ATE Annual Survey

2018 Report

EvaluATE

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INTRODUCTION

The Scientific and Advanced-Technology Act of 1992 called for establishing "a national advanced technician training program utilizing the resources of the nation's two-year associate-degree-granting colleges."[1] In response, the National Science Foundation (NSF) created the Advanced Technological Education (ATE) program. The ATE program makes awards ranging from $70,000 to $4 million to support projects, centers, and targeted research. A separate funding track is dedicated to supporting small projects at institutions new to the ATE program. (All types of funded work are referred to as "projects" in the remainder of this report.) The program is focused on investing in education in high-technology fields such as advanced manufacturing technologies, biotechnology, energy and environmental technologies, engineering technologies, information technologies, and nanotechnology.

This report summarizes data gathered in the 2018 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 19th annual ATE survey. Included here are findings about ATE projects and the activities, accomplishments, and impacts of the projects during the 2017 calendar year (2017 fiscal year for budget-related questions).

The 2018 survey was a census of ATE principal investigators (PIs) (N=276) with active grants. Ninety percent (n=248) of PIs responded to the survey. The survey has five sections. Most respondents partially or fully completed the Grantee Characteristics and Practices (100%) and Special Topics (99%) sections. Fewer responded to the Materials Development (42%), Professional Development (34%), and Program Development and Improvement (38%) 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 2017 to the activities in question were expected to complete the relevant sections. These sections were optional for others.

HIGHLIGHTS

In 2017, ATE projects collectively reported the following accomplishments:

- Educated more than 99,900 students — 53 percent of whom were at two-year colleges and 33 percent of whom were at secondary schools.[2]
- Developed 1,980 curriculum materials, including 790 activities, 820 modules, and 370 courses.
- Offered 1,560 professional development opportunities, which served 36,050 educators; roughly 33 percent of participants were two-year-college faculty and 48 percent were secondary school teachers.
- Supported 899 existing articulation agreements and developed 252 new agreements; these agreements helped 3,060 students matriculate between high schools and two-year colleges and 6,400 students matriculate between two-year and four-year institutions.
- Served a student population that was 17 percent underrepresented racial minority,[3] 22 percent Hispanic or Latino/Latina, and 26 percent female.
- Collaborated with more than 9,700 groups.

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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 racial minorities in STEM include American Indian, Alaska Native, Black, and African American.

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 ATE projects are located at two-year colleges.

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

Nonprofit organizations

Four-year colleges

Two-year colleges

| 69% | 21% | 6% | 4% |

Other

Figure 1. ATE grant recipient institutions (n=248)

Project awards fit into three main categories: projects, centers, and targeted research. Of the 248 survey respondents, 183 indicated their grants supported projects, 37 identified as center awards, and 28 identified as targeted research. The ATE program has special funding tracks for institutions new to the program and for organizations developing plans for national centers. Among the 183 projects, 38 grants were small grants for institutions new to the ATE program and three grants were for planning grants.

Most ATE grants support **projects**.

| 183 | 37 | 28 |
| Projects | Centers | Targeted Research |

Figure 2. ATE grant types (n=248)

DISCIPLINES

In alignment with the broad aim of the ATE program to promote improvement in the education of science and engineering technicians, the disciplinary emphases of ATE grantees are diverse.

