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National Science Foundation ATE Grant Funding and Mentoring Opportunities

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National Science Foundation
Advanced Technological Education Program
Grant Funding and Mentoring Opportunities

Abstract

The National Science Foundation Advanced Technological Education (NSF-ATE) program has grant funding opportunities available to support CTE and STEM technician program development. NSF-ATE grant funding opportunities are intended to help educators develop or improve their 2-year technician programs. Proposals may focus on program, curriculum, and educational materials development, program improvement, faculty professional development, teacher preparation, career pathways, outreach activities, undergraduate research experiences, internships, apprenticeships, and more. Partnerships with universities, colleges, and 7-12 institutions in support of workforce development are encouraged. Industry partnerships are essential for NSF-ATE projects.

NSF-ATE supports Emerging Technologies and technologies such as Biotechnology, Engineering, Energy, Environmental, Agricultural, Advanced Manufacturing, Micro/Nano Technologies, Information, Security, and Geospatial. Multiple categories of NSF-ATE grant funding are available including Projects, Small Projects for Institutions New to ATE, Applied Research on Technician Education, National Centers, and Resource Centers. The new NSF-ATE solicitation (NSF 21-598) was released in 2021 and includes higher funding levels and multiple categories of grant funding opportunities, including a new Consortia for Innovations in Technician Education. NSF-ATE has some helpful resources for educators planning to develop or improve their courses or programs. Mentoring opportunities for grant proposal development are available through multiple projects such as Mentor-Connect, MNT-EC (Micro Nano Technology Education Center), Mentor Up, Project Vision, Pathways to Innovation, CCPI-STEM, and FORCCE-ATE. Each of these projects has a unique approach and a different focus to help their mentees successfully submit NSF-ATE grant proposals.

Introduction

This paper is part of a collaboration between the MNTEC (Micro Nano Technology Education Center DUE# 2000281) and the ACOE (ATE Collaborative Outreach and Engagement Project DUE# 1723419). One of the MNT-EC goals is to expand and support the MNT community by mentoring faculty to prepare NSF ATE program proposals, providing professional development for educators, and supporting the development of MNT educational materials and curriculum. The ACOE project is intended to inform stakeholders of the resources and services offered by ATE program funded projects and centers, create materials and resources for use and integration into ATE projects, and facilitate collaboration and engagement opportunities within and beyond the ATE community. This paper is part of the information sharing and dissemination of ATE resources intended in the ACOE grant objectives.

ATE Program Overview

The NSF ATE (National Science Foundation Advanced Technological Education) program [1] was originally established in 1992 through a congressional mandate for the purpose of improving the quantity, quality and diversity of the nation's science and engineering technician workforce. The ATE program is a great resource for community colleges and 2-year institutions that offer technician education programs. ATE supports the education of technicians for the advanced-technology fields that drive the United States economy. The ATE program supports professional development of college faculty and secondary school teachers; curriculum, educational materials, and program development; career pathways; outreach activities; undergraduate research experiences; apprenticeships; internships; and even encourages applied research proposals for technician education. All projects must be faculty driven and courses or programs that are developed must be credit based. Incumbent worker education programs (continuing education) may also utilize ATE developed curriculum and programs.

The ATE program encourages partnerships between academic institutions, industry, and economic development agencies with a focus on improvement in the undergraduate and secondary school education of science and engineering technicians. The ATE program also encourages partnerships with entities such as the National Institute of Standards and Technology (NIST) Manufacturing Extension Partnerships (MEPs), Manufacturing USA Institutes, NSF Industry University Cooperative Research Centers Program (I/UCRC) awardees, or any organization that supports technician education programs.

The ATE program encourages proposals from Minority Serving Institutions such as Hispanic Serving Institutions, Historically Black Colleges and Universities, Tribal Colleges and Universities, and Alaska Native and Native Hawaiian Serving Institutions. ATE is actively engaged in supporting strategies for the recruitment, retention, and completion of historically underrepresented students, veterans, and students with disabilities in associate degree technician education programs. The ATE program supports projects focused on rural technician education programs and projects that expand the diversity of the technician workforce.

The technologies supported by the ATE program include advanced manufacturing, agricultural, biotechnology, energy, environmental, engineering, micro and nano technologies, security, information, geospatial, and emerging technologies. Some of these categories include other technologies such as photonics, optics, aviation, automotive, construction, nuclear, chemistry, autonomous technologies, and more.

NSF 21-598 [2] is the current ATE program solicitation and was effective as of July 12, 2021. According to NSF 21-598, the ATE program tracks include Small Projects for Institutions New to ATE, Projects, Consortia for Innovations in Technician Education, Applied Research on Technician Education, and Centers and Resource Centers. The ATE program has $75 million available for new and continuing awards in FY2022 expects to make 45-80 new awards per year as listed in Table 1.

Table 1. ATE Program Grant Information

ATE Program Tracks	Estimated Number Funded Per Year	Maximum Budget	Maximum Duration
Small Projects for Institutions New to ATE	Up to 20	$350k	3 years
Projects	Up to 45	$650k	3 years
Consortia for Innovation in Technician Education	Up to 5	$1.2m for 2 institutions or $3m for 3 or more institutions	4 years
Centers	Up to 2 or TBD	$7.5m	5 years
Applied Research on Technician Education	Up to 5	$150k planning/pilot $300k exploratory research $800k research and development	2 years 2 years 3 years
Conferences/Meetings	TBD	$250k	<1 year

In the Small Projects for Institutions New to ATE category, up to 20 grants are awarded each year for up to $350k for a duration of up to 3 years. Institutions are encouraged to start small, build on successes, and work up to larger project grants. As project teams complete successive projects, their networks and partnerships as well as their expertise in developing and implementing successful projects. Project evaluation results and evidence of positive outcomes and impacts become increasingly important as people seek larger, more complex funding opportunities.

The Projects category is the most common ATE award. There are typically up to 45 grants awarded each year with a funding level up to $650k per award and a duration of up to 3 years. Projects should have an appropriate budget and timeframe for the scope of the work and each project may vary in time and funding to accomplish the stated goals.

The new Consortia for Innovation in Technician Education track has replaced the previous Coordination Network track. This track focuses on collaborations that strengthen partnerships between 2-year Institutions of Higher Education that serve either a specific industry or where the convergence of technologies is changing the skills and competencies needed by the skilled technical workforce. Prospective PIs are expected to collaborate with ATE projects and Centers that support the disciplinary focus of the consortia. Proposers are encouraged to investigate and develop innovative and creative approaches for program improvement and development in response to both industry and technician education needs.

In the Consortia for Innovations in Technician Education track, NSF expects to award 1-5 new awards, ranging from $1.2M to $3M, typically spread over 3-4 years. Consortia of 2 institutions have a maximum budget of $1.2M and consortia of 3 or more institutions have a maximum budget of $3M. The budget should match the scope of the project.

Applied research on technician education project grants are available for a duration of 2 or 3 years at several levels of funding with up to 5 awards per year. Research studies may range from planning to full-scale studies to test implementation or development efforts or innovations.

The largest ATE grants are center grants (known as National Centers of Excellence). A total of 10 ATE centers may be funded nationwide over the next few years with up to 2 center grants

typically awarded each year until the 10 centers are established. A center can be awarded for 2 5-year cycles. After a center's work has ended, they can apply to transition to a resource center grant with funding up to $1.65M for 3 years. The centers are typically awarded to experienced NSