ATE Annual Survey

2016 Report

INTRODUCTION

The Advanced Technological Education (ATE) program was created by the National Science Foundation (NSF) in response to the *Scientific and Advanced-Technology Act of 1992*, which called for establishing "a national advanced technician training program, utilizing the resources of the nation's two-year associate-degree-granting colleges."[1] The program focuses on high-technology fields such as advanced manufacturing technologies, biotechnology, energy and environmental technologies, engineering technologies, information technologies, and nanotechnology. Awards ranging from $150,000 to $4 million are made to support projects, support centers, regional centers, national centers, and targeted research. A separate funding track is for small grants for institutions new to the ATE program. (All types of funded work are referred to as "projects" in the remainder of this report.)

This report summarizes data gathered in the 2016 survey of ATE program grantees. Conducted by EvaluATE, the evaluation support center for the ATE program located at The Evaluation Center at Western Michigan University, this was the seventeenth annual ATE survey. Included here are findings about funded projects and their activities, accomplishments, and impacts during the 2015 calendar year (2015 fiscal year for budget-related questions).

The 2016 survey was a census of ATE principal investigators (PIs) (N=234) with active grants. Survey responses were received from 208 grantees (89%). The survey has five sections. Most respondents partially or fully completed the sections on Grantee Characteristics and Practices (93%) and Special Topics (91%). Fewer responded to the sections on Materials Development (45%), Professional Development (43%), and Program Development/Improvement (46%). Whether grantees responded to those three sections depended on the focus of their projects—that is, those who allocated at least $100,000 or 30 percent of their project budgets in 2015 to the activities in question were expected to complete the relevant sections. These three sections were optional for others.

Highlights

In 2015, National Science Foundation-funded Advanced Technological Education projects and centers

- educated approximately 112,010 students—54 percent of whom were at two-year colleges and 37 percent at secondary schools.[2]
- developed 2,530 curriculum materials, including 1,080 activities, 1,130 modules, and 320 courses
- offered 2,120 professional development opportunities, which served 47,810 educators—roughly 32 percent of participants were two-year college faculty and 38 percent secondary school teachers.
- had approximately 1,752 articulation agreements in place and developed 347 new agreements in 2015; these agreements helped about 1,890 students matriculate between high schools and two-year colleges and 4,130 students between two-year and four-year institutions.
- served a student population that was 49 percent underrepresented minority[3] and 30 percent female.
- collaborated with more than 8,180 groups that provided more than $8.6 million in monetary contributions and $18 million in-kind support.

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[1] Public Law 102-476.

[2] Reported numbers of participants, products, and activities throughout this report are rounded to the nearest ten. The 'n' that appears with tables and figures indicates the number of respondents for a given item.

[3] Underrepresented minorities in STEM include Hispanic/Latino, American Indian and Alaskan Native, Black and African American, Native Hawaiian or Pacific Islander, and multiracial.

GRANTEE CHARACTERISTICS AND PRACTICES

The ATE program solicitation states that the "program focuses on two-year colleges and expects two-year colleges to have a leadership role in all projects." Accordingly, two-year colleges figure prominently in the program, as both grantees (Figure 1) and beneficiaries of grant-supported activities (Figure 2).

Most **ATE grantees** are located at two-year colleges, followed by four-year colleges and universities and nonprofits.

Two-year colleges

Non-profit organizations

Four-year colleges

| 67% | 19% | 8% | 6% |

Other

Figure 1. ATE grant recipient institutions (n=208)

Collectively, ATE grantees allocated most of their **funding** to serve audiences at two-year colleges.

Two-year colleges

Secondary schools

Business/industry sites

Four-year colleges

| 66% | 18% | 9% | 4% |

Other (2%)

Figure 2. Percentage of project budgets devoted to serving different audiences (n=177)

DISCIPLINES

The disciplinary emphases of ATE grantees are diverse. The highest concentration of projects is in the area of advanced manufacturing technologies, closely followed by information and security technologies and general advanced technological education (Figure 3).

