



# ATE Annual Survey

2017 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.”<sup>1</sup> 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 \$70,000 to \$4 million fund projects, support centers, regional centers, national centers (and the planning for national centers), and targeted research. A separate funding track exists 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 2017 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 18th annual ATE survey. Included here are findings about funded projects and their activities, accomplishments, and impacts during the 2016 calendar year (2016 fiscal year for budget-related questions).

The 2017 survey was a census of ATE principal investigators (PIs) (N=250) with active grants. Survey responses were received from 210 grantees (84%). The survey has five sections. Most respondents partially or fully completed the Grantee Characteristics and Practices (98%) and Special Topics (96%) sections. Fewer responded to the Materials Development (34%), Professional Development (37%), and Program Development and Improvement (35%) sections. Grantees’ completion of the latter 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 2016 to the activities in question were expected to complete the relevant sections. These three sections were optional for others.

## HIGHLIGHTS

In 2016, NSF-funded ATE projects collectively reported the following accomplishments:

- Educated more than 70,000 students—60 percent of whom were at two-year colleges and 31 percent at secondary schools.<sup>2</sup>
- Developed 1,430 curriculum materials, including 870 activities, 430 modules, and 130 courses.
- Offered 1,710 professional development opportunities, which served 32,000 educators; roughly 44 percent of participants were two-year-college faculty and 29 percent secondary school teachers.
- Supported 1,183 existing articulation agreements and developed 162 new agreements in 2016; these agreements helped 3,590 students matriculate between high schools and two-year colleges, and 6,230 students between two-year and four-year institutions.
- Served a student population that was 31 percent racial minority,<sup>3</sup> 34 percent Hispanic or Latino/Latina, and 28 percent female.
- Collaborated with more than 9,600 groups.

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<sup>1</sup> Public Law 102-476.

<sup>2</sup> 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.

<sup>3</sup> Underrepresented racial minorities in STEM include American Indian and Alaska 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, most grantees are located at two-year colleges.

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



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

Project awards fit into three main categories: projects, centers, and targeted research. Most respondents indicated their grants supported projects (n=141), 37 identified as center awards, and 26 as targeted research. ATE provides special planning and support for institutions new to the program and for organizations developing plans for national centers. Among the 141 projects, 30 awards were small grants for institutions new to the ATE program and three awards were for planning grants.



Figure 2. ATE grant award types (n=207)

## DISCIPLINES

The disciplinary emphases of ATE grantees are diverse. The highest concentration of projects was in the area of advanced manufacturing technologies (22%), followed by general ATE learning, evaluation, and research (16%) and engineering technologies (16%) (Figure 3).

The majority of ATE projects are in the areas of **advanced manufacturing technologies**, **general ATE**, and **engineering technologies**.

