ATE program. When combined with other information[13] and criteria, these findings provide a basis for judging the overall impact and effectiveness of the ATE program. Findings from this survey are expected to be useful to NSF staff in preparing their annual GPRA[14] reports and making programmatic decisions. ATE *projects* are likely to use survey results to learn about the activities and findings of other *projects* and to serve their own improvement needs.

ATE has approximately 220 active *projects*. Of these, the 139 active *projects* that had completed at least 1 year of their grant-funding period at the time of the survey in early February 2003 were asked to participate. Ninety-two percent (128) completed and submitted survey responses within the prescribed time frame (February-April 2003).

The ATE program's projects are expected to develop materials, improve their programs of instruction, and provide professional development to disseminate model materials and programs developed. In these efforts, *projects* are expected to collaborate with business, industry, and educational partners. Neither Congress nor NSF has specified what number or proportion of the ATE *projects* should be engaged in each identified work category. Neither have they stated the exact nature of work necessary to improve the workforce capabilities of technicians.

Figure 1 depicts the ATE program model and serves as an organizer for this report. As the figure shows, collaboration, materials development, and professional development efforts are all expected to serve program improvement and directly impact the workforce through better-educated students. Collaboration, because it

[11] The first survey was conducted in May 2000. Subsequent surveys have been conducted in February of 2001, 2002, and 2003.

[12] The term "project" has double meaning for the ATE program. NSF uses the term to refer to all entities that receive funding; it also refers just to smaller awards within the ATE program. The ATE program labels its largest and most complex projects as centers. To provide clarity in referencing these groups, the term projects (unitalicized) will refer to the smaller grants, centers will refer to the subgroup of larger grants, and *projects* (in italics) will be used to refer to the full group of projects and centers.

[13] See *Status Report 1* for descriptive information about the ATE program. See *Status Report 2,* the *Survey 2001 Report*, and the *Survey 2002 Report* for the 2000, 2001, and 2002 survey findings, respectively. See the issue papers for in-depth analyses based on the surveys and site visits and organized by topic (e.g., materials development). All these evaluation products may be found at <http://www.ate.wmich.edu>.

[14] Government Performance Results Act. For current information about NSF's response to this requirement, see its Web page at <http://www.nsf.gov/od/gpra/>.

can either influence student instructional programs directly or indirectly through materials development and professional development, is placed higher in the diagram. Materials development can serve professional development and vice versa. Both most often directly serve program improvement or the dissemination of programs that have been shown to be effective. Because all four program attributes (i.e., collaboration, materials development, etc.) occur within an institutional and project setting, project characteristics and organizational practices are viewed as the starting point for this model.

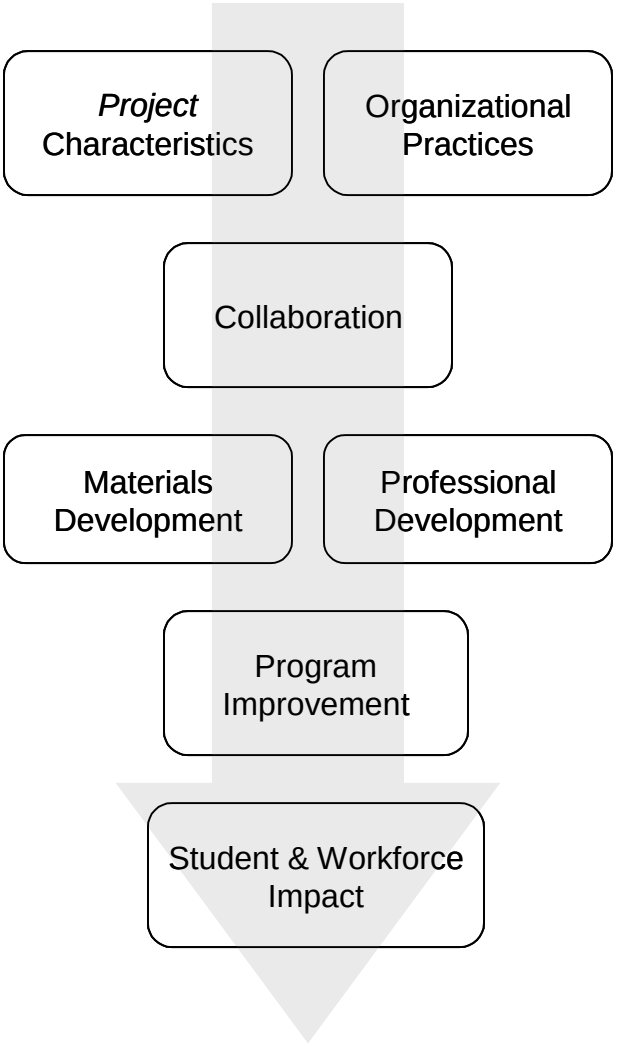

Figure 1: ATE Program Model

Consistent with previous years, the 2003 survey contained nine sections. The principal investigator for the project was asked to respond personally or assign another person(s) to respond for the project. All *projects* were asked to complete three sections: (a) basic information–confirmed general *project* information collected

from other sources (e.g., name of principal investigator and the nature and duration of grant), (b) monitoring–addressed the NSF program staff's efforts to monitor the *projects*, and (c) principal investigator (PI) overview–addressed several overarching and general *project* issues.

Each *project* was also asked to complete one or more additional sections focusing on the four primary categories of work that the ATE program supports: collaboration, materials development, professional development, and program improvement (see Figure 1). *Projects* that responded to the program improvement category were asked to complete a section for each educational level (secondary school, associate degree, and baccalaureate) where improvement efforts were targeted. A large and diverse project or center (i.e., one that engages in all identified types and levels of effort) would be expected to complete all nine sections. The smallest and narrowest of projects would complete four sections.

Past survey reports described the findings from each survey section. This report takes a different approach based on the ATE program model as shown in Figure 1. The survey results provide indicators that describe the nature of ATE *projects*, the work they are performing, and the results they are producing. In aggregate, these results describe the ATE program. Table 1 summarizes these indicators.

Table 1: Evaluation Indicators

Program Element	Indicators
1. *Project* Characteristics	1.1. Demographics 1.2. Stability 1.3. Unintended Outcomes 1.4. Barriers to Success 1.5. Sustainability
2. Organizational Practices	2.1. Work Categories 2.2. Workforce Needs Assessment 2.3. Advisory Committees 2.4. Evaluation 2.5. Monitoring
3. Collaboration	3.1. Collaboration with Other ATE Projects 3.2. Collaboration with Non-ATE Institutions 3.3. External Support 3.4. Quality of Collaboration

Program Element	Indicators
4. Materials Development	4.1. Purpose for Materials Development 4.2. Results 4.3. Development Practices 4.4. Quality
5. Professional Development	5.1. Results 5.2. Impact 5.3. Support
6. Program Improvement	6.1. Results 6.2. Changes in Classroom Environment Due to *Project* Efforts 6.3. Articulation
7. Student Impact	7.1. Demographics 7.2. Recruitment and Retention 7.3. Outcomes

Each indicator is made up of one or more survey items. Most often, an indicator draws upon information from a single survey section, but in some cases, we created indicators by combining items from multiple sections. For example, indicator 6.3: Articulation is made up of items from the program improvement and principal investigator overview sections.

We hope that this logic and the reports help readers understand the ATE program. While the emphasis of this report is on the 2003 survey results, we also report results from previous years to highlight program changes.

SECTION TWO PROGRAM INDICATORS

1.0 Project Characteristics

During its lifetime, ATE has made more than 500 awards to a variety of institutions. A typical grant is made to a 2-year college and runs for 3 years. After the initial funding period, a project may be awarded a continuation grant. *Projects* were asked to report their basic characteristics, their stability, any unintended outcomes, barriers to success, and their plans for sustainability. Combined, these indicators provide an overall description of ATE *projects*.

1.1 Demographics

In 2003, 128 *projects* responded to the survey. As Table 2 shows, this number is substantially larger than previous years and reflects the growing size of the ATE program.

In the 2000 program solicitation, NSF announced a new program emphasis: articulation partnerships between two-year and four-year colleges and universities. The first awards in this funding category were made in 2001 and the first articulation partnerships responded to the annual survey in 2003 (see Table 2).

In addition, NSF began to differentiate between national, regional, and resource centers. The survey did not ask for this level of differentiation, but as Table 2 shows, the number of centers increased from 10 to 15 across the four years. This increase reflects the differentiated emphases identified by the ATE program.

Table 2: Number and Proportion of *Projects* in Each Funding Category

		2000	2001	2002	2003
Project	*n*	90	64	68	110
	%	90.0%	85.3%	88.3%	85.9%
Center	*n*	10	11	9	15
	%	10.0%	14.7%	11.7%	11.7%
Articulation Partnership	*n*				3
	%				2.3%
Totals	*N*	100	75	77	128
	%	100.0%	100.0%	100.0%	100.0%

Across all four survey years, most respondents represented projects, and most respondents have been from 2-year colleges (see Table 3). There has been an increase in the proportion of respondents from associations/societies, while the proportion of respondents from 2-year colleges has declined slightly since 2000.

Congress did not specify that all awards were to be made to two-year colleges—it emphasized the important role these institutions play in the educational fabric of the

country. The proportion of respondents in the various institution categories reflects the flexibility of the program while remaining consistent with the program design.

Table 3: Number and Proportion of *Projects* in each Institution Category

		2000	2001	2002	2003
4-Year College/University	*n*	12	10	12	20
	%	12.0%	13.3%	15.6%	15.6%
2-Year College	*n*	82	56	54	88
	%	82.0%	74.7%	70.1%	68.8%
Association/Society	*n*	2	2	4	9
	%	2.0%	2.7%	5.2%	7.0%
Secondary School	*n*	1	1	1	1
	%	1.0%	1.3%	1.3%	0.8%
Other	*n*	3	6	6	10
	%	3.0%	8.0%	7.8%	7.8%
Totals	*N*	100	75	77	128
	%	100.0%	100.0%	100.0%	100.0%

The mix of funding levels has remained consistent across all four survey years (see Table 4). Over the four years Table 4 shows that the ATE program funding has increased, with the amount of funding per project remaining relatively constant.

The amount of funding provided to a *project* is a direct indicator of the project's capability to make an impact: the more funds received, the greater the anticipated impact. As Table 4 shows, the support provided to most *projects* is modest, supporting, perhaps, one to two additional professional persons per year[15] although we do not know exactly how *projects* spend the funding they receive (i.e., whether for personnel or other work-related needs).

Table 4: Total Award Amounts Reported by Respondents

		2000	2001	2002	2003
$0- $299,999	*n*	24	16	13	27
	%	24.0%	21.3%	16.9%	21.1%
$300,000- $499,999	*n*	24	19	17	32
	%	24.0%	25.3%	22.1%	25.0%
$500,000- $849,999	*n*	29	18	24	39
	%	29.0%	24.0%	31.2%	30.5%
$850,000 +	*n*	23	22	23	30
	%	23.0%	29.3%	29.9%	23.4%
Totals	*N*	100	75	77	128
	%	100.0%	100.0%	100.0%	100.0%

[15] If one applies a rule of thumb that 1 FTE costs in excess of one hundred thousand dollars a year and that most *projects* have an expected length of three years, this yields an increase of less than 2 FTEs for the median project size.

Project longevity is the difference between the survey date and the start date of the respondent's current award.[16] Table 5 shows that most survey respondents worked with projects that had been funded for between 1 and 3 years at the time they responded to the survey. Small proportions of respondents were in their first year of funding or had been receiving funding for more than three years.[17]

Table 5: Longevity of *Projects*

		2000	2001	2002	2003
Less Than 1 Year	*n*	34	14	11	4
	%	34.0%	18.7%	14.3%	3.1%
1-2 Years	*n*	30	33	37	75
	%	30.0%	44.0%	48.1%	56.6%
2-3 Years	*n*	24	21	25	35
	%	24.0%	28.0%	32.5%	27.3%
3-4 Years	*n*	8	1	3	12
	%	8.0%	1.3%	3.9%	9.4%
4 or More Years	*n*	4	6	1	2
	%	4.0%	8.0%	1.3%	1.6%
Totals	*N*	100	75	77	128
	%	100.0%	100.0%	100.0%	100.0%

ATE *projects* work in 20 different technology fields. Table 6 reports the number of *projects* working in the most and least frequently funded fields. Since 2000, the number and proportion of projects working in biotechnology, information technology, and mathematics has increased. The number of projects working in physics, distance learning, and geographic information systems has decreased. Across all years, the largest proportion of *projects* address IT, manufacturing technology, and multidisciplinary programs—in 2003, 46 percent of projects reported working in these 3 areas.

Table 6: *Project's* Technology Emphasis

		2000	2001	2002	2003
Information Technology, Telecommunication	*n*	10	10	16	24
	%	10%	13%	21%	19%
Multidisciplinary or Interdisciplinary (general)	*n*	13	2	8	18
	%	13%	3%	10%	14%
Manufacturing and Industrial Technology	*n*	14	10	9	16

[16] These data do not account for the original funding start date for projects that are under a continuing award number. As a result, the proportion of projects operating four or more years is underrepresented.

[17] In 2000, all active projects were asked to participate. In subsequent years, only projects that were active for at least 1 year, or those that were in the first year of a continuing award, were asked to participate in the survey.

		2000	2001	2002	2003
	%	14%	13%	12%	13%
Other Technology Fields	*n*	40	39	37	58
	%	40%	51%	46%	46%
Physics	*n*	8	5	1	1
	%	8%	7%	1%	1%
Geographic Information Systems	*n*	5	1		1
	%	5%	1%	0%	1%
Distance Learning	*n*	1	2		
	%	1%	3%	0%	0%
Totals	*N*	100	75	77	128
	%	100%	100%	100%	100%

1.2 Stability

Principal investigators rated the current status of their *project* compared with its status the previous year on nine dimensions (see Table 7). *Project* stability was evaluated based on these ratings. The nine dimensions reflect the four primary work categories—collaboration, materials development, professional development, and program improvement. A rating of 3.0 indicates no change in status. Ratings higher or lower than 3.0 indicate a relative improvement or decline in performance. Results indicate that, on average, *project* status on individual dimensions has fluctuated relatively little (5-20%) each year. There were no reported dramatic (>20%) improvements or declines in status.

Table 7: Principal Investigator Ratings of Current *Project* Status Compared With the Previous Year

		2000	2001	2002	2003
Number of Collaborations	*M*			2.9	2.9
	SD			1.0	1.1
	n			65	111
Financial Support from Other Organizations	*M*	2.5	3.4	2.4	2.5
	SD	1.0	0.8	0.9	0.9
	n	61	64	53	81
Use of Project/Center-Related Products	*M*	3.3	4.0	3.2	3.4
	SD	1.2	0.7	1.2	1.2
	n	64	56	63	94
Participation in Project/Center Activities by Other Institutions and Organizations	*M*	3.1	3.7	3.1	3.1
	SD	1.1	0.7	1.2	1.0
	n	74	68	67	108
Students Enrolled	*M*	3.2	3.7	3.2	3.1
	SD	1.3	1.0	1.3	1.4
	n	55	55	57	83

		2000	2001	2002	2003
Students Graduating/Completing	*M*	2.8	3.6	2.7	2.6
	SD	1.2	0.9	1.1	1.0
	n	39	44	40	60
Students Placed in Related Technical Jobs	*M*	2.8	3.8	2.7	2.4
	SD	0.9	0.9	0.9	0.9
	n	42	42	37	55
Number of Professional Development Opportunities	*M*		3.5	2.8	3.0
	SD		0.9	1.1	1.2
	n		66	68	112
Number of Participants in Professional Development Activities	*M*		3.7	3.0	3.1
	SD		0.9	1.2	1.3
	n		65	65	108

Note. The scale for this item was: 1=substantial decline (>20%), 2=some decline (5-20%), 3=stable, 4=some increase (5-20%), and 5=substantial increase (>20%).

The first two rows in Table 7 suggest that after *project* initiation, the number of collaborations remains steady but the amount of funding support received from external sources tends to decline.

Three student impact measures—student enrollment, student completion, and placement of students in technical positions are mixed. Once initiated, the *projects* appear to maintain student enrollment; but both the numbers of students completing and the numbers placed in technician positions appear to decline. Both anecdotal evidence and the fact that these trends are consistent with declining U.S. economic figures for the past several years suggest that the struggling U.S. economy has impacted the ability to place students in technical jobs as well as the attractiveness of technical careers for incoming students.

1.3 Unintended Outcomes

Respondents reported unintended outcomes of *project* work in five areas—three of which are positive outcomes and two negative (see Table 8). Overall, a much higher proportion of *projects* reported positive unintended outcomes.

Table 8: Number and Proportion of *Projects* Reporting Unintended Outcomes of *Project* Efforts

		2000	2001	2002	2003
Positive Unintended Outcomes					
Partnerships, Networks, and/or Collaborations	*n*			53	78
	%			81.5%	72.9%
Applications to or Work for Other Disciplines	*n*			33	48
	%			50.7%	44.8%
Additional Funding Received	*n*			30	40
	%			46.1%	37.3%

		2000	2001	2002	2003
Indicated More Than One Positive Outcome	*n*			61	95
	%			80.2%	75.3%
Indicated No Positive Outcomes/No Response	*n*			15	31
	%			19.7%	24.6%
Negative Unintended Outcomes					
Loss of Staff to Business Opportunities	*n*			11	11
	%			16.9%	10.2%
Communication or Work-Related Difficulties with Collaborating Partners	*n*			10	31
	%			15.3%	28.9%
Indicated Both Negative Outcomes	*n*			3	4
	%			3.9%	3.1%
Indicated No Negative Outcomes/No Response	*n*			58	88
	%			76.3%	69.8%

Note. Sample size for 2002 was 76; for 2003 it was 126.

In addition, 18 respondents reported "other" unintended outcomes of *project* work. Examples of positive unintended outcomes were increased faculty effectiveness in implementing integrated curricula (n=4), communication with and dissemination of materials to users (n=2), and adoption of demonstrated educational technology delivery method by industry (n=2). Examples of negative unintended outcomes were changes in curriculum without full participation of partner colleges (n=1) and an indication that 4-year schools are not good at meeting commitments (n=1).

1.4 Barriers to Success

Survey respondents reported up to three barriers or challenges to success that occurred in their *projects*. Six themes were consistently reported across survey years—resources, students, project staff, technological changes, communication and coordination, and institutional policy (see Table 9).

In 2003, lack of resources was the most commonly reported barrier as it was in each of the previous years. Project responses indicate that the primary resource issue over time is funding—either overall or for specific purposes—though no trends are visible in the responses.

Project staff and communication and coordination were the next most frequently reported barriers in 2003. Project staff barriers fell into two primary categories—loss of staff to higher paying opportunities in the private sector and the difficulty in getting experienced faculty members to change. Communication and coordination barriers centered on the difficulty in getting all partners to follow through on their commitments. In some cases, commitments were general collaborative relationships and in others may be linked to specific project-related activities.

Each barrier has implications for the sustainability of *project* work beyond ATE funding.

Table 9: Barriers to *Project* Success

Barrier	Year	%	Example Survey Responses
Resources	2000	60.0%	Lack of resources and competing requests for support.
	2001	25.3%	Additional funding from public and private sectors.
	2002	70.5%	Inadequate funding of technical/labor support due to acceptance of reduced budget.
	2003	64.8%	Limited equipment dollars—additional funds are needed to acquire equipment necessary to prototype new laboratory exercises.
Students	2000	-	
	2001	9.5%	Student recruitment and students transferring before they finish the program.
	2002	13.2%	Skills of incoming students have been below standards and have required bridge programs/remediation efforts prior to students being fully accepted into the program.
	2003	34.2%	Attracting academically prepared students for the rigor or the A.S. degree program.
Project Staff	2000	17.7%	It is very hard for long-time lecture-based faculty to change their view of how learning occurs.
	2001	19.0%	Lead teacher cohort stability (faculty attrition).
	2002	29.4%	The difficulty of keeping a good tech writer. The market pays them much more than the project can pay.
	2003	41.6%	Turnover of staff and faculty within our department and within our college has challenged our efforts to create a stable program.
Technological Change	2000	24.4%	Teachers resistant to learning or adapting new technologies.
	2001	20.6%	Rapid changes in the field that complicate the curriculum and curriculum change process.
	2002	13.2%	Faculty not current in technology needing more "instruction" when we thought they would be contributors.
	2003	16.6%	Telecommunications technology changes very rapidly and so does the related equipment for learning.
Communication and Coordination	2000	15.5%	Collaborative partners not completing projects in a timely manner.
	2001	15.8%	Coordination of materials development projects.
	2002	54.4%	Some of the partner colleges have not forged close ties with local "mentor" firms as we have encouraged them to do.
	2003	37.9%	The difficulty of coordinating between organizations has resulted in misconceptions of assigned tasks.
Institutional Policy	2000	26.6%	Lack of administrative support at the local high schools.
	2001	23.8%	Lack of support from administration, not enough space on campus, internal issues between staff, lack of department support.
	2002	8.8%	Lack of buy-in by college/department to obligations of the project.
	2003	29.6%	New accountability testing in high schools makes it harder to implement a new curriculum that isn't directly tied to those tests.

Note. The sample size was 45 in 2000, 63 in 2001, 68 in 2002, and 108 in 2003. Categories are not mutually exclusive.

1.5 Sustainability

Projects were asked to describe plans for project sustainability. Five themes emerged from responses:

- Funding (seeking external funding sources to continue or expand *project*)
- Dissemination (*project* produced products [e.g., publication of materials, instructional materials, etc.] including other revenue sources such as paid project services [e.g., fee-based training or professional development])
- Development/Modification (ongoing development and/or modification of curricula, materials, etc.)
- Collaboration/Partnership (*project* sustained through activities and/or agreements with other institutions and/or organizations). The external evaluator provides an objective view for suggested process and project improvements and validates processes that are working well. The internal evaluator develops data collection tools and pilots and field-tests the products being developed.
- Institutionalization (working to institutionalize the *project* at the institution where the *project* is housed). The evaluator is giving us feedback from students and faculty on the effectiveness of our materials. Due to this feedback we have made changes in our product.

In 2003 (see Table 10), 40 *projects* reported funding as a primary method of sustainability, 36 *projects* reported dissemination, 23 reported collaboration/ partnership, 19 reported *project* development/modification, and 10 reported institutionalization as a plan for *project* sustainability.

Table 10: Sustainability Plans

Sustainability Plan	Year	%	Representative Statement
Funding	2002	46.8%	Submit an ATE grant for years 7-10 and have plans to submit other grants through other funding sources.
	2003	37.0%	As has been done in the past, NSF funding will be sought to continue main functions of the project.
Dissemination	2002	15.6%	Market identified products: textbooks, academic workshops, and corporate training.
	2003	33.3%	Project will be sustainable through revenue generated through sales of product, registration fees for institutes, and access and troubleshooting fees.
Development/Modification	2002	25.0%	Three new courses have been developed and offered this past academic year.
	2003	21.2%	The project will be sustained by way of continuing to offer newly developed courses.
Institutionalization	2002	34.3%	It is believed that the curriculum will become institutionalized and that the call to continue the program (from industry) will drive this.
	2003	9.2%	Institutionalize the courses we're developing for middle school mathematics education majors.

Sustainability Plan	Year	%	Representative Statement
Collaboration/ Partnerships	2002	20.3%	Participating institutions have formed alliances with each other and other educational institutions and business partners that will continue beyond the scope of the project.
	2003	21.2%	Institutions have formed alliances and collaborations with each other and with business partners.