The majority of ATE projects are in the areas of **advanced manufacturing technologies**, **information and security technologies**, and **general advanced technological education**.
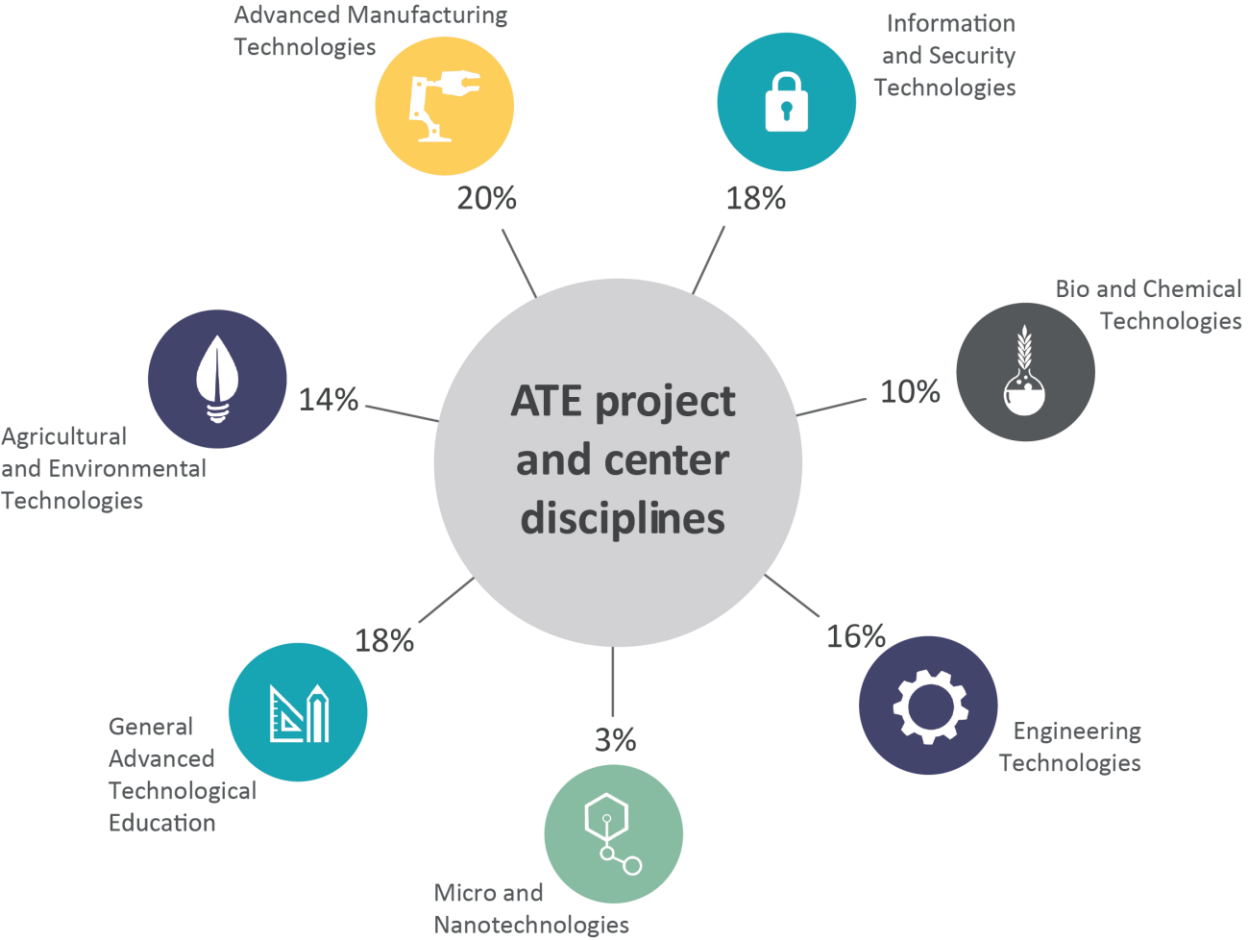
Advanced Manufacturing Technologies

Information and Security Technologies

Bio and Chemical Technologies

Agricultural and Environmental Technologies

ATE project and center disciplines

20%

18%

10%

14%

18%

3%

16%

General Advanced Technological Education

Micro and Nanotechnologies

Engineering Technologies

Figure 3. Project disciplines (n=208)

EVALUATION

97%

of projects had an
evaluator in 2015. (n=179)

87% used external evaluators
3% used internal evaluators
7% used both types
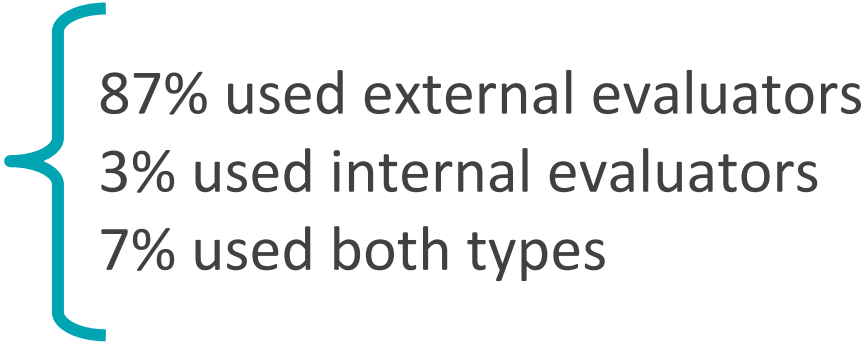
Most projects (174 of 179) reported having an **evaluator**. Of those who used external evaluators exclusively, most were external to both their projects and institutions (141). Just a few used evaluators who were external to their projects, but internal to their institutions (10). On average, PIs reported that they allocated 8 percent of their grant funds to evaluation. This average expenditure has remained nearly constant since 2010.

COLLABORATION

On the survey, **collaboration** is defined as "a project/center's relationship with another institution, business, or group that provides money or other support to your project or center. Collaborators are not funded by the grant." Respondents were asked to report the value of both monetary and in-kind support from their collaborators.

Collaborators provided nearly $27 million in
monetary and **in-kind** support to 96 ATE projects.

$8,600,150 monetary support
$18,193,910 in-kind support

As in the past, the total amount of support reported was significantly impacted by just a few projects. Three projects accounted for 47 percent of the total monetary support reported and 55 percent of the total in-kind support reported in 2015.[4] The median values for monetary support and in-kind support across projects and centers were $40,000 and $16,000, respectively.

Collaborations with business/industry and education partners are most common, comprising 78 percent of all collaborating organizations (Figure 4). Of the 208 survey respondents, 143 (69%) reported at least one collaboration with business and industry.

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[4] Follow-up with these projects revealed that they included other grants in their monetary support. High-value in-kind support was mainly included facilities and laboratory equipment.

ATE projects and centers collaborate most with **business and industries** and **other education institutions**.