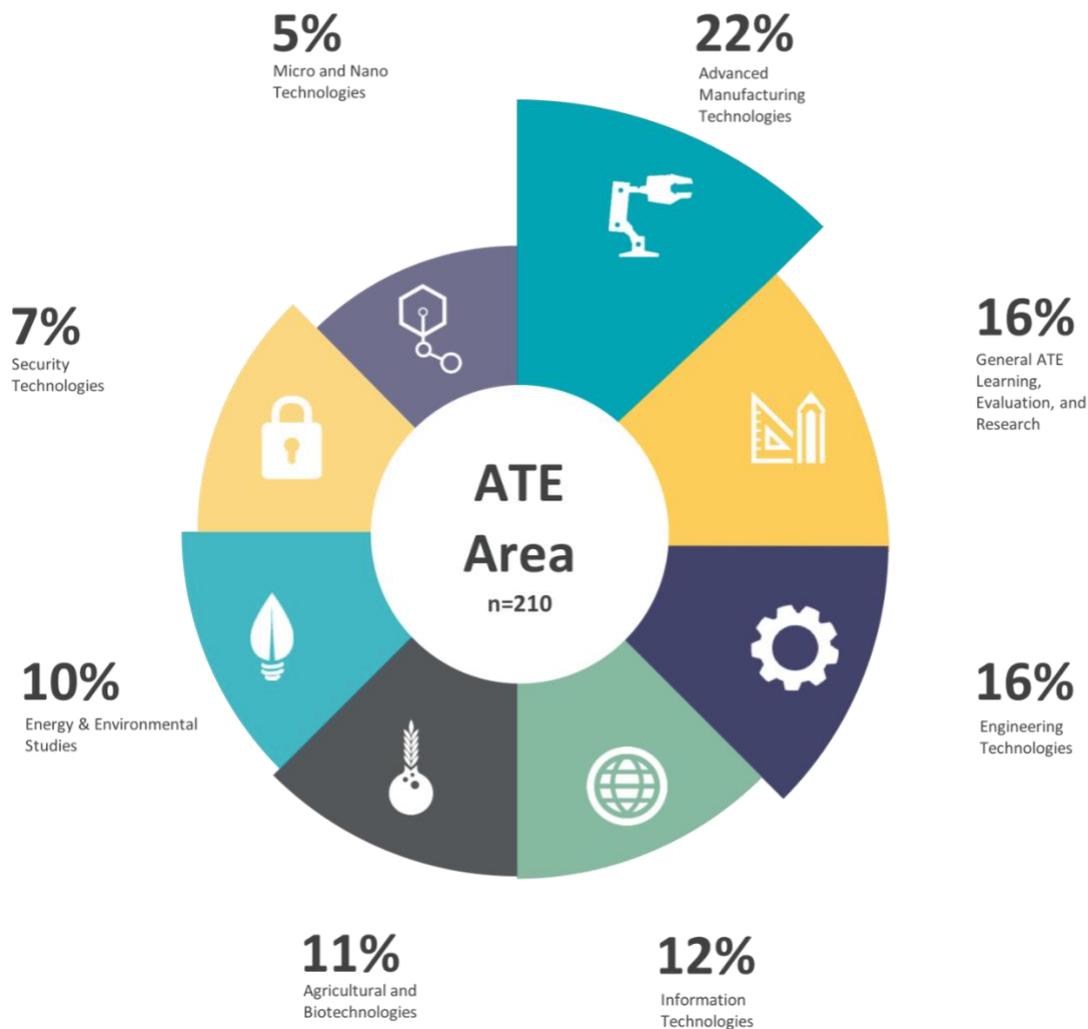


Figure 3. Disciplinary areas of ATE projects (n=210)

## 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.”

Ninety-one percent of respondents (n=187) reported at least one collaboration. Collaborations with business and industry, and with education partners were most common, comprising 79 percent of the 9,640 collaborating organizations (Figure 4). Among those who engaged in collaborative efforts, 158 (77%) reported at least one collaboration with business and industry, and 150 (73%) reported at least one collaboration with education partners.

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



Figure 4. Number and type of collaborating organizations (n=206)

Perceived benefits of collaboration varied by the types of organization involved. Respondents who collaborated with business and industry identified four main benefits: (1) obtain information about the workforce (n=105), (2) assistance with developing program content (n=60), (3) general support (n=44), and (4) financial or in-kind support (n=43). Three main benefits were noted for collaborations within the

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. Developing program content

### With other ATE projects/centers

1. Developing program content
2. General support

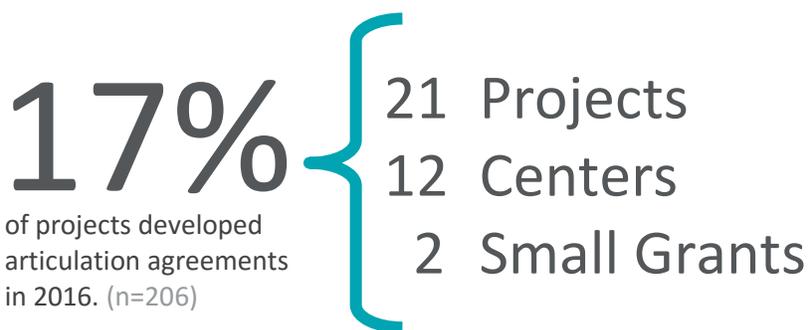
### With public agencies

1. Information about workforce needs
2. General support

host institutions: (1) general support (n=67), (2) developing program content (n=52), and (3) student support (n=48). The top two reported benefits for each type of collaboration are listed beside Figure 4.

## 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. Seventy-four respondents indicated that their projects developed articulation agreements in 2016 or previous years.



Grantees reported a total of 1,183 articulation agreements already in place, with slightly more agreements between high schools and two-year colleges (606) than between two-year and four-year colleges (577). An additional 162 new articulation agreements were developed in 2016. Agreements between high schools and two-year colleges involved 375 institutions, and agreements between two-year and four-year colleges involved 427 institutions. The number of students matriculating from two-year to four-year colleges (6,230) was much larger than the number matriculating from high school to two-year colleges (3,590). Figure 5 shows these numbers graphically.