Note. Sustainability data were not reported in 2000 and 2001; for 2002, the sample size was 64; for 2003 it was 108. Categories are not mutually exclusive.

Overall, plans for sustainability in 2003 are consistent with 2002, with the exception of an increased reliance on dissemination of *project*-produced materials and/or other *project* generated revenues in 2003 (15.6% in 2002 versus 33.3% in 2003).

Securing additional grant funding was most commonly reported as the key to sustaining *project* work. However, in 2003 a large number of *projects* also reported their intention to sustain *project* work through sale of products or services developed under *project* auspices. Though not addressed in the collaboration/partnerships theme, certainly some continued funding likely would enhance their sustainability as well. Two sustainability themes appear to be viable without additional funds: fruits of development/modification and institutionalization.

2.0 Organizational Practices

Organizational practices indicators summarize the work that ATE *projects* are engaged in and provide an overall understanding of how *projects* conduct their activities. This set of indicators emphasizes systematic approaches and feedback mechanisms for conducting *project* activities—types of workforce assessments conducted, use of advisory panels, use of evaluation, and participation in monitoring activities. These indicators are set against the backdrop that describes the combinations of work categories in which *projects* are engaged.

2.1 Work Categories

Each *project* completed one or more survey sections that focused on the four primary work categories supported by the ATE program (see Figure 2). A response to a survey section meant that a *project* engaged in that type of work. Table 11 summarizes these results.

Collaboration with businesses, industries, educational institutions, and other organizations to achieve *project* objectives. Collaborations serve the other three work categories (materials development, program improvement, and professional development) to achieve ATE program objectives.

Materials Development conducted by *projects*. "Materials" include one or more courses, modules, process models, and/or other instructional or assessment units. "Development" includes the preparation, adaptation for implementation, and/or testing of materials.

Program Improvement at the (1) secondary school, (2) associate degree, and (3) baccalaureate degree levels. “Program improvement” refers to multiple, related courses and/or field experiences for students at the designated education level that lead to a defined outcome such as a degree, certification, or occupational completion point.

Professional Development focus on instruction and/or support provided to teaching faculty and staff to update their knowledge and skills and to train them to teach new or improved curricula effectively.

Figure 2: ATE Program Work Categories

Program emphases as reported by survey respondents have remained stable, with slight increases in collaboration and professional development and a decrease in materials development. The increase in the proportion of projects reporting that they collaborate—both the large proportion responding and the increase in the two most recent years—is consistent with the strong program emphasis on collaboration as

integral to success in reaching ATE program goals. While not required of ATE *projects*, collaboration is encouraged as reflected in the program guidelines. Effective technological education programs should involve partnerships between two-year colleges, four-year colleges and universities, secondary schools, business, industry, and government and should respond to industry's need for well-prepared workers having adaptable skills.

Table 11: Percentage of *Projects* Engaged in Each Work Category

		2000	2001	2002	2003
Collaboration	*n*	68	57	68	111
	%	68.0%	76.0%	88.3%	86.7%
Materials Development	*n*	75	62	65	99
	%	75.0%	82.7%	84.4%	77.3%
Professional Development	*n*	67	58	59	104
	%	67.0%	77.3%	76.6%	81.3%
Program Improvement	*n*	57	51	51	84
	%	57.0%	68.0%	66.2%	65.6%
Totals	*N*	100	75	77	128
	%	100.0%	100.0%	100.0%	100.0%

Table 12 provides a breakdown of the 2003 survey responses showing the nature of work conducted by the 128 *projects*. This table reflects the program model. The first breakdown is based on whether or not a project reported collaboration. Subsequent breakdowns address each of the remaining work categories—materials development, professional development, and program improvement. The results indicate that more than half (51%) of respondents are engaged in all work categories.

Only four *projects* did not report for any of the work categories. A review of the abstracts and project reports (from PIRS) for these projects indicate that three of the four received small awards (less than $300,000), but they are working in the ATE program areas. The absence of data for these *projects* suggests that they chose not to complete the relevant survey sections or that they thought that the survey questions did not adequately reflect their activities.

Table 12: *Projects* Engaged in Combinations of Categories of Work in 2003

Collaboration (C)		Materials Development (MD)		Professional Development (PD)		Program Improvement (PI)	
Yes C	**111 87%**	**Yes + C + MD**	**92 72%**	**Yes + C + MD + PD**	**82 64%**	**Yes + C + MD + PD + PI**	**65 51%**
						No + C + MD + PD not PI	17 13%
				No + C + MD not PD	10 8%	Yes + C + MD not PD + PI	4 3%
						No + C + MD not PD not PI	6 5%
		No + C not MD	19 15%	Yes + C not MD + PD	13 10%	Yes + C not MD + PD + PI	5 4%
						No + C not MD + PD not PI	8 6%
				No + C not MD not PD	6 5%	Yes + C not MD not PD + PI	2 2%
						No + C not MD not PD not PI	4 3%
No Not C	**17 13%**	Yes Not C + MD	7 5%	Yes Not C + MD + PD	3 2%	Yes Not C + MD + PD + PI	2 2%
						No Not C + MD + PD not PI	1 1%
				No Not C + MD not PD	4 3%	Yes Not C + MD not PD + PI	4 3%
						No Not C + MD not PD not PI	0 0%
		No Not C, not MD	**10 8%**	Yes Not C not MD + PD	4 3%	Yes Not C not MD + PD + PI	0 0%
						No Not C not MD + PD not PI	4 3%
				No Not C, not MD Not PD	**6 5%**	Yes Not C not MD not PD + PI	2 2%
						No Not C not MD not PD not PI	**4 3%**
Totals	128 100%		128 100%		128 100%		128 100%

Note. Results based on 128 responses in 2003.

2.2 Workforce Needs Assessment

Needs assessments are perceived as an essential tool to guide *project* work. Respondents reported if they conducted a workforce needs assessment in the last

12 months. In 2003, 35 percent (45 of 128) of *projects* reported conducting at least 1 type of workforce needs assessment, down from 43 percent in 2002 (see Table 13). While many *projects* likely conducted some form of preproposal effort to justify *project* objectives, these results indicate that most *projects* do not use needs analysis as a regular (ongoing) tool to guide project work.

Table 13: Number and Proportion of *Projects* Conducting Different Types of Workforce Needs Assessment

		2000	2001	2002	2003
Survey	*n*			13	22
	%			16.9%	17.2%
Review of Existing Literature or Reports	*n*			24	20
	%			31.2%	15.6%
Interviews	*n*			20	22
	%			26.0%	17.2%
Focus Groups	*n*			18	20
	%			23.4%	15.6%
Other Assessment Type	*n*			8	11
	%			10.4%	8.6%
At Least One Type	*n*			33	45
	%			42.9%	35.2%

Note. Sample size for 2002 was 77; for 2003 it was 128.

2.3 Advisory Committees

Projects are encouraged to form and use advisory committees to help guide *project* activities, provide support, and collaborate on performing *project* work. In addition, NSF expects that large projects and centers will form a National Visiting Committee (NVC) with the advice and consent of the NSF program officer. In 2003, 76 percent (97 of 128) of *projects* reported using an advisory committee at one or more levels (e.g., local, regional, national), down slightly from 88 percent in 2002 (see Table 14). In 2002, regional committees were most frequently used; in 2003, local and/or national groups were used most frequently.

Notable in these findings is that 100 percent of centers reported using a national advisory committee in 2003, which is consistent with NSF expectations. Also interesting is the decrease in use of local committees—NSF expects *project* activities to have a regional or national focus, but not purely a local focus. Given this, use of a local advisory committee would seem less relevant. However, if the purpose of the local committee were to help establish ties with local businesses then *projects'* use of this type of committee would be appropriate. In 2003, 43 percent (54 of 126) of projects reported using a local committee, down from 52 percent (40 of 76) in 2002. In 2003, two-thirds (36 of 54) also used a regional, national, or other type of advisory committee; in 2002, 60 percent (24 of 40) also used another type of advisory committee. These practices are consistent with NSF expectations.

Table 14: Types of Advisory Committees Employed by *Projects*

			2000	2001	2002	2003
Project	Local Institution or Group	*n*			36	48
		%			53.7%	44.4%
	Regional	*n*			35	22
		%			52.2%	20.3%
	National[a]	*n*				39
		%				36.1%
	Other Advisory Committee	*n*			11	11
		%			16.4%	10.1%
	At Least One Type	*n*			58	80
		%			86.5%	74.0%
	Total Projects	*N*			67	108
Center	Local Institution or Group	*n*			4	6
		%			44.4%	40.0%
	Regional	*n*			9	5
		%			100.0%	33.3%
	National[a]	*n*				15
		%				100.0%
	Other Advisory Committee	*n*			1	0
		%			11.1%	0.0%
	At Least One Type	*n*			9	15
		%			100.0%	100.0%
	Total Centers	*N*			9	15
Articulation Partnership	Local Institution or Group	*n*			0	0
		%			0.0%	0.0%
	Regional	*n*			0	1
		%			0.0%	33.3%
	National[a]	*n*				1
		%				33.3%
	Other Advisory Committee	*n*			0	0
		%			0.0%	0.0%
	At Least One Type	*n*			0	2
		%			0.0%	66.6%
	Total Articulation Partnership	*N*			0	3
All *Projects*	Local Institution or Group	*n*			40	54
		%			51.90%	42.8%
	Regional	*n*			44	28
		%			57.10%	22.2%
	National[a]	*n*				55
		%				43.6%
	Other Advisory Committee	*n*			12	11
		%			15.60%	8.7%
	At least one type	*n*			68	97
		%			88.40%	75.8%
	Total *projects* reporting	*N*			76	126

Note. Percentages do not equal 100% because respondents may report using more than one type of committee.
Note[a]. In 2002, regional and national choices were combined into one category.

Respondents reported that advisory committees engage in a number of different activities, including these:

- Review of *project* materials, activities, advising, evaluating, and providing feedback
- Assistance with obtaining resources for *projects*
- Design and development (curricula, standards, materials)

The widespread use of advisory committees suggests that *projects* do rely on the expertise of people in the field to help determine project direction, but the views of advisory members are likely to be geared toward personal experiences rather than knowledge of broader–based needs.

2.4 Evaluation

Use of evaluators has remained stable from 2000-2003 (see Table 15). In 2003, 89.1 percent of *projects* reported using at least one type of evaluator. Most *project* evaluators were external in 2003 (62.5 percent), which is consistent with 2000 when 60.7 percent of projects used an external evaluator, but represents a decrease from 2002 when 71 percent used an external evaluator. The use of internal evaluators has increased since 2000 (from 2.3 percent in 2000 to 8.6 percent in 2003). Across all survey years, of the *projects* that did not report using an evaluator, most have been operating for 1-2 years. In 2003, 4 projects that have been operating 2 or more years did not report using an evaluator of any type.

Table 15: Types of Evaluators Used

		2000	2001	2002	2003
External evaluator only	*n*	51	51	54	80
	%	60.7%	68.0%	71.0%	62.5%
Internal evaluator only	*n*	2	3	3	11
	%	2.3%	4.0%	3.9%	8.6%
Both types of evaluator	*n*	17	12	15	23
	%	20.2%	16.0%	19.7%	18.0%
At Least One Type of Evaluator	*n*	70	65	72	114
	%	83.3%	86.6%	93.5%	89.1%
Not Applicable/Did Not Respond	*n*	14	9	5	14
	%	16.6%	12.0%	6.5%	10.9%

Projects also reported the usefulness of the evaluations and how well evaluative efforts provided evidence of the quality of *project* outcomes (see Table 16). These results show that *projects* view evaluations as useful, but not essential to *project* work. In 2003, projects reported that evaluations provide half of the evidence of quality of outcomes.[18]

[18] Responses to this item were distributed evenly, with 96 percent of respondents indicating that evaluations provided some, about half, or most of the evidence of *project* outcomes.

Table 16: Evaluation Usefulness and Evidence of *Project* Outcomes

		2000	2001	2002	2003
Usefulness of Evaluation[a]	*M*			4.0	4.0
	SD			0.9	0.9
	n			71	113
Evaluation Evidence of *Project* Outcomes[b]	*M*				3.1
	SD				0.9
	n				103

Note[a]. The scale for this item was 1=not useful, 2=minimally useful, 3=some use, 4=useful, and 5=essential to the project/center.
Note[b]. The scale for this item was 1=no evidence, 2=some evidence, 3=about half the evidence, 4=most of the evidence, and 5=all of the evidence.

Projects reported using evaluation in a variety of ways, including the following:

- The external evaluator provides an objective view for suggested process and project improvements and validates processes that are working well. The internal evaluator develops data collection tools, pilots, and field-tests the products being developed.
- The evaluator is giving us feedback from students and faculty on the effectiveness of our materials. Due to this feedback we have made changes in our product.
- The evaluation will be used to determine the success of assisting students in obtaining employability skills in various STEM programs.
- The evaluation team gathered baseline data on enrollment that will help establish goals for our work and also creates a basis from which we can make judgments about our impact. The evaluation survey of our institutes was a formative feedback tool to help improve our outcomes and meet the needs of educators.

Results from the materials development and professional development survey sections provide additional insights into the *projects'* use of evaluation. These results are reported in Sections 4.0 and 5.0, respectively.

2.5 Monitoring

NSF holds projects accountable primarily through annual *project* reports and, for large projects, the use of National Visiting Committees. During the year, *projects* also have the choice to engage in other activities to strengthen their relationship with NSF, receive feedback and guidance on *project* activities, and improve their collaborations with other ATE projects. These activities are collectively referred to as monitoring.

Table 17 summarizes the extent to which *projects* engage in various monitoring activities. The pattern of activity is consistent across survey years. Overall, telephone calls and e-mail contact are the most frequently reported types of contact with NSF. Only about one-third of *projects* reported site visits by NSF—this result is

consistent across years, although the proportion of projects reporting 2-4 visits by NSF has doubled since 2000. Also interesting is that an increasing proportion of *projects* made visits to NSF. In 2003, 43 percent of *projects* were neither the recipient of an NSF site visit, nor visited NSF. This proportion has increased from 34 percent in 2002 and 28 percent in 2001.

Table 17: *Project* Participation in Monitoring Activities

Activity			2000	2001	2002	2003
Site Visits by NSF	0 times	*n*	68	48	47	84
		%	68.0%	64.0%	61.8%	66.1%
	1 time	*n*	23	21	27	31
		%	23.0%	28.0%	35.5%	24.4%
	2-4 times	*n*	5	4	1	12
		%	5.0%	5.3%	1.3%	9.4%
	More than 4 times	*n*	4	2	1	
		%	4.0%	2.7%	1.3%	
Visits to NSF	0 times	*n*	44	35	38	71
		%	44.0%	46.7%	50.0%	55.9%
	1 time	*n*	35	26	24	35
		%	35.0%	34.7%	31.6%	27.6%
	2-4 times	*n*	20	14	14	20
		%	20.0%	18.7%	18.4%	15.7%
	More than 4 times	*n*	1			1
		%	1.0%			0.8%
Projects that have not been visited by NSF nor visited NSF at least one time		*n*	35	21	26	54
		%	35.0%	28.0%	34.2%	42.5%
Telephone Calls To/From NSF	0 times	*n*	19	14	13	23
		%	19.0%	18.7%	17.1%	18.1%
	1 time	*n*	6	10	8	19
		%	6.0%	13.3%	10.5%	15.0%
	2-4 times	*n*	36	29	31	52
		%	36.0%	38.7%	40.8%	40.9%
	More than 4 times	*n*	39	22	24	33
		%	39.0%	29.3%	31.6%	26.0%
E-Mail Contacts with NSF	0 times	*n*	4	4	3	6
		%	4.0%	5.3%	3.9%	4.7%
	1 time	*n*	2	1	1	6
		%	2.0%	1.3%	1.3%	4.7%
	2-4 times	*n*	23	23	24	30
		%	23.0%	30.7%	31.6%	23.6%
	More than 4 times	*n*	71	47	48	85
		%	71.0%	62.7%	63.2%	66.9%
PI Meetings	0 times	*n*	24	5	15	22

Activity			2000	2001	2002	2003
		%	24.0%	6.7%	19.7%	17.3%
	1 time	*n*	56	48	42	75
		%	56.0%	64.0%	55.3%	59.1%
	2-4 times	*n*	14	9	11	15
		%	14.0%	12.0%	14.5%	11.8%
	More than 4 times	*n*	6	13	8	15
		%	6.0%	17.3%	10.5%	11.8%
NSF Reading and Reaction to Submitted Reports	0 times	*n*	24	18	24	27
		%	24.0%	24.0%	31.6%	21.3%
	1 time	*n*	21	15	24	52
		%	21.0%	20.0%	31.6%	40.9%
	2-4 times	*n*	38	30	21	36
		%	38.0%	40.0%	27.6%	28.3%
	More than 4 times	*n*	17	12	7	12
		%	17.0%	16.0%	9.2%	9.4%
Total		*N*	100	75	76	127
		%	100.0%	100.0%	100.0%	100.0%

Table 18 below summarizes the extent to which *projects* participate in monitoring activities. These results are consistent across years—the vast majority of *projects* participates in one or two activities and slightly fewer than one in five participate in all activities. A small number of *projects* reported participating on no monitoring activities.

Table 18: Summary of Participation in Monitoring Activities

		2000	2001	2002	2003
No Monitoring Activities	*n*	11	2	8	10
	%	11.0%	2.7%	10.5%	7.9%
1 or 2 Monitoring Activities	*n*	70	62	53	93
	%	70.0%	82.7%	69.7%	73.2%
All Monitoring Activities	*n*	19	11	15	24
	%	19.0%	14.7%	19.7%	18.9%
Totals	*N*	100	75	76	127
	%	100.0%	100.0%	100.0%	100.0%

Projects were also asked to report their perceptions of NSF. These results were analyzed in relation to the frequency of participation in monitoring activities (see Table 19). These results clearly indicate that *projects* that maintain closer contact with NSF through monitoring activities have more positive perceptions of NSF.

These results show differences in perceptions of NSF between *projects* that participate in some or all monitoring activities and those that do not. The greater the level of a *project's* participation, the more positively it rates NSF's assistance and

understanding of *project* work. Combined, these suggest that NSF program officers' monitoring efforts positively impact on project staffs' attitudes.

Table 19: *Project* Perceptions of NSF

			2000	2001	2002	2003
NSF Responsive to Needs	No Monitoring Activities	*M*	2.9	3.5	3.3	3.2
		SD	0.8	0.7	0.9	0.9
		n	11	2	8	10
	1 or 2 Monitoring Activities	*M*	3.4	3.5	3.5	3.4
		SD	0.7	0.7	0.6	0.6
		n	70	62	53	93
	All Monitoring Activities	*M*	3.7	3.6	3.7	3.7
		SD	0.5	0.9	0.5	0.5
		n	19	11	15	24
NSF Site Visits and Evaluations Helpful	No Monitoring Activities	*M*	2.6	3.0	2.8	2.7
		SD	0.9	1.4	1.2	0.8
		n	11	2	8	10
	1 or 2 Monitoring Activities	*M*	3.0	3.2	3.2	3.1
		SD	0.8	0.7	0.7	0.7
		n	70	62	53	93
	All Monitoring Activities	*M*	3.6	3.4	3.5	3.6
		SD	0.6	0.9	0.7	0.6
		n	19	11	15	24
NSF Facilitates Collaboration Between Other ATE Projects/Centers	No Monitoring Activities	*M*	2.6	3.0	2.9	2.9
		SD	1.0	1.4	1.0	0.9
		n	11	2	8	10
	1 or 2 Monitoring Activities	*M*	3.2	3.3	3.3	3.2
		SD	0.8	0.8	0.7	0.7
		n	70	62	53	93
	All Monitoring Activities	*M*	3.6	3.2	3.4	3.5
		SD	0.5	1.0	0.6	0.5
		n	19	11	15	24
Accurate Understanding by NSF	No Monitoring Activities	*M*	2.6	3.0	3.4	2.9
		SD	0.5	0.0	0.5	0.9
		n	11	2	8	10
	1 or 2 Monitoring Activities	*M*	2.7	2.6	3.3	3.3
		SD	0.6	0.6	0.6	0.7
		n	70	62	53	93
	All Monitoring Activities	*M*	2.8	2.9	3.6	3.6
		SD	0.4	0.3	0.6	0.5
		n	19	11	15	24

Note. The scale for these items was 1=strongly disagree, 2=disagree, 3=agree, and 4=strongly agree.

3.0 Collaboration

The ATE program encourages *projects* to develop collaborative arrangements to promote improvement in technological education. This expectation is visible in the language from Congress about developing the program and is strongly embedded in the language of the NSF solicitation for proposals.

Consistent with those expectations, the 2003 survey answers four questions:

- With whom do *projects* collaborate?
- How much collaboration occurs?
- What purposes are served by these collaborations?
- What is the value of these collaborations to the *projects*?

Projects were asked to complete this section if they had "relationships with institutions or groups, including your center/project institutions, which provide money and/or other support." This is the operational definition of collaboration established for the survey.

3.1 Collaboration with Other ATE *Projects*

Projects reported many collaborative arrangements with other ATE *projects*. These collaborations served a number of different purposes (see Table 20). In 2003, 71 percent (79 of 111) *projects* collaborated with other ATE projects, down from 82 percent in 2002 (56 of 68). In 2003, the most common reason for collaborating with other ATE *projects* was to share products; in 2002, the most common reason was sharing best practices.

Table 20: Reasons for Collaboration with other ATE *Projects*

		2000	2001	2002	2003
Materials Development	*n*			26	37
	%			38.2%	33.3%
Professional Development	*n*			30	55
	%			44.1%	49.5%
Best Practices Development	*n*			22	28
	%			32.4%	25.2%
Sharing of Project/Center Products	*n*			40	57
	%			58.8%	51.4%
Sharing of Best Practices	*n*			42	52
	%			61.8%	46.8%
Other Collaboration	*n*			10	7
	%			14.7%	6.3%
Collaboration with other ATE Projects for at least one purpose	*n*			56	79
	%			82.4%	71.2%

Note. The sample size for 2002 was 68; for 2003 it was 111.

3.2 Collaboration with Non-ATE Institutions

Projects also collaborate with a large number of non-ATE institutions (see Table 21). In each survey year, nearly all *projects* reporting indicated that they collaborated with at least one type of non-ATE institution.

Table 21: Number of Collaborations with Non-ATE Institutions

		2000	2001	2002	2003
Business and Industry Collaborations	Total	804	693	956	883
	M	14.6	13.3	17.4	9.8
	SD	18.5	14.1	29.3	16.5
	n	55	52	55	90
	%	80.9%	91.2%	80.9%	81.1%
Public Agency Collaborations	Total	208	140	128	227
	M	5.8	3.7	3.1	3.0
	SD	7.1	5.2	2.6	5.8
	n	36	38	42	75
	%	52.9%	66.7%	61.8%	67.6%
Educational Institution Collaborations	Total	1349	1177	912	1108
	M	25.0	21.8	15.7	11.9
	SD	41.7	28.7	18.4	27.4
	n	54	54	58	93
	%	79.4%	94.7%	85.3%	83.8%
Other Collaborations	Total	22	39	80	241
	M	2.2	4.3	3.1	4.6
	SD	1.4	8.2	2.9	14.6
	n	10	9	26	52
	%	14.7%	15.8%	38.2%	46.8%
At least 1 type of institution	*n*	63	55	61	106
	%	92.6%	96.5%	89.7%	95.5%
Total Number of Responses		68	57	68	111

Projects are expected to collaborate to produce materials, improve programs, and develop teachers. As Table 21 shows, across all survey years, *projects* most often chose to collaborate with other educational institutions and business and industry to achieve these objectives. Although the total number of such collaborative efforts remains quite large, the average number of these collaborations with both groups declined in 2003, especially in the business and industry category. This decline should not be perceived as entirely negative—the smaller number of collaborations is likely to provide greater opportunity for in-depth working relations than could occur with the larger numbers of collaborators.

