# ATE Annual Survey

## 2015 Report

# INTRODUCTION

This report summarizes data gathered in the 2015 survey of National Science Foundation (NSF) Advanced Technological Education (ATE) grant recipients. Conducted by EvaluATE, the evaluation resource center for the ATE program located at The Evaluation Center at Western Michigan University, this was the sixteenth annual survey of ATE projects and centers. Included here are findings about the program's grantees and their activities, accomplishments, and impacts during the 2014 calendar year.

The 2015 survey was a census of active ATE principal investigators (PIs) (N=247). Survey responses were received from 230 grantees (93%). The survey has five sections. Most survey recipients completed the sections on Grantee Characteristics and Practices (93%) and Special Topics (91%). Fewer completed the sections on Materials Development (33%), Professional Development (39%), and Program Development/Improvement (42%). Whether grantees completed those sections depended on the nature of their grant work—that is, those who allocated at least $100,000 or 30 percent of their budgets in 2014 to the activities in question were expected to complete the relevant sections. These three sections were optional for PIs who spent less.

## Highlights

In 2014, National Science Foundation-funded Advanced Technological Education projects and centers

- educated approximately 114,970 students—52 percent of whom were at two-year colleges and 41 percent at secondary schools.[1]
- developed 2,340 curriculum materials, 17 percent of which were full courses and 12 percent were published commercially.
- offered 2,190 professional development opportunities, which served more than 45,800 educators—roughly 45 percent of whom were two-year college faculty and 44 percent secondary school teachers.
- had approximately 1,270 articulation agreements in place and developed 150 agreements in 2014; these agreements helped about 1,350 students matriculate between high schools and two-year colleges and 2,760 students between two-year and four-year institutions.
- served a student population that was 45 percent minority and 28 percent female.
- collaborated with more than 9,950 groups that provided more than $9 million in monetary contributions and $11 million in-kind support.

The remainder of this report describes the survey findings in more detail.

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[1] 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.

# GRANTEE CHARACTERISTICS AND PRACTICES

The ATE program was established by NSF in response to the *Scientific and Advanced-Technology Act of 1992*, which was intended "to establish a national advanced technician training program, utilizing the resources of the nation's two-year associate-degree-granting colleges."[2] Consistent with that mandate, the ATE program solicitation states that "the ATE 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 and beneficiaries of grant-supported activities.

Most **ATE grantees** are located at 2-year colleges, followed by nonprofit organizations and 4-year colleges/universities. (n=230)

| 2-year colleges | Nonprofit organizations | 4-year colleges | Other |
|---|---|---|---|
| 65% | 16% | 10% | 9% |
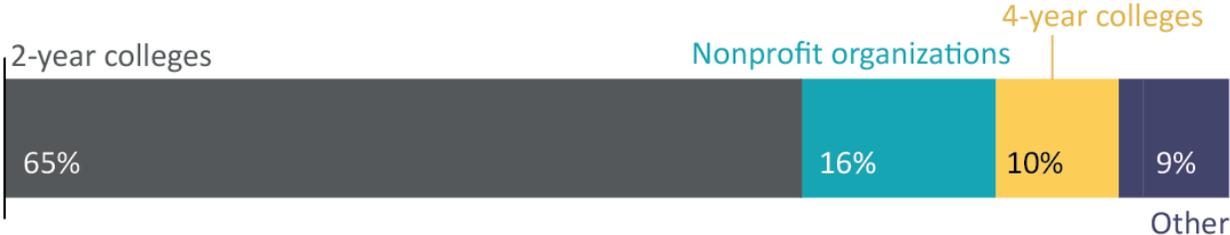
Collectively, ATE grantees allocate most of their **funding** to serve audiences at 2-year colleges. (n=220)

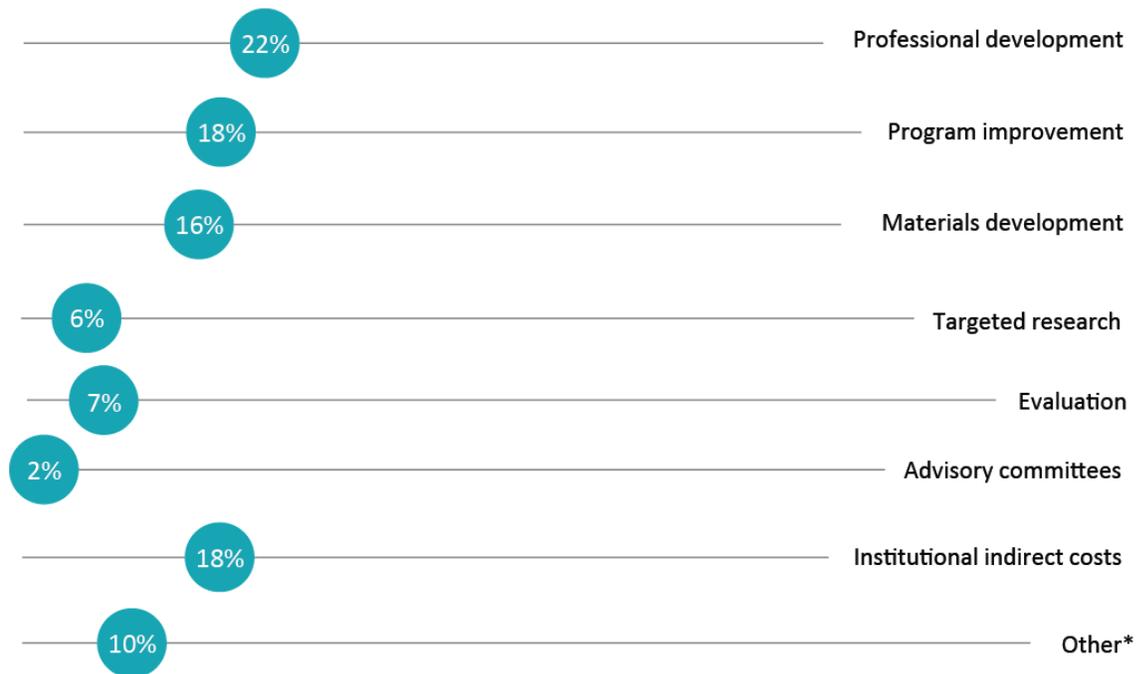| 2-year colleges | Secondary schools | 4-year colleges | Business/industry sites | Other (3%) |
|---|---|---|---|---|
| 65% | 17% | 10% | 5% | |