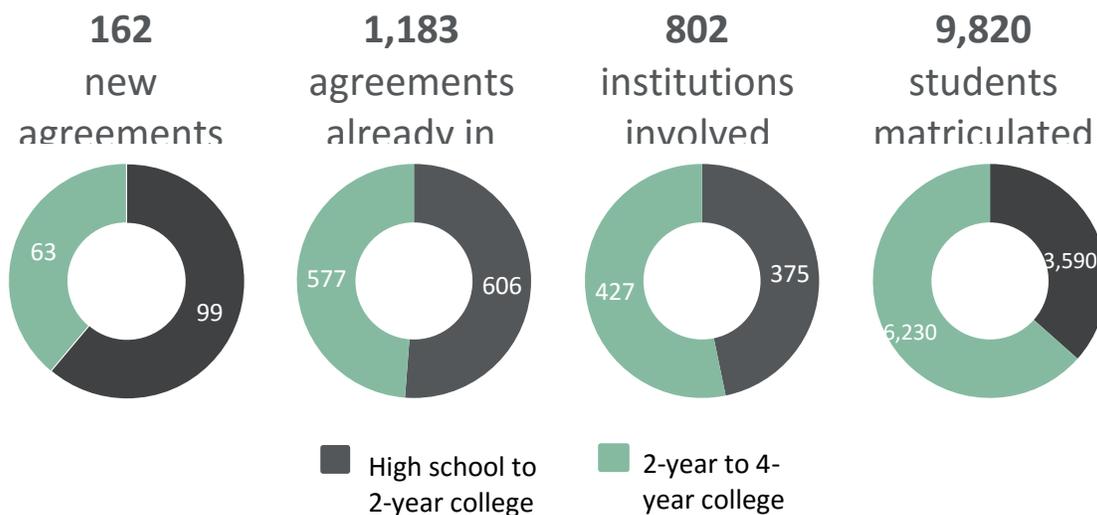


Figure 5. Number of articulation agreements, institutions, and students (n=74)

## ATE STUDENT DEMOGRAPHICS

All projects involved in instructing students were asked to provide demographic data about their students, reported in Table 1. Fifty-nine percent of projects provided information on the gender of students (n=116), 51 percent of projects provided information on the race and ethnicity of students (n=108), and only 18 percent provided information about students requesting accommodations under the Americans with Disabilities Act (n=37). The total number of students varies by demographic category, due to the differing numbers of respondents. The gender category is the most comprehensive, with 71,330 students.

Table 1. Demographic characteristics of ATE students

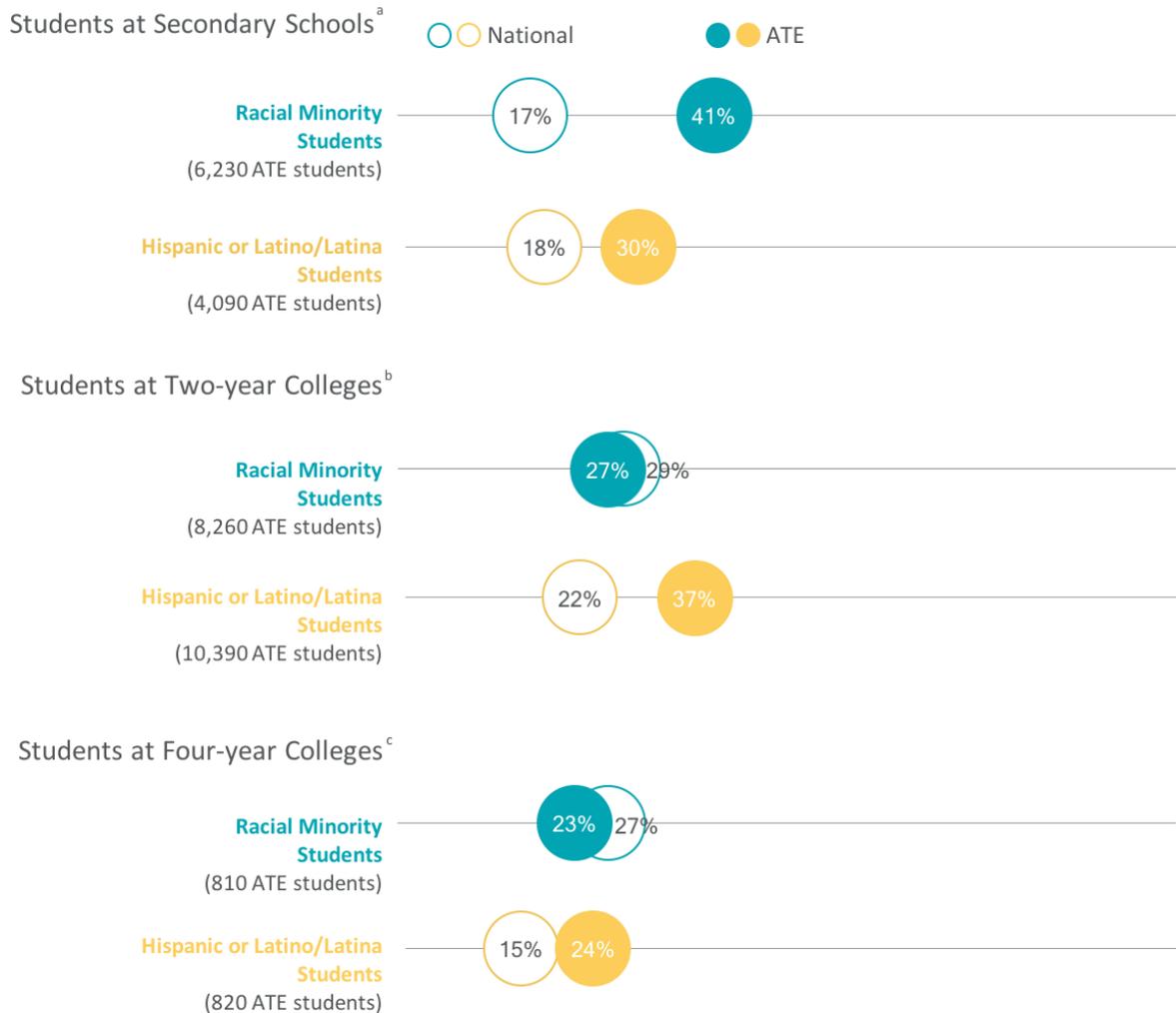
DEMOGRAPHIC CHARACTERISTIC	NUMBER OF STUDENTS	PERCENTAGE OF CATEGORY	VALID PERCENTAGE OF CATEGORY (excludes "unknown")
<b>Gender</b> (n=116)			
Men	49,700	70%	72%
Women	19,700	28%	28%
Unknown	1,930	3%	-
<b>Race</b> (n=108)			
American Indian/Alaska Native	1,540	3%	3%
Asian	3,430	6%	7%
Black/African American	12,430	22%	25%
Multiracial	1,040	2%	2%
Native Hawaiian/Pacific Islander	320	1%	1%
White	31,300	55%	63%
Unknown	6,910	12%	-
<b>Ethnicity</b> (n=108)			
Hispanic or Latino/Latina	15,330	29%	34%
Non-Hispanic or non-Latino/Latina	30,330	57%	66%
Unknown	8,000	15%	-
<b>Disabilities</b> (n=37)			
Students requesting accommodation under the Americans with Disabilities Act	968	-	-