Table 22 provides more specific detail regarding collaborative arrangements for each identified group. General support was reported as the most common purpose of collaborative activities across all institution categories. *Projects* most commonly

collaborated with educational institutions for program-related activities (materials development, program improvement, professional development). These purposes were less prevalent with business and industry collaborators.

Table 22: Purpose of Collaborations with Different Institutional Types

			2000	2001	2002	2003
Business and Industry	General Support	*n*	57	52	52	80
		%	83.8%	91.2%	76.5%	72.1%
	Materials Development	*n*	68	38	45	52
		%	100.0%	66.7%	66.2%	46.8%
	Program Improvement	*n*	36	38	45	60
		%	52.9%	66.7%	66.2%	54.1%
	Prof. Development	*n*	48	43	44	62
		%	70.6%	75.4%	64.7%	55.9%
Public Agencies	General Support	*n*	41	38	39	42
		%	60.3%	66.7%	57.4%	37.8%
	Materials Development	*n*	27	24	24	26
		%	39.7%	42.1%	35.3%	23.4%
	Program Improvement	*n*	21	19	31	39
		%	30.9%	33.3%	45.6%	35.1%
	Prof. Development	*n*	24	20	26	35
		%	35.3%	35.1%	38.2%	31.5%
Educational Institutions	General Support	*n*	58	50	52	83
		%	85.3%	87.7%	76.5%	74.8%
	Materials Development	*n*	54	45	49	70
		%	79.4%	78.9%	72.1%	63.1%
	Program Improvement	*n*	48	41	47	69
		%	70.6%	71.9%	69.1%	62.2%
	Prof. Development	*n*	51	43	44	71
		%	75.0%	75.4%	64.7%	64.0%
Other Organizations	General Support	*n*	32	29	22	34
		%	47.1%	50.9%	32.4%	30.6%
	Materials Development	*n*	17	16	12	21
		%	25.0%	28.1%	17.6%	18.9%
	Program Improvement	*n*	14	16	12	22
		%	20.6%	28.1%	17.6%	19.8%
	Prof. Development	*n*	17	16	12	21
		%	25.0%	28.1%	17.6%	18.9%
Total Number of Responses			68	57	68	111

3.3 External Support

Projects reported receiving both monetary and in-kind support from non-NSF sources (see Table 23). Across all institution categories, *projects* were more likely to report receiving in-kind support than monetary support. While educational

institutions and business and industry were the most frequently reported providers of such support, the *projects'* own institutions were most likely to supplement NSF funding. Across survey years, both monetary and in-kind external support declined in 2003 from 2002 levels.

Table 23: Number and Proportion of Projects Receiving External Support from Various Types of Institutions

Source of Support		2000	2001	2002	2003
Center/Project Host Institutions (monetary)	*n*	35	31	32	41
	%	51.5%	54.4%	47.1%	36.9%
Center/Project Host Institutions (in-kind)	*n*	39	40	41	57
	%	57.4%	70.2%	60.3%	51.4%
Business and Industry (monetary)	*n*	18	22	26	26
	%	26.5%	38.6%	38.2%	23.4%
Business and Industry (in-kind)	*n*	44	42	50	70
	%	64.7%	73.7%	73.5%	63.1%
Public Agencies (monetary)	*n*	15	18	19	27
	%	22.1%	31.6%	27.9%	24.3%
Public Agencies (in-kind)	*n*	17	14	23	34
	%	25.0%	24.6%	33.8%	30.6%
Educational Institutions (monetary)	*n*	11	9	21	29
	%	16.2%	15.8%	30.9%	26.1%
Educational Institutions (in-kind)	*n*	23	29	44	61
	%	33.8%	50.9%	64.7%	55.0%
Other Organizations (monetary)	*n*	19	20	12	10
	%	27.9%	35.1%	17.6%	9.0%
Other Organizations (in-kind)	*n*	20	35	19	19
	%	29.4%	61.4%	27.9%	17.1%
Monetary Support From At Least 1 Source	*n*	48	44	51	68
	%	70.6%	77.2%	75.0%	61.3%
In-Kind Support From At Least 1 Source	*n*	56	50	61	94
	%	82.4%	87.7%	89.7%	84.7%
Total Number of Responses	*N*	68	57	68	111

Supplemental funding and in-kind support can help *projects* directly meet project objectives and help ensure sustainability of *projects* or their products beyond the lifetime of the ATE award. *Projects* in total reported receiving nearly $10.7 million in monetary support and $10.1 million in in-kind support in 2003 (see Table 24). On average, each *project* received a total of $187,000 in monetary AND in-kind support in 2003. This total represents a decline in external support from 2000 and 2001 levels, but is an improvement from the average support received in 2002. While there is an overall increase in non-NSF support from 2002 to 2003, this should be attributed, at least in part, to the larger number of *projects* reporting.

A parallel question is the degree to which *projects* successfully leverage their ATE funding to secure additional support. The answer to this question has implications for the sustainability of ATE efforts and may reveal if *projects* are treating ATE funding as a capacity building opportunity or a direct *project* investment. Table 25 shows the relationship between ATE award amounts and the total amount of supplemental support received (monetary and in-kind support).

Table 24: Total Monetary Support and In-Kind Support Received by ATE *Projects*

		2000	2001	2002	2003
Total Monetary for Last 12 Months	Total	$13,694,320	$12,204,587	$5,307,123	$10,689,707
	M	$201,387	$214,115	$78,045	$96,303
	Mdn	$25,451	$56,760	$17,000	$1,000
	SD	$677,616	$492,374	$127,443	$338,321
	Min	$0	$0	$0	$0
	Max	$5,375,000	$3,413,000	$613,000	$2,500,000
	n	68	57	68	111
Total In-Kind for Last 12 Months	Total	$16,287,171	$24,017,001	$5,393,012	$10,092,177
	M	$239,517	$421,350	$79,309	$90,920
	Mdn	$58,134	$92,000	$16,000	$20,000
	SD	$741,680	$1,240,288	$154,419	$281,035
	Min	$0	$0	$0	$0
	Max	$5,020,000	$7,750,000	$836,684	$2,500,000
	n	68	57	68	111
Total Monetary and In-Kind Support	Total	$29,981,491	$36,221,588	$10,700,135	$20,781,884
	M	$440,904	$635,466	$157,354	$187,224
	Mdn	$125,000	$205,000	$67,000	$50,000
	SD	$1,025,677	$1,588,652	$230,813	$568,463
	Min	$0	$0	$0	$0
	Max	$5,560,000	$8,450,000	$1,020,000	$4,810,000
	n	68	57	68	111

Large *projects* (awards greater than $850,000) have consistently secured more monetary and in-kind supplemental funding than small projects. The one exception to this finding occurred in 2001 when *projects* with awards from $500,000-850,000 received more overall funding—this was primarily due to one *project* that secured nearly $8.5 million in external funding.

Results also show that the amount of funding the average small *project* received has remained stable from 2000 through 2003. Funding for large *projects* has declined since 2000, but increased in 2003 from 2002 levels. Overall, large *projects* generate more than half of the supplemental funding produced by all ATE projects. These results suggest that large *projects* are devoting resources to fund-raising that smaller *projects* cannot. In addition, the scope for larger *projects*-both in terms of activities

and geography—likely enables them to cast a wider net when seeking external support.

Table 25: Relationship Between ATE Award Amount and Supplemental Funding

Funding Quartile		2000	2001	2002	2003
$0-$299,999	Total	$1,265,461	$9,730,312	$607,600	$1,163,900
	M	$115,042	$973,031	$67,511	$64,661
	Mdn	$45,000	$147,500	$30,000	$4,000
	SD	$177,826	$2,547,602	$86,673	$178,403
	Min	$0	$0	$0	$0
	Max	$521,500	$8,213,000	$216,000	$761,900
	n	11	10	9	18
$300,000-$499,999	Total	$2,321,225	$3,067,660	$1,691,114	$1,459,261
	M	$122,170	$235,974	$105,695	$52,116
	Mdn	$54,000	$242,000	$64,750	$44,500
	SD	$166,408	$197,984	$115,789	$54,701
	Min	$0	$27,000	$0	$0
	Max	$582,000	$592,000	$294,450	$208,391
	n	19	13	16	28
$500,000-$849,999	Total	$9,187,860	$14,159,937	$2,604,737	$3,342,995
	M	$483,572	$1,011,424	$130,237	$95,514
	Mdn	$130,000	$311,944	$45,750	$57,000
	SD	$1,193,351	$2,176,501	$169,915	$105,874
	Min	$20,204	$41,000	$0	$0
	Max	$5,335,000	$8,450,000	$628,000	$361,500
	n	19	14	20	35
$850,000+	Total	$17,206,945	$9,263,679	$5,796,684	$14,815,728
	M	$905,629	$463,184	$252,030	$493,858
	Mdn	$410,018	$155,000	$102,000	$118,000
	SD	$1,429,850	$890,922	$331,898	$1,028,005
	Min	$0	$0	$0	$0
	Max	$5,560,000	$3,907,600	$1,020,000	$4,810,000
	n	19	20	23	30
Total	Total	$29,981,491	$36,221,588	$10,700,135	$20,781,884
	M	$440,904	$635,466	$157,355	$187,224
	Mdn	$125,000	$205,000	$67,000	$50,000
	SD	$1,025,677	$1,588,652	$230,813	$568,464
	Min	$0	$0	$0	$0
	Max	$5,560,000	$8,450,000	$1,020,000	$4,810,000
	N	68	57	68	111

3.4 Quality of Collaborations

Projects reported on the quality of their collaborations and the type of institution that was their most effective collaborator. Overall, *projects* rated the quality of collaborations with all types of institutions as good to excellent (see Table 26).

Table 26: *Project* Ratings of Quality of Collaborations

		2000	2001	2002	2003
Business and Industry	*M*	2.9	2.9	3.5	3.3
	SD	0.9	0.9	0.6	0.7
	n	60	52	60	91
Public Agencies (local, state and/or federal)	*M*	2.5	2.2	3.2	3.2
	SD	1.0	1.0	0.8	0.7
	n	43	37	51	63
Educational Institutions	*M*	3.0	2.9	3.5	3.4
	SD	0.9	1.0	0.6	0.7
	n	59	54	60	98
Other Organizations	*M*	2.4	2.5	3.4	3.4
	SD	1.1	1.1	0.7	0.6
	n	36	30	29	40

Note. The scale for this item was 1=poor, 2=satisfactory, 3=good, and 4=excellent.

Projects were also asked to select which type of institution had been the most effective collaborator in assisting them in reaching their goals, as shown in Table 27. In 2003, as in previous years, the highest proportion of *projects* ranked educational institution collaborations as most effective followed closely by business and industry collaborators.

Table 27: Most Effective Collaborators

		2000	2001	2002	2003
Business and/or Industry	*n*	25	27	28	42
	%	36.8%	47.4%	41.2%	37.8%
Public Agencies (local, state, federal)	*n*	4	3	8	12
	%	5.9%	5.3%	11.8%	10.8%
Educational Institutions	*n*	32	20	30	54
	%	47.1%	35.1%	44.1%	48.6%
Other Organizations	*n*	7	7	2	3
	%	10.3%	12.3%	2.9%	2.7%
Totals	*n*	68	57	68	111
	%	100.0%	100.0%	100.0%	100.0%

4.0 Materials Development

Materials development can be a stand-alone activity, or it can support professional development and/or program improvement activities. The *ATE Program Guidelines* consistently set forward the expectations that developed materials be of good quality, disseminated, and used. The findings here are used to examine the basic elements of these expectations.

4.1 Purposes for Materials Development

Ninety-nine *projects* reported results for the materials development section of the 2003 survey. As Table 28 shows, most materials development occurs in conjunction with instructional programs or professional development. Nearly 90 percent of *projects* developed materials for purposes of program improvement, and almost 75 percent developed materials for professional development purposes. Far fewer, 40 percent, plan to disseminate their work beyond *project* bounds, and only 1 project indicated that dissemination was its sole purpose for materials development.

Table 28: Purpose of Materials Development 2003

		2000	2001	2002	2003
Program Improvement	*n*				87
	%				87.9%
Dissemination	*n*				39
	%				39.4%
Professional Development	*n*				72
	%				72.7%
Other	*n*				14
	%				14.1%
Dissemination ONLY	*n*				1
	%				1.0%

Note. The sample size for 2003 was 99.

4.2 Results

Projects engaged in materials development reported the number and types of materials under development, as well as their stage of development. Respondents indicated how many materials were in use locally, at other locations, and/or how many had been published commercially (See Table 29).

Overall, production of courses and modules per project has declined. Fewer materials are in draft stage, fewer are being field-tested, and fewer were completed in 2003 than in previous years. This is consistent with the ATE Program's reduced emphasis on materials development. Similarly, the number of materials in use locally and elsewhere has declined. These trends were similar for production of modules.

Table 29: Types, Numbers, and Stages of Materials Being Developed

		2000	2001	2002	2003
Course Development					
Number in Draft Stage	Total	171	180	166	145
	n	32	28	27	45
	M	5.34	6.43	6.15	3.22
	SD	7.673	13.276	9.037	3.424
Number Being Field-Tested	Total	121	193	111	115
	n	31	29	22	31
	M	3.9	6.66	5.05	3.71
	SD	5.205	13.321	6.557	4.337
Number Completed	Total	374	295	314	334
	n	38	32	26	43
	M	9.84	9.22	12.08	7.77
	SD	15.841	11.87	13.389	13.275
Number in Use Locally	Total	283	309	299	329
	n	35	30	28	48
	M	8.09	10.3	10.68	6.85
	SD	14.496	13.854	11.573	11.535
Number in Use Elsewhere	Total	123	107	103	45
	n	12	15	14	10
	M	10.25	7.13	7.36	4.5
	SD	12.374	7.386	7.531	3.375
Number Published Commercially	Total	48	50	27	0
	n	4	4	1	0
	M	12	12.5	27	0
	SD	12.754	12.179	0.0	0.0
Number with Problem Solving Tasks	Total				253
	n				37
	M				6.84
	SD				9.982
Module Development					
Number in Draft Stage	Total	537	1122	382	340
	n	35	35	29	42
	M	15.34	32.06	13.17	8.1
	SD	40.571	123.53	36.599	9.968
Number Being Field-Tested	Total	406	935	412	250
	n	30	31	23	36
	M	13.53	30.16	17.91	6.94
	SD	31.819	108.317	41.383	6.315
Number Completed	Total	477	495	588	303
	n	39	26	28	38
	M	12.23	19.04	21	7.97
	SD	24.853	27.721	27.592	9.808
Number in Use Locally	Total	442	1263	472	292
	n	38	23	22	36
	M	11.63	54.91	21.45	8.11
	SD	24.723	149.689	28.42	8.035
Number in Use Elsewhere	Total	268	419	641	670

	n	18	18	15	25
	M	14.89	23.28	42.73	26.8
	SD	31.524	36.973	102.208	98.881
Number Published Commercially	Total	46	171	1	8
	n	5	6	1	2
	M	9.2	28.5	1	4
	SD	10.109	23.33	0.0	4.243
Number with Problem Solving Tasks	Total				326
	n				36
	M				9.06
	SD				8.194

Projects provided descriptive information about each of up to three of their *best* materials development efforts. Overall, 266 different materials were detailed in 2003, up from 176 in 2002. Table 30 summarizes the number of materials developed in various technology fields. The fields listed are consistent with the areas where the largest numbers of projects have been funded (see Table 6). Similarly, few materials were developed in technology areas where few projects were funded.

Table 30: Numbers of Materials Developed in Selected Technology Fields

		2000	2001	2002	2003
Information Technology, Telecommunication	*n*	22	25	33	58
	%	10.6%	15.2%	18.8%	21.8%
Multidisciplinary or Interdisciplinary (general)	*n*	13	3	8	24
	%	6.3%	1.8%	4.5%	9.0%
Manufacturing or Industrial Technology	*n*	20	20	31	36
	%	9.6%	12.1%	17.6%	13.5%
Other Technology Field	*n*	128	98	90	140
	%	61.5%	59.4%	51.1%	52.6%
Physics	*n*	13	13	12	7
	%	6.3%	7.9%	6.8%	2.6%
Geographic Information Systems	*n*	7	3	1	0
	%	3.3%	1.8%	0.6%	0.0%
Distance Learning	*n*	5	3	1	1
	%	2.4%	1.8%	0.6%	0.4
Totals	*N*	208	165	176	266
	%	100%	100%	100%	100%

4.3 Development Practices

Projects reported on the practices used during materials development. This information was solicited on the premise that good practices are likely to lead to quality materials. Three general practices were addressed:

- Assurance of content validity (see Table 31)
- Inclusion of measures to assess student success (see Table 32)

- Pilot and field-testing (see Table 33)

In addressing these three attributes, each item asked the respondents to state the frequency with which each measure or technique was used. Responses are summarized in Table 31.

Table 31: Use of Industry Standards or Other Relevant Guidelines for Developing Materials to Assure Content Validity

		2000	2001	2002	2003
Verification of Workforce Skill/Need by Industry	*M*	3.4	3.5	3.5	3.3
	SD	0.8	0.7	0.6	0.7
	n	70	56	59	86
Industry/Student-Based Standards to Guide Materials Development	*M*	3.4	3.6	3.5	3.4
	SD	0.7	0.6	0.7	0.7
	n	71	59	61	84

Note. The scale for these items was 1=almost never or never used, 2=used less than half the time, 3=used most times, and 4=used each time.

These *projects* indicate that they verify the workforce skill/need with industry most of the time. This finding is consistent with the previously reported finding regarding *projects* conducting workforce assessments. In 2003, there was a clear difference in the frequency with which *projects* verified workforce skill needs according to whether or not a *project* conducted a workforce assessment in the last year (mean of 3.7 for projects conducting workforce assessments versus a mean of 3.1 for *projects* that did not).

Table 32: Use of Measures to Assess Student Success

		2000	2001	2002	2003
Assess Student Success in Comparison With Standards (e.g., business/industry, educational, nontechnical skills)	*M*	2.8	2.9	3.3	3.1
	SD	1.0	0.9	0.8	0.9
	n	58	49	56	80
Assess Student Success (knowledge and skills) in Comparison With Other Non*project* or Nonparticipating Students	*M*	2.4	2.4	2.6	2.4
	SD	1.1	1.1	1.2	1.0
	n	57	49	50	74

Note. The scale for these items was 1=almost never or never used, 2=used less than half the time, 3=used most times, and 4=used each time.

These results show that projects are more likely to assess student success in comparison with standards rather than with nonparticipating students. As was true of the indicators for content validity, results for these student success validation processes have held relatively steady across all four years.

Finally, *projects* reported the degree to which they engage in pilot tests and field testing when developing materials. As Table 33 shows, *projects* reported

conducting a pilot and field-test within their own *projects* most of the time. External field tests were less common. Again, these indicators are stable across all years of the survey.

Table 33: The Extent to Which *Projects* Test Materials During Development

		2000	2001	2002	2003
Pilot Test Materials	*M*	3.3	3.5	3.5	3.4
	SD	0.9	0.7	0.7	0.8
	n	72	57	52	88
Field Test Materials Internally (i.e., within the *project*)	*M*	3.5	3.5	3.4	3.4
	SD	0.7	0.7	0.7	0.8
	n	72	57	51	84
Field Test Materials Externally (i.e., not *project*-based locations)	*M*	2.7	2.7	2.7	2.6
	SD	1.1	1.1	1.1	1.2
	n	65	52	45	69

Note. The scale for these items was 1=almost never or never used, 2=used less than half the time, 3=used most times, and 4=used each time.

4.4 Quality

Projects selected one material that they developed and reported what they considered to be the most compelling evidence for its quality. Responses indicate that they rely on reviews and statements of satisfaction by users rather than on concrete evidence of quality. These results are summarized in Table 34.

Table 34: Evidence of Quality of Materials Developed

Theme	Example
Teacher/Student Testimonials 56.5% (*n*=52)	Enthusiastic use by both secondary teachers and their students Students who have taken the module as a noncredit class have said on surveys that they learned a lot in the class that they intended to implement in their respective industries. The enthusiasm of the students in the class, which was a result of the knowledge they were gaining.
Professional/Industry Testimonials 44.6% (*n*=41)	Comments from reviewers and from pilot test participants have been uniformly favorable. The module has been demonstrated to NAIT, ASEE, and industry groups with excellent results. Publisher's comments from initial marketing efforts revealed that there is nothing comparable on the market, and faculty expressed need for material. At this point, the most compelling evidence is the fact that nationally renowned scientists in the field developed it. Moreover, the industry

Theme	Example
	and agency contacts we have consider it to be of high quality.
Evaluation of Materials 16.3% (*n*=15)	Student results of pre- and posttest by evaluator on selected items from the Force Concept Inventory Test. Feedback to evaluator from faculty using the material in field-testing. Extensive research and evaluation of 11 colleges in our state that currently offer manufacturing/machining training programs has identified this as a training gap among these programs. Only one offers a manufacturing process module; however, it focuses on engineering rather than manufacturing. Also, industry focus groups and feedback from our Advisory Committee have provided further support in to the development of this module. Course outcomes are based on third party competencies. These competencies are evaluated by authentic assessments where students demonstrate what they can do with knowledge as opposed to a closed book final examination.

Note. The sample size of responses was 92. Themes are not mutually exclusive.

5.0 Professional Development

Projects conducted large numbers of professional development activities for faculty and staff members engaged in technology education at the secondary, associate, and baccalaureate levels.

The survey section on professional development included six topics:

1. Number of professional development opportunities and number of participants in those activities
2. Number of professional development participants from different education levels
3. Attendance related to the capacity of professional development opportunities
4. Support provided to professional development participants
5. Percentage of participants who engaged in various implementation behaviors after participating in professional development opportunities
6. Outcomes resulting from professional development opportunities

One hundred-four of the 128 *projects* surveyed (81 percent) in 2003 provided information about their professional development activities over the last 12 months.

5.1 Results

Projects reported that in the last 12 months, they offered 1,104 professional development opportunities that were attended by 14,709 faculty and staff members at the secondary, associate, and baccalaureate levels. Table 35 illustrates that conferences, workshops, and in-service opportunities were the most common form of professional development activity. Conferences were defined as a multiple-track session of workshops or presentations; workshops as a single-track, 1 to 3-day directed learning experience; and in-service development as a course or seminar longer than a three-day directed learning experience.

Projects reported providing a total of 744 large-group offerings for professional development. These offerings included 166 conferences (4,214 participants), 325 workshops (5,317 participants), and 253 in-service courses (2,568 participants). Additionally, 36 internships or leaves of absence to work in the technical industry were offered (48 participants), and 128 online courses (226 participants) and professional development activities were offered by *projects* in 2003.