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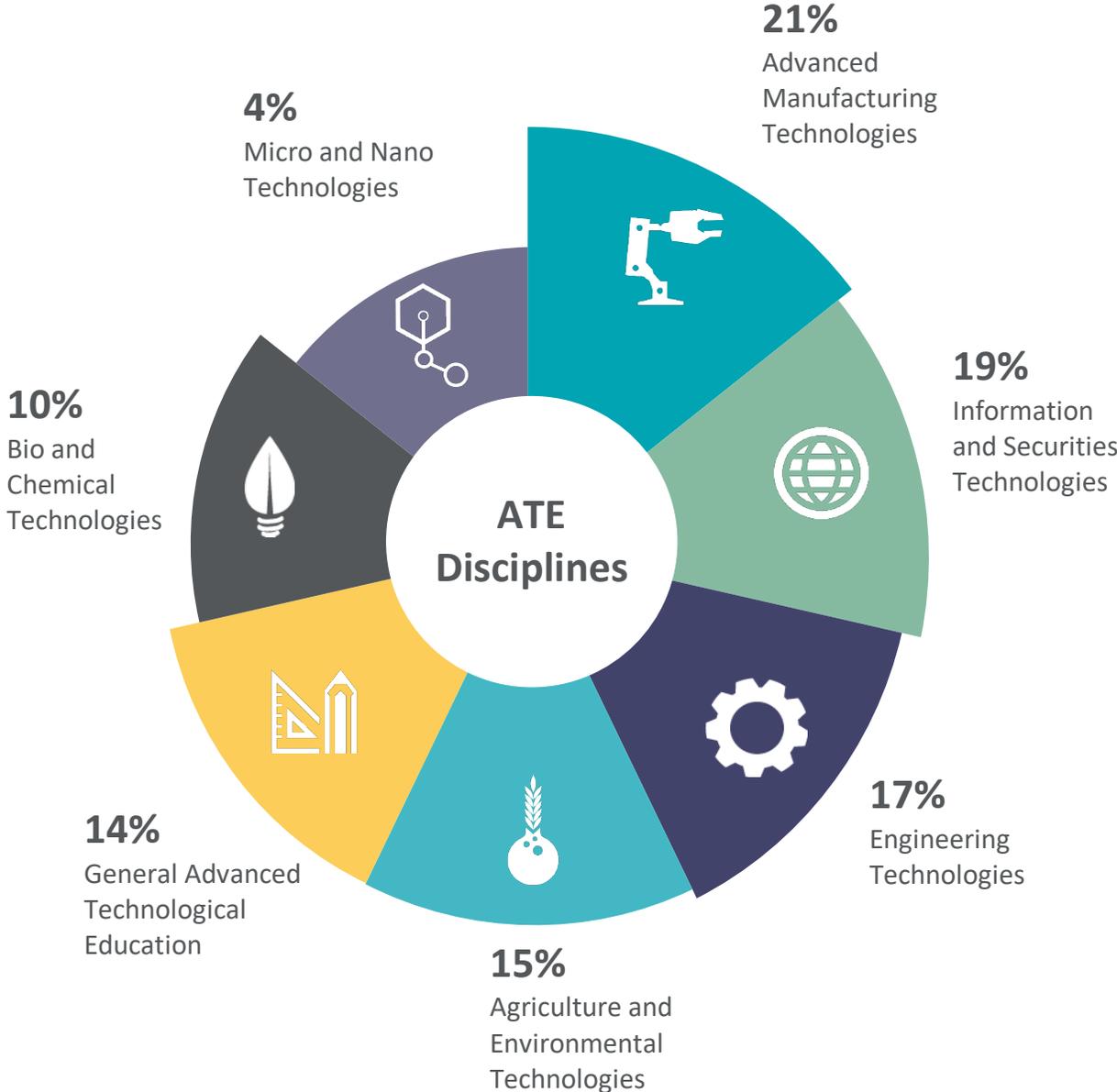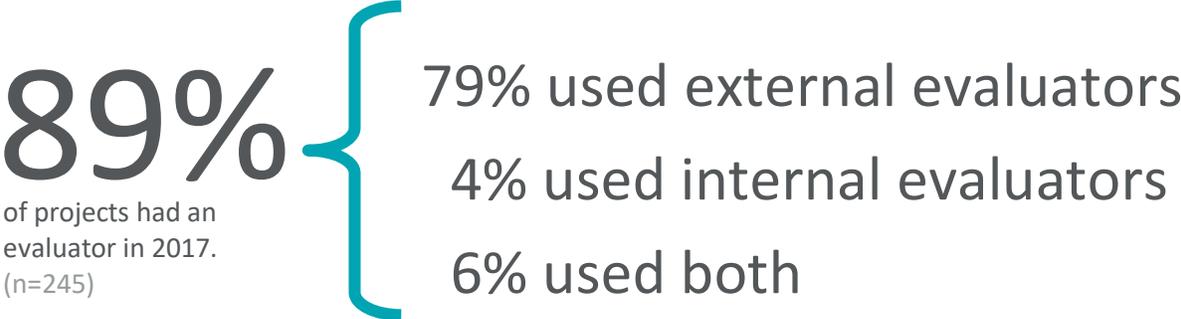

21%
Advanced Manufacturing Technologies

4%
Micro and Nano Technologies

10%
Bio and Chemical Technologies

ATE Disciplines

19%
Information and Securities Technologies

17%
Engineering Technologies

14%
General Advanced Technological Education

15%
Agriculture and Environmental Technologies

Figure 3. Disciplinary areas of ATE projects (n=248)

EVALUATION

89%

of projects had an
evaluator in 2017.
(n=245)

79% used external evaluators

4% used internal evaluators

6% used both

Most projects (219 out of 245) reported having an evaluator. Seventy-nine percent reported having an external evaluator, four percent reported having an internal evaluator, and six percent reported having both an internal and external evaluator. Most projects (84%) that had an evaluator received an evaluative report, whether written, oral, or both.

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 $20 million in **monetary** and **in-kind** support to 204 ATE projects.

$11,831,430 monetary support
$8,009,350 in-kind support

As in the past years, just a few projects accounted for a large proportion of the monetary and in-kind supported received from external collaborators. Three projects reported receiving 43 percent of the total monetary support reported, while four other projects reported receiving 44 percent of the total in-kind support reported in 2017. The median values for monetary support and in-kind support across projects and centers were $81,750 and $25,000 respectively.

Ninety percent of respondents (n=245) reported at least one collaboration. Collaborations with business and industry and with education partners were most common, comprising 77 percent of the 9,730 collaborating organizations. Among those who engaged in collaborative efforts, 184 (75%) reported at least one collaboration with business and industry, and 166 (67%) reported at least one collaboration with education partners.

ATE projects and centers collaborated with over 9,700 organizations, mostly from **business and industries** and **other educational institutions**.