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[2] Public Law 102-476.

The largest expenditures among ATE grantees were for professional development, program improvement, and materials development, as shown in the chart below depicting program wide expenditures.
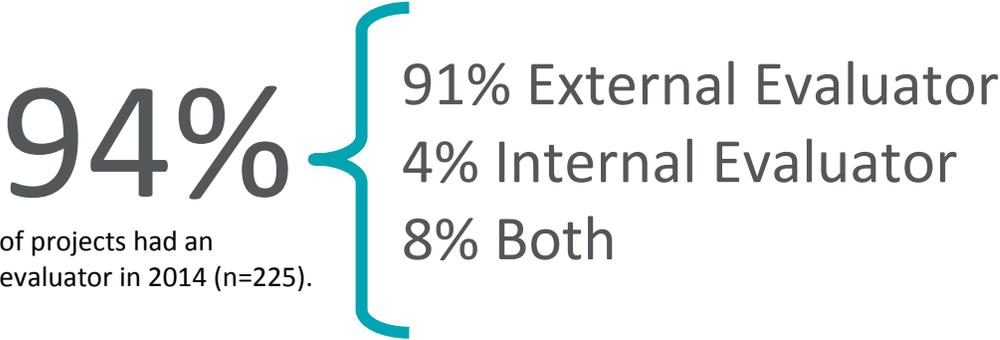
## 62% of ATE funds were devoted to professional development, program improvement, materials development, and targeted research.
(n=216)

| | |
|---|---|
| 22% | Professional development |
| 18% | Program improvement |
| 16% | Materials development |
| 6% | Targeted research |
| 7% | Evaluation |
| 2% | Advisory committees |
| 18% | Institutional indirect costs |
| 10% | Other* |

*"Other" costs reported by respondents included salaries and fringe, equipment, participant support, and travel—expenses that mostly likely should have been reported within the preexisting categories.

## EVALUATION

# 94%

of projects had an
evaluator in 2014 (n=225).

91% External Evaluator
4% Internal Evaluator
8% Both

Most respondents (82%) reported some expenditure on **evaluation** in 2014.[3] Within this group, the average budget allocation was 7 percent. This average expenditure has remained nearly constant since 2010.

An even larger percentage of projects and centers (94%) reported having an evaluator. Most used evaluators who were external to both the project and the institution (84%); just a few (8%) used evaluators who were external to their projects, but internal to their institutions. A few of these grants coupled their external evaluation with some form of internal evaluation.

## COLLABORATION

The survey questions about **collaboration** were accompanied by a definition of this term, describing it 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."

Collaborators provided more than $20 million in **monetary** and **in-kind** support to ATE grantees.

# $9,589,200 monetary support

# $11,307,380 in-kind support

As in the past, the total amount of monetary support reported was significantly impacted by just a few grants. Three grants accounted for 40 percent of the total monetary support reported. Three other grants accounted for 49 percent of the total in-kind support reported in 2014. The median values for monetary support and in-kind support across projects and centers were $27,500 and $16,500, respectively.

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[3] Not all grantees who reported having an evaluator also reported expenditure on evaluation in 2014. Aside from missing data, possible causes for this discrepancy may be that some new grants had not yet paid for any evaluation services and/or that the compensation for internal evaluators was not reported under Evaluation on the question about budget allocations. Alternatively, some grants may only pay for summative evaluation services to take place near the end of their grants.

Collaborations with business/industry and education partners are most common, comprising 78 percent of all collaborating organizations. Of the 230 survey respondents, 170 (74%) reported at least one collaboration with business and industry. Respondents were asked about the top two benefits they derived from collaborating with different types of partners, listed under the corresponding bubbles below.