Table 35: Professional Development Opportunities and Participants

		2000	2001	2002	2003
Conference Opportunities	Total	128	125	112	166
	M	3.4	3.6	2.5	2.6
	Mdn	3.0	2.0	2.0	1.0
	SD	3.0	4.0	3.4	3.5
	n	37	34	44	65
Conference Participants	Total	3987	3502	1927	4214

		2000	2001	2002	2003
	M	107.7	106.1	43.8	69.0
	Mdn	65.0	20.0	6.0	20.0
	SD	151.6	209.8	65.1	109.9
	n	37	33	44	61
Workshop Opportunities	Total	353	239	369	325
	M	8.0	5.5	7.5	3.7
	Mdn	2.5	4.0	3.0	2.0
	SD	18.3	7.5	17.0	4.3
	n	44	43	49	87
Workshop Participants	Total	4573	3131	3530	5317
	M	108.8	74.5	76.7	62.5
	Mdn	30.0	39.0	38.0	25.0
	SD	277.8	110.1	114.8	88.1
	n	42	42	46	85
In-service Opportunities	Total	167	111	98	253
	M	5.7	3.2	2.7	3.9
	Mdn	2.0	1.5	1.0	1.0
	SD	11.7	3.9	5.9	11.6
	n	29	34	36	64
In-service Participants	Total	2037	1053	972	2568
	M	72.7	31.9	28.5	42.8
	Mdn	26.0	20.0	13.0	16.5
	SD	96.1	36.3	45.9	88.4
	n	28	33	34	60
Internship/Work Experience Opportunities	Total	127	43	43	36
	M	6.3	2.1	1.5	0.8
	Mdn	2.0	2.0	0.0	0.0
	SD	12.3	3.2	4.7	1.7
	n	20	20	28	44
Internship/Work Experience Participants	Total	193	176	54	48
	M	10.1	9.7	1.9	1.2
	Mdn	4.0	2.5	0.0	0.0
	SD	12.4	18.1	3.8	2.2
	n	19	18	28	38
Online Course Opportunities	Total	17	53	242	128
	M	4.2	3.7	9.6	2.9
	Mdn	1.0	1.0	0.0	0.0
	SD	6.5	7.3	44.9	15.0
	n	4	14	25	44
Online Course Participants	Total	202	2204	453	226
	M	67.3	200.3	20.5	6.1
	Mdn	80.0	18.0	30.0	18.0
	SD	114.8	598.0	63.9	20.1
	n	3	11	22	37

Projects reported that most participants were from two-year colleges (see Table 36). This result was consistent across all four years and is consistent with the finding that most program improvement efforts are taking place at the associate's degree level (see Section 6.0). Participants from secondary schools were the next largest group to attend professional development opportunities.

Table 36: Average Number of Participants at Different Education Levels

		2000	2001	2002	2003
Secondary Schools	Total	2351	2898	1839	3313
	M	48.9	60.3	35.3	37.6
	SD	81.5	147.2	57	69.1
	n	48	48	52	88
2-Year Colleges	Total	4322	3853	3095	5975
	M	78.5	71.3	57.3	59.1
	SD	211.2	187.9	79.9	109.4
	n	55	54	54	101
4-Year Universities	Total	519	261	832	1063
	M	16.2	6.3	17.7	12.9
	SD	17.8	10	47.7	24.9
	n	32	41	47	82
Other	Total	465	348	182	1936
	M	33.2	20.4	6.7	33.3
	SD	61.2	35.1	10.4	114.9
	n	14	17	27	58

Projects reported overall enrollment in the professional development activities offered as a proportion of the capacity for these activities (see Table 37). In 2003, a majority reported that enrollment was 76-100 percent of capacity. This figure is slightly lower than 2002, but an improvement from 2000 and 2001.

Table 37: Enrollment Capacity for Professional Development Activities

		2000	2001	2002	2003
0%-25% of Full Capacity	*n*	4	2	5	8
	%	6.0%	3.4%	8.5%	7.7%
26%-50% of Full Capacity	*n*	8	10	2	13
	%	11.9%	17.2	3.4%	12.5%
51%-75% of Full Capacity	*n*	15	23	15	28
	%	22.4%	39.7%	25.4%	26.9%
76%-100% of Full Capacity	*n*	33	23	37	55
	%	49.3%	39.7%	62.7%	52.9%
No Response	*n*	7			
	%	10.4%			

5.2 Impact

Projects engaged in professional development reported the follow-up methods they used with professional development participants. Overall, most projects did conduct some type of follow-up—in 2003, the most common follow-up method was a letter or e-mail. We do not know the nature of these follow-up communications (e.g., is evaluative information sought, or are these just reminders or encouragement to

apply the professional development tools?). About half conducted a follow-up survey, which suggests a more systematic approach to collecting information. These findings suggest that feedback mechanisms are in place for their program activities; the extent to which this feedback is used to improve their programs is unknown.

Table 38: Number and Proportion of Projects Using Different Follow-Up Methods with Professional Development Participants

		2000	2001	2002	2003
Personal Contact	*n*			24	54
	%			40.7%	50.9%
Survey	*n*			32	51
	%			54.2%	48.1%
Newsletter	*n*			14	22
	%			23.7%	20.8%
Letter or E-Mail	*n*			31	63
	%			52.5%	59.4%
Other	*n*			13	19
	%			22.0%	17.9%
At Least One Follow-Up Method	*n*			44	82
	%			74.6%	77.4%

Note. 2002 n=59 and 2003 n=106.

Professional development requires more than just presenting new ideas. These ideas must be accepted, and participants must be able to take the ideas back to their individual educational settings and implement what they have learned.

Table 39 shows the proportion of participants reported by the *projects* as engaging in various implementation strategies. Projects reported that a large majority of participants were satisfied with the professional development activities offered through ATE projects, with the exception of online courses.

Table 39: Participant Satisfaction with *Project*-Sponsored Professional Development Activities

		2000	2001	2002	2003
Conference: Indicated Satisfaction with the Activity	*M*	87.4%	89.5%	76.1%	76.3%
	SD	27.4	22.3	34.7	34.9
	n	36	27	23	38
Conference: Indicated Intention to Utilize Materials and/or Ideas Presented	*M*	78.3%	80.6%	69.7%	62.6%
	SD	33.6	27.0	37.0	34.2

		2000	2001	2002	2003
	n	33	23	23	33
Conference: Tried Technology, Materials, and/or Ideas in Classroom	*M*	70.8%	69.5%	47.3%	44.0%
	SD	34.2	32.8	37.2	39.7
	n	24	19	16	23
Conference: Fully Incorporated Materials and/or Ideas into Course/Program	*M*	54.3%	45.5%	51.4%	37.5%
	SD	34.8	34.8	40.7	37.5
	n	22	18	12	16
Short-Term Workshop: Indicated Satisfaction with the Activity	*M*	91.6%	81.4%	87.4%	81.6%
	SD	21.0	29.0	21.9	30.0
	n	44	38	33	61
Short-Term Workshop: Indicated Intention to Utilize Materials and/or Ideas Presented	*M*	79.4%	75.8%	71.8%	67.8%
	SD	27.8	30.5	29.1	33.9
	n	41	33	34	65
Short-Term Workshop: Tried Technology, Materials, and/or Ideas in Classroom	*M*	68.8%	63.8%	48.6%	56.6%
	SD	32.5	35.0	30.1	35.5
	n	27	31	24	44
Short-Term Workshop: Fully Incorporated Materials and/or Ideas into Course/Program	*M*	56.5%	42.4%	43.1%	43.9%
	SD	35.5	34.9	35.3	39.2
	n	25	25	19	41
In-Service Course or Seminar: Indicated Satisfaction with the Activity	*M*	83.2%	84.2%	66.8%	77.7%
	SD	34.7	25.9	40.5	34.1
	n	29	27	18	35
In-Service Course or Seminar: Indicated Intention to Utilize Materials and/or Ideas Presented	*M*	76.2%	79.9%	65.5%	70.0%
	SD	36.5	27.7	43.1	36.5
	n	0	25	18	38
In-Service Course or Seminar: Tried Technology, Materials, and/or Ideas in Classroom	*M*	63.0%	68.3%	35.6%	61.9%
	SD	38.6	37.7	33.8	37.3
	n	21	16	15	35
In-Service Course or Seminar: Fully Incorporated Materials and/or Ideas into Course/Program	*M*	52.6%	56.5%	41.0%	52.0%
	SD	38.0	36.2	43.1	36.7
	n	19	17	12	31

		2000	2001	2002	2003
Online Course: Indicated Satisfaction with the Activity	*M*	16.3%	65.6%	33.2%	43.0%
	SD	36.6	41.4	46.3	49.5
	n	11	9	5	12
Online Course: Indicated Intention to Utilize Materials and/or Ideas Presented	*M*	24.5%	66.2%	31.6%	43.2%
	SD	42.7	38.1	45.3	49.6
	n	11	8	5	14
Online Course: Tried Technology, Materials, and/or Ideas in Classroom	*M*	5.4%	62.2%	26.4%	38.7%
	SD	15.0	47.5	37.8	46.7
	n	11	7	5	12

Online Course: Fully Incorporated Materials and/or Ideas into Course/Program	*M*	5.4%	80.8%	21.8%	37.7%
	SD	15.0	35.5	32.0	46.5
	n	11	6	5	12
Other: Indicated Satisfaction with the Activity	*M*	71.3%	68.2%	100.0%	61.6%
	SD	43.2	43.5	0.0	44.7
	n	12	5	1	11
Other: Indicated Intention to Utilize Materials and/or Ideas Presented	*M*	64.8%	72.1%	87.5%	50.0%
	SD	42.2	39.6	17.6	47.8
	n	11	6	2	8
Other: Tried Technology, Materials, and/or Ideas in Classroom	*M*	52.0%	55.0%	40.0%	18.4%
	SD	45.9	38.8	28.2	30.4
	n	8	5	2	7
Other: Fully Incorporated Materials and/or Ideas into Course/Program	*M*	27.2%	55.0%	50.0%	13.7%
	SD	28.0	42.8	0.0	23.8
	n	7	6	1	7

Systematically, as the difficulty or involvement level increases (expressed satisfaction, intention to use, tried, incorporated), the numbers decrease for both the number of projects responding and the proportion engaged in the activity. For example, more participants indicated satisfaction with the activity than having a plan to use ideas or materials presented. Fewer yet indicated they would try out the activities or fully incorporate them into their course or program. This trend is consistent with typical expectations. That is, one expects that the proportion actually implementing will be lowest.

The fact that the sample size gets smaller as well suggests a lack of *project* attention to follow up in this important area. For example, only half as many *projects* reported on implementation of ideas obtained from conferences as responded to participants' satisfaction with the conference. The online courses provide an interesting counterpoint to this trend. While response percentages follow the expected trend, the response sample sizes remain nearly constant across all four levels. This suggests much greater evaluative follow-through for this type of professional development.

5.3 Support

Institutional support for implementation of program curricula and ideas is an important factor that contributes to participants' ability to integrate the results of professional development activities into their classrooms. The provider of professional development can provide this support, but support provided by the institution whose staff receives the professional development is also viewed as important.

Across the four survey years, a decreasing proportion of *projects* require external support implementation for participants (see Table 40). This suggests that *projects* have lowered their expectations with respect to full implementation of ideas. This may also represent a trend toward offering professional development opportunities

that build on existing classroom practices rather than comprehensively revamping those practices (i.e., incremental rather than wholesale change).

Table 40: Proportion of Projects That Require Support for Implementation as a Condition of Enrollment/Acceptance

		2000	2001	2002	2003
Yes	*n*	34	25	24	37
	%	50.7%	43.1%	40.7%	35.6%
No	*n*	33	33	35	67
	%	49.3%	56.9%	59.3%	64.4%
Totals	*N*	67	58	59	104
	%	100.0%	100.0%	100.0%	100.0%

Projects reported the types of implementation support that they provided to professional development participants (see Table 41).

Table 41: Implementation Support for Professional Development Activities

		2000	2001	2002	2003
Money	*n*	31	26	29	46
	%	46.3%	44.8%	49.2%	44.2%
Equipment	*n*	20	19	18	28
	%	29.9%	32.8%	30.5%	26.9%
Materials	*n*	46	40	46	85
	%	68.7%	69.0%	78.0%	81.7%
Technical Assistance	*n*	52	41	40	75
	%	77.6%	70.7%	67.8%	72.1%
Follow-Up Activities	*n*			37	69
	%			62.7%	66.3%
E-Mail	*n*			34	71
	%			57.6%	68.3%
Newsletter	*n*			18	29
	%			30.5%	27.9%
Other	*n*	18	16	8	20
	%	26.9%	27.6%	13.6%	19.2%
Total Responses	*N*	67	58	59	104

In 2003, the most common type of implementation support was providing materials to participants. A large majority of *projects* also provided technical assistance, e-mails, and various follow-up activities. Fewer than half of the *projects* reported providing financial support for implementation. Fewer still reported providing equipment.

Finally, *projects* were asked to describe what faculty could do as a result of participation in professional development activities that they could not do before participating in the opportunity. Three themes emerged from respondent's answers:

1. Course improvement
2. Increased knowledge of technology
3. Increased industry knowledge

Thirty-nine *projects* reported outcomes related to course improvement, 56 reported outcomes related to increased knowledge of technology, and 13 indicated that participants developed an increased knowledge of the industry (see Table 42).

Table 42: Examples of Professional Development Outcomes

Category	Example
Course Improvement 44.8% (*n*=39)	They can incorporate science activities into their classes to provide hands-on projects to excite students about science. Faculty gain an understanding of what learning objects are, how they are created, how they can be used in teaching and learning processes. Most of the faculty participants will submit content ideas for learning object development as a result of the professional development activities. Most faculty who have taken our workshop are now using satellite imagery and GIS in both classroom and research applications.
Increased Knowledge of Technology 64.4% (*n*=56)	Faculty and others can articulate basic information technology skills that occur in the majority of work settings and those specialized IT skills required of technical workers in their clusters. Faculty can assess information technology skills within their career content areas. Faculty can develop scenario-based lessons that focus on core IT users' skills as applied to their career content area. Faculty can identify and monitor progress of core IT users' skills in their career content areas. Participants come away with a firmer grasp of current technology. Many indicate that it is their first exposure and that they intend to follow up with further study or professional development. The high school science teachers are able to speak in a better-informed manner with their students about the program in Chemical Technology to be offered at our institution.

Category	Example
Increased Understanding of Industry 14.9% (*n*=13)	Teachers are more aware of environmental issues and current work and opportunities for employment/careers for students and types of degree options. As a result of participating in ___ professional development opportunities, ____ faculty can now design and perform market and curriculum gap analyses to align their program/curriculum with IT industry skill standards. Professional development activities focused on increasing faculty knowledge and skills in technologies needed by natural resources technicians including GIS, GPS, automatic data collectors, and impulse lasers.

Note. Sample size was 87.

6.0 Program Improvement

Projects reported improving their technician-based programs by constructing new courses, modifying existing courses, and taking steps to serve students in matters of recruitment, retention, and placement. *Projects* engaged in these activities at the secondary, associate, and baccalaureate levels.

Respondents provided *project* wide information for program improvement efforts and identified *one* specific ATE grant funded program at *one* specific location and provided detailed information about efforts for that specific program. These data provide indicators of program improvement impact. This section reports the following information:

- Program levels where improvements are occurring
- Numbers of courses undergoing development or change
- Changes that are occurring in the classroom due to program improvement efforts
- The degree to which course credits articulate to other institutions

6.1 Results

In 2003, 84 of the 128 *projects* (66%) responded to at least one of the three program improvement survey sections. Ninety-two percent of these projects directed their program improvement efforts at the associate degree level. This trend is consistent across years and is consistent with Congressional expectations and the ATE program design.

Table 43: Number of Program Improvement Efforts by Education Level

Education Level		2000	2001	2002	2003
Secondary Only	*n*	2	4	2	5
	%	3.5%	7.8%	3.9%	6.0%
Secondary & Associate	*n*	7	8	11	12
	%	12.3%	15.7%	21.6%	14.3%
Secondary & Baccalaureate	*n*	2	0	0	0
	%	3.5%	0.0%	0.0%	0.0%
Associates Only	*n*	29	33	32	49
	%	50.9%	64.7%	62.7%	58.3%
Associates & Baccalaureate	*n*	1	1	2	8
	%	1.8%	2.0%	3.9%	9.5%
Baccalaureate Only	*n*	0	0	1	2
	%	0.0%	0.0%	2.0%	2.4%
All Levels	*n*	16	5	3	8
	%	28.1%	9.8%	5.9%	9.5%
Total Projects Responding	*N*	57	51	51	84

Consistently, across years the large majority of program development relationships with secondary and baccalaureate institutions occur concurrently with an associate degree program. Though these likely are not true articulation arrangements and we do not expressly address the nature of these relationships, it appears that the associate degree institutions are building secondary school programs to feed into their own technology programs or opportunities so their associate degree graduates or certificated students can continue to advanced study of technology at baccalaureate institutions.

Figure 3 illustrates the combinations of education levels where *projects* engaged in program improvement in 2003. Interestingly, the only combination not represented is secondary-baccalaureate programs.

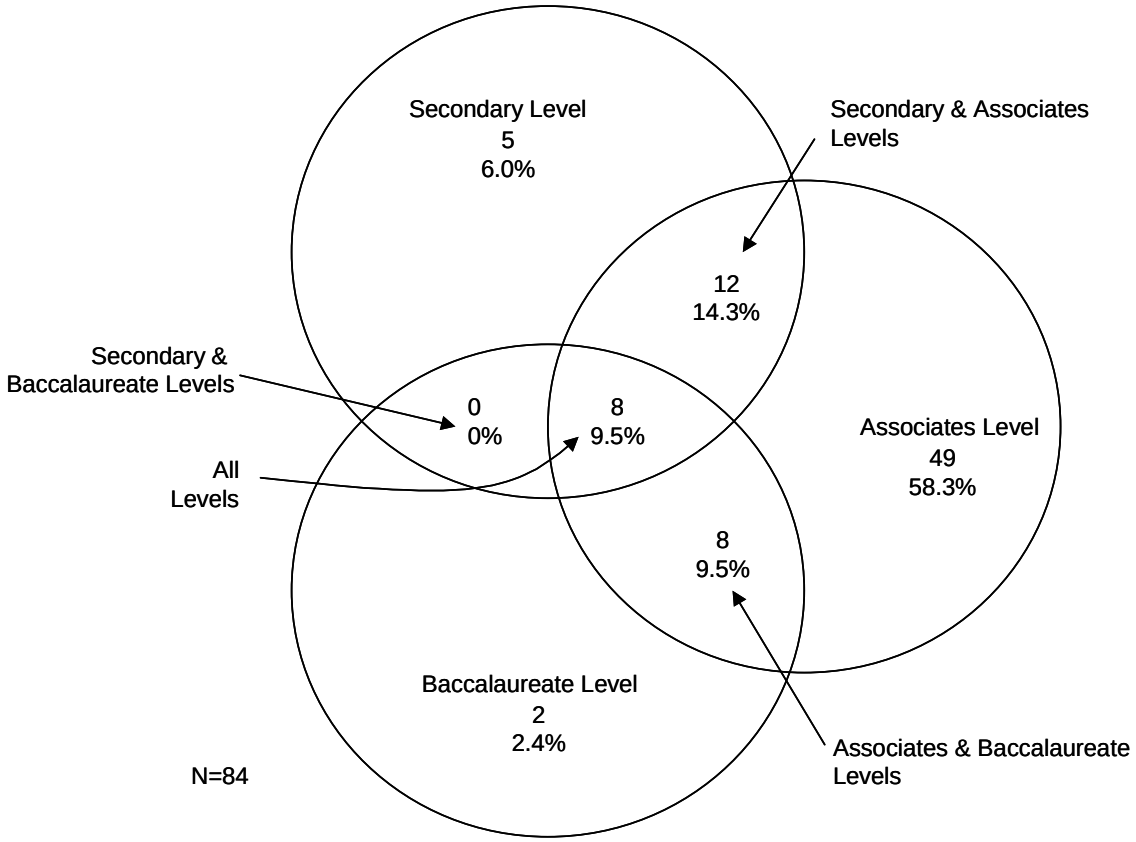

Figure 3: Combinations of 2003 Program Improvement Efforts

As Table 44 shows, a typical ATE program improvement *project* offers 4 or more student programs at 7 locations or sites. Though not addressed in the survey, we know from our other studies that these programs can be various combinations of degree and certification programs. The total number of courses offered under the auspices of ATE grants is large; the typical *project* reports offering more than 37

such courses. As can be expected from this large number of offerings, the total number of persons reached annually through these courses is large (more than 68,000) with the average *project* reportedly reaching nearly 600 students in the past year.

In terms of total numbers, the reported program, course, and student enrollments are greater in 2003 than occurred in 2002 because the ATE program size has increased (included more funded projects). Per *project* averages tend to be fairly consistent across the two years. The exception to this is in the average number of students enrolled in at least one course. That number has been volatile across the survey's four years. While it increased from 2002-2003, it is still well below 2000 and 2001 levels.[19]

Table 44: Program Improvement Impact

		2000	2001	2002	2003
Number of ATE Funded Programs Offered	Total	371	508	462	523
	M	4.6	7.4	6.6	4.4
	SD	8.1	21.5	14.2	10.6
	n	80	69	70	118
Number of Locations/Sites of ATE Funded Programs	Total	479	954	489	824
	M	6.2	13.8	7.0	7.0
	SD	12.8	45.8	11.8	13.5
	n	77	69	70	118
Number of Courses Across All ATE Funded Locations/Sites	Total	4,567	3,713	3,108	4,381
	M	57.8	58.0	44.4	37.4
	SD	212.4	144	122.6	109.2
	n	79	64	70	117
Number of Students Taking at Least One Course in Last 12 Months	Total	50,617	121,666	32,775	68,450
	M	674.9	1,763.3	468.2	585.0
	SD	2,491.0	9,037.3	1,256.8	1,993.0
	n	75	69	70	117

The disaggregation of program, location, course, and enrollment data by education level (Table 45) shows an increase in *project* efforts at the secondary level, with stable to declining emphasis at the associate and baccalaureate degree levels.

[19] Two significant outliers were reported that impact these results. In 2000, one project reported serving 21,000 students and in 2001, one project reported serving 75,000 students. These results inflate the average number of students served, as indicated by the large standard deviations in those years.