3,140 Other education institutions

3,260 Business/Industries

690 Within host institutions

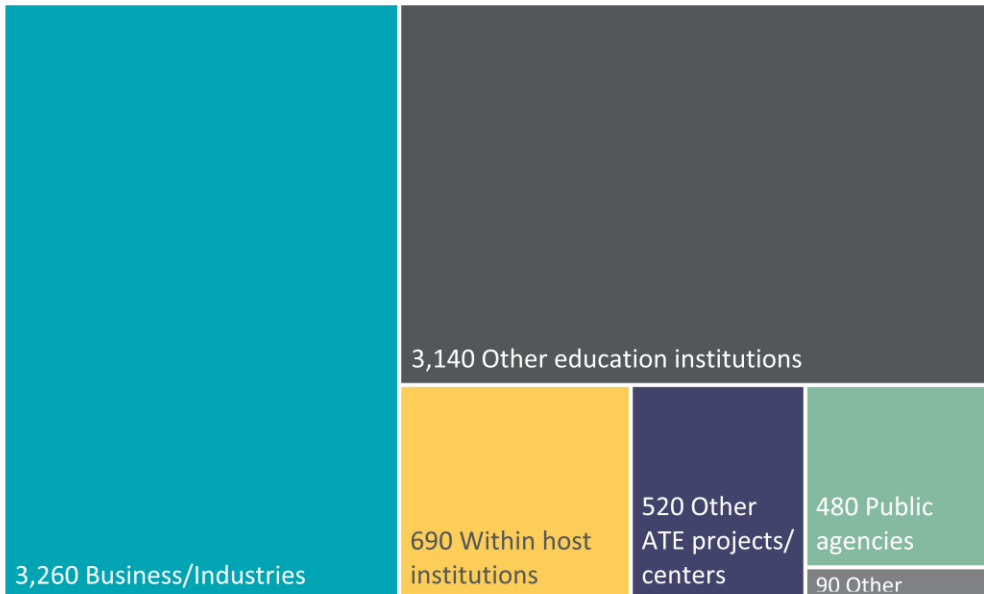520 Other ATE projects/ centers

480 Public agencies

90 Other

Figure 4. Number and type of collaborating organizations (n=208)

Respondents were asked about the benefits they derived from collaborating with different types of partners. The top two reported benefits for each type of collaboration are listed below.

Top 2 reported benefits from collaborations:

With business/industry

1. Information about workforce needs
2. Developing program content

With other educational institutions

1. Developing program content
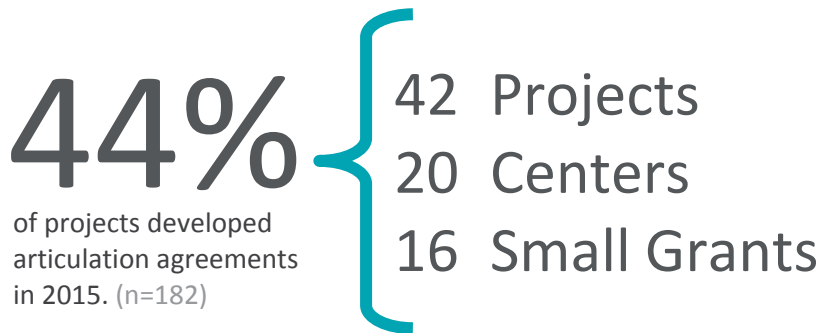2. Developing articulation agreements

With host institutions

1. General support
2. Student support

With other ATE projects/centers

1. Developing program content
2. General support

With public agencies

1. Information about workforce needs
2. General support

ARTICULATION AGREEMENTS

Articulation agreements enable students who complete a program or series of courses to matriculate to a higher level of education at partner institutions. Of the 79 respondents who indicated that developing articulation agreements was part of their project/center activities, all but one provided additional information on these agreements, reported below.

44%
of projects developed
articulation agreements
in 2015. (n=182)