## ATE projects and centers **collaborate** most with business and industry.
(n=202)
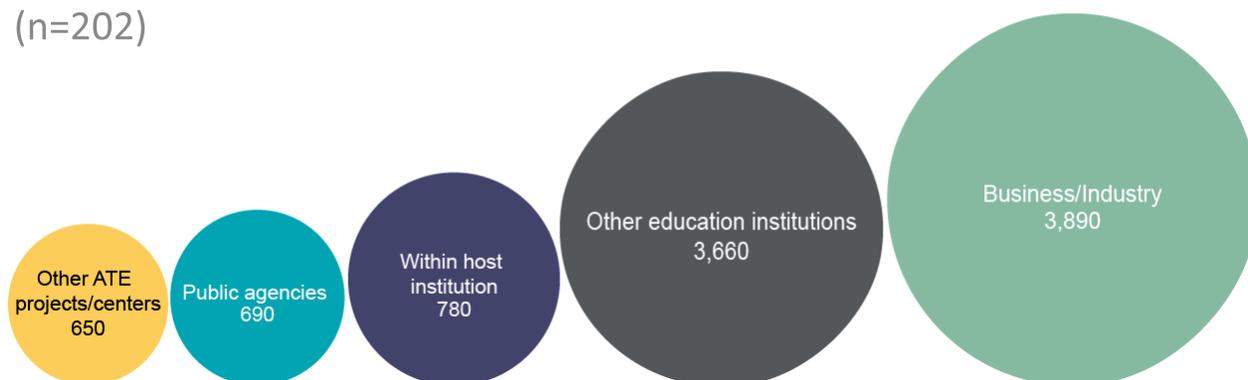


**Top 2 reported benefits from collaborations:**

**With other ATE projects/centers** (650)

1. Developing program content
2. General support

**With public agencies** (690)

1. Information about workforce needs
2. Access to decision makers

**With host institutions** (780)

1. General support
2. Developing program content and student support (tie)

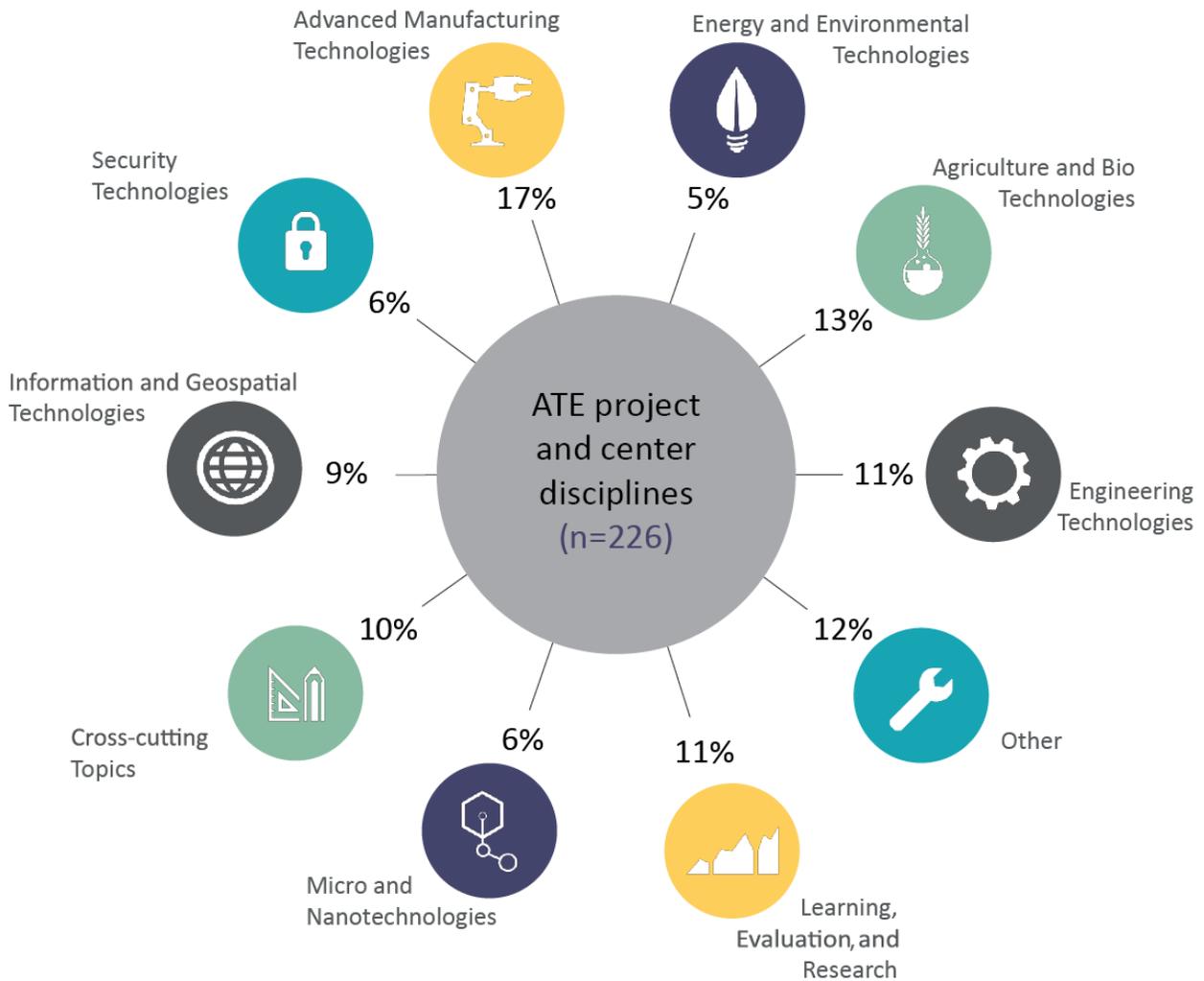**With other education institutions** (3,660)

1. Developing articulation agreements
2. General support and facilitating service delivery

**With business/industry** (3,890)

1. Information about workforce needs*
2. Developing program content*

Forty-six grantees reported other types of collaborators not listed on the survey form. In total, these accounted for 280 collaborations. One of the most common collaborators that were written in by respondents were professional societies, such as the American Association of Community Colleges, International Society for Photonics and Optics, and Society for Manufacturing Engineering.