Figure 4. Number and type of collaborating organizations (n=245)

Top two reported benefits from collaborations:

With business/industry
1. Information about workforce needs
2. Developing program content

With other educational institutions
1. Developing articulation agreements
2. Developing program content

With host institutions
1. General support
2. Facilitating service delivery

With other ATE projects/centers
1. Developing program content
2. General support

With public agencies
1. Information about workforce needs
2. General support

Perceived benefits of collaboration varied by type of organization. Respondents who collaborated with **business and industry** (n=182) identified four main benefits: (1) information about the workforce (70%), (2) assistance with developing program content (36%), (3) financial or in-kind support (29%), and (4) general support (29%). Four main benefits were also noted for **collaboration with other educational institutions** (n=164): (1) developing articulation agreements (40%), (2) developing program content (40%), (3) general support (28%), and (4) facilitating service delivery (22%). 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. Eighty-five respondents indicated that they developed articulation agreements with ATE support in 2017 or previous years.

19%

of projects developed new articulation agreements in 2017. (n=245)

25 Projects

9 Centers

8 Small Grants

Grantees reported having 899 articulation agreements already in place. Of these, 520 agreements were between high schools and two-year colleges; 379 were between two-year and four-year colleges. An additional 252 new articulation agreements were developed in 2017. In total, the agreements between high schools and two-year colleges involve 661 institutions, and agreements between two-year and four-year colleges involve 435 institutions. These agreements supported nearly 9,500 matriculations in 2017, two-thirds of which were from two-year to four-year colleges.

Most articulation agreements in place or developed in 2017 were between **high schools and two-year colleges**.

252	**899**	**1,096**	**9,460**
new agreements developed	agreements already in place	institutions involved	students matriculated

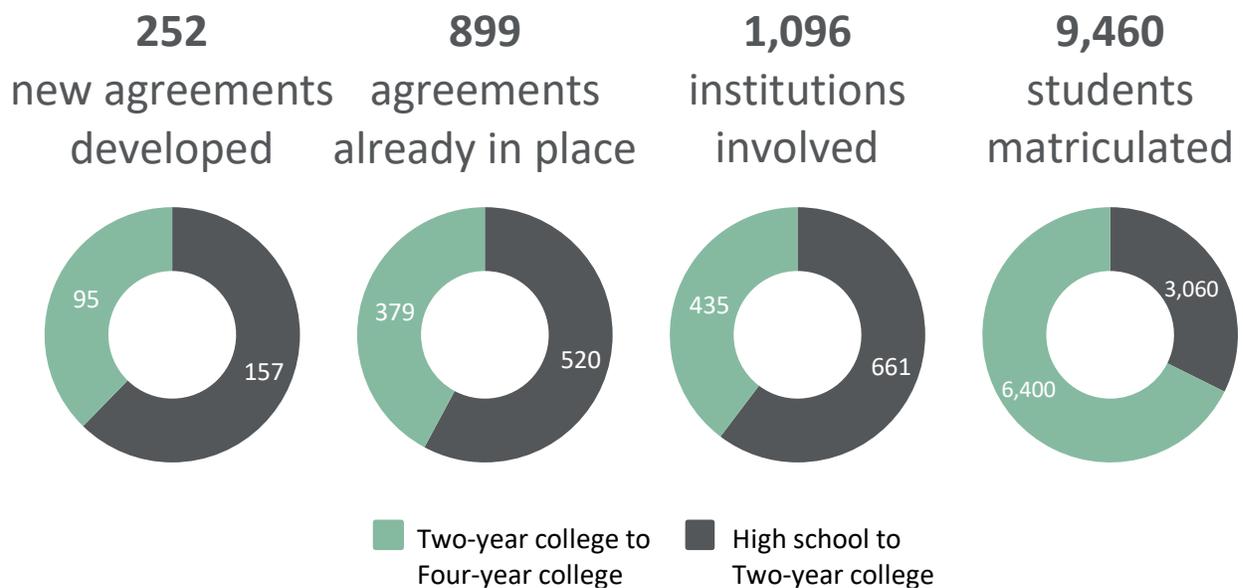Legend: Two-year college to Four-year college | High school to Two-year college

Figure 5. Number of articulation agreements, institutions, and students (n=85)

ATE STUDENT DEMOGRAPHICS

Fifty-seven percent of respondents (n=141) indicated that their projects directly supported STEM instruction in 2017. These projects were asked to provide demographic data about their students, reported in Table 1. Of these 141 projects, 136 (96%) provided information on the gender of students, 124 (88%) provided information on the race and ethnicity of students, and 138 (98%) reported the number of students requesting accommodations under the Americans with Disabilities Act. The number of students reported varies by demographic category, due to the differing number of projects reporting data for each category. The gender category is the most comprehensive, with 99,900 students.

Table 1. Demographic characteristics of ATE students

DEMOGRAPHIC CHARACTERISTIC	NUMBER OF STUDENTS	PERCENT OF CATEGORY	VALID PERCENTAGE OF CATEGORY (excludes "unknown")
Gender (n=136)			
Men	64,090	64%	74%
Women	22,200	22%	26%
Unknown	13,610	14%	-
Race (n=124)			
American Indian/Alaska Native	940	1%	1%
Asian	5,260	6%	8%
Black/African American	13,850	15%	20%
Native Hawaiian/Pacific Islander	470	<1%	1%
Multiracial	4,210	4%	6%
White	43,510	46%	64%
Unknown	26,260	28%	-
Ethnicity (n=124)			
Hispanic or Latino/Latina	16,030	16%	22%
Non-Hispanic or Non-Latino/Latina	57,690	59%	78%
Unknown	24,580	25%	-
Disabilities (n=138)			
Students requesting accommodation under the Americans with Disabilities Act	2,450	-	-