According to NSF, underrepresented minorities in STEM include Hispanics, Latino/Latinas, American Indians, Alaska Natives, Blacks/African Americans, and Native Hawaiians or other Pacific Islanders.<sup>4</sup> Compared with national data on students enrolled in secondary schools, and two-year and four-year colleges, the ATE survey data indicated that the program is enrolling a higher proportion of Hispanic or Latino/Latina students at all education levels. The ATE program is enrolling a higher proportion of students who are considered underrepresented racial minorities at the secondary school level but is approximately even with national rates for STEM programs at two-year and four-year colleges. To align with how the U.S.

<sup>4</sup> See "Women, Minorities, and Persons with Disabilities in Science and Engineering: 2013," available from <http://bit.ly/urm-2013>

Census Bureau handles race and ethnicity questions, the ATE survey asked about students' race and ethnicity separately.

## The ATE program exceeds national rates of **Hispanic or Latino/Latina** student enrollment at all educational levels.



<sup>a</sup> National comparison for the secondary school level is based on U.S. population data.

<sup>b</sup> National comparison for two-year colleges is based on students in two-year college programs nationally.

<sup>c</sup> National comparison for four-year colleges is based on students in four-year college programs nationally.

Figure 6. Percentage of students from underrepresented racial and ethnic minority groups in ATE programs at secondary schools, two-year colleges, and four-year colleges, compared with national rates

As shown in Figure 6, the ATE program is performing better than the U.S. overall in terms of enrolling Hispanic and Latino/Latina students at all education levels, and in terms of enrolling students from racial minority groups at the secondary level. The ATE program has a slightly lower percentage of racial minority students at two- and four-year colleges compared with national rates.<sup>5,6</sup>

A priority for NSF is to increase the participation of women and underrepresented minorities in STEM. Overall, 28 percent of ATE students are women, although the proportion of women varies by education level and discipline. According to data from the U.S. Department of Education,<sup>7</sup> 23 percent of students in technical programs at two-year colleges in the U.S. are women, which is very close to the percentage of women in two-year programs supported by ATE (24%).