The disciplinary emphases of ATE grantees are diverse. The highest concentration of grants is in the area of advanced manufacturing, accounting for 17 percent of projects and centers. Twelve percent of respondents indicated "other" as their project emphasis, which they identified as aviation maintenance education, welding technologies, materials science, or a combination of available fields as their area of focus. Due to small numbers, grantees that focused on recruitment, technology teacher training, and the development of core courses were combined into one group labeled "cross-cutting topics."



Advanced Manufacturing Technologies — 17%

Energy and Environmental Technologies — 5%

Agriculture and Bio Technologies — 13%

Security Technologies — 6%

ATE project and center disciplines (n=226)

Engineering Technologies — 11%

Information and Geospatial Technologies — 9%

Other — 12%

Cross-cutting Topics — 10%

Micro and Nanotechnologies — 6%
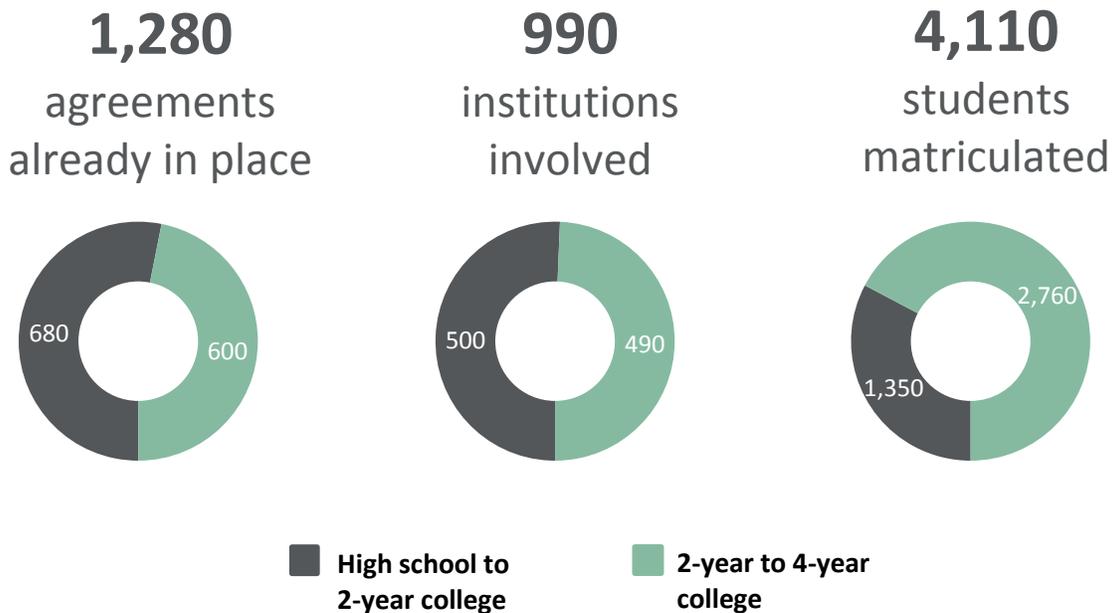
Learning, Evaluation, and Research — 11%

# 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 92 respondents who indicated that developing articulation agreements was part of their project/center activities, 77 (84%) provided additional information on these agreements, reported below.

# 41%

of grantees developed
articulation agreements
in 2014.

| 50 | Projects |
| 27 | Centers |
| 14 | Small Grants |
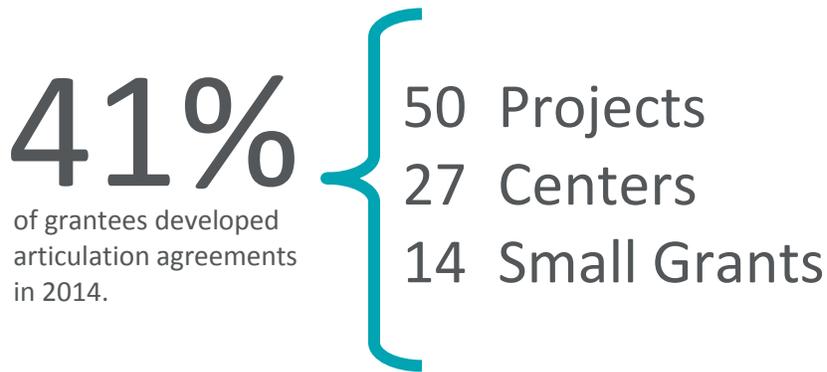
Grantees reported a total of 1,276 articulation agreements already in place, with slightly more agreements between high schools and 2-year colleges (680) than between 2-year and 4-year colleges (600). An additional 150 new articulation agreements were developed in 2014. Those agreements were made either between high schools and 2-year colleges (77) or 2-year colleges and 4-year colleges (73). The number of students matriculating from 2-year colleges to 4-year colleges (2,760) was more than twice the number matriculating from high school to 2-year colleges (1,350). The large difference in matriculation rates was due to one grant that accounted for 1,700 of the 2,760 students who matriculated from a 2-year college to a 4-year college in 2014.