{
42 Projects
20 Centers
16 Small Grants

Grantees reported a total of 1,750 articulation agreements already in place, with slightly more agreements between high schools and 2-year colleges (913) than between 2-year and 4-year colleges (839). An additional 347 new articulation agreements were developed in 2015. Those agreements were made either between high schools and 2-year colleges (161) or 2-year colleges and 4-year colleges (186). The number of students matriculating from 2-year to 4-year colleges (4,130) was more than twice the number matriculating from high school to 2-year colleges (1,890) (Figure 5). The large difference in matriculation rates was due to one grant that accounted for 1,990 (48%) of the 4,130 students who matriculated from a 2-year college to a 4-year college in 2015. This large project had 11 articulation agreements in place, involving 12 community colleges and 8 colleges and universities.
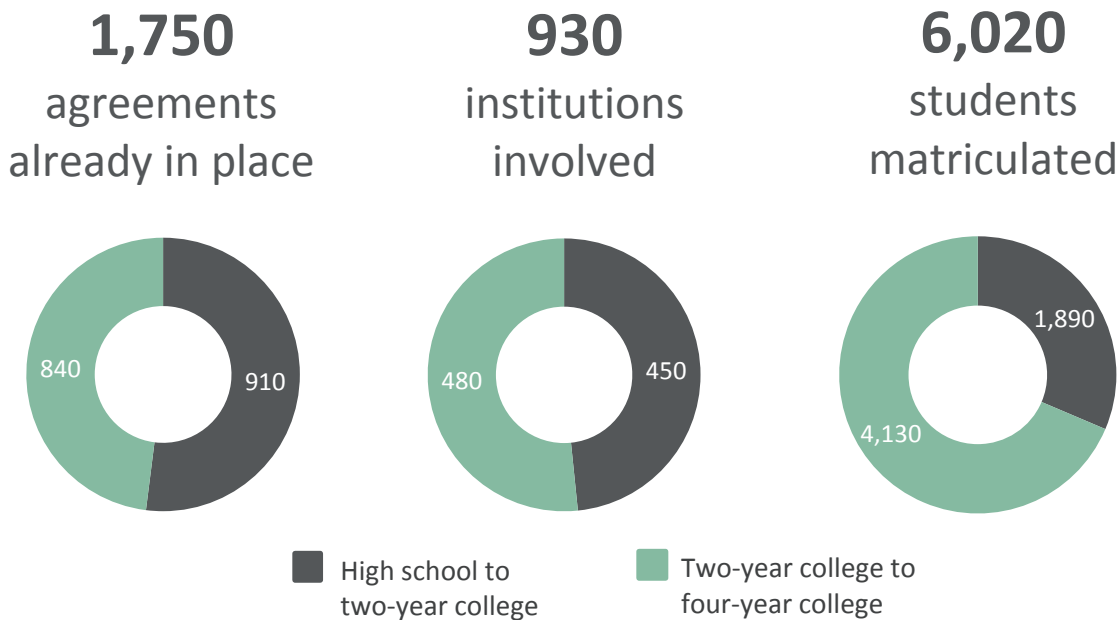
1,750
agreements
already in place

930
institutions
involved

6,020
students
matriculated

840 · 910

480 · 450

1,890 · 4,130

■ High school to two-year college   ■ Two-year college to four-year college

Figure 5. Number of articulation agreements, institutions, and students (n=182)

MATERIALS DEVELOPMENT

40% **of respondents provided data about their materials development activities.**

Ninety-three respondents indicated that their projects were significantly involved in developing curriculum and educational materials for national dissemination. Of these, 83 (40% of survey respondents) provided data about their work in this area.

ATE projects and centers developed 2,530 materials in 2015.

Materials included various media (textbooks, laboratory experiments and manuals, software, videos, or other courseware) used to convey the content and instruction of courses, modules, and activities, defined as follows:

Course: A stand-alone collection of instructional content and activities to achieve some desired educational outcomes. Courses usually last a semester or a year.

Module: A self-contained collection of content and activities designed to achieve a set of specific objectives. Modules are generally shorter than courses and focus on fewer outcomes.

Activity: An instructional exercise, such as a laboratory experiment or test, designed to achieve a discrete learning outcome.

ATE projects produced about equal numbers of modules and activities in 2015 (Figure 6). Eighteen percent of the 1,340 materials completed in 2015 were published commercially.

Courses   Modules   Activities

Number of materials in draft or field-testing stage (n=61)
- Courses: 110
- Modules: 540
- Activities: 540

Number of materials completed (n=60)
- Courses: 180
- Modules: 450
- Activities: 470

Number of materials published commercially (n=20)
- Courses: 30
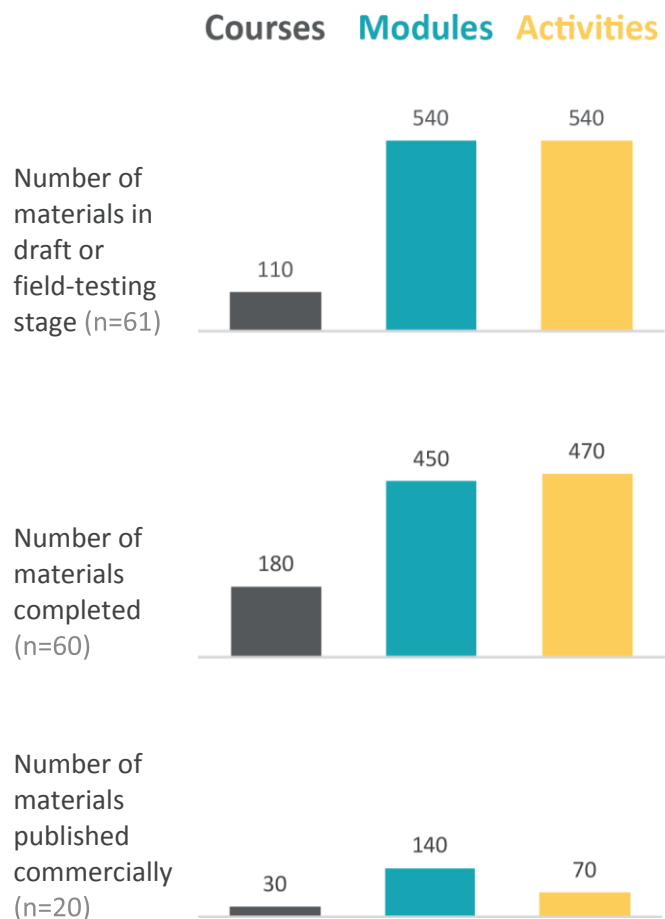- Modules: 140
- Activities: 70

Figure 6. Number of courses, modules, and activities at various development stages (n=83)