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

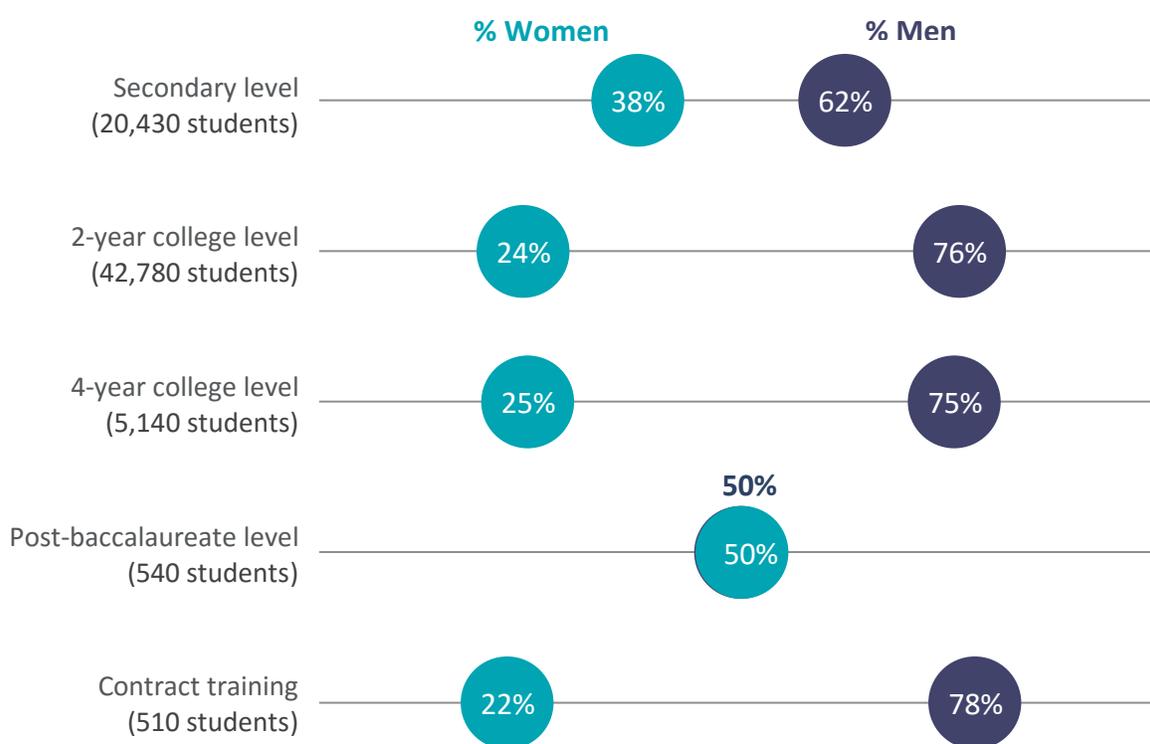


Figure 9. Percentage of men and women in ATE programs by education level (n=118)

<sup>5</sup> National Science Foundation Statistics. *Table 2-3*. Undergraduate enrollment at two-year institutions, by citizenship, ethnicity, race, sex, and enrollment status: 2004-14. (2014). Available from <http://bit.ly/nsf-2014>

<sup>6</sup> National Science Foundation Statistics. *Table 2-4*. Undergraduate enrollment at four-year institutions, by citizenship, ethnicity, race, sex, and enrollment status: 2004-14. (2014). Available from <https://www.nsf.gov/statistics/2017/nsf17310/static/data/tab2-4.pdf>

<sup>7</sup> National data for two-year STEM programs are from the National Center for Education Statistics Digest of Education Statistics. (2014). *Table 321.50*. (Retrieved from [https://nces.ed.gov/programs/digest/2014menu\\_tables.asp](https://nces.ed.gov/programs/digest/2014menu_tables.asp).) This is the most recent year for which data are available. Fields of study included are 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.

# MATERIALS DEVELOPMENT

**34%** of respondents provided data about their projects' materials development activities.

Seventy-one respondents indicated that their projects were significantly involved in developing curriculum and educational materials for national dissemination.

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 in Figure 10.

ATE projects and centers developed **1,430 materials** in 2016.