## 1,280
agreements
already in place

680    600

## 990
institutions
involved

500    490

## 4,110
students
matriculated

2,760
1,350

■ **High school to 2-year college**    ■ **2-year to 4-year college**

# MATERIALS DEVELOPMENT

**33%** of respondents completed this section, including **58 projects** and **19 centers**.

**48%** allocated at least 30 percent of their direct costs or $100,000 to materials development in 2014.

**52%** did not meet the monetary threshold, but chose to report on their activities in this area.

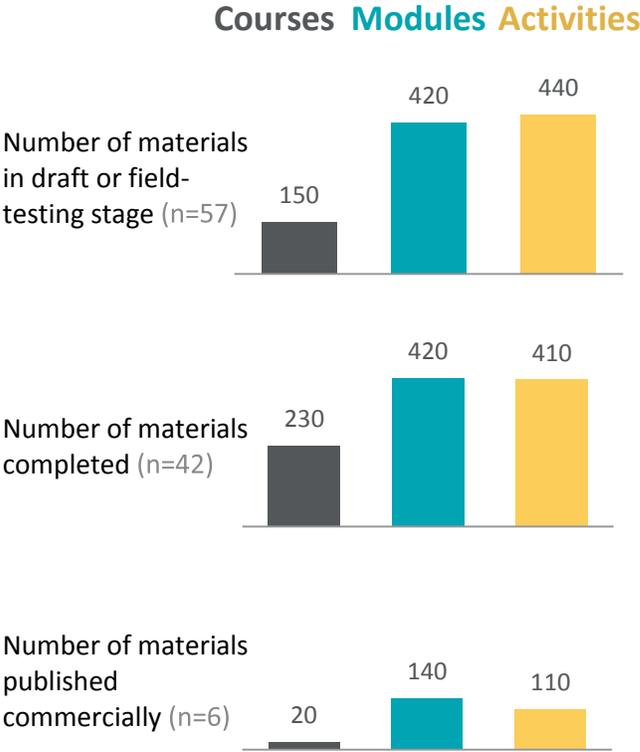## ATE projects and centers developed 2,340 materials in 2014.

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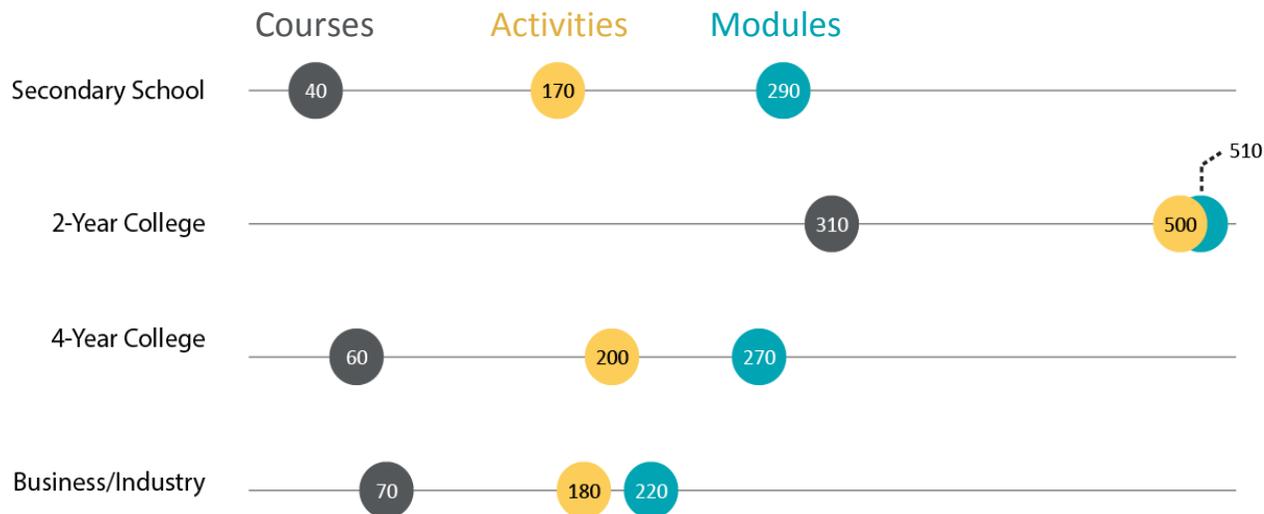
**Module:** A self-contained collection of content and activities designed to achieve a set of specific objectives. Modules are generally shorter than courses and focus on fewer outcomes.

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

ATE grants produced about equal numbers of modules and activities in 2014 (see charts to right). One-quarter of the 1,060 materials completed in 2014 were published commercially.