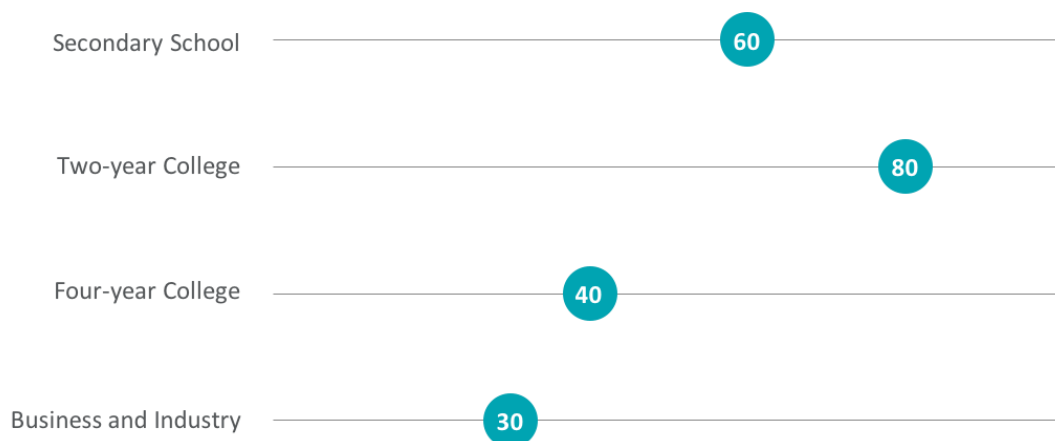Most projects developed materials for **two-year colleges** and **secondary schools**.

Figure 7. Number of projects that developed materials for various audiences (n=80)

PROFESSIONAL DEVELOPMENT

41% **of respondents provided data about their professional development offerings.**

Ninety-three respondents indicated that their projects were significantly involved in providing professional development to educators. Of these, 85 (41% of survey respondents) provided data about their work in this area.

Professional development is defined on the survey as "activities for secondary school teachers, college faculty, and pre-service teachers to enhance their disciplinary capabilities, teaching skills, understanding of current technologies and practices, and 21st century skills in a way that will directly impact technician education." Respondents to this section of the survey reported providing 2,120 professional development activities in 2015, ranging from short presentations intended primarily to raise awareness to long-term periodic instructional activities (e.g., internships or peer coaching). A total of 47,810 individuals participated in these ATE-supported professional development activities. Short presentations served more than twice as many participants as all other types of professional development activities combined (Figure 8).

In 2015, ATE projects offered **2,120 professional development activities**, serving **47,810 participants**.
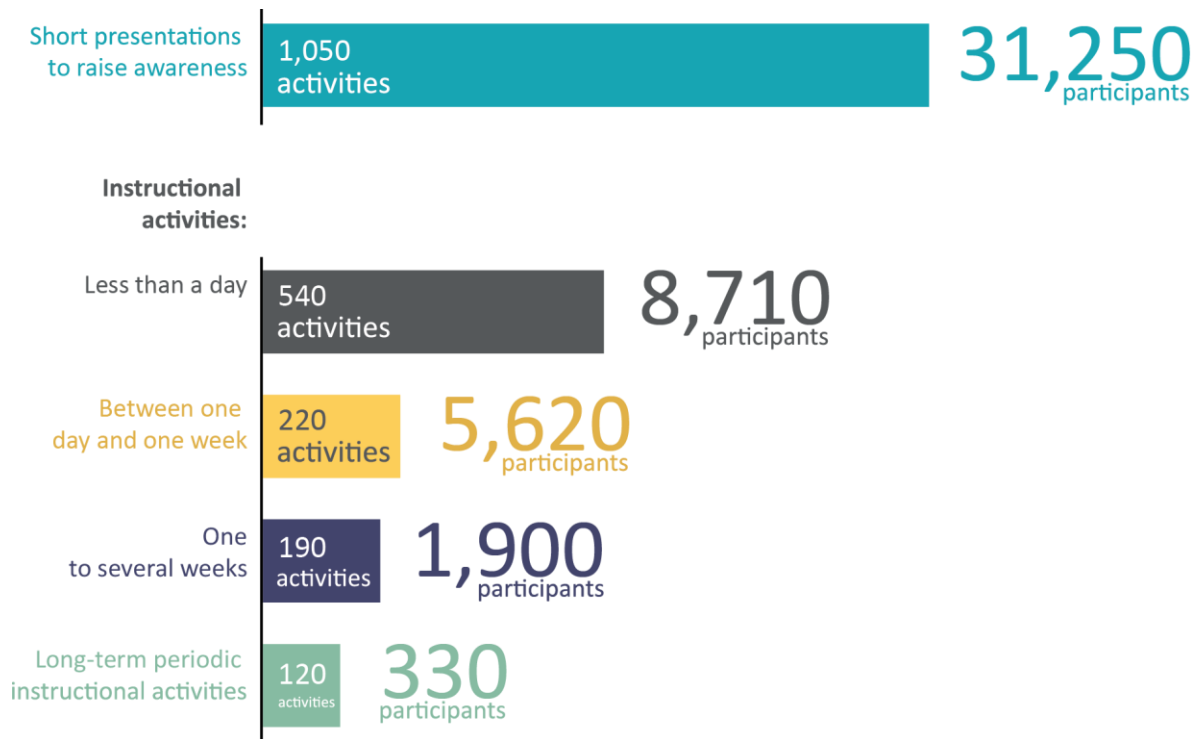
Short presentations to raise awareness
1,050 activities
31,250 participants

Instructional activities:

Less than a day
540 activities
8,710 participants

Between one day and one week
220 activities
5,620 participants

One to several weeks
190 activities
1,900 participants

Long-term periodic instructional activities
120 activities
330 participants

Figure 8. Number of professional development activities and participants by length of activity (n=85)

The majority of projects that conducted professional development offered activities at least one day in length, and approximately half offered activities of at least one week in length.