A priority for NSF is to increase the participation of women and underrepresented minorities in STEM. According to the NSF, underrepresented minorities in STEM include American Indian, Alaska Native, Black, African American, Hispanic, and Latino or Latina. Students who identify as Black, African American, Hispanic, and Latino or Latina have a stronger presence in ATE-supported programs than they do in the general population of students across education levels.[i] See the end notes for a full explanation of comparison sources for national data.[ii] To align with how the U.S. Census Bureau handles race and ethnicity questions, the ATE survey asked about students' race and ethnicity separately.[iii]

Compared with rates for STEM programs nationally, students who identify as Black/African American and Hispanic/Latino or Latina are generally well-represented in the ATE program.
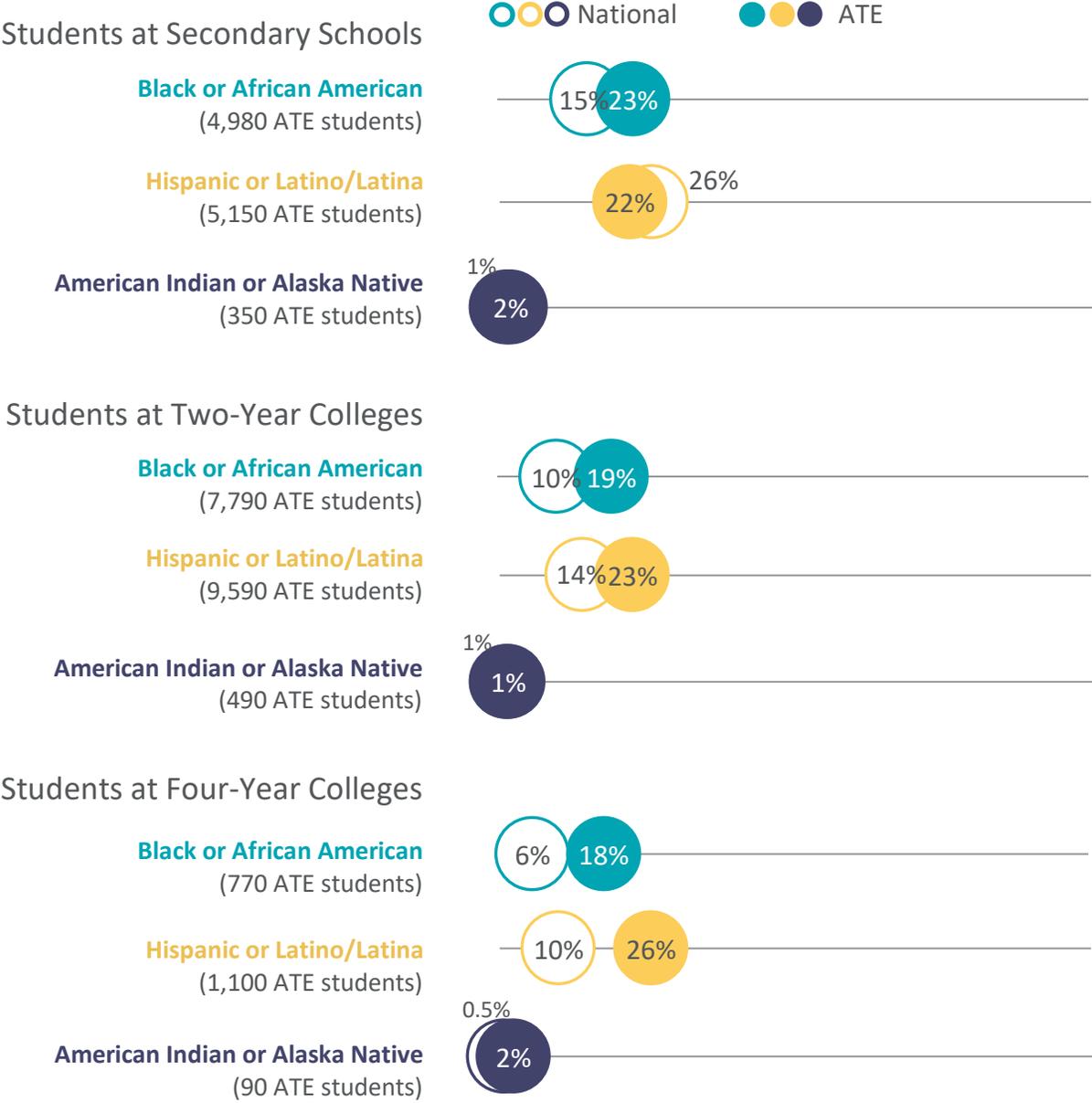
○○○ National   ●●● ATE

Students at Secondary Schools

Black or African American
(4,980 ATE students)
15% 23%

Hispanic or Latino/Latina
(5,150 ATE students)
22% 26%

American Indian or Alaska Native
(350 ATE students)
1%
2%

Students at Two-Year Colleges

Black or African American
(7,790 ATE students)
10% 19%

Hispanic or Latino/Latina
(9,590 ATE students)
14% 23%

American Indian or Alaska Native
(490 ATE students)
1%
1%

Students at Four-Year Colleges

Black or African American
(770 ATE students)
6% 18%

Hispanic or Latino/Latina
(1,100 ATE students)
10% 26%

American Indian or Alaska Native
(90 ATE students)
0.5%
2%

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 (n=124)