Table 45: Program Improvement Impact by Education Level

			2000	2001	2002	2003
Number of ATE Funded Programs Offered	Secondary	Total	90	47	71	153
		M	4.0	2.7	4.4	6.1
		SD	2.9	2.8	8.6	13.6
		n	22	17	16	25
	Associate	Total	258	451	350	336
		M	5.0	9.6	7.2	4.3
		SD	9.8	25.7	15.8	10.4
		n	51	47	48	77
	Baccalaureate	Total	23	10	41	34
		M	3.2	2.0	6.8	2.1
		SD	3.9	1.5	13.8	4.5
		n	7	5	6	16
Number of Locations/Sites of ATE Funded Programs	Secondary	Total	172	447	135	278
		M	8.1	26.2	8.4	11.1
		SD	14.6	83.5	8.2	14.0
		n	21	17	16	25
	Associate	Total	291	496	345	532
		M	5.9	10.5	7.1	6.9
		SD	12.8	24.2	13.3	14.3
		n	49	47	48	77
	Baccalaureate	Total	16	11	9	14
		M	2.2	2.2	1.5	0.8
		SD	1.7	2.1	1.7	0.3
		n	7	5	6	16
Number of Courses Across All ATE Funded Locations/Sites	Secondary	Total	552	129	121	279
		M	25.0	9.9	7.5	11.1
		SD	71.9	8.6	13.3	15.1
		n	22	13	16	25
	Associate	Total	3858	3467	2864	3839
		M	77.1	75.3	59.6	50.5
		SD	261.6	166.9	145.6	132.4
		n	50	46	48	76
	Baccalaureate	Total	157	117	123	263
		M	22.4	23.4	20.5	16.4
		SD	31.5	25.5	21.7	40.2
		n	7	5	6	16
Number of Students Taking at Least One Course in Last 12 Months	Secondary	Total	4890	11935	2201	4991
		M	244.5	702.0	137.5	199.6
		SD	393.7	1255.8	188.1	336.4
		n	20	17	16	25
	Associate	Total	43915	108296	29986	62097
		M	914.9	2304.1	624.7	817.0
		SD	3085.9	10919.2	1492.3	2438.6
		n	48	47	48	76
	Baccalaureate	Total	1812	1435	588	1362
		M	258.8	287.0	98.0	85.1
		SD	401.0	236.0	81.6	122.7
		n	7	5	6	16

Projects were asked to report on a single ATE-funded program and provide detailed information for that program. Overall, projects reported that there were 1,863 courses in the specified programs. Based on data provided in Table 44, these detailed programs constitute a large proportion of all ATE-based programs; they account for 42 percent of the total number of courses reported. Since on average *projects* report including more than 4 programs in their project, the program described for this evaluation must typically be the largest or one of the largest for the *project.*

Of 1,863 reported courses, 555 (30%) were new courses and 436 (23%) were changed or updated courses; this represents more than half the courses in the designated programs. Such extensive changes clearly indicate that the programs themselves are undergoing major updates.

One aspect of these changes that stands out as unusual is that program size, the number of courses per program, appears to be increasing dramatically. In 2000 the program size on average was 4.6 courses; by 2003 this program size had increased to more than 16 courses. One explanation for this substantial increase in program size is that projects are attempting to broaden the scope of their programs to encompass more technician opportunities. Separate interview data from several sites suggest that these large programs provide both degree options and smaller certificate programs. As such, it is likely the reported program serves as an umbrella for 1 or more smaller programs.

Table 46: Number of Courses in Specified ATE-Funded Programs

		2000	2001	2002	2003
Number of Courses in Specified Program	S	371	300	866	1863
	M	4.6	5.1	14.0	16.5
	SD	8.1	7.0	11.4	16.3
	n	80	59	62	113
Number of New Courses	S	268	36	267	555
	M	5.1	2.6	4.8	5.1
	SD	4.6	3.0	5.5	12.2
	n	53	14	56	108
Number of Changed Courses	S	239	200	270	436
	M	5.7	3.6	4.7	4.0
	SD	6.1	4.4	5.8	5.4
	n	42	56	58	110
Number of Unchanged Courses	S	434	265	261	904
	M	10.6	4.7	4.6	8.8
	SD	8.3	6.2	5.9	11.9
	n	41	56	57	103

6.2 Changes in Classroom Environment Due to Project Efforts

With the large program improvement efforts is an associated question regarding the degree to which these efforts impact and change classroom instruction. Table 47 provides principal investigators' perceptions regarding several types of changes that are occurring.

Table 47: Changes in Classroom and Other Educational Experiences Due to *Project* Efforts

		2000	2001	2002	2003
Increased Use of Work-Based Skills in Curricula	*n*			41	58
	%			53.9%	46.0%
Increased Interest in Learning by Students	*n*			27	55
	%			35.5%	43.7%
More Relevant and Up-to-Date Materials Available	*n*			38	69
	%			50.0%	54.8%
Movement Away from Traditional Lecture Delivery of Lessons	*n*			33	62
	%			43.4%	49.2%
Other	*n*			4	20
	%			5.3%	15.9%
At Least One Change in Classroom	*n*			71	113
	%			93.4%	89.7%

Note. 2002 n=76 and 2003 n=126.

About half reported that classroom changes are occurring in a variety of ways. The most common change was providing new or updated materials. Respondents also reported an increased use of work-skills-based curricula and a movement away from lecture-based courses—these are important instructional changes that reflect current educational practices, but they are not yet pervasive across ATE-funded programs. Finally, principal investigators reported increased interest in learning by students; however, no information was provided to support this finding.

6.3 Articulation

An increasingly important issue within the ATE program is articulation of credits across education levels. The premise is that removing the structural impediments that slow students in moving through the education system may increase the numbers of people choosing to become technicians.

Section 6.1, Table 43, showed the high correspondence between programs being developed at the secondary and baccalaureate levels with ongoing program development at the associate degree level. This suggests substantial attention to articulation issues, whether or not they result in articulation agreements. Table 48 provides more direct evidence that these relationships are in fact resulting in formal articulation agreements.

As Table 48 shows, articulation agreements range across all 3 education levels, secondary, associate and baccalaureate. Greater numbers of agreements tend to occur between secondary and 4-year colleges and between secondary and 2-year colleges. But nearly 10 percent of the *projects* reporting on program development report having an articulation agreement in place between a secondary school and a 4-year college.

Table 48: Number and Purpose for Articulation Agreements

		2000	2001	2002	2003
Articulation Agreements In Place					
Between Secondary and 2-Year College	*n*				43
	%				34.1%
Between Secondary and 4-Year College	*n*				11
	%				8.7%
Between 2-Year and 4-Year College	*n*				51
	%				40.5%
Other	*n*				16
	%				12.7%
Responded at One or More Levels	*n*				76
	%				60.3%
No Response/Not Applicable	*n*				50
	%				36.9%
Purposes of Articulation Agreements					
Strengthen Technical Knowledge and Skills of K-12 Teachers	*n*				22
	%				17.5%
Strengthen Science and Mathematics Preparation of K-12 Teachers	*n*				18
	%				14.3%
Facilitate Transition of Students From 2-year to 4-year Collage Programs	*n*				57
	%				45.2%
Other	*n*				22
	%				17.5%
No Response/Not Applicable	*n*				7
	%				5.6%
Total	*N*				126
	%				100.0%

Note. Data are not available for 2000-2002.

An important attribute of such articulation agreements regards their purposes. The bottom half of Table 48 shows that a majority of these agreements provide for transition of students from a 2-year to 4-year colleges. However, large numbers of these agreements provide for professional development of secondary school teachers. Such professional development agreements seem likely to improve the quality of technology education courses in secondary schools, more firmly establish technology education programs in secondary schools, and better prepare secondary students for enrollment in either associate or baccalaureate degree programs.

P*rojects* are striving to develop programs that articulate to higher education levels, and survey findings show that a solid proportion of credits from ATE programs will articulate to higher education levels (see Table 49).

Table 49: Transfer of Course Credit to Higher Level Degree Institution by Educational Level

Educational Level			2000	2001	2002	2003
Secondary	None	*n*	6	5	3	3
		%	22.2%	29.4%	18.8%	12.0%
	Some	*n*	4	2	6	2
		%	14.8%	11.8%	37.5%	8.0%
	Most	*n*	4	4	1	3
		%	14.8%	23.5%	6.3%	12.0%
	All	*n*	9	5	5	16
		%	33.3%	29.4%	31.3%	64.0%
	Don't know	*n*	4	1	1	1
		%	14.8%	5.9%	6.3%	4.0%
	Total	*N*	27	17	16	25
		%	100.0%	100.0%	100.0%	100.0%
Associate	None	*n*	2	2	3	3
		%	3.8%	4.3%	6.3%	3.9%
	Some	*n*	14	8	7	26
		%	26.4%	17.0%	14.6%	33.8%
	Most	*n*	19	17	21	21
		%	35.8%	36.2%	43.8%	27.3%
	All	*n*	17	19	14	22
		%	32.1%	40.4%	29.2%	28.6%
	Don't know	*n*	1	1	3	5
		%	1.9%	2.1%	6.3%	6.5%
	Total	*N*	53	47	48	77
		%	100.0%	100.0%	100.0%	100.0%
Baccalaureate	None	*n*	6			6
		%	31.6%	0.0%	0.0%	37.5%
	Some	*n*			2	4
		%	0.0%	0.0%	33.3%	25.0%
	Most	*n*	6	1	4	5
		%	31.6%	20.0%	66.7%	31.3%
	All	*n*	4	2		1
		%	21.1%	40.0%	0.0%	6.3%
	Don't know	*n*	3	2		
		%	15.8%	40.0%	0.0%	0.0%
	Total	*N*	19	5	6	16
		%	100.0%	100.0%	100.0%	100.0%

Most impressive is the trend visible at the secondary level. In 2000, 1 in 3 projects reported that all their credits would transfer to higher degree institutions (i.e., 2-year colleges or 4-year colleges). In 2003, that proportion rose to nearly 2 in 3.

Conversely, at the associates' level the proportion of *projects* reporting that most or all their credits would transfer to higher degree granting institutions (i.e., 4-year colleges) has declined across the four survey years. This finding is important in light of the above results that show that the most common purpose for articulation partnerships is to help transition students from associate's to bachelor's programs.

7.0 Student Impact

The overarching goal of the ATE program is to increase the number and quality of trained workers in technology fields and, as a result, positively impact the U.S. workforce. For this to occur, students must participate in and complete the ATE programs, and completing students must continue working in technology fields or enter the workforce as newly trained technology workers.

An associated program goal is to increase the number of female and minority students trained in technology fields through the ATE program.

Projects reported detailed student data for one ATE-funded program. These data included enrollment and employment figures and demographic information. This section is based on these data and provides an overall picture of the degree to which ATE is achieving the desired student outcomes.

7.1 Demographics

Projects were asked to report the estimated proportions of applicants and enrolled students in a number of different demographic categories. The emphasis of this question was to understand if projects are being successful in their efforts to recruit female students and minority students.

Findings indicate that the proportion of female applicants has declined since 2000, but the proportion of female students enrolling in programs has remained steady (see Table 50).

Table 50: Gender of Applicants and Enrolled Students

		2000	2001	2002	2003
Female: Applicants	*M*	36.2%	30.3%	32.7%	30.5%
	SD	21.4	23.9	24.5	24.6
	n	50	38	37	68
Female: Enrollment	*M*	35.5%	30.2%	31.5%	34.1%
	SD	22.3	23.1	23.2	24.1
	n	62	58	58	98
Male: Applicants	*M*	63.8%	69.3%	67.2%	62.8%
	SD	21.4	24.2	24.5	28.9
	n	50	37	37	68
Male: Enrollment	*M*	64.4%	69.7%	68.4%	62.0%
	SD	22.3	23.1	23.2	26.3
	n	62	58	58	98

Projects also reported the ethnic makeup of students in the selected program (see Table 51). African-American applications and enrollments have declined since 2002, after holding steady between 2000 and 2002. Proportions of Hispanic applicants and enrolled students have remained steady as well.

Table 51: Racial/Ethnic Composition of Applicants and Enrolled Students

		2000	2001	2002	2003
Hispanic/Latino: Applicants	*M*	15.4%	9.0%	19.5%	13.5%
	SD	15.4	9.6	23.9	23.5
	n	35	15	28	51
Hispanic/Latino: Enrollment	*M*	13.1%	13.3%	16.0%	12.0%
	SD	13.2	20.1	22.5	20.7
	n	45	52	47	83
American Indian/Alaska Native: Applicants	*M*	4.1%	7.8%	8.2%	2.8%
	SD	5.5	24.3	20.7	7.7
	n	12	30	30	49
American Indian/Alaska Native: Enrollment	*M*	4.1%	7.6%	5.8%	6.7%
	SD	5.3	24.0	16.8	19.8
	n	16	47	47	75
Asian: Applicants	*M*	12.0%	6.2%	4.7%	3.2%
	SD	12.1	7.9	6.3	4.2
	n	30	33	28	54
Asian: Enrollment	*M*	12.4%	6.7%	5.1%	5.2%
	SD	13.4	9.3	8.1	8.7
	n	35	51	47	83
African American: Applicants	*M*	19.5%	15.7%	20.1%	8.6%
	SD	14.4	15.7	23.6	14.4
	n	41	36	30	55
African American: Enrollment	*M*	17.2%	14.8%	16.6%	11.4%
	SD	12.7	15.9	20.1	16.0
	n	50	56	49	82
Native Hawaiian/PI: Applicants	*M*	7.0%	0.6%	2.8%	0.3%
	SD	5.1	1.6	11.5	0.9
	n	3	30	27	43
Native Hawaiian/PI: Enrollment	*M*	10.2%	0.6%	2.0%	0.2%
	SD	7.7	1.8	7.7	0.8
	n	4	46	44	61
White: Applicants	*M*	62.1%	52.1%	44.4%	57.2%
	SD	29.3	31.1	32.2	35.0
	n	48	36	32	58
White: Enrollment	*M*	66.2%	54.6%	53.0%	55.9%
	SD	26.2	32.0	31.3	33.4
	n	60	55	50	89
Requesting ADA Accommodation: Applicants	*M*	11.2%	1.1%	0.7%	1.6%
	SD	9.0	3.0	1.4	3.8
	n	26	29	30	59
Requesting ADA Accommodation: Enrollment	*M*	10.2%	0.8%	5.3%	3.1%
	SD	8.5	2.2	20.9	11.8
	n	29	39	44	80

Though these findings are for just one program from each reporting *project*, we think it likely that these findings are likely to be consistent with their other programs.

7.2 Recruitment and Retention

Principal investigators reported methods used by their *projects* to recruit and retain students (see Table 52). Written materials and Web sites were the most common recruitment tools used. Over half also used summer workshops for teachers to recruit students. Presentations, college fairs, and campus visits were all methods used by approximately half of the projects.

Table 52: Recruitment and Retention Methods

		2000	2001	2002	2003
Written Materials	*n*			57	102
	%			75.0%	81.0%
Web Sites	*n*			53	93
	%			69.7%	73.8%
Presentations	*n*			40	67
	%			52.6%	53.2%
College Fairs	*n*			38	68
	%			50.0%	54.0%
Campus Visit Programs	*n*			38	60
	%			50.0%	47.6%
Summer Workshops for Students	*n*			22	43
	%			28.9%	34.1%
Summer Workshops for Teachers	*n*			40	74
	%			52.6%	58.7%
Work-Related Experiences for Students	*n*			29	44
	%			38.2%	34.9%
Targeted Workshops	*n*			23	43
	%			30.3%	34.1%
Financial Aid	*n*			32	40
	%			42.1%	31.7%
Tutoring	*n*			18	19
	%			23.7%	15.1%
Articulation Agreements	*n*			35	58
	%			46.1%	46.0%
Counseling	*n*			30	39
	%			39.5%	31.0%
Other	*n*			21	29
	%			27.6%	23.0%

Note. Sample size for 2002 was 76; for 2003 it was 126.

Projects also reported methods used specifically to recruit students from underrepresented groups (i.e., females and minority students). While written materials and websites were reported as the most frequent methods used, the proportion of *projects* reporting using these methods specifically for underrepresented groups was lower than the number that used these methods to

recruit all students. This suggests that projects do not uniformly apply special recruitment methods for underrepresented groups (see Table 53).

Table 53: Recruitment and Retention Methods Specifically for Underrepresented Groups

		2000	2001	2002	2003
Written Materials	*n*			46	74
	%			60.5%	58.7%
Web Sites	*n*			41	63
	%			53.9%	50.0%
Presentations	*n*			29	46
	%			38.2%	36.5%
College Fairs	*n*			34	57
	%			44.7%	45.2%
Campus Visit Programs	*n*			32	49
	%			42.1%	38.9%
Summer Workshops for Students	*n*			17	40
	%			22.4%	31.7%
Summer Workshops for Teachers	*n*			24	44
	%			31.6%	34.9%
Work-Related Experiences for Students	*n*			24	35
	%			31.6%	27.8%
Targeted Workshops	*n*			20	30
	%			26.3%	23.8%
Financial Aid	*n*			24	31
	%			31.6%	24.6%
Tutoring	*n*			17	23
	%			22.4%	18.3%
Articulation Agreements	*n*			22	38
	%			28.9%	30.2%
Counseling	*n*			25	38
	%			32.9%	30.2%
Other	*n*			19	28
	%			25.0%	22.2%

Note. Sample size for 2002 was 76; for 2003 it was 126.

7.3 Outcomes

Projects reported the number of students enrolled in a selected ATE-funded program and the outcomes associated with these students. Figure 4 shows the pattern of outcomes for associate degree level students reported in the 2003 survey.

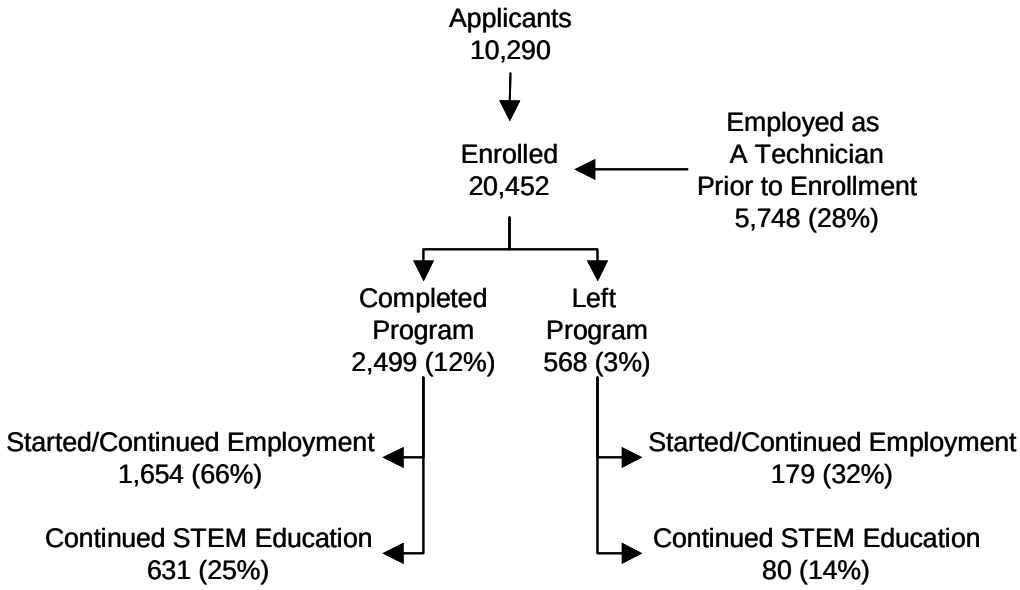

Figure 4: 2003 Student Outcomes for Associate Degree Students

2003 results at the associate degree level show that a total of 20,452 students were enrolled in at least 1 course in a specified ATE-funded program. Of these, 3 in 10 were employed as technicians in a related field prior to enrollment—this suggests a significant proportion of program improvement activity is targeted toward in-service education, rather than preservice. Of the total number enrolled, 12 percent completed the program and 3 percent left the program prior to completion. It should be assumed that the remaining 85 percent of participants were still enrolled and pursuing program completion.

Of those who completed the program, 2 in 3 started or continued employment as a technician. One in 4 continued STEM education. It is not known what happened to the remaining 9 percent. Projects were able to provide follow-up information on about half (46 percent) of those who left the program. Their reports indicate that 3 in 10 started or continued employment as a technician, while 3 in 20 continued their STEM education.

An important caveat should be considered when reviewing these results. In 2003, two projects reported very large numbers of applicants (559 and 6,000) and enrolled (6,791and 6,000) students for the specified ATE-funded program at the associate level. These figures represent more than half of the total applicants and enrolled students. While the overall ATE program impact remains the same, the average impact by ATE project for the 77 projects reporting results in this category is lower when these outlying cases are not considered.

Table 54 shows student outcomes for each survey year and each education level. In that table note the growth rate across all selected programs.

Table 54: Student Outcomes by Year and Education Level

	Year			
Education Level / Measure	2000	2001	2002	2003
Secondary				
Number of *Projects* Responding	27	17	16	25
Applicants	3,314	2,787	875	1,015
Enrolled	3,256	2,741	841	1,072
Absolute Growth Rate[a]		-16%	-69%	27%
Adjusted Growth Rate[b]		34%	-67%	-18%
Completed	2,367	479	278	564
% Completed	73%	17%	33%	53%
Started/Continued Employment	1,465	93	118	120
% Started/Continued Employment	62%	19%	42%	21%
Continued STEM Education	345	262	209	271
% Continued STEM Education	15%	55%	75%	48%
Left Program	809	40	120	29
% Left	25%	1%	14%	3%
Associate				
Number of *Projects* Responding	53	47	48	77
Applicants	3,207	5,149	2,965	10,290
Enrolled	3,134	6,468	7,267	20,452
Absolute Growth Rate		106%	12%	181%
Adjusted Growth Rate		133%	10%	75%
Employed as Technician Prior to Enrollment	664	1,400	557	5,748
% Employed Prior	21%	22%	8%	28%
Completed	1,489	1,992	974	2,499
% Completed	48%	31%	13%	12%
Started/Continued Employment	966	954	654	1,654
% Started/Continued Employment	65%	48%	67%	66%
Continued STEM Education	396	588	290	631
% Continued STEM Education	27%	30%	30%	25%
Left Program	505	901	317	568
% Left	16%	14%	4%	3%
Started/Continued Employment	444	425	157	179
% Started/Continued Employment	88%	47%	50%	32%
Continued STEM Education	169	82	38	80
% Continued STEM Education	33%	9%	12%	14%

Education Level / Measure	Year			
	2000	2001	2002	2003
Baccalaureate				
Number of *Projects* Responding	19	5	6	16
Applicants	1,153	865	350	1,308
Enrolled	1,002	700	732	1,378
Absolute Growth Rate		-30%	5%	88%
Adjusted Growth Rate		165%	-13%	-29%
Employed as Technician Prior to Enrollment	44	68	382	13
% Employed Prior	4%	10%	52%	1%
Completed	197	220	117	264
% Completed	20%	31%	16%	19%
Started/Continued Employment	58	58	175	100
% Started/Continued Employment	29%	26%	150%	38%
Continued STEM Education	40	65	27	111
% Continued STEM Education	20%	30%	23%	42%
Left Program	28	58	43	38
% Left	3%	8%	6%	3%
Started/Continued Employment	25	19	80	-
% Started/Continued Employment	89%	33%	186%	0%
Continued STEM Education	20	-	51	21
% Continued STEM Education	71%	0%	119%	55%

Note[a]. Absolute growth rate is calculated as (current year enrollment – previous year enrollment) divided by previous year enrollment.
Note[b]. Adjusted growth rate is calculated as above, except that current year enrollment is adjusted by accounting for the increase or decrease in number of projects reporting from one year to the next.

Growth rate is defined as the difference between the current year enrollment and the previous year enrollment. At each of the three levels—secondary, associate, and baccalaureate—the findings are dramatic for 2003. After declining for 2 years, secondary program enrollment grew by 27 percent in 2003. Enrollment in associate level programs has grown each year—and grew by an astounding 181 percent in 2003. Baccalaureate level programs declined between 2000 and 2001, grew only slightly in 2002, and then grew dramatically in 2003.

However, these results should be considered in light of the increase in number of projects reporting in 2003. Adjusted growth rates for the secondary and baccalaureate levels indicate declines from 2002 to 2003. Associate degree level program grew, but at a slower pace than indicated by the absolute figures.

While the number of *projects* reporting program improvement at each level has also grown, these results demonstrate that the ATE program is impacting students in technology education fields. Similarly, students are continuing to work as technicians or starting work as technicians. These findings demonstrate that ATE is positively impacting the workforce.