The main audiences for ATE professional development activities were educators at **secondary schools** and **two-year colleges.**

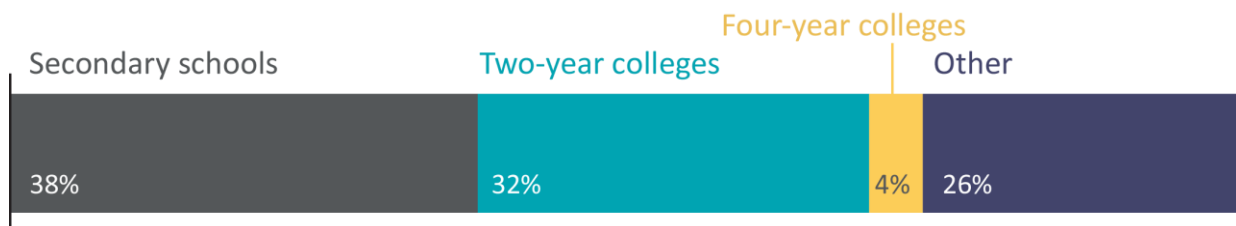| Secondary schools	Two-year colleges	Four-year colleges	Other
38%	32%	4%	26%

Figure 9. Percentage of professional development participants by education level (n=81)

More than one-quarter of the respondents identified their professional development audiences as *other*. Because the survey form requested only numbers and not explanations for the *other* category, we cannot describe this audience.

PROGRAM DEVELOPMENT & IMPROVEMENT

80% **of respondents provided data about their academic programming.**

One-hundred sixty-seven respondents (80%) indicated that their projects supported courses or programs in 2015. Eighty-six respondents (41%) indicated that their projects were *significantly* involved in program development and improvement.

Survey questions about program development and improvement were preceded by the definition of a program as "a sequence of courses, laboratories, and/or work-based experiences that lead students to a degree, certification, or occupational competency point." Here we report findings about ATE-supported **programs** and **courses**, as well as the **students** enrolled in them.

Most programs and courses supported or developed in 2015 were for two-year college students (Figure 10). Respondents were also asked about programs and courses at the four-year and post-baccalaureate levels, as well as on-the-job training.

At the four-year college level, ATE funds were used to support 48 programs and to create or modify eight programs and 54 individual courses in 2015. At the post-baccalaureate level, six programs were supported and five programs were created or modified, while 14 individual courses were created or modified. In terms of on-the-job training, ATE grantees supported 31 programs and created or modified 11 programs and 18 individual courses. (Because involvement in four-year college and on-the-job training contexts was so small, those programs are not included in Figure 10.)
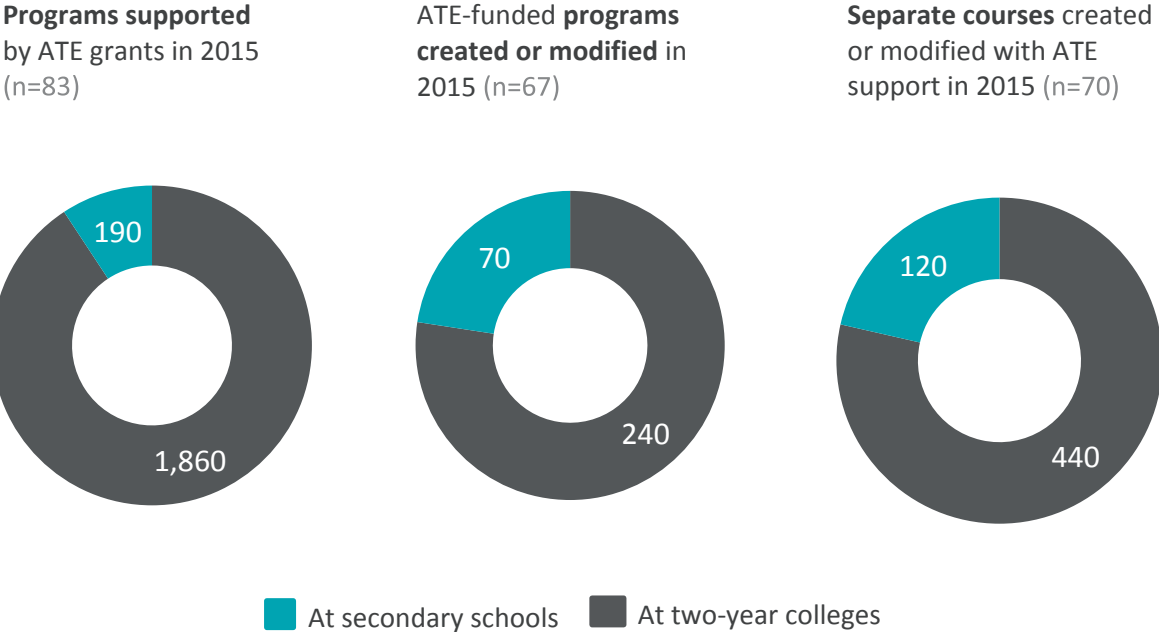
Programs supported by ATE grants in 2015 (n=83)

ATE-funded **programs created or modified** in 2015 (n=67)

Separate courses created or modified with ATE support in 2015 (n=70)

190
1,860

70
240

120
440

■ At secondary schools   ■ At two-year colleges

Figure 10. Number of ATE programs and courses at secondary schools and two-year colleges

ATE-SUPPORTED INSTRUCTION

Eighty percent of ATE projects supported a specific degree or certification program in 2015. Most of these were in the areas of advanced manufacturing technologies and information security technologies. Together, projects with an emphasis in one of these two areas accounted for 43 percent of degree or certification programs funded by the ATE program in 2015.