The percentage of women in ATE-supported programs is similar to national participation rates. Overall, 26 percent of ATE students are women, although the proportion of women varies by education level and discipline. According to the U.S. Department of Education, 25 percent of students in technical programs at two-year colleges in the U.S. are women.[iv]

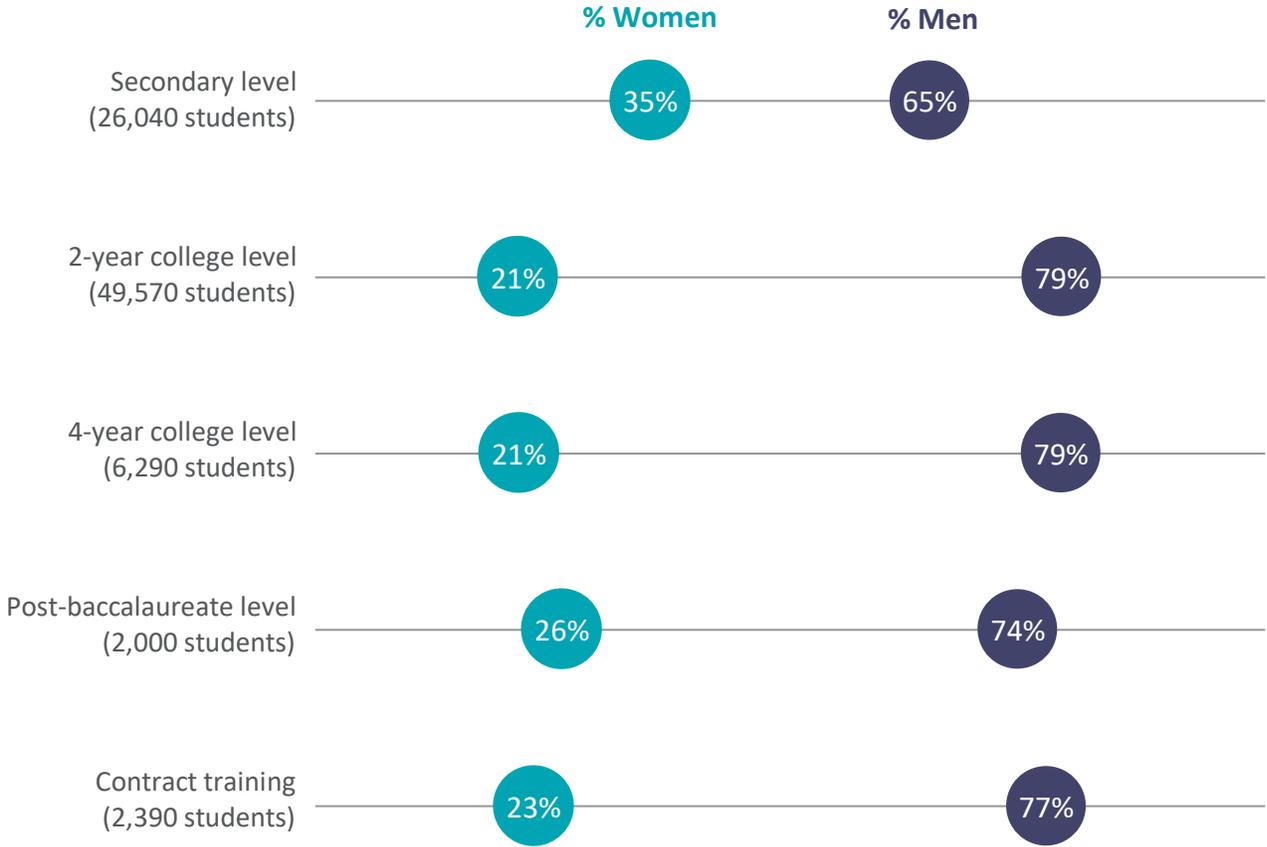## Like other STEM programs, ATE projects still face a challenge in attracting **women** to the field.

Figure 7. Percentage of men and women in ATE programs by education level (n=139)

A detailed breakdown of student demographics by ATE discipline can be found in additional data snapshots at evalu-ate.org/annual_survey.

MATERIALS DEVELOPMENT

One-hundred and three respondents (42%) indicated that their projects were significantly involved in developing curriculum and educational materials for national dissemination.

ATE grantees are involved in developing an array of education materials, such as textbooks, laboratory experiments and manuals, software, videos, and other courseware. These materials are used to convey the content and aid in the instruction of courses, modules, and activities, as defined in Figure 8.

ATE projects developed **1,980 materials** in 2017.

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

790

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

820

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

370

Figure 8. Numbers of courses, modules, and activities developed in 2017 (n=102)

Most materials were developed for use at two-year colleges and secondary schools.