**Courses  Modules  Activities**

Number of materials in draft or field-testing stage (n=57)
- Courses: 150
- Modules: 420
- Activities: 440

Number of materials completed (n=42)
- Courses: 230
- Modules: 420
- Activities: 410

Number of materials published commercially (n=6)
- Courses: 20
- Modules: 140
- Activities: 110

Most materials* **produced** by ATE grantees in 2014 were for **2-year college** audiences.
(n=75)



Courses    Activities    Modules

| | Courses | Activities | Modules |
| --- | --- | --- | --- |
| Secondary School | 40 | 170 | 290 |
| 2-Year College | 310 | 500 | 510 |
| 4-Year College | 60 | 200 | 270 |
| Business/Industry | 70 | 180 | 220 |

*The fact that sum of materials reported by education level exceeds the total number of materials developed indicates that some materials were intended to serve multiple audiences.

# PROFESSIONAL DEVELOPMENT

**39%** of respondents completed this section, including **57 projects** and **33 centers**.

**54%** allocated at least 30 percent of their direct costs or $100,000 to professional development in 2014.

**46%** did not meet the monetary threshold, but chose to report on their activities in this area.

Respondents to this section of the survey on professional development reported providing 2,190 professional development activities in 2014, ranging from short presentations intended primarily to raise awareness to long-term periodic instructional activities (e.g., internships or peer coaching). A total of 45,830 individuals participated in these ATE-supported professional development activities. As the length of the professional development activities increases, the number of activities and participants engaged in those types of activities decreases.

In 2014, ATE projects and centers offered **2,190 professional development activities,** serving **45,830 participants**. (n=90)

Short presentations to raise awareness were the most prevalent type, accounting for 60 percent of all ATE professional development participants. The majority of grantees who conducted professional development offered activities at least one day in length, and approximately half offered activities of at least one week in length.

27,220

8,560

Short presentations 860

5,360

Instructional activities of less than a day 670

4,340

Instructional activities that last between one day and one week 340

Instructional activities that last from one to several weeks 230

350

Long-term periodic instructional activities 90

Activities

Participants

The primary audiences for ATE professional development activities were educators at secondary schools and 2-year colleges. Over the past five years, there has been an increase in the percentage of professional development activities for secondary school educators, while those for 4-year college and other audiences has decreased.

Most **professional development activities** offered by ATE grantees in 2014 were developed for audiences at secondary schools and 2-year colleges.

(n=90)

| Secondary | 2-year colleges | 4-year colleges | Other |
|---|---|---|---|
| 44% | 45% | 5% | 5% |
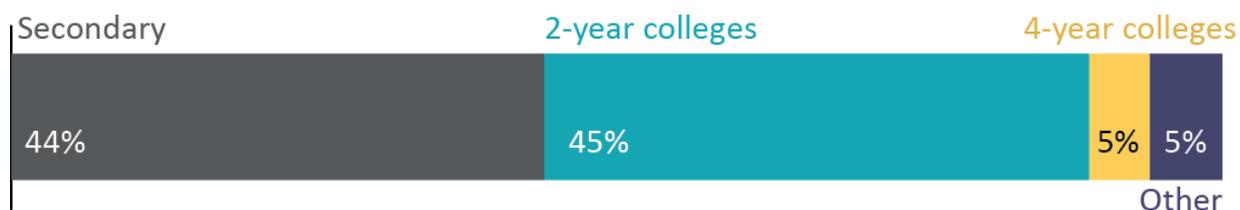
# PROGRAM DEVELOPMENT/IMPROVEMENT

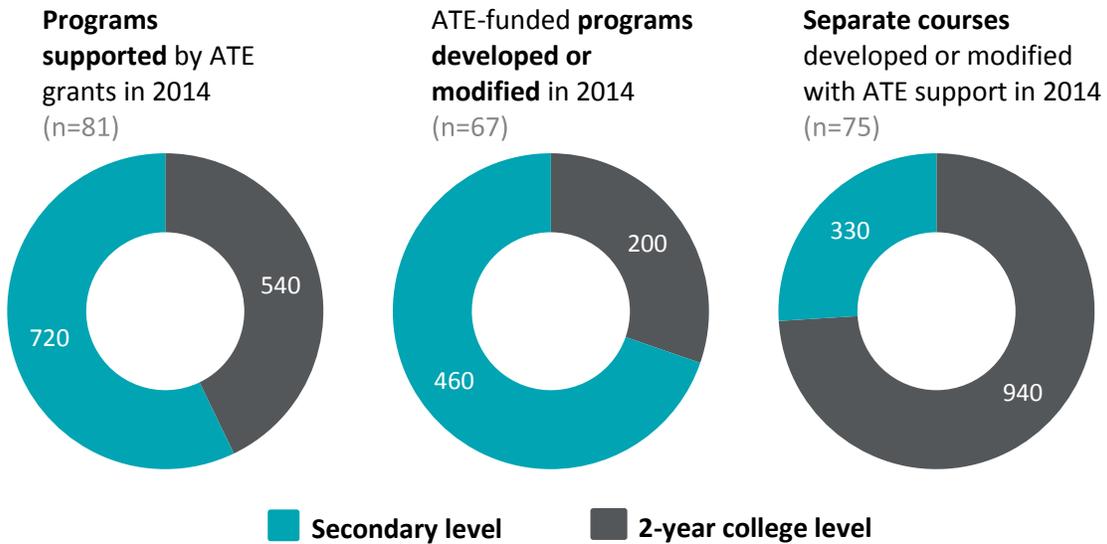**42%** of respondents completed this section, **73 projects** and **24 centers**.