106 ATE projects supported a degree or certification program in 2015.

Among participating students, 94% either **continued** in their programs or **completed** a program.

8,630 completed	38,610 continued	3,070 left

Each icon represents 1,000 students.
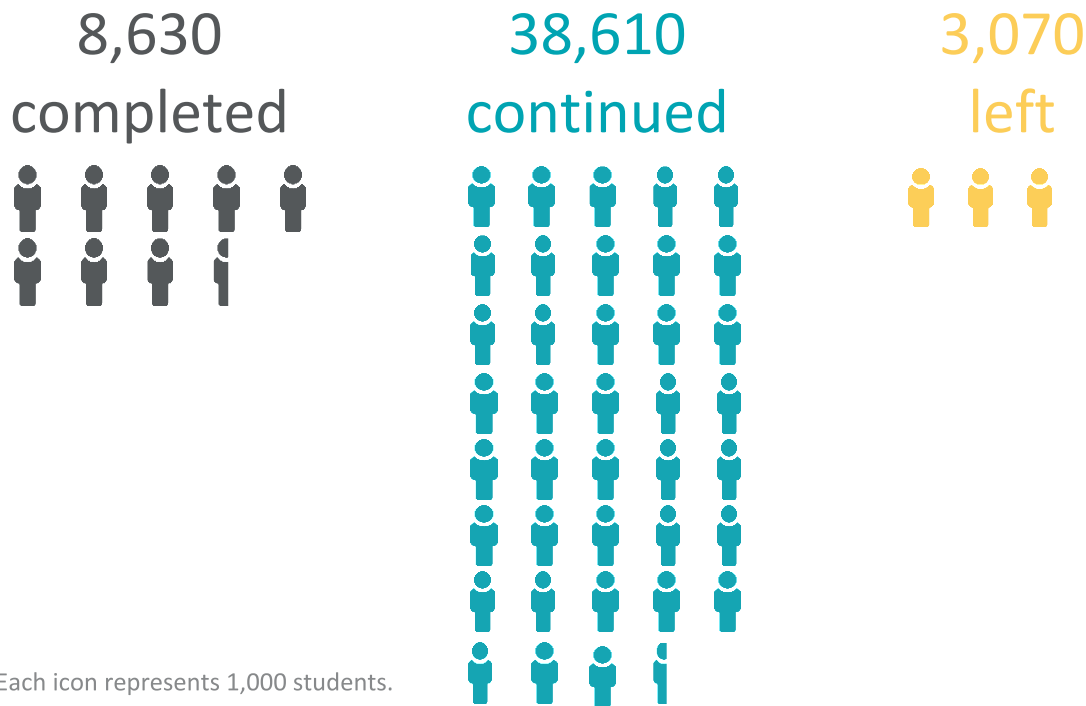
Figure 11. Number of students who completed, continued in, and left ATE-supported programs in 2015 (n=84)

The number of students who either completed or continued in ATE-supported programs varied only slightly across education levels. At the two-year college level, 91 percent of students in 2015 either completed or continued in their programs, compared with 99 percent at four-year colleges. Only 6 percent of students enrolled in ATE-supported programs in 2015 left their programs prior to completion.

A priority for NSF is to increase the participation of women and underrepresented minorities in STEM. Overall, 30 percent of ATE students are women, although the proportion of women varies by education level and discipline, as show in Figure 12. According to data from the U.S. Department of Education,[5] 23 percent of students in technical programs at two-year colleges in the U.S. are women, which is very close the percentage of women in two-year programs supported by ATE (24 percent).

The majority of students in ATE-supported programs are **men,** except at the post-baccalaureate level.

Figure 12. Percentage of men and women in ATE programs by education level (n=124)

ATE STUDENT DEMOGRAPHICS

DEMOGRAPHIC CHARACTERISTIC	NUMBER[6]	PERCENTAGE OF CATEGORY
Gender (n=124)		
Men	71,820	70%
Women	30,670	30%
Race and Ethnicity (n=108)		
Hispanic/Latino	19,120	21%
American Indian/Alaska Native	1,500	2%
Asian	5,570	6%
Black/African American	20,210	22%
Native Hawaiian/Pacific Islander	680	1%
Multiracial	2,340	3%
White	40,930	45%
Disabilities (n=37)		
Students requesting accommodation under the Americans with Disabilities Act	1,300	

According to NSF, underrepresented minorities (URM) in STEM include American Indians, Alaska Natives, Blacks/African Americans, Hispanics/Latinos, and Native Hawaiians or other Pacific Islanders.[7] Compared with national data on technical programs at two- and four-year colleges, the ATE program is enrolling a higher proportion of students from these groups, particularly at 2-year colleges. In general, women and URMs make up a larger proportion of the students in ATE-supported programs at secondary schools and 2-year colleges than at 4-year colleges and the post-baccalaureate programs.[8]

Sixty-one percent of 34,280 ATE students at secondary schools were from underrepresented minority (URM) groups, while 33 percent of all U.S. secondary students are from URM groups (Figure 13). Forty-two percent of 50,390 two-year college ATE students are from URM groups, compared with 28 percent of all two-year college students nationally (Figure 14). Underrepresented minority students make up 35 percent of ATE students at four-year colleges, compared with 19 percent of all four-year college students nationally (Figure 15).