SECTION THREE SUMMARY OF EVALUATION INDICATORS

This final section summarizes findings based on the evaluation indicators detailed above. For each indicator, the current program status and the trend of the program are judged on a 5-point scale.[20] These results were compiled as follows: (1) each author conducted an independent review of the survey results; (2) individual ratings of program status and trend were discussed; (3) where disagreements occurred, a review of the supporting evidence from the report was conducted; (4) a final rating was determined for each indicator.

As Figure 5 shows, the indicators detailed throughout this report can be organized into three categories, which we call (1) Setting the Stage, (2) Program Activities, and (3) Program Goals. The program status and trend ratings for each group of indicators are included in this figure. The supporting detail for this summary is provided in Table 55.

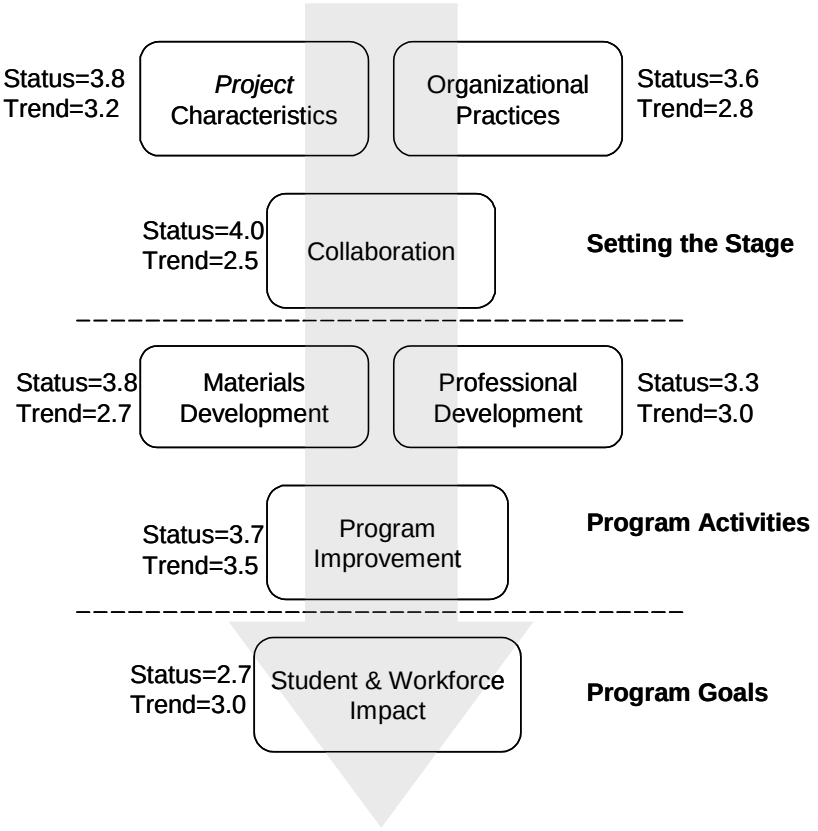

Figure 5: ATE Program Model with Summary Indicators

[20] *Note*. The *status* scale is 5=excellent, 4=good, 3=average, 2=mediocre, and 1=poor. The *trend* scale is 5=strong improvement, 4=improving, 3=stable, 2=declining, and 1=strong decline.

Table 55: Detail of Evaluation Indicators

Program Status		Program Trend	
⇨ = Excellent ↗ = Good = Average ↠ = Mediocre ◔ = Poor		⇨ = Strong Improvement ↗ = Improving = Stable ↠ = Declining ◔ = Strong Decline	
Indicator	Status	Trend	Comments
1. *Project* Characteristics			
1.1. Demographics	⇨		• Characteristics are a strong match with program design • Characteristics reflect changing program priorities
1.2. Stability	↗		• PIs report stability in project activties • External financial support is declining • Student completion and placement data show declines
1.3. Unintended Outcomes	↗		• More projects report positive rather than negative unintended outcomes
1.4. Barriers to Success			• Resources are a consistent issue across years • Student recruitment and staffing are emerging as issues
1.5. Sustainability		↗	• Additional funding is the most common plan for sustainability • Projects increasingly reporting alternative sustainability methods—institutionalization and dissemination of products
2. Organizational Practices			
2.1. Work Categories	↗		• Nearly all projects are collaborating • Decrease in materials development and slight increases in professional development and program improvement reflect changing program emphases
2.2. Workforce Needs Assessment	↠	↠	• Small % of projects doing some form of assessment • Decrease in use of methods other than surveys
2.3. Advisory Committees	↗		• National and regional committees are most common • All Centers report using a national committee

Program Status		Program Trend	
⇨ = Excellent ➶ = Good = Average ➳ = Mediocre ◔ = Poor		⇨ = Strong Improvement ➶ = Improving = Stable ➳ = Declining ◔ = Strong Decline	
Indicator	Status	Trend	Comments
2.4. Evaluation	➶		• Vast majority have consistently used an evaluator in all years • Evaluations are considered useful and provide some evidence of program quality • Missing evidence of the quality of the evaluations
2.5. Monitoring	➶		• Frequent e-mails and phone contacts are most common • Increasing % of projects have no face-to-face contact with NSF • Strong relationship between participation in monitoring and perceptions of NSF
3. Collaboration			
3.1. Collaboration With Other ATE Projects	➶	➳	• A consistent drop in the number of collaborations for any purpose, but more than 70% of projects are collaborating for at least one purpose.
3.2. Collaboration With Non-ATE Institutions	➶	➳	• Numbers of collaborations are high, but appear to be declining slightly (Note: this may be a positive, enabling projects to better focus on a smaller number of collaborative relationships.)
3.3. External Support	➶		• The amount of supplemental support received increased in the most recent year, but it is still below 2001 levels. • The % of projects receiving some form of supplemental support is high. • Slow economy and post 9-11 world may be influencing external support amounts.
3.4. Quality of Collaboration	➶		• Quality of collaborations is reported as high.
4. Materials Development			
4.1. Purpose for Materials Development	➶	Insufficient Data	• Purposes are consistent with current program goals. • Only 1 project reported materials development solely for dissemination.
4.2. Results	➶	➳	• Many materials have been produced. • Content areas are aligned with most frequently supported technology fields. • Trend is toward producing fewer materials.

Program Status		Program Trend	
⇨ = Excellent ➶ = Good = Average ➸ = Mediocre ◔ = Poor		⇨ = Strong Improvement ➶ = Improving = Stable ➸ = Declining ◔ = Strong Decline	
Indicator	Status	Trend	Comments
4.3. Development Practices	➶		• Verification is being done most of the time; internal field-testing is common • Little change in practices over time
4.4. Quality			• Minimal evidence available to judge whether quality of materials produced is strong or weak. • Anectdotal evidence suggests materials are well accepted by users
5. Professional Development			
5.1. Results	➶		• Projects are offering a large number of opportunities for a large number of individuals • Increase or decrease of a particular type of offering is mixed • Capacity of events has improved since 2000, but is down from 2001 levels.
5.2. Impact			• Satisfaction is reported as high. • Acceptance and adoption is less common. • A small proportion of projects invests in learning about the downstream impacts of their professional development activities.
5.3. Support			• Few projects require support for implementation as a condition of acceptance. • Types of support provided for implementation remain consistent.
6. Program Improvement			
6.1. Results	➶		• Overall impact and productivity are high—ATE supports a large number of programs that are delivered at a large number of locations. • Nearly 70,000 students are impacted. • Large number of new and changed courses reflects constant adaptatation of curricula by program staff. • Increased attention to articulation agreements at associate and baccalaureate levels.

Program Status		Program Trend	
⇨ = Excellent ➶ = Good = Average ➸ = Mediocre ◔ = Poor		⇨ = Strong Improvement ➶ = Improving = Stable ➸ = Declining ◔ = Strong Decline	
Indicator	Status	Trend	Comments
6.2. Changes in Classroom Environment Due to *Project* Efforts		➶	• Results have been improving but could still be better.
6.3. Articulation	➶	Insufficient Data	• 60% of projects report some type of articulation agreement activity—40% at the 2-year and 4-year college levels. • Vast majority report that some to all of their credits transfer to higher-level institutions.
7. Student Impact			
7.1. Demographics	➸		• Student populations reflect national 2-year college makeup except for % of females enrolled in ATE programs. • No changes in applications or enrollments of female and underserved populations.
7.2. Recruitment and Retention	➸		• No evidence that methods are successful. • No evidenece of strategies that specifically target underserved populations.
7.3. Outcomes	➶		• Overall numbers of students are high. • Large proportions are in-service technicians. • A large proportion of those who complete a program are placed or continue STEM education.

Note. These results were compiled as follows: (1) each author conducted an independent review of the survey results; (2) individual ratings of status and trend were discussed; (3) where disagreements occurred, a review of the supporting evidence from the report was conducted; (4) a final rating was determined for each indicator.

These results show that the ATE program is very good at setting the stage for its work. The *projects* funded are consistent with program guidelines, and the overall amount of funding provided is increasing. *Projects* are using advisory committees and evaluation to help guide program activities; there is also a clear link between participation in monitoring activities and positive perceptions of NSF. *Projects* are successful in securing supplementary funding and resources to support their activities. The primary deficiency in this area is the infrequent use of workforce analysis to guide project work. Also of concern are the overall trends in this area—the evaluation indicators show that the program is stable to slightly declining on two of the three measures that "set the stage" for project success.

The ATE program is productive in the three primary work categories. Indicators in these areas show that ATE projects are doing the work they are established to do and are highly productive. Similarly, the trends in this area are positive, with the exception of the materials development indicator—which is consistent with a noted shift away from this activity.

What is not visible in the summarized indicators is *project* and program attention to the broad category of "quality assurance." In materials development, projects pilot test materials, but they generally do not field-test them. In professional development, follow-up with participants is generally weak; as such, there is little evidence to support claims that these activities are positively impacting the classroom. In program improvement, projects provide little follow-up with graduates to explain what happens to individuals who complete (or fail to complete) their programs.

Finally, the ATE program is meeting its primary goal—to prepare technicians for the workforce. Large numbers of students are receiving technician training and being placed in technician positions or continuing work as technicians. This finding shows that there are two primary ways that ATE projects prepare technicians—*projects recruit* new students and *retrain existing employees*. The degree to which projects engage in one or both activities should be explored further.

ATE also seeks to increase the diversity of the technician workforce. Like collaboration, improving diversity is not an explicit program goal, but it is clearly an implied objective; there are several references to its attainment throughout the program guidelines.[21] Specifically, National Centers of Excellence are expected to establish plans for "the recruitment, retention, and placement of students, especially students from groups underrepresented in SMET fields." Similarly, articulation partnerships that focus on teacher preparation in 2-year colleges "should aim to increase the number, quality, and diversity of prospective K-12 science, mathematics, or technology teachers . . ."

Nationally[22], almost 60 percent of community college students are females, although the proportion of female students enrolled in technical education programs is likely to be much lower. Across ATE *projects*, the proportion of females enrolled is approximately 35 percent. National enrollment for African Americans and Hispanics is 12 percent and 11 percent, respectively; Caucasian enrollment is nearly 65

[21] Source: Advanced Technology Education (ATE) Program Solicitation, NSF 01-52. Available online at <http://www.nsf.gov>.

[22] These statistics were obtained from the American Association of Community College Web site. They are contained in Kent, A. P. (2000). Community college fall headcount enrollment by age and gender: 1997. In M. Patton (Ed.), *National profile of community colleges: Trends & statistics* (3rd ed.). Washington, DC: Community College Press. Available online at <http://www.aacc.nche.edu/Content/NavigationMenu/AboutCommunityColleges/Trends_and_Statistics/EnrollmentInfo/Enrollment_Info.htm>.

percent. ATE projects report that 11 percent of students are African American, 12 percent are Hispanic, and 56 percent are Caucasian. With the exception of gender statistics, the diversity of ATE students compares favorably with national community college enrollment statistics.

Across years, however, data show that ATE has not improved the diversity of students in its programs; and there is no evidence to show that ATE is *improving* the diversity of the workforce. Doing so would require enrollment of diverse populations in ATE-funded programs to exceed national benchmarks. Furthermore, we know that ATE is serving a large number of existing technicians. Thus, the opportunity to change the composition of the workforce through these students does not exist. The question of diversity should continue to be monitored going forward, and our findings suggest there is room for improvement in this area.

Overall, our ratings indicate that the current status of the ATE program is "good" (3.6 on a 5-point scale) and that the trend of the program is "stable" (2.8 on a 5-point scale). For the few indicators rated as declining, we believe that trend is due at least in part to the generally stagnant U.S. economy and the impact of the 9-11 attacks, since most evidence shows that the program is currently strong and being executed as intended. The 9-11 attacks generally had the impact of reducing travel and discretionary business expenditures (i.e., training) and shifting charitable giving toward human needs. The large improvement in survey results observed in 2001 followed by a deep decline in 2002 supports this analysis. Trend indicators for 2003 are mixed across all areas with declines reported in some cases and increases in others. Overall, this suggests that the program is beginning to climb out of the hole created by the events of 2001 and should be expected to demonstrate positive results in the coming years.

APPENDICES

Appendix A: 2003 ATE Survey Instrument

NSF Award #: _____

Basic Information—Required

This section provides basic information about your center/project ATE grant**. Please verify or correct the provided information and complete where needed.**

Numerical values must be entered as integers (e.g., "3420", "6" or "0").
Do not use: decimal points, dollar signs, commas or percent signs in numerical values (e.g., "3,000", "6.00", "$320" or "95%").

Basic Information about Your Center/Project

1.

a. **Funded Institution:**

_____

b. **Institution Category:** ***Place an X next to Only One.***
__ 4 year college/university
__ 2 year college
__ Association/Society
__ Secondary School
__ Other

c. **Funding Category:** ***Place an X next to Only One.***
__ Project
__ Center
__ Articulation Partnerships

d. **Begin date of current NSF-ATE funding:** __/__/_____ (MM/DD/YYYY)

e. **End date of current NSF-ATE funding:** __/__/_____ (MM/DD/YYYY)

f. **Current award amount:** $ _____

g. **Project Director / Principal Investigator**
Title: ***Place an X next to Only One.***
__ Dr. __ Mr. __ Mrs. __ Ms.

Contact Information: ***Please complete.***
First Name: _____
Middle: _____
Last Name: _____
Email: _____

h. **Technology Field:** ***Place an X next to Only One.***

__ A. Agriculture
__ B. Aquaculture
__ C. Biotechnology
__ D. Chemical Technology
__ E. Distance Learning
__ F. Electronics, Instrumentation, Laser and Fiber Optics
__ G. Engineering Technology(general)
__ H. Environmental Technology
__ I. Geographic Information Systems
__ J. Graphics and Multimedia Technology
__ K. Information Technology, Telecommunications
__ L. Machine Tool Technology, Metrology
__ M. Manufacturing and Industrial Technology
__ N. Marine Technology
__ O. Mathematics
__ P. Multidisciplinary or Interdisciplinary (General)
__ Q. Physics
__ R. Semiconductor Manufacturing
__ S. Transportation
__ T. Other

NSF Award #: _____

PI Overview—Required

This section should indicate the Principal Investigator's (PI's) view of the Center/Project and reflect information provided in the other sections of this survey. ***Unless indicated otherwise, please fill out every question and items in these questions. Thank you!***

Numerical values must be entered as integers (e.g., "3420", "6" or "0").
Do not use: decimal points, dollar signs, commas or percent signs in numerical values (e.g., "3,000", "6.00", "$320" or "95%").

1. Time and Status

I. **Where is the project/center in its life cycle?** ***Place an X next to Only One.***

__ > 3 years
__ Other. Please describe _____

II. **Is this the last year of the project's/center's work?** ***Place an X next to Only One.***
__ Yes
__ No
__ Other. Please describe _____

III. **Please rate the current status of your center/project as compared to its status last year at this time for each of the following factors.** ***For each item a-i, place an X under Only One of the 6 rating options (e.g., Stable).***

Factor	Not Applicable	Substantial Decline(>20%)	Some Decline(5-20%)	Stable	Some Increase(5-20%)	Substantial Increase(>20%)
a. Number of collaborations (relationships with institutions or groups that provide money and/or other support)	__	__	__	__	__	__
b. Financial support from other organizations	__	__	__	__	__	__
c. Use of center/ project-developed products	__	__	__	__	__	__
d. Participation in project/center activities by other institutions and organizations	__	__	__	__	__	__
e. Students enrolled	__	__	__	__	__	__
f. Students graduating or completing the program	__	__	__	__	__	__
g. Students placed in related technical jobs, whether they completed program or not	__	__	__	__	__	__
h. Number of professional development opportunities (e.g., conferences, workshops, inservice, on-line courses)	__	__	__	__	__	__
i. Number of participants in professional development opportunities	__	__	__	__	__	__

2. **If you conducted a workforce needs assessment <u>in the last 12 months</u>, please CHECK ALL METHODS that you used.** ***If you place an X next to Not Applicable, please go to 3. Otherwise, place an X next to all that apply.***

__ This question is Not Applicable
__ Survey
__ Review of existing reports or other literature
__ Interviews
__ Focus groups
__ Other. Please describe _____

3. **Center/Project Evaluation**

a. If you have an evaluator, is/are the evaluator(s) (choose one). *Place an X next to Only One.*

__ This question is Not Applicable
__ External (hired specifically to evaluate this grant)
__ Internal (is a member of center/project staff)
__ Both (you have both types of evaluators)

b. How useful is your project's/center's evaluation to your project? (choose one). *Place an X next to Only One.*

__ This question is Not Applicable
__ Not useful
__ Minimally useful
__ Some use
__ Useful
__ Essential to the project/center

c. If applicable, describe in what way(s) you used the evaluation in your project/center.

_____
_____
_____
_____

d. To what extent do your project's/center's evaluation findings provide evidence of the quality of your outcomes? (choose one). *Place an X next to Only One.*

__ This question is Not Applicable
__ No evidence
__ Some evidence
__ About half of the evidence
__ Most of the evidence
__ All of the evidence

4. **Collaboration: If you collaborate with other ATE projects/centers, please CHECK ALL THAT APPLY** (***If you place an X next to Not Applicable, please go to 5. Otherwise, place an X next to all that apply).***
We collaborate for:

__ This question is Not Applicable
__ Materials development
__ Professional development (e.g., workshops)
__ Best practices development
__ Sharing of project/center products
__ Sharing of best practices
__ Other. Please describe _____

5**. Product dissemination: Indicate what method(s) your center/project uses to disseminate your center/project's products regionally or nationally by CHECKING ALL THAT APPLY (*If you place an X next to Not Applicable, please go to 6. Otherwise, place an X next to all that apply).***
__ This question is Not Applicable
__ In-house publication and distribution
__ Commercial publication
__ Presentations at regional/national conferences or meetings
__ Web page
__ Other (please describe) _____

6. I. **Please CHECK ALL STEPS THAT APPLY for how you recruit and/or retain for the ATE-grant funded program (*If you place an X next to Not Applicable, please go to 6II. Otherwise, place an X next to all that apply).***
__ This question is Not Applicable
__ Written materials (e.g., brochures, newsletters)
__ Web sites about the program
__ Presentations by invited speakers
__ College fairs at secondary schools or other locations
__ Campus visit programs
__ Summer or academic workshops for students (e.g., STEM or technician-skill development, career awareness)
__ Summer or academic year workshops for teachers
__ Work-related experiences for students (e.g., day on the job, visit to business, internship)
__ Targeted workshops
__ Financial aid (e.g., scholarships, work study)
__ Tutoring
__ Articulation agreements
__ Counseling
__ Other. Please describe _____

II. **Please CHECK ALL STEPS THAT APPLY specifically for recruiting and/or retaining underrepresented groups (e.g., minorities, women, people with disabilities) for the ATE-grant funded program (*If you place an X next to Not Applicable, please go to 7. Otherwise, place an X next to all that apply).***

__ This question is Not Applicable
__ Written materials (e.g., brochures, newsletters)

__ Web sites about the program
__ Presentations by invited speakers
__ College fairs at secondary schools or other locations
__ Campus visit programs
__ Summer or academic workshops for students (e.g., STEM or technician-skill development, career awareness)
__ Summer or academic year workshops for teachers
__ Work-related experiences for students (e.g., day on the job, visit to business, internship)
__ Targeted workshops
__ Financial aid (e.g., scholarships, work study)
__ Tutoring
__ Articulation agreements
__ Counseling
__ Other. Please describe _____

7. **If applicable, please describe your placement strategies employed for the ATE-grant funded program**. ***Optional question.***

_____
_____
_____
_____
_____

8. **Please CHECK THE TOP TWO (IF APPLICABLE) regarding what you believe are the most important ways in which classrooms and other educational experiences for students have changed as a result of your center's/project's work (*If you place an X next to Not Applicable, please go to 9. Otherwise, place an X next to the <u>top two</u> that apply).***

__ Increased use of work-based skills in curricula
__ Increased interest in learning by students
__ More relevant and up-to-date materials available
__ Movement away from traditional lecture delivery of lessons
__ Other. Please describe _____

9. **For any significant unintended outcomes (positive and/or negative) of your center/project work, please CHECK ALL THAT APPLY (*If you place an X next to Not Applicable, please go to 10. Otherwise, place an X next to all that apply).***

__ This question is Not Applicable
__ Partnerships, networks, collaborations (i.e., relationships with institutions or groups that provide money and/or other support) increased beyond those planned
__ Applications to or work for other disciplines occurred
__ Additional funding received
__ Loss of staff to business opportunities
__ Communication or work-related difficulties with collaborating partners
__ Other(s). Please describe _____

10. **Please provide up to three barriers or challenges to success that occurred in your center/project. *Optional question.***

a. Barrier #1:

_____
_____
_____
_____
_____

b. Barrier #2:

_____
_____
_____
_____
_____

c. Barrier #3:

_____
_____
_____
_____
_____

11. **Advisory Committees**

a. **If you have advisory committee(s) to serve the project's/center's needs, CHECK ALL THAT APPLY for committee type (*If you place an X next to Not Applicable, please go to 12. Otherwise, place an X next to all that apply).***

__ Local institution or other locally based group
__ Regional
__ National (e.g., National Visiting Committee)
__ Other. Please describe _____

b. **If applicable, please describe the activities of your advisory committee(s). *Optional question.***

_____
_____
_____
_____
_____

12. **Describe your plans for sustainability, if any, of your project/center. *Optional question.***

_____
_____
_____
_____
_____

13. **Please describe any other important features of your center/project that are not captured in the survey. That is, what center/project features would you like to highlight that have not been described elsewhere. *Optional question.***

_____
_____
_____
_____
_____

14. **What is your view of the effectiveness and value of the ATE program? *Optional question.***

_____
_____
_____
_____
_____

Questions 15 a-d are <u>Optional</u>

15. **a. What features of the survey (e.g., web interface) did you find most helpful?**

b. What features of the survey should be changed?

c. How much time, including data collection and on-line time, did it take you to complete the survey this year?

d. Additional comments regarding the survey itself.