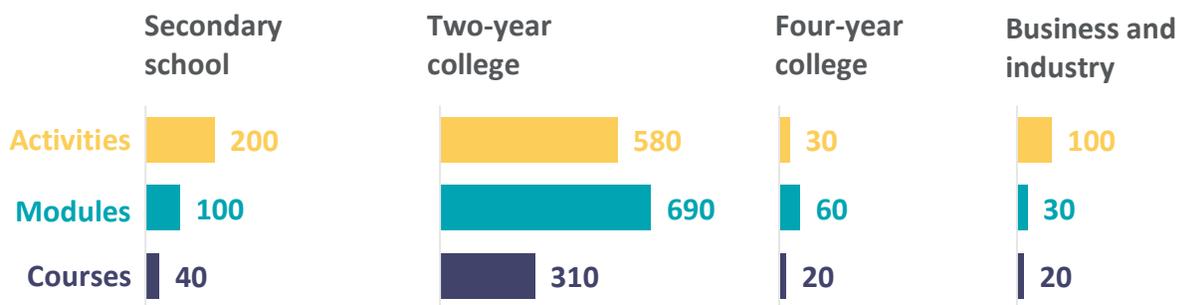|	Secondary school	Two-year college	Four-year college	Business and industry
Activities	200	580	30	100
Modules	100	690	60	30
Courses	40	310	20	20

Figure 9. Number of materials developed for various audiences (n=102)
Note: Since some materials may have been designed for use at more than one education level, the number of activities, modules, and courses shown in this figure exceeds the total reported in Figure 8.

Ninety-six respondents reported on the availability of their projects' developed materials. Most made materials available in limited ways: seven made materials available to select groups, 49 provided materials upon request, and 20 made them publicly available on the internet. Eight noted that their materials were not currently available to anyone outside of the project. Additionally, 12 indicated that availability depended on the type of the material.
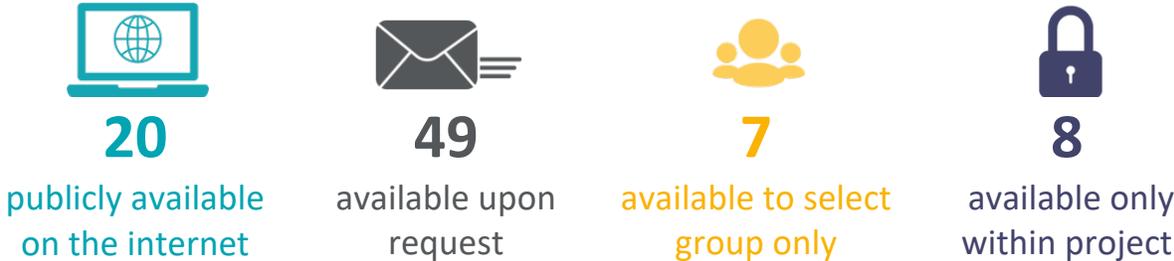
20
publicly available
on the internet

49
available upon
request

7
available to select
group only

8
available only
within project

Figure 10. Number of projects that make their ATE materials available to internal and external audiences (n=96)

PROFESSIONAL DEVELOPMENT

Eighty-four respondents (34%) indicated that their projects were significantly involved in providing professional development to educators.

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 practice, and 21st century skills in a way that will directly impact technician education." Most professional development activities offered by ATE projects were for educators at secondary schools (48%) and two-year colleges (33%). This mirrors the emphasis on developing materials for use at secondary schools and two-year colleges (see Figure 11).

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

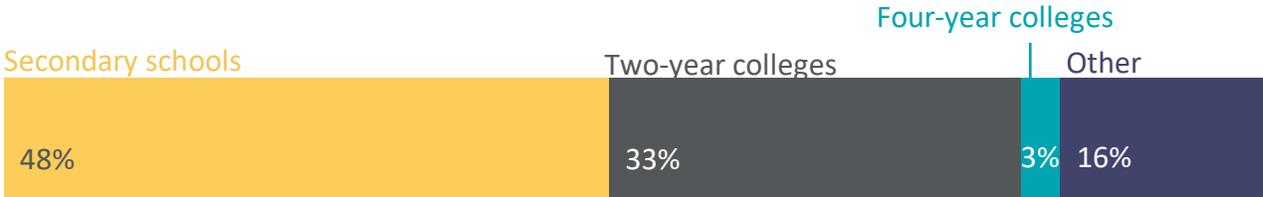| Secondary schools	Two-year colleges	Four-year colleges	Other
48%	33%	3%	16%

Figure 11. Percentage of professional development participants by education level where they teach (n=84)

Respondents reported providing 1,560 professional development activities in 2017, ranging from short presentations intended primarily to raise awareness to long-term periodic instructional activities (e.g., internships or peer coaching). A total of 36,050 individuals participated in these ATE-supported professional development activities — a majority (58%) were involved in instructional activities intended to accomplish more than raising awareness. Nearly 14,000 educators participated in activities that lasted one full day or more.