**66%** allocated at least 30 percent of their direct costs or $100,000 to program development/improvement in 2014.

**34%** did not meet the monetary threshold, but chose to report on their activities in this area.

Survey questions about program development and improvement were preceded by a 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 supported or developed in 2014 were for secondary school students. However, the courses developed or modified in 2014 were overwhelmingly targeted at 2-year college students. In addition to these two education levels, respondents were asked about programs and courses at the 4-year and post-baccalaureate levels, as well as on-the-job training.

At the 4-year college level, ATE grants supported 70 programs and developed or modified 10 programs and 50 individual courses in 2014. In terms of on-the-job training, ATE grantees supported 40 programs and developed or modified 20 programs and 80 individual courses. (Because involvement at the 4-year college level and in on-the-job training was so small, those programs are not included in the graphic below.)

**Programs supported** by ATE grants in 2014
(n=81)

540

720

**ATE-funded programs developed or modified** in 2014
(n=67)

200

460

**Separate courses** developed or modified with ATE support in 2014
(n=75)

330

940

■ **Secondary level**    ■ **2-year college level**

## ATE-SUPPORTED INSTRUCTION

Forty-four percent of ATE grants supported a specific degree or certification program in 2014. Most of these were in the areas of advanced manufacturing, agricultural and biotechnology, and engineering technology. Collectively, grants with an emphasis in one of these three areas accounted for 52 percent of the projects that supported a degree or certification program in 2014.
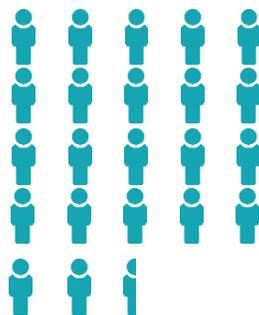
# 101 ATE grants supported a degree or certification program in 2014.

Among participating students, 91% either **continued** in their programs or **completed** a program.

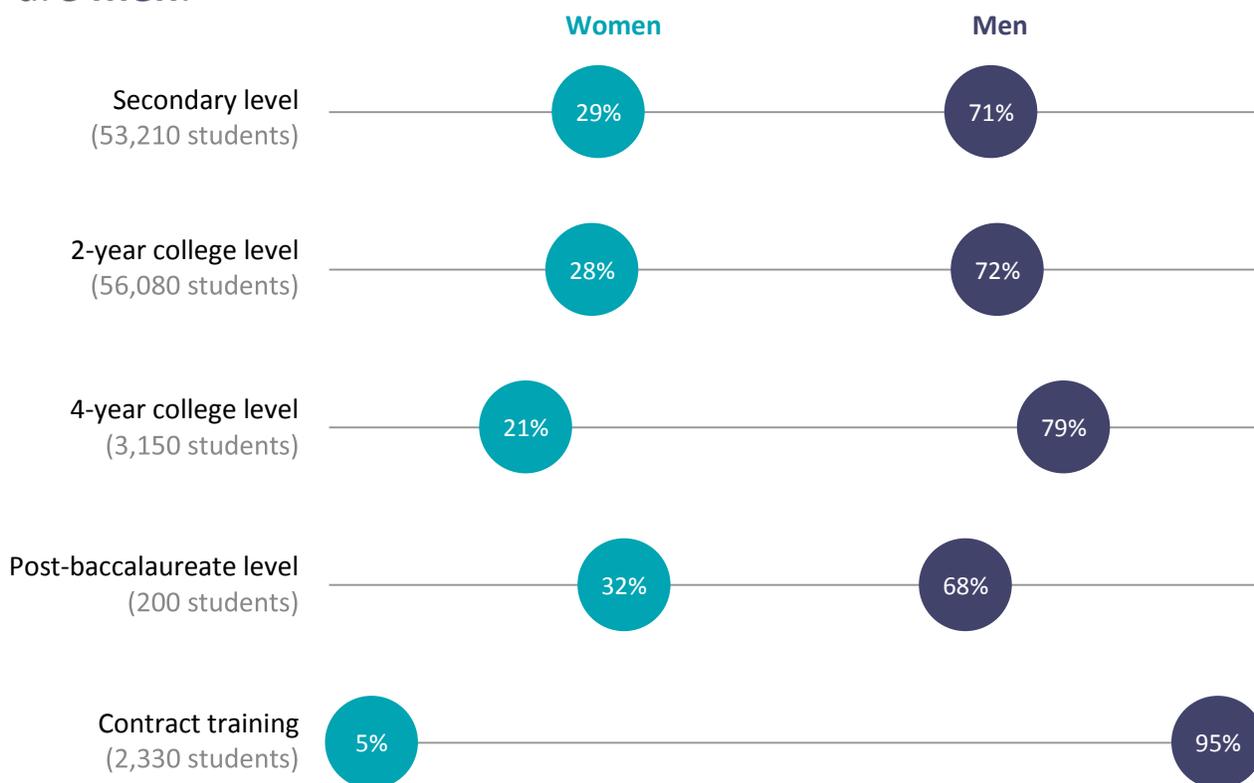**8,290**
completed
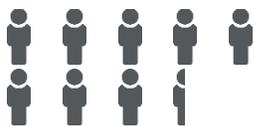
**22,210**
continued

**3,070**
left

(n=85) Each icon represents 1,000 students.