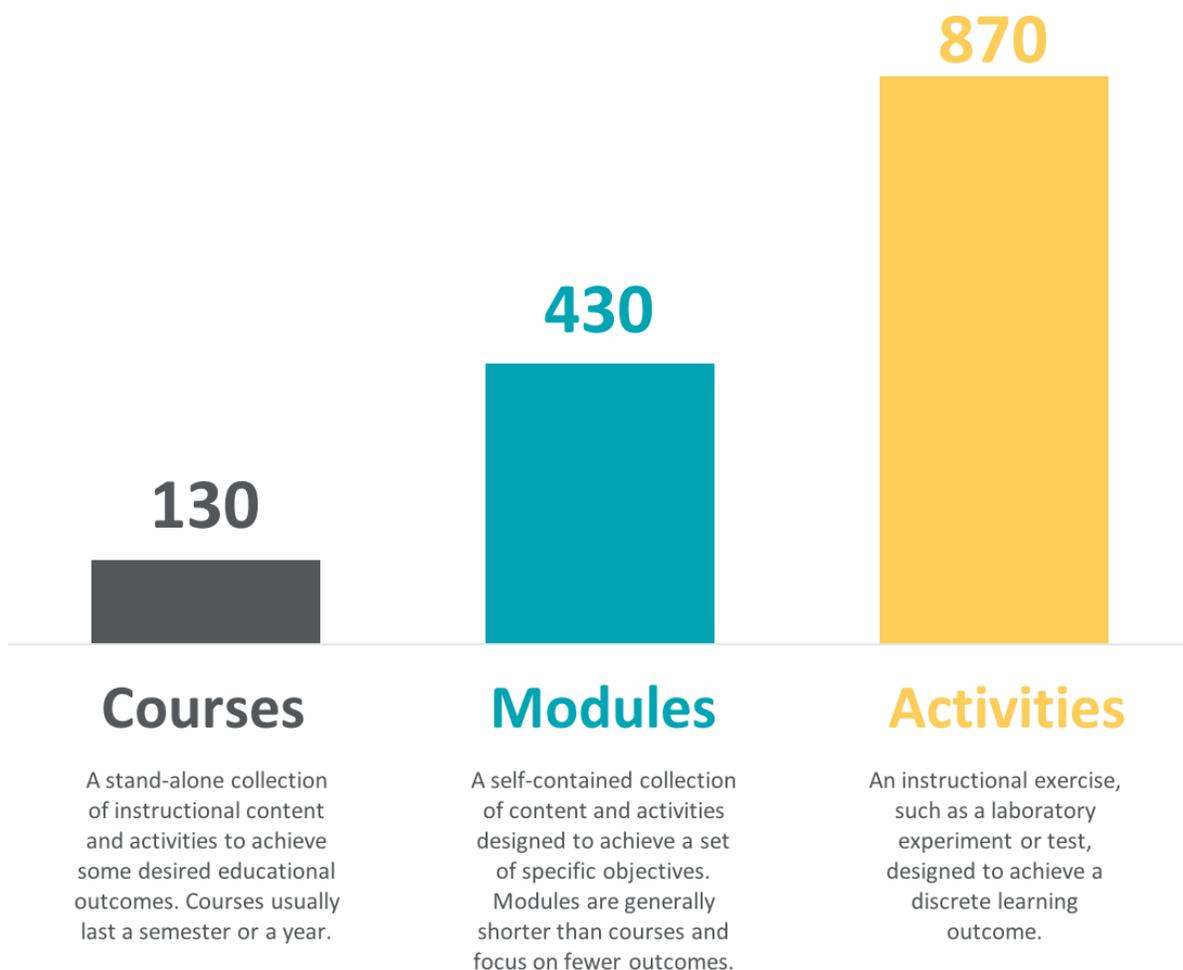


Figure 10. Number of courses, modules, and activities developed in 2016 (n=71)

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

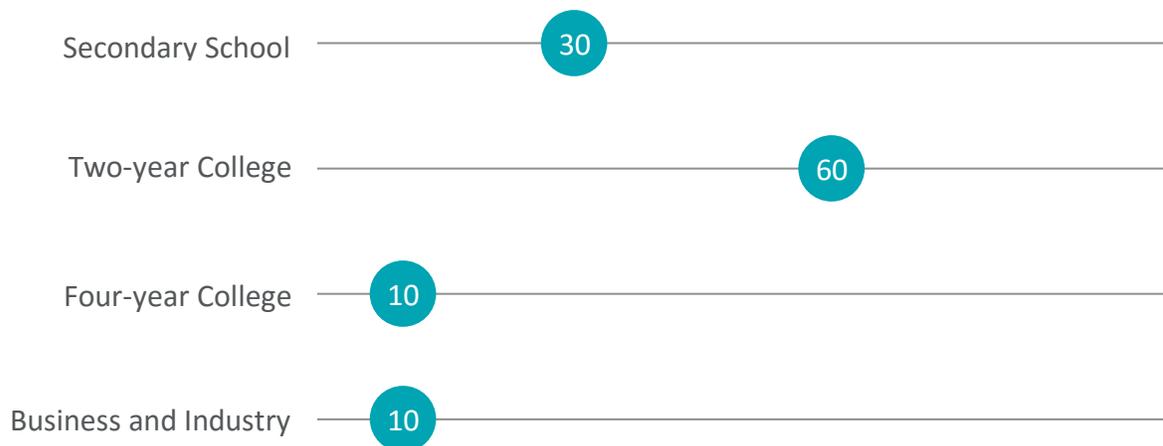


Figure 11. Number of projects that developed materials for various audiences (n=61)

Sixty-four respondents reported on the availability of their projects' developed materials. Most made materials available in limited ways: three made materials available to a select group, 21 provided materials upon request, and 23 made them publicly available on the internet (Figure 12). Four noted that their materials were not currently available to anyone outside the project. Additionally, 13 stated that availability depended on the type of the material.