In 2017, ATE projects offered **1,560 professional development activities**, serving **36,050 participants**.
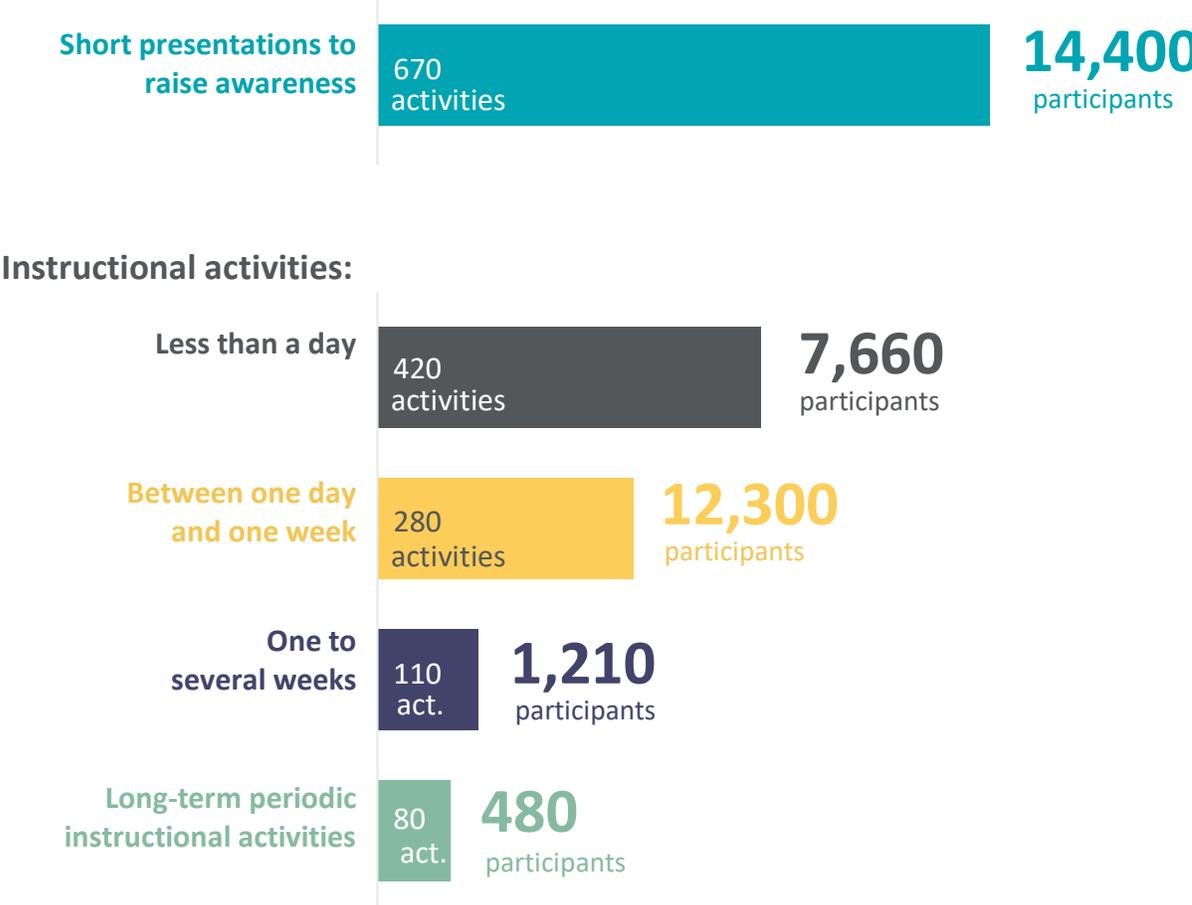
Figure 12. Number of professional development activities and participants by length of activity (n=84)

PROGRAM DEVELOPMENT & IMPROVEMENT

Ninety-three respondents (38%) indicated that their projects were significantly involved in program development and improvement.

One-hundred forty-one respondents (57%) indicated that their projects supported courses or programs in 2017.

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 2017 were for two-year-college students. Few grantees reported conducting program development and improvement efforts at the four-year and post-baccalaureate levels and on-the-job training. At the four-year-college level, ATE funds were used to support 70 programs and to create or modify three programs and one individual course in 2017. At the post-baccalaureate level, no programs or courses were supported, created, or modified. In terms of on-the-job training, ATE grantees supported 37 programs and created or modified five programs and 14 individual courses. (Because involvement in four-year-college and on-the-job-training contexts was at such a minimal level compared with the other levels, those programs are not included in Figure 13.)
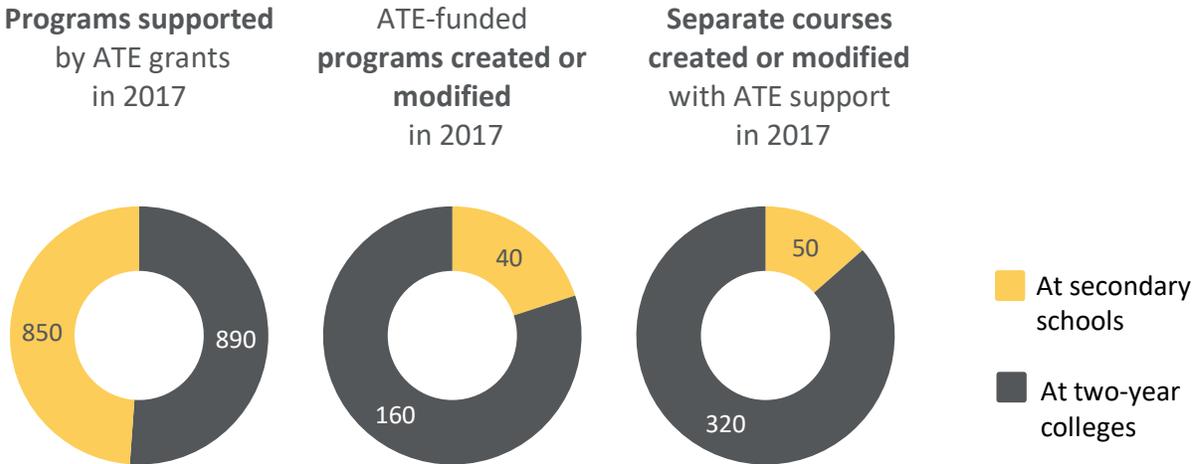
Programs supported by ATE grants in 2017