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[6] The total number of students reported by gender and race/ethnicity is less than the total number of students reported on p. 1 (112,010) because not all respondents reported student demographic data).

[7] See "Women, Minorities, and Persons with Disabilities in Science and Engineering: 2013," available from http://www.nsf.gov/statistics/wmpd/2013/pdf/nsf13304_digest.pdf

[8] Data for STEM programs at two- and four-year colleges are from the National Center for Education Statistics. Fields of study include agriculture and natural resources, biological and biomedical sciences, communications technologies, computer and information sciences, construction, engineering and engineering technologies, mechanic and repair technologies/technicians, physical sciences and science technologies, precision production, and transportation and materials moving.

Students in ATE Programs at Secondary Schools (34,280)

White	Underrepresented Minority	Asian
34%	61%	5%

U.S. Population

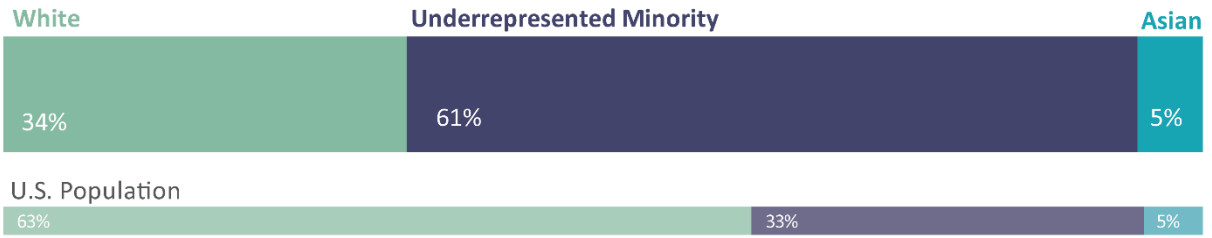|		
63%	33%	5%

Figure 13. Percentage of underrepresented minority students in ATE programs at secondary schools and secondary schools nationally

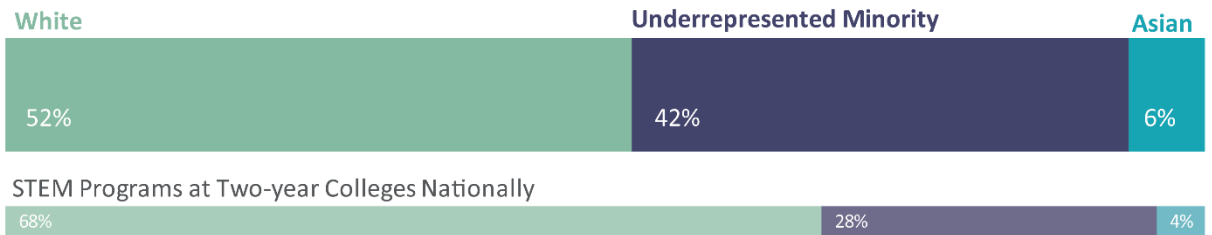**Students in ATE Programs at Two-year Colleges** (50,390)

White	Underrepresented Minority	Asian
52%	42%	6%

STEM Programs at Two-year Colleges Nationally

68%	28%	4%

Figure 14. Percentage of underrepresented minority students in ATE programs at two-year colleges and in STEM programs at two-year college programs nationally

Students in ATE Programs at Four-year Colleges (4,720)

White	Underrepresented Minority	Asian
55%	35%	10%

STEM Programs at Four-year Colleges Nationally
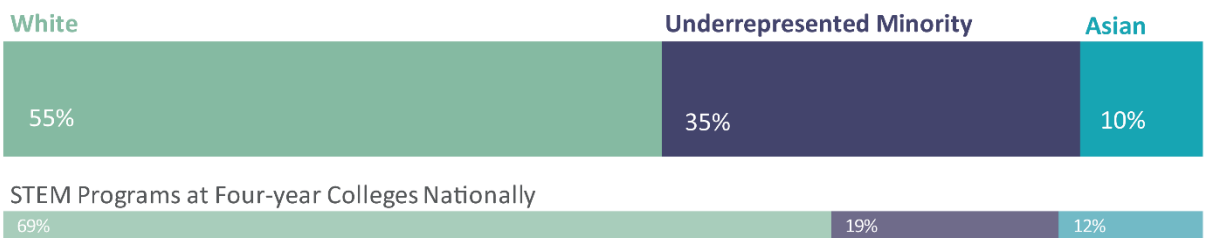
69%	19%	12%

Figure 15. Percentage of underrepresented minority students in ATE programs at four-year colleges and in STEM programs at four-year colleges nationally

Additional reports based on annual ATE survey data, dating back to 2000, are available at evalu-ate.org/annual_survey/reports. Custom reports may be developed upon request. For more information, contact lori.wingate@wmich.edu.

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Lyssa N. Wilson
Lori A. Wingate
Miranda Lee
Arlen Gullickson