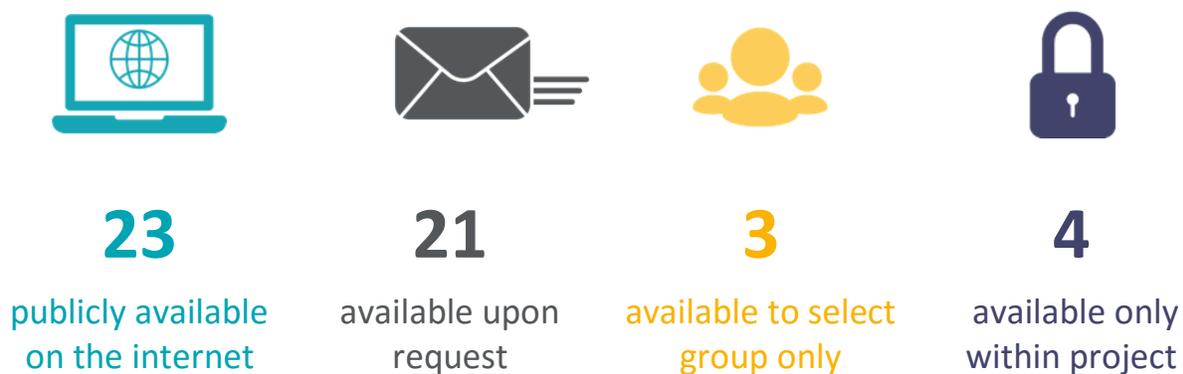


Figure 12. Number of projects that make their ATE materials available to internal and external audiences (n=64)

# PROFESSIONAL DEVELOPMENT

**37%** of respondents provided data about their projects' professional development offerings.

Seventy-eight respondents indicated that their projects were significantly involved in providing professional development to educators. All provided data about their work in this area.

The survey defined professional development 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 21<sup>st</sup> century skills in a way that will directly impact technician education.” Respondents to this section of the survey reported providing 1,710 professional development activities in 2016, ranging from short presentations intended primarily to raise awareness to long-term periodic instructional activities (e.g., internships or peer coaching). A total of 31,990 individuals participated in these ATE-supported professional development activities—a little more than half attended short presentations and a little less than half attended longer sessions, with more than 7,000 educators participating in activities that lasted one full day or more (Figure 13).

In 2016, ATE projects offered **1,710 professional development activities**, serving **31,990 participants**.