ATE-funded programs created or modified in 2017

Separate courses created or modified with ATE support in 2017

- At secondary schools
- At two-year colleges

Figure 13. Number of ATE programs and courses at secondary schools and two-year colleges (n=93)

ATE-SUPPORTED INSTRUCTION

Forty-seven percent of ATE projects supported a degree or certification program in 2017. The majority of these were projects in the areas of advanced manufacturing technologies, engineering technologies, and agricultural and environmental technologies. Together, these three areas accounted for 64 percent of degree or certification programs funded by the ATE program in 2017.

116 ATE projects supported a degree or certification program in 2017.

Among participating students, 93 percent either **continued** in their programs or **completed** a program.

Note: Each icon represents 1,000 students.

11,140 completed	30,750 continued	3,390 left
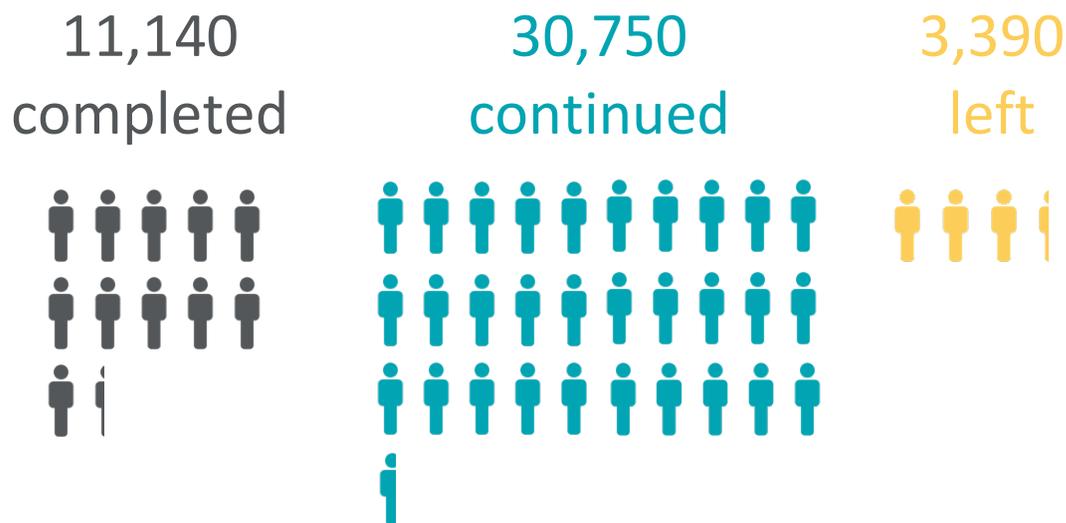
Figure 14. Number of students who completed, continued in, and left ATE-supported programs in 2017 (n=116)

The number of students who either completed or continued in ATE-supported programs varied slightly across education levels. At the secondary school level, 96 percent of students either completed or continued in their programs, compared with 90 percent at two-year and 95 percent at four-year colleges. Seven percent of students enrolled in ATE-supported programs in 2017 left their programs prior to completion.

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 lyssa.becho@wmich.edu.

TECHNICAL NOTES

[i] According to the 2017 report *Women, Minorities, and Persons with Disabilities in Science and Engineering* (available from http://bit.ly/urm-2017), NSF designates the following racial and ethnic identities as underrepresented minorities in STEM: American Indian, Alaska Native, Black, African American, Hispanic, and Latino or Latina. This is a change in how the ATE Annual Survey Report has presented student demographics in previous years. For more details on previous years' categorization of underrepresented minorities in STEM, see the footnotes of previous reports.

[ii] Comparison data for student demographics are from the National Center for Education Statistics (NCES). The referenced NCES tables were retrieved from https://nces.ed.gov/programs/digest/current_tables.asp. The national percentage of underrepresented minority students at the secondary school level reflects enrollment in public schools in 2017 and is from *Table 203.60.* The national percentage of underrepresented minority students at the two-year and four-year levels reflect STEM degrees conferred in 2016, derived bfrom *Table 321.30* for two-year institutions and *Table 322.30* for four-year institutions. Selected 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. While these are not exact comparison groups, they are as close as available data allows.

[iii] The 2018 ATE Annual Survey asked about the racial and ethnic identity of students separately, in alignment with the survey practices of the U.S. Census Bureau and NSF. This approach treats race and ethnicity as independent of one another. Therefore, it is not possible to provide a single number or percentage of students who come from underrepresented groups — numbers of underrepresented racial and ethnic minority students must be reported separately. They cannot be combined due to the high probability of double counting individual students.

[iv] National data for two-year STEM programs are from the 2015-16 National Center for Education Statistics Digest of Education Statistics *Table 321.50.* (Retrieved from https://nces.ed.gov/programs/digest/2014menu_tables.asp.) Selected fields of study are the same as those listed in note ii.

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