16. **What aspects of your project/center are likely to be institutionalized (i.e., remain in the institution after the project/center has ended)? *Optional question.***

17. Articulation Agreements

a. ***If applicable, what type of articulation agreement(s) have been established through your project's/center's work?*** **Please CHECK ALL THAT APPLY.**

__ This question is Not Applicable
__ Between secondary and 2-year colleges
__ Between secondary and 4-year colleges
__ Between 2-year and 4-year colleges and universities
__ Other. Please describe.

b. What are the purposes/focuses of these agreements? ***Please CHECK ALL THAT APPLY.***

__ This question is Not Applicable
__ Strengthen the technological knowledge and skills of K-12 teachers
__ Strengthen the science and mathematics preparation of K-12 teachers
__ Facilitate the transition of students from STEM (Science, Technology, Engineering, Mathematics) associate's degree programs to related bachelors degree programs, especially those having a strong technological basis.
__ Other. Please describe.

NSF Award #: _____

Monitoring—Required

Confidentiality of responses to this section will be provided to the extent allowed by law. Unless indicated otherwise, please fill out every question and items in these questions. Thank you!

Numerical values must be entered as integers (e.g., "3420", "6" or "0").

Do not use: decimal points, dollar signs, commas or percent signs in numerical values (e.g., "3,000", "6.00", "$320" or "95%").

NSF Monitoring of Centers and Projects

1. **Indicate the frequency of the following monitoring actions between your center/project and your NSF program officer during the past 12 months**. ***For each item a-f, place an X under Only One of the 4 Frequency options.***

	Frequency (Number of Times)			
Monitoring Action	***0***	***1***	***2 – 4***	***>4***
a. Site visits	__	__	__	__
b. Telephone calls	__	__	__	__
c. Email contacts	__	__	__	__
d. Visits to NSF	__	__	__	__
e. Principal Investigator meetings	__	__	__	__
f. Reading and reaction to reports submitted by your center/project	__	__	__	__

2. **To what extent do you agree with the following statements?** ***For each item a-d, place an X under Only One of the 4 Agreement options.***

Statement	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
a. NSF has been responsive in meeting my center's/project's identified needs (e.g., through telephone calls, emails).	__	__	__	__
b. NSF site visits and/or evaluative actions have helped to improve the quality of my center/project.	__	__	__	__
c. NSF facilitates collaboration between my center/project and other ATE projects or centers.	__	__	__	__
d. NSF has an accurate understanding of my center/project.	__	__	__	__

NSF Award #: _____

Collaboration

Complete this section if your center/project has relationships with institutions or groups, including your center/project institutions (i.e., institutions that are the primary participants in the work of the center/project and the primary recipients of center/project funds), that provide money and/or other support.

Place an X next to

__ This Section **DOES NOT APPLY**
if the above paragraph does not apply to your project/center. GO TO THE NEXT SECTION OF THE SURVEY (p. 18).

Place an X next to
__ This Section **DOES APPLY**
if the above paragraph does describe your project/center. PROCEED WITH THE

COLLABORATION SECTION.

Unless indicated otherwise, please fill out every question and items in these questions. Thank you!

All questions refer to the past 12 months.

Numerical values must be entered as integers (e.g., "3420", "6" or "0").
Do not use: decimal points, dollar signs, commas or percent signs in numerical values (e.g., "3,000", "6.00", "$320" or "95%").

Collaboration with Other Institutions Or Groups

1. Non-NSF funding and in-kind support.

I. **Please CHECK FOR ALL APPLICABLE INSTITUTIONS in b-f, if you received MONETARY SUPPORT in the last 12 months (including project cost sharing). (*If you place an X next to Not Applicable, please go to II. Otherwise, place an X next to all that apply).***

__ a. This question is Not Applicable
__ b. Center/Project institutions
(The institutions that are the primary participants in the work of the center/project and the primary

recipients of center/project funds)

__ c. Business and industry
__ d. Public agencies (local, state, federal)
__ e. Educational institutions
__ f. Other organizations

II. **Please CHECK FOR ALL APPLICABLE INSTITUTIONS in b-f, if you received IN-KIND support (non-monetary support [e.g., equipment]) in the last 12 months. (*If you place an X next to Not Applicable, please go to III. Otherwise, place an X next to all that apply).***

__ a. This question is Not Applicable
__ b. Center/Project institutions
(The institutions that are the primary participants in the work of the center/project and the primary recipients
of center/project funds)
__ c. Business and industry
__ d. Public agencies (local, state, federal)
__ e. Educational institutions
__ f. Other organizations

III. **Total for the last 12 months. Please provide the approximate amount of total monetary and in-kind support that your center/project has received in the past 12 months from all the non-NSF sources you identified. Estimate dollar amounts to the nearest $1,000. Please enter only numbers (no "$", commas, or periods).**
If the information is Unavailable enter "U".

	Description	**Dollars**
a.	**Total for last 12 months of monetary support**	_____
b.	**Total for last 12 months of in-kind support**	_____

2. **With how many institutions EXTERNAL to your project/center has your center/project established collaborative arrangements that involve support (contributions of time, personnel sharing, equipment, etc.) and approximately how many persons from these institutions collaborate? Please specify for each type of institution listed below. For collaborators that offer their time, include only those that have spent a minimum of two days per year working with your center/project.**
*** If the information is Unavailable enter "U"**

Types of collaborating institutions	**# of Institutions**	**# of Persons**
a. **Business and industry**	_____	_____
b. **Public agencies (local, state, federal)**	_____	_____
c. **Educational institutions**	_____	_____
d. **Other organizations**	_____	_____

3. **For each of the institution types 1-4, please check ALL THE COLLABORATION PURPOSES THAT APPLY for your center's/project's collaborative arrangements with these institutions. *If you place an X next to Not Applicable, proceed to the next Institution Type. Otherwise, place an X next to all purposes that apply.***

I. Institution Type 1: Business and Industry

__ This question is Not Applicable
__ General center or project support (e.g., advice, contributed or shared equipment/technology, contributed time and effort)
__ Materials development (e.g., development or implementation of standards/guidelines, determining or confirming materials content, pilot testing of materials, field testing of materials)
__ Program improvement (e.g., student recruitment program, student understanding of industry opportunities and requirements, college/school-based instruction matters, work-based instruction and experience matters, student entry to the workforce)
__ Professional development (e.g., faculty/staff knowledge of industry needs, opportunities, and requirements; faculty/staff knowledge and skill in discipline; business/industry representatives' knowledge of educational options and opportunities)
__ Other. Please describe _____

II. Institution Type 2: Public Agencies (Local, State, Federal)

__ This question is Not Applicable
__ General center or project support (e.g., advice, contributed or shared equipment/technology, contributed time and effort)
__ Materials development (e.g., development or implementation of standards/guidelines, determining or confirming materials content, pilot testing of materials, field testing of materials)
__ Program improvement (e.g., student recruitment program, student understanding of industry opportunities and requirements, college/school-based instruction matters, work-based instruction and experience matters, student entry to the workforce)
__ Professional development (e.g., faculty/staff knowledge of industry needs, opportunities, and requirements; faculty/staff knowledge and skill in discipline; business/industry representatives' knowledge of educational options and opportunities)
__ Other. Please describe _____

III. Institution Type 3: Educational Institutions
__ This question is Not Applicable
__ General center or project support (e.g., advice, contributed or shared equipment/technology,

contributed time and effort)

__ Materials development (e.g., development or implementation of standards/guidelines, determining or confirming materials content, pilot testing of materials, field testing of materials)
__ Program improvement (e.g., student recruitment program, student understanding of industry opportunities and requirements, college/school-based instruction matters, work-based instruction and experience matters, student entry to the workforce)
__ Professional development (e.g., faculty/staff knowledge of industry needs, opportunities, and requirements; faculty/staff knowledge and skill in discipline; business/industry representatives' knowledge of educational options and opportunities)
__ Other. Please describe _____

IV. Institution Type 4: Other Organizations
__ This question is Not Applicable
__ General center or project support (e.g., advice, contributed or shared equipment/technology, contributed time and effort)
__ Materials development (e.g., development or implementation of standards/guidelines, determining or confirming materials content, pilot testing of materials, field testing of materials)
__ Program improvement (e.g., student recruitment program, student understanding of industry opportunities and requirements, college/school-based instruction matters, work-based instruction and experience matters, student entry to the workforce)
__ Professional development (e.g., faculty/staff knowledge of industry needs, opportunities, and requirements; faculty/staff knowledge and skill in discipline; business/industry representatives' knowledge of educational options and opportunities)
__ Other. Please describe _____

4. **Provide ratings of the quality/productivity of collaboration by each institution type. *For each item a-d, place an X under Only One of the 5 Rating options.***

Institution Type	**Not Applicable**	**Poor**	**Satisfactory**	**Good**	**Excellent**
a. Business or Industry	__	__	__	__	__
b. Public Agencies (Local, State, and Federal)	__	__	__	__	__
c. Educational Institutions	__	__	__	__	__
d. Other Organizations	__	__	__	__	__

5. **Most effective collaborator**

I. **Which institution type has been the most effective external collaborator in helping your center/project reach its goals? Place an X next to Only One.**

__ Business or Industry
__ Public Agencies (Local, State, and Federal)
__ Educational Institutions
__ Other Organizations

II. **For the organization type described in 5I, briefly describe what you consider to be the two most important products and/or results of your collaboration with groups within that organization type.** ***Optional question.***

_____
_____
_____
_____
_____

NSF Award #: _____

Materials Development

Complete this section if the development of materials is a focus of your center/project. "Materials" include one or more courses, modules, process models, and/or other instructional or assessment units. "Development" includes the preparation, adaptation for implementation and/or testing of materials.
Place an X next to

__ This Section **DOES NOT APPLY**
if the above paragraph does not apply to your project/center. GO TO THE NEXT SECTION OF THE SURVEY (p. 24).
Place an X next to
__ This Section **DOES APPLY**
if the above paragraph does describe your project/center. PROCEED WITH THE MATERIALS DEVELOPMENT SECTION.

Unless indicated otherwise, please fill out every question and items in these questions. Thank you! **If your center/project provides instruction to students as a part of a curricular program, you should also complete a Program Improvement section.**

Numerical values must be entered as integers (e.g., "3420", "6" or "0"). Do not use: decimal points, dollar signs, commas or percent signs in numerical values (e.g., "3,000", "6.00", "$320" or "95%").

Materials Development: Courses, Modules and Other Types of Materials

1. **Please indicate the <u>number of items</u> developed or under development for each development type listed below. Materials development is often a mix of simple and substantial efforts. For example, making changes throughout a course or module would likely require substantial effort, while revision of a test would probably not require substantial effort for the center/project. List only substantial items.**
<u>* If the information is Unavailable enter "U"</u>

Materials Development	No. in draft stage	No. being field tested	No. completed	No. in use locally*	No. with No. in use elsewhere**	No. published commercially	No. problem solving tasks***
a. Course Development	____	____	____	____	____	____	____
b. Module Development (a component that can be used in more than one course)	____	____	____	____	____	____	____
c. Other. Please describe	____	____	____	____	____	____	____

Description for c: _____

* Materials in use locally means at institutions within your center/project.
** Materials in use elsewhere means at institutions not a part of your center/project.
*** Materials with problem solving tasks require students to 1) recognize that a problem (i.e., discrepancy between what is and what should be) exists, 2) identify possible reasons for the problem, 3) devise and implement a plan of action to resolve the problem, and/or 4) evaluate and monitor progress, revising the plan as indicated by findings.

2. **Please provide the following information for up to three (3) of your best materials that your center/project developed (or is developing).** ***You need to complete at least a-f.***

a. **Material #1: Title _____**

b. **Material #1: Type of Development.** ***Place an X next to Only One.***

__ Combination of above
__ Other. Please describe: _____

c. **Material #1: Technology Field.** ***Place an X next to Only One.***
__ Agriculture
__ Aquaculture
__ Biotechnology
__ Chemical Technology
__ Distance Learning
__ Electronics, Instrumentation, Laser and Fiber Optics
__ Engineering Technology(general)
__ Environmental Technology
__ Geographic Information Systems
__ Graphics and Multimedia Technology
__ Information Technology, Telecommunications
__ Machine Tool Technology, Metrology
__ Manufacturing and Industrial Technology
__ Marine Technology
__ Mathematics
__ Multidisciplinary or Interdisciplinary (General)
__ Physics
__ Semiconductor Manufacturing
__ Transportation
__ Other. Please describe _____

d. **Material #1: Grade Level(s).** ***Place an X next to Only One.***
__ Elementary/Middle
__ Secondary
__ College-first year
__ College-second year
__ College-upper level

e. **Material #1: Comparable Materials.** Are you aware of comparable (i.e., equivalent purpose, scope, & audience) materials to Material #1 in use?

i. __ Yes
__ No

If Yes, please provide:

ii. Title: _____
iii. Publisher: _____
iv. Name of the Institution Where It Is in Use: _____

f. **Material #1: Licensure or Certification Exam.** Is Material #1 designed to assist students in passing a specific licensure or certification exam?

i. __ Yes
__ No

If Yes, please provide:

ii. Title of the Exam _____

g. **Material #2: Title _____**

h. **Material #2: Type of Development.** ***Place an X next to Only One.***

__ Combination of above
__ Other. Please describe: _____

i. **Material #2: Technology Field.** ***Place an X next to Only One.***

__ Agriculture
__ Aquaculture
__ Biotechnology
__ Chemical Technology
__ Distance Learning
__ Electronics, Instrumentation, Laser and Fiber Optics
__ Engineering Technology(general)
__ Environmental Technology
__ Geographic Information Systems
__ Graphics and Multimedia Technology
__ Information Technology, Telecommunications
__ Machine Tool Technology, Metrology
__ Manufacturing and Industrial Technology
__ Marine Technology
__ Mathematics
__ Multidisciplinary or Interdisciplinary (General)
__ Physics
__ Semiconductor Manufacturing
__ Transportation
__ Other. Please describe _____

j. **Material #2: Grade Level(s).** ***Place an X next to Only One.***

__ Elementary/Middle
__ Secondary
__ College-first year
__ College-second year
__ College-upper level

k. **Material #2: Comparable Materials.** Are you aware of comparable (i.e., equivalent purpose, scope, & audience) materials to Material #2 in use?

i. __ Yes
__ No

If Yes, please provide:

ii. Title: _____
iii. Publisher: _____
iv. Name of the Institution Where It Is in Use: _____

l. **Material #2: Licensure or Certification Exam.** Is Material #2 designed to assist students in passing a specific licensure or certification exam?

i. __ Yes
__ No

If Yes, please provide:

ii. Title of the Exam _____

m. **Material #3: Title _____**

n. **Material #3: Type of Development.** ***Place an X next to Only One.***

__ Combination of above
__ Other. Please describe: _____

o. **Material #3: Technology Field.** ***Place an X next to Only One.***

__ Agriculture
__ Aquaculture
__ Biotechnology
__ Chemical Technology
__ Distance Learning
__ Electronics, Instrumentation, Laser and Fiber Optics
__ Engineering Technology(general)
__ Environmental Technology
__ Geographic Information Systems
__ Graphics and Multimedia Technology
__ Information Technology, Telecommunications
__ Machine Tool Technology, Metrology
__ Manufacturing and Industrial Technology
__ Marine Technology
__ Mathematics
__ Multidisciplinary or Interdisciplinary (General)
__ Physics
__ Semiconductor Manufacturing
__ Transportation
__ Other. Please describe _____

p. **Material #3: Grade Level(s).** ***Place an X next to Only One.***

__ Elementary/Middle
__ Secondary
__ College-first year
__ College-second year
__ College-upper level

q. **Material #3: Comparable Materials.** Are you aware of comparable (i.e., equivalent purpose, scope, & audience) materials to Material #3 in use?

i. __ Yes
__ No

If Yes, please provide:

ii. Title: _____
iii. Publisher: _____
iv. Name of the Institution Where It Is in Use:_____

r. **Material #3: Licensure or Certification Exam.** Is Material #3 designed to assist students in passing a specific licensure or certification exam?
i. __ Yes
__ No

If Yes, please provide:
ii. Title of the Exam _____

3. **Select one of the materials from Question 2 above as developed by your center/project. For that item please briefly describe (*Optional question)*:**

a. **The title of the chosen material**

_____

_____

b. **What you consider to be the most compelling evidence for its quality.**

_____

_____

_____

_____

_____

4. In the table below, identify the frequency of use for each practice that your center/project employs when developing curricular materials. ***For each item a-h, place an X under Only One of the 5 Frequency options.***

Practices	Frequency of Use				
	Not applicable	**Used each time**	**Used most times**	**Used less than half the time**	**Almost never used or never used**
a. Obtain verification by industry regarding alignment of materials with workforce and skill needs	__	__	__	__	__
b. Use applicable student and industry-based standards or guidelines to guide materials development	__	__	__	__	__
c. Assess student success (knowledge and skills) in comparison with standards (e.g., business/industry, educational, nontechnical skill)	__	__	__	__	__
d. Assess student success (knowledge and skills) in comparison with other nonproject or nonparticipating students	__	__	__	__	__
e. Pilot test *(1) materials	__	__	__	__	__
f. Field-test *(2) materials internally (i.e., within the center/project)	__	__	__	__	__
g. Field-test *(2) materials externally (i.e., not center/project-based locations)	__	__	__	__	__
h. Assess improvement of student performance in the workforce	__	__	__	__	__

* (1) Pilot testing refers to brief, preliminary testing of materials or portions of materials; usually done with a small number of sites and/or students.

* (2) Field testing refers to testing of materials in settings where they will be used when finalized; usually large and more in-depth than pilot testing.

5. **Please indicate the types of materials development in which your project engages.** ***Place an X next to ALL THAT APPLY.***

__ Program improvement (e.g., developed materials used in modifying or developing courses in an ATE-funded program)
__ Dissemination (e.g., commercial)

__ Professional development activities
__ Other. Please describe _____

NSF Award #: _____

Professional Development

Complete this section if your center/project provides instruction and/or support to teaching faculty and staff, so that they update their knowledge and skills in order to effectively teach new or improved curricula.

Place an X next to

__ This Section **DOES NOT APPLY**
if the above paragraph does not apply to your project/center. GO TO THE NEXT SECTION OF THE SURVEY (p. 28).

Place an X next to

__ This Section **DOES APPLY**
if the above paragraph does describe your project/center. PROCEED WITH THE PROFESSIONAL DEVELOPMENT SECTION.

Unless indicated otherwise, please fill out every question and items in these questions. Thank you!
Numerical values must be entered as integers (e.g., "3420", "6" or "0").
Do not use: decimal points, dollar signs, commas or percent signs in numerical values (e.g., "3,000", "6.00", "$320" or "95%").

Professional Development: Instruction and/or Support provided by your project/center to teaching faculty (e.g., college faculty and secondary school teachers).

1. **Please provide the number of opportunities your project/center provided for each option for a-f (e.g., 3 conferences) and then provide the total number of participants across all opportunities for the past 12 months.**
*** If the information is Unavailable enter "U"**
*** If the information is Not Applicable enter "N"**

Professional Development Opportunities	**No. of Opportunities**	**Total No. of**
a. Conference (multiple track-participants choose from a selection of workshops or presentations to attend)	_____	_____
b. Short-term workshop (single track-1 to 3 day directed learning experience)	_____	_____
c. Inservice course or seminar (longer than a 3-day directed learning experience)	_____	_____
d. Internship, leave of absence to work with industry, or work exchange program (faculty, teachers)	_____	_____
e. On-line courses	_____	_____
f. Other (please describe)	_____	_____

Description for f: _____

2. **Approximately what <u>number of participants</u> from the following institutions was engaged in professional development opportunities provided by your center/project in the last 12 months?**
*** If the information is Unavailable enter "U"**
*** If the information is Not Applicable enter "N"**

Institution Type	**Number of Participants**
a. Secondary schools	_____
b. 2-year colleges	_____
c.4-year colleges/universities	_____
d. Other (please describe)	_____

Description for d: _____

3. **Overall, to what extent are your professional development opportunities operating at full capacity (100 percent of available seats occupied in these opportunities)?** ***Place an X next to Only One.***

__ 0-25% of full capacity
__ 26-50% of full capacity
__ 51-75% of full capacity
__ 76-100% of full capacity

4. **Follow up**

I. **If you formally follow up on participants in your professional development activities, please CHECK ALL FOLLOW-UP METHODS THAT APPLY.** ***If you place an X next to Not Applicable, please go to II. Otherwise, place an X next to all that apply.***

__ This question is Not Applicable
__ Personal (e.g., voice or in person) contacts to all participants
__ Survey
__ Newsletter
__ Letter or email
__ Other. Please describe _____

II. **For items a-f and each of the 4 column headings (e.g., indicated satisfaction with the activity), please provide the <u>percent of participants</u> in the past 12 months who have taken the following actions as a result of participating in each type of professional development activity provided by your project/center.**

<u>* If the information is Unavailable enter "U"</u>

<u>* If the information is Not Applicable enter "N"</u>

	Indicated satisfaction with the activity	Indicated intention to use the technology, materials, and/or major ideas presented	Tried out the technology, materials and/or major ideas at least once in the classroom	Fully incorporated the technology, materials, and/or major ideas into their course or program
Professional Development Opportunities				
a. Conference	_____	_____	_____	_____
b. Short term workshop	_____	_____	_____	_____
c. Inservice course or seminar	_____	_____	_____	_____
d. Internship, leave of absence to work with industry, or work exchange program	_____	_____	_____	_____
e. On-line courses	_____	_____	_____	_____
f. Other. Please describe	_____	_____	_____	_____

Description for f: _____

5. **Support**

I. **Does your center/project require participants to obtain administrative, monetary, or other support for implementation as a condition of acceptance to your professional development program?**

Require Support: ***Place an X next to Only One.***

__ yes
__ no

II. **PLEASE CHECK ALL THAT APPLY for types of implementation support that your center/project typically provides to participants as part of your professional development program.** ***If you place an X next to Not Applicable, please go to 6. Otherwise, place an X next to all that apply.***

__ This question is Not Applicable
__ money
__ equipment
__ materials
__ technical assistance
__ follow-up activities (e.g., stipends, web site)
__ email
__ newsletter
__ Other. Please describe _____

6. **Please comment on your project's/center's effectiveness regarding professional development activities. That is, briefly describe what faculty can do now as a result of participation in professional development activities you provided that they could not do before. If possible, please provide an example.** ***Optional question.***

*** If the information is Unavailable enter "U"**
*** If the information is Not Applicable enter "N"**

NSF Award #: _____

Program Improvement: Secondary School Level

Complete this section if your center/project provides an instructional program to students (e.g. degree, certification or other collection of courses) at the Secondary School Level and ATE grant monies have been used to improve that instructional program.

Place an X next to

__ This Section **DOES NOT APPLY**
if the above paragraph does not apply to your project/center. GO TO THE NEXT SECTION OF THE SURVEY (p. 32).

Place an X next to
__ This Section **DOES APPLY**
if the above paragraph does describe your project/center. PROCEED WITH THE PROGRAM IMPROVEMENT-SECONDARY SECTION.

Unless indicated otherwise, please fill out every question and items in these questions. Thank you! **If you have modified or developed an individual course or courses in this program as part of this ATE grant, you should also complete the Materials Development section.**

"Program", as used here, refers to multiple, related courses and/or field experiences for students at the designated education level. These instructional experiences lead to a defined outcome such as a degree, certification, or occupational completion point.

"Module", as used here, refers to a component that can be used in one or more courses.

"Course", as used here, refers to an educational unit (usually at the secondary, college or university level) consisting of a series of instruction periods (e.g., lectures, recitations, and laboratory sessions) dealing with a particular subject.

Numerical values must be entered as integers (e.g., "3420", "6" or "0").
Do not use: decimal points, dollar signs, commas or percent signs in numerical values (e.g., "3,000", "6.00", "$320" or "95%").