The number of students who either completed or continued in ATE-supported programs varied only slightly across education levels. At the 2-year college level, 90 percent of students in 2014 either completed or continued in their programs, compared with 94 percent at 4-year colleges. Only 9 percent of students enrolled in ATE-supported programs in 2014 left their programs prior to completion.

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 Department of Education,[4] 23 percent of students in technical programs at two-year colleges in the U.S. are women.

## The majority of students in ATE-supported programs are **men**.

| | Women | Men |
|---|---|---|
| Secondary level (53,210 students) | 29% | 71% |
| 2-year college level (56,080 students) | 28% | 72% |
| 4-year college level (3,150 students) | 21% | 79% |
| Post-baccalaureate level (200 students) | 32% | 68% |
| Contract training (2,330 students) | 5% | 95% |

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[4] National data for 2-year STEM programs are from the National Center for Education Statistics Digest of Education Statistics (https://nces.ed.gov/programs/digest/2014menu_tables.asp), Table 321.50. 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.

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.[5] The ATE program is enrolling a higher proportion of students from these groups, particularly at 2-year colleges, when compared with national data. 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.[6]
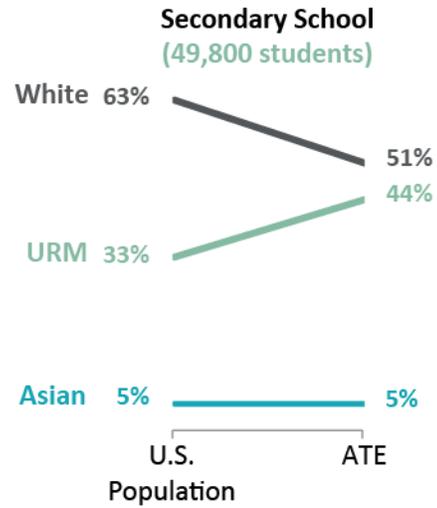
## Demographics of ATE Students

| DEMOGRAPHIC CHARACTERISTIC | NUMBER | PERCENTAGE OF CATEGORY |
|---|---|---|
| **Gender** (n=102) | | |
| Men | 82,909 | 72% |
| Women | 32,054 | 28% |
| **Race/ethnicity** (n=83) | | |
| Hispanic/Latino[†] | 19,699 | 18% |
| American Indian/Alaska Native | 975 | 1% |
| Asian | 5,612 | 5% |
| Black/African American | 21,565 | 20% |
| Native Hawaiian/Pacific Islander | 1,013 | 1% |
| Multiracial | 3,837 | 4% |
| White | 53,909 | 50% |
| **Disabilities** (n=57) | | |
| Students requesting accommodation under the Americans with Disabilities Act | 1,048 | |

[†] Hispanic origin is not a race, and persons of Hispanic origin may be of any race.
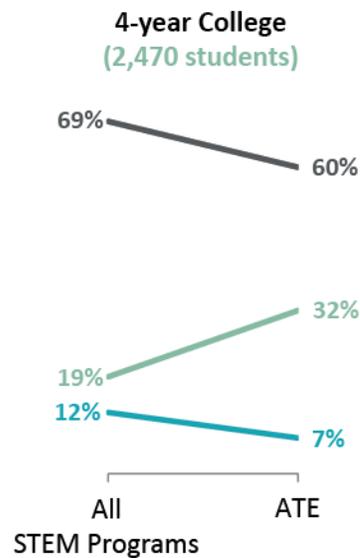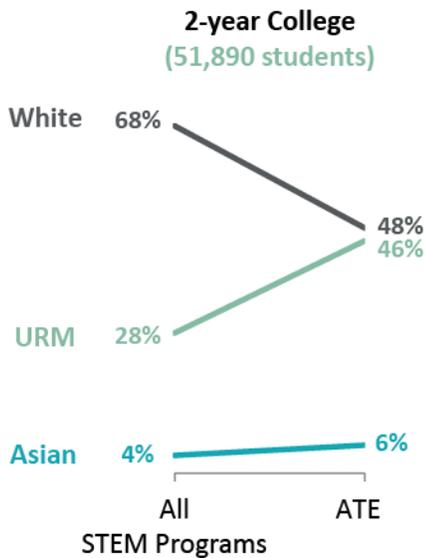
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[5] See "Women, Minorities, and Persons with Disabilities in Science and Engineering: 2013," available from http://www.nsf.gov/statistics/wmpd/2013/pdf/nsf13304_digest.pdf

[6] Data for STEM programs at 2-year, 4-year colleges were obtained from the National Center for Education Statistics. They include the following fields of study: 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.

**44% of students**

in ATE-supported programs at secondary schools were from underrepresented minority (URM) groups; 37% of all secondary school students are from URM groups

**Secondary School**
(49,800 students)

White  63% ————— 51%
                         44%
URM  33% —————

Asian  5% ————— 5%

U.S.          ATE
Population

ATE-supported programs enrolled a larger proportion of URM students than STEM programs nationally.[6]

**2-year College**
(51,890 students)

White  68%
URM  28%
              48%
              46%
Asian  4% ————— 6%

All            ATE
STEM Programs

**4-year College**
(2,470 students)

69% ————— 60%

              32%
19%
12% ————— 7%

All            ATE
STEM Programs

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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## 2015 REPORT

October 2015

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