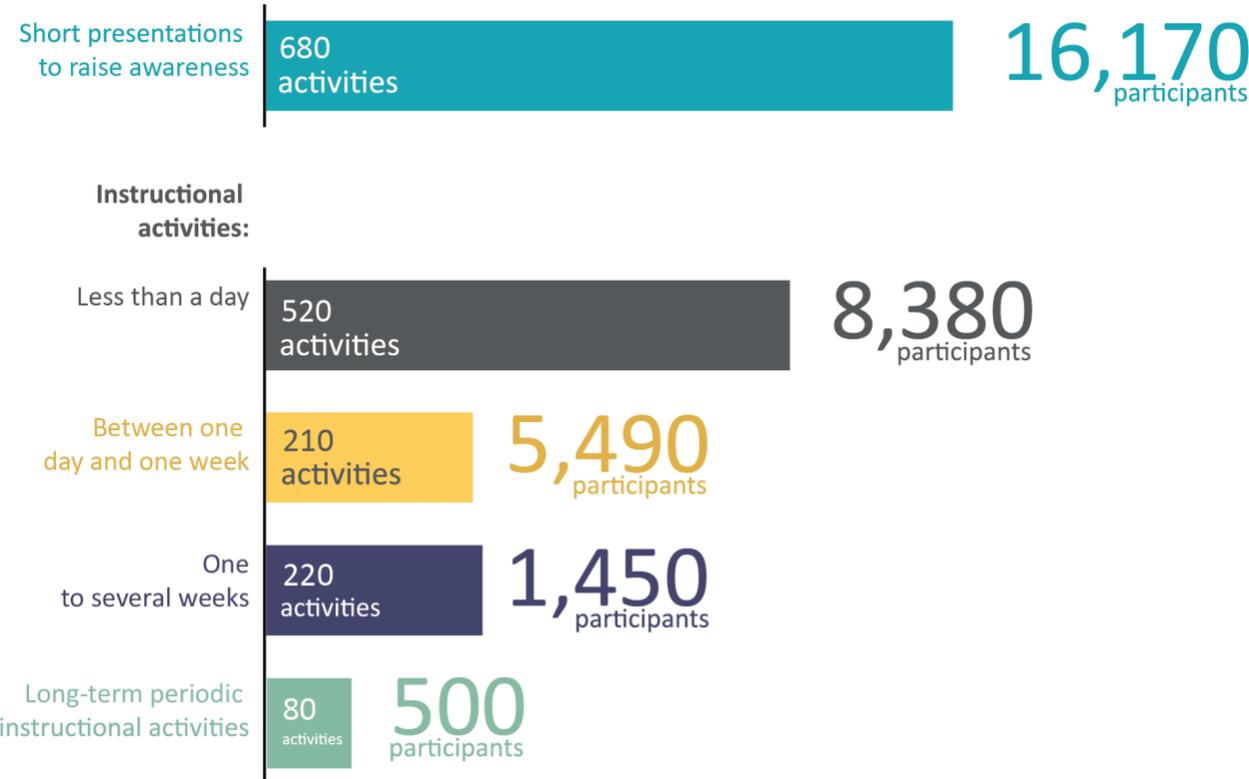


Figure 13. Number of professional development activities and participants by length of activity (n=78)

Most professional development activities offered by ATE projects were for educators at two-year colleges (44%) and secondary schools (29%) (Figure 14). This mirrors the emphasis on developing materials for use at two-year colleges and secondary schools (see Figure 11).

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



Figure 14. Percentage of professional development participants by education level taught (n=78)

## PROGRAM DEVELOPMENT & IMPROVEMENT

**56%** of respondents provided data about their projects' support of academic programming.

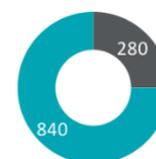
One-hundred seventeen respondents (57%) indicated that their projects supported courses or programs in 2016. Seventy-four respondents (35%) indicated that their projects were significantly involved in program development and improvement.

Survey questions about program development and improvement were preceded by the definition of a program as “a sequence of classes, 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.

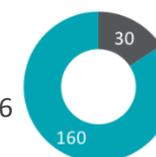
Most programs and courses supported or developed in 2016 were for two-year-college students. Respondents reported far fewer programs, courses, and on-the-job training at the four-year and post-baccalaureate levels.

At the four-year-college level, ATE funds were used to support 40 programs and create or modify four programs and 15 individual courses in 2016. At the post-baccalaureate level, one program was supported and no programs were created or modified, while two individual courses were created or modified. In terms of on-the-job training, ATE grantees supported 19 programs and created or modified nine programs and 16 individual courses. (Because involvement in four-year-college and on-the-job-training contexts was so small, those programs are not included in Figure 15.)

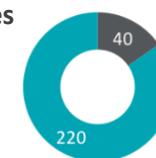
**Programs supported by ATE grants in 2016 (n=74)**



**ATE-funded programs created or modified in 2016 (n=74)**



**Separate courses created or modified with ATE support in 2016 (n=74)**



■ At secondary schools  
■ At two-year colleges

Figure 15. Number of ATE programs and courses at secondary schools and two-year colleges

## ATE-SUPPORTED INSTRUCTION

Forty-seven percent of ATE projects supported a degree or certification program in 2016. The majority of these were projects in the areas of advanced manufacturing technologies, agricultural and environmental technologies, or information and security technologies. Together, these three areas accounted for 64 percent of degree or certification programs funded by the ATE program in 2016.

# 98

 ATE projects supported a degree or certification program in 2016.

Among participating students, 92 percent either **continued** in their programs or **completed** a program.



Each icon represents 1,000 students.

Figure 16. Number of students who completed, continued in, and left ATE-supported programs in 2016 (n=98)

The number of students who either completed or continued in ATE-supported programs varied slightly across education levels. At the secondary school level, 98 percent of students either completed or continued in their programs, compared with 91 percent at two-year and four-year colleges. Eight percent of students enrolled in ATE-supported programs in 2016 left their programs prior to completion.

Additional reports based on annual ATE survey data, dating back to 2000, are available at [evaluate.org/annual\\_survey/reports](http://evaluate.org/annual_survey/reports). Custom reports may be developed upon request. For more information, contact [lori.wingate@wmich.edu](mailto:lori.wingate@wmich.edu).

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