Program Improvement and Student Characteristics: Secondary School Level

1. **This question addresses the size and scope of your educational program(s) funded by the ATE grant for this level.** ***For items a-d, please fill in the Total Number.***

Description	**Total Number**
a. State the total number of ATE-grant funded programs developed/offered.	_____
b. State the total number of secondary schools where the ATE-grant funded programs are offered.	_____
c. State the total number of courses offered across all ATE-grant funded programs	_____
d. State (estimate) the total number of students (head count) who are enrolled in one of your ATE-grant funded programs (i.e., who have taken at least one course in one of your ATE-grant funded programs during the past 12 months).	_____

2. **In completing the remainder of this section, please refer to one specific ATE-grant funded program as offered at one location and that best represents your center/project.**

a. **Program name: Choose one specific ATE-grant funded program to consider when answering the remaining questions in this section.**

_____

b. **School name: Choose one location to consider when answering the remaining questions in this section.**

_____

3. **Indicate the extent to which the courses in your specified ATE-grant funded program meet the following conditions.** ***<u>For each item a-b, place an X under Only One of the 5 column options (e.g., None).</u>***

Condition	**None**	**Some**	**Most**	**All**	**Don't Know**
a. Course credits can be transferred to higher degree level institutions (e.g., courses can be taken for dual credit for secondary and community college.)	__	__	__	__	__
b. Certification can be obtained by students in these courses (e.g., business/industry based certification)	__	__	__	__	__

4. **How <u>many persons</u> instruct courses in your specified ATE-grant funded program?**

_____

5. **For courses in the single ATE-grant funded program and location you specified in Question 2, estimate the Total Number of Courses and then by Course Status (New(1), Changed(2) or Unchanged(3)).**
*** If the information is Unavailable enter "U"**
*** If the information is Not Applicable enter "N"**

I. Total No. of Courses in the Specified Program _____

II.

Course Status	**Number of Courses**
a. **New Courses(1)**	_____
b. **Changed Courses(2)**	_____
c. **Unchanged Courses(3)**	_____

Note: **The number of New, Changed, and Unchanged should add up to the number you entered for Total No. of Courses in the Specified Program**.
* (1) New Courses means courses added as part of this grant.
* (2) Changed Courses means pre-existing courses that were substantially changed through this grant's efforts.
* (3) Unchanged Courses means pre-existing courses, used in the specified program, that were not changed through this grant's efforts.

6. **For courses in the single ATE-grant funded program and location you specified in Question 2, estimate the number of your students in each of the following categories. Use the past academic year plus summer (12 months) as the basis for answering.**
*** If the information is Unavailable enter "U"**
*** If the information is Not Applicable enter "N"**

Student Characteristics	**Number of Students**
a. **Number of students who applied to your specified program**	_____
b. **Number of students enrolled in your specified program**	_____
c. **Number of students who completed the specified program**	_____
d. **Number of students who left the specified program without completing it**	_____

Of those students who completed the specified program

e. **Number who go into employment as a technician**	_____
f. **Number who continue science, technology-related, engineering, or mathematics (STEM) higher education**	_____

7. **For courses in the single ATE-grant funded program and location you specified in Question 2, please provide <u>your best estimate</u> of gender, ethnicity, race, and disability information from application and enrollment information for the past academic year plus summer (12 months).**
<u>* If the information is Unavailable enter "U"</u>
<u>* If the information is Not Applicable enter "N"</u>

a. **Gender**

Student Category	**Applicants (%)**	**Enrollment (%)**
% Female	_____	_____
% Male	_____	_____

b. **Ethnicity/Race**
<u>(These will not necessarily sum to 100%.)</u>

Student Category	**Applicants (%)**	**Enrollment (%)**
% Hispanic or Latino	_____	_____
% American Indian or Alaska Native	_____	_____
% Asian	_____	_____
% Black or African American	_____	_____
% Native Hawaiian or Other	_____	_____
Pacific Islander		
% Multiracial	_____	_____
% White Non Hispanic/Latino	_____	_____

c. **Percent of students who requested accommodation due to a disability recognized under the Americans with Disabilities Act.**

	Applicants (%)	**Enrollment (%)**
Students requesting ADA accommodation	_____	_____

NSF Award #: _____

Program Improvement: Associate Degree Level (2-year college programs)

Complete this section if your center/project provides an instructional program to students (e.g. degree, certification or other collection of courses) at the Associate Degree Level (2-year college programs) and ATE grant monies have been used to improve that instructional program.

Place an X next to

__ This Section **DOES NOT APPLY**
if the above paragraph does not apply to your project/center. GO TO THE NEXT SECTION OF THE SURVEY (p. 38).

Place an X next to
__ This Section **DOES APPLY**
if the above paragraph does describe your project/center. PROCEED WITH THE PROGRAM IMPROVEMENT-ASSOCIATE SECTION.

Unless indicated otherwise, please fill out every question and items in these questions. Thank you! **If you have modified or developed an individual course or courses in this program as part of this ATE grant, you should also complete the Materials Development section.**

"Program", as used here, refers to multiple, related courses and/or field experiences for students at the designated education level. These instructional experiences lead to a defined outcome such as a degree, certification, or occupational completion point.

"Module", as used here, refers to a component that can be used in one or more courses.

"Course", as used here, refers to an educational unit (usually at the secondary, college or university level) consisting of a series of instruction periods (e.g., lectures, recitations, and laboratory sessions) dealing with a particular subject.

Numerical values must be entered as integers (e.g., "3420", "6" or "0").
Do not use: decimal points, dollar signs, commas or percent signs in numerical values (e.g., "3,000", "6.00", "$320" or "95%").

Program Improvement and Student Characteristics: Associate Degree Level (2-year college programs)

1. **This question addresses the size and scope of your ATE educational program(s) funded by the ATE grant for this level.** ***For items a-d, please fill in the Total Number.***

Description	Total Number
a. State the total number of ATE-grant funded programs developed/offered.	_____
b. State the total number of 2-year institutions/campuses where the ATE-grant funded programs are offered.	_____
c. State the total number of courses offered across all ATE-grant funded programs.	_____
d. State (estimate) the total number of students (head count) who are enrolled in one of your ATE-grant funded programs (i.e., who have taken at least one course in one of your ATE-grant funded programs during the past 12 months).	_____

2. **In completing the remainder of this section, please refer to one specific ATE-grant funded program as offered at one location and that best represents your center/project.**

a. **Program name: Choose one specific ATE-grant funded program to consider when answering the remaining questions in this section.**

_____

b. **Institution name: Choose one institution to consider when answering the remaining questions in this section.**

_____

3. **Indicate the extent to which the courses in your specified ATE-grant funded program meet the following conditions.** ***<u>For each item a-c, place an X under Only One of the 5 column options (e.g., None).</u>***

Condition	None	Some	Most	All	Don't Know
a. Course credits from secondary technical programs articulate into this program.	__	__	__	__	__
b. Course credits can be transferred to other similar institutions.	__	__	__	__	__
c. Course credits can be transferred to higher degree level institutions.	__	__	__	__	__

4. **Which of the following options does your specified ATE-grant funded program offer (CHECK ALL THAT APPLY)?** ***If you place an X next to Not Applicable, please go to 5. Otherwise place an X next to all that apply.***

__ Multiple courses without a degree or certificate
__ College certificates
__ Associate degrees
__ Preparation for industry-based certification

5. **How <u>many persons</u> instruct courses in your specified ATE-grant funded program?**

_____

6. **<u>Of those persons who instruct courses</u> in your specified ATE-grant funded program, <u>how many</u> also currently work in business or industry?**

_____

7. **For courses in the single ATE-grant funded program and location you specified in Question 2, <u>estimate the Total Number of Courses and then by Course Status</u> (New(1), Changed(2) or Unchanged(3)).**

<u>* If the information is Unavailable enter "U"</u>
<u>* If the information is Not Applicable enter “N”</u>

Description	**Total Number**
I. **Total No. of Courses in the Specified Program**	_____
II.	

Course Status	**Number of Courses**
a. **New Courses(1)**	_____
b. **Changed Courses(2)**	_____
c. **Unchanged Courses(3)**	_____

<u>Note: The number of New, Changed, and Unchanged should add up to the number you entered for Total No. of Courses in the Specified Program.</u>

* (1) New Courses means courses added as part of this grant.
* (2) Changed Courses means pre-existing courses that were substantially changed through this grant's efforts.
* (3) Unchanged Courses means pre-existing courses, used in the specified program, that were not changed through this grant's efforts.

8. **For courses in the single ATE-grant funded program and location you specified in Question 2, estimate the number of your students in each of the following categories. Use the past academic year plus summer (12 months) as the basis for answering.**
*** If the information is Unavailable enter "U"**
*** If the information is Not Applicable enter "N"**

Student Characteristics	**Number of Students**
a. **Number of student who applied to your specified program**	_____
b. **Number of students enrolled in your specified program**	_____
c. **Number of students who completed the specified program**	_____
d. **Number of students who left the specified program without completing it**	_____
e. **Number of students who were already employed as technicians in specified program-related fields upon entry into the specified program**	_____

Of those students who completed the specified program

f. **Number who go into or continue employment as a technician**	_____
g. **Number who continue science, technology-related, engineering, or mathematics (STEM) higher education**	_____

Of those students who left the specified program without completing it

h. **Number who go into or continue employment as a technician**	_____
i. **Number who continue science, technology-related, engineering, or mathematics (STEM) higher education**	_____

9. **For courses in the single ATE-grant funded program and location you specified in Question 2, estimate the percent of your students in each of the following categories. Use the past academic year plus summer (12 months) as the basis for answering.**
*** If the information is Unavailable enter "U"**
*** If the information is Not Applicable enter "N"**

Student Characteristics	**Percent of Students (%)**
a. **Students who were required to take remedial math and science courses before entering your specified program**	_____
b. **Students who meet basic science, technology, engineering, and mathematics (STEM) workforce entry requirements for technician jobs related to your specified program at the time of entry into your specified program**	_____
c. **If your specified program offers a college certificate, what percent of the students in the specified program's courses seek this certificate?**	_____
d. **If your specified program offers a degree, what percent of the students in the specified program's courses seek the degree?**	_____

10. **For courses in the single ATE-grant funded program and location you specified in Question 2, please provide your best estimate of gender, ethnicity, race, and disability information from application and enrollment information for your ATE grant-based academic specified program for the past academic year plus summer (12 months).**
*** If the information is Unavailable enter "U"**
*** If the information is Not Applicable enter "N"**

a. **Gender**

Student Category	**Applicants (%)**	**Enrollment (%)**
% Female	_____	_____
% Male	_____	_____

b. **Ethnicity/Race**
(These will not necessarily sum to 100%.)

Student Category	**Applicants (%)**	**Enrollment (%)**
% Hispanic or Latino	_____	_____
%American Indian or Alaska Native	_____	_____
% Asian	_____	_____
% Black or African American	_____	_____
% Native Hawaiian or Other	_____	_____
% Multiracial	_____	_____
% White Non Hispanic/Latino	_____	_____

c. **Percent of students who requested accommodation due to a disability recognized under the Americans with Disabilities Act.**

	Applicants (%)	Enrollment (%)
Student requesting ADA accommodation	_____	_____

NSF Award #: _____

Program Improvement: Baccalaureate Level (4-year college/university programs)

Complete this section if your center/project provides an instructional program to students (e.g. degree, certification or other collection of courses) at the Baccalaureate Level (4-year college/university programs) and ATE grant monies have been used to improve that instructional program.

Place an X next to

__ This Section **DOES NOT APPLY**
if the above paragraph does not apply to your project/center. YOU HAVE NOW COMPLETED THE SURVEY. PLEASE GO TO THE FILLING OUT INSTRUCTIONS FOR INFORMATION ON WHERE TO SEND IT.

Place an X next to
__ This Section **DOES APPLY**
if the above paragraph does describe your project/center. PROCEED WITH THE PROGRAM IMPROVEMENT-BACCALAUREATE SECTION.

Unless indicated otherwise, please fill out every question and items in these questions. Thank you! **If you have modified or developed an individual course or courses in this program as part of this ATE grant, you should also complete the Materials Development section.**
"Program", as used here, refers to multiple, related courses and/or field experiences for students at the designated education level. These instructional experiences lead to a defined outcome such as a degree, certification, or occupational completion point.

"Module", as used here, refers to a component that can be used in one or more courses.

"Course", as used here, refers to an educational unit (usually at the secondary, college or university level) consisting of a series of instruction periods (e.g., lectures, recitations, and laboratory sessions) dealing with a particular subject.

Numerical values must be entered as integers (e.g., "3420", "6" or "0").
Do not use: decimal points, dollar signs, commas or percent signs in numerical values (e.g., "3,000", "6.00", "$320" or "95%").

Program Improvement and Student Characteristics: Baccalaureate Level (4-year college/university programs)

1. **This question addresses the size and scope of your educational program(s) funded by the ATE grant for this level.** ***For items a-d, please fill in the Total Number.***

Description	**Total Number**
a. State the total number of ATE-grant funded programs developed/offered.	_____
b. State the total number of 4-year institutions/campuses where the ATE-grant funded programs are offered.	_____
c. State the total number of courses offered across all ATE-grant funded programs.	_____
d. State (estimate) the total number of students (head count) who are enrolled in one of your ATE-grant funded programs (i.e., who have taken at least one course in one of your ATE-grant funded programs during the past 12 months).	_____

2. **In completing the remainder of this section, please refer to one specific ATE-grant funded program as offered at one location and that best represents your center/project.**

a. **Program name: Choose one specific ATE-grant funded program to consider when answering the remaining questions in this section.**

_____

b. **Institution name: Choose one location to consider when answering the remaining questions in this section.**

_____

3. **Indicate the extent to which the courses in your specified ATE-grant funded program meet the following conditions.** ***For each item a-f, place an X under Only One of the 5 column options (e.g., None).***

Condition	**None**	**Some**	**Most**	**All**	**Don't Know**
a. Course credits from secondary technical programs articulate into this program.	__	__	__	__	__
b. Course credits from associate degree technical programs articulate into this program.	__	__	__	__	__
c. Course credits can be transferred to other similar institutions.	__	__	__	__	__
d. Course credits can be transferred to higher degree level institutions.	__	__	__	__	__
e. Preparation for industry-based certification	__	__	__	__	__
f. Provides a baccalaureate degree in a technician-based program	__	__	__	__	__

4. **For courses in the single ATE-grant funded program and location you specified in Question 2, estimate the Total Number of Courses and then by Course Status (New(1), Changed(2) or Unchanged(3)).**

*** If the information is Unavailable enter "U"**

*** If the information is Not Applicable enter "N"**

Description	**Total Number**

II.

Course Status	**Number of Courses**
a. **New Courses(1)**	_____
b. **Changed Courses(2)**	_____
c. **Unchanged Courses(3)**	_____

Note: The number of New, Changed, and Unchanged should add up to the number you entered for Total No. of Courses in the Specified Program.

* (1) New Courses means courses added as part of this grant.
* (2) Changed Courses means pre-existing courses that were substantially changed through this grant's efforts.
* (3) Unchanged Courses means pre-existing courses, used in the specified program, that were not changed through this grant's efforts.

5. **For courses in the single ATE-grant funded program and location you specified in Question 2, estimate the number of your students in each of the following categories. (Use the past academic year plus summer (12 months) as the basis for answering.)**

*** If the information is Unavailable enter "U"**

*** If the information is Not Applicable enter "N"**

Student Characteristics	**Number of Students**
a. **Number of student who applied to your specified program**	_____
b. **Number of students enrolled in your specified program**	_____
c. **Number of students who completed the specified program**	_____
d. **Number of students who left the specified program without completing it**	_____
e. **Number of students who were already employed as technicians in specified program-related fields upon entry into the specified program**	_____

Of those students who completed the specified program

f. **Number who go into or continue employment as a technician** _____

g. **Number who continue science, technology-related, engineering, or mathematics (STEM) higher education** _____

Of those students who left the specified program without completing it

h. **Number who go into or continue employment as a technician** _____

i. **Number who continue science, technology-related, engineering, or mathematics (STEM) higher education** _____

6. For **courses in the single ATE-grant funded program and location you specified in Question 2, estimate the percent of your students in each of the following categories. Use the past academic year plus summer (12 months) as the basis for answering.**

*** If the information is Unavailable enter "U"**

*** If the information is Not Applicable enter "N"**

Student Characteristics	**Percent of Students**
a. **Students who were required to take remedial science and math courses before entering your specified program**	_____
b. **Students who meet basic science, technology , engineering, and mathematics (STEM) workforce entry requirements for technician jobs related to your specified program at the time of entry into your specified program**	_____
c. **If your specified program offers a certificate, what percent of the students in the specified program's courses seek this certificate?**	_____
d. **If your specified program offers a degree, what percent of the students in the specified program's courses seek the degree?**	_____

7. **For courses in the single ATE-grant funded program and location you specified in Question 2, please provide your <u>best estimate</u> of gender, ethnicity, race, and disability information from application and enrollment information for the past academic year plus summer (12 months).**
<u>* If the information is Unavailable enter "U"</u>
<u>* If the information is Not Applicable enter "N"</u>

a. **Gender**

Student Category	**Applicants (%)**	**Enrollment (%)**
% Female	_____	_____
% Male	_____	_____

b. **Ethnicity/Race**
<u>(These will not necessarily sum to 100%.)</u>

Student Category	**Applicants (%)**	**Enrollment (%)**
% Hispanic or Latino	_____	_____
%American Indian or Alaska Native	_____	_____
% Asian	_____	_____
% Black or African American	_____	_____
% Native Hawaiian or Other	_____	_____
% Multiracial	_____	_____
% White Non Hispanic/Latino	_____	_____

c. **Percent of students who requested accommodation due to a disability recognized under the Americans with Disabilities Act.**

	Applicants (%)	**Enrollment (%)**
Student requesting ADA accommodation	_____	_____

Appendix B: Evaluation Indicators

Indicator	Variables
1.0 Project Characteristics	
1.1 Demographics	• Funding categories (Project, Center, Articulation Partnership) • Institution type for host institution • Award amounts (quartiles) • Project Longevity (number of years between start date of current funding and survey date) • Technology Emphasis
1.2 Stability	• Principal investigator ratings of project status compared to the previous 12 months (9 different ratings on various topics)
1.3 Unintended Outcomes	• Number of projects reporting unintended outcomes (5 positive unintended outcomes; 3 negative unintended outcomes)
1.4 Barriers to Success	• Open-ended responses detailing barriers to success
1.5 Sustainability	• Open-ended responses detailing plans for sustaining project operations after the end of ATE funding
2.0 Organizational Practices	
2.1 Work Categories	• Number of projects engaged in 4 ATE work categories—collaboration, materials development, professional development, and program improvement
2.2 Workforce Needs Assessment	• Number of projects conducting different forms of workforce needs assessments
2.3 Advisory Committees	• Number of projects engaging different types of advisory committees
2.4 Evaluation	• Number of projects using internal and/or external evaluators • Usefulness of evaluation information • Amount of evidence of project quality provided by evaluation
2.5 Monitoring	• Number of projects engaging in various NSF monitoring activities and frequency of that engagement • Project perceptions of NSF related to participation in monitoring activities
3.0 Collaboration	
3.1 Collaboration with other ATE Projects	• Reasons for collaborating with other ATE projects
3.2 Collaboration with Non-ATE Institutions	• Number of collaborations with non-ATE institutions • Purposes of of collaborations with non-ATE institutions
3.3 External Support	• Number of projects receiving monetary and/or in-kind support from different external sources • Total monetary and in-kind support received from external sources
3.4 Quality of Collaboration	• Ratings of the quality of collaborations with different institution types • Number of projects indicating which type of institution is their most effective collaborator

Indicator	Variables
4.0 Materials Development	
4.1 Purpose for Materials Development	• Number of projects indicating different purposes for engaging in materials development
4.2 Results	• Number and type of materials in various stages of development. Types are courses, modules, and other. Stages are draft, field tested, completed. • Number and type of materials in use in various ways. Uses are locally, elsewhere, published commericiall • Number and type of materials with problem solving tasks • Numbers of materials developed in various technology fields
4.3 Development Practices	• Frequency of verifying workforce skills and industry needs • Frequency of using standards to guide development • Frequency of assessing student success in comparison with standards • Frequency of assessing student success in comparison with non-project students • Frequency of pilot testing materials • Frequency of field testing materials internally • Frequency of field testing materaisl externally
4.3 Quality	• Open-ended responses detailing evidence of materials quality
5.0 Professional Development	
5.1 Results	• Number of opportunities and participants for various types of professional development. Types are conferences, workshops, in-service, internships, and online courses • Number of participants from different education levels • Average capacity of opportunities
5.2 Impact	• Number of projects using different follow-up methods • Number of participants reporting level of implementation following the opportunities. Levels are satisfied, intent to use new ideas or materials, tried the materials or ideas, fully incorporated materials or ideas
5.3 Support	• Number of projects requiring support for implementation as a condition of acceptance • Types of support provided for participants • Open-ended responses indicating examples of professional development outcomes
6.0 Program Improvement	
6.1 Results	• Number of projects engaged in program improvement at different levels—secondary, associate, and baccalaureate • Number of programs offerred • Number of locations where programs are offerred • Number of courses in programs • Number of students enrolled in at least one course • Number of new, changes, unchanged courses in one specified ATE program

Indicator	Variables
6.2 Changes in Classroom Environment Due to *Project* Efforts	• Number of projects reporting various changes in the classroom due to program improvement efforts
6.3 Articulation	• Number of projects reporting different types of articulation agreements • Number of projects reporting different purposes for articulation agreements • Number of projects reporting that program credits transfer to higher education levels and the extent to which credits transfer
7.0 Student Impact	
7.1 Demographics	• Gender of program applicants and enrolled students • Racial/ethnic makeup of applicants and enrolled students
7.2 Recruitment and Retention	• Methods used to recruit and retain students • Methods used to recruit and retain students from underrepresented groups
7.3 Outcomes	• Number of applicants • Number of enrolled students • Number of students employed as technicians prior to enrollment • Absolute and adjusted growth rates • Number of students completing the program • Of completing students, number of start/continue employment and number who continue STEM Education • Number of students leaving the program • Of leaving students, number of start/continue employment and number who continue STEM Education

Appendix C: Online Data Access Instructions

Overview

The SPSS Viewer Web site allows users to view summarized data from the NSF Advanced Technological Education (ATE) annual survey. Data published to the Web site correspond with the tables and figures presented in the 2003 survey report. Users can examine survey results according to any number of combinations of five primary categorical variables:

1. Survey Year
2. Award Type
3. Institution Category
4. Funding Amount Category
5. *Project* Age Category

Results are mostly presented in the form of OLAP (Online Analytical Processing) cubes, although static tables, charts, and graphs are also available on the Web site. OLAP cubes allow users to select single or multiple categorical variables to generate tables within or across these variables.

Logging-in to the SPSS Data Viewer

Using a standard Web browser (e.g., Internet Explorer, Netscape) go to http://www.ate.wmich.edu/sv/home

You will be presented with a login screen. The username and password for access to the ATE survey data are:

Username: ATEdata
Password: 2003ATE

The username and password are case-sensitive.

After you enter the site, we recommend that you explore the documentation section be selecting the link on the bottom left of page.

Questions, comments, or concerns regarding the online data displays should be directed to carl.hanssen@wmich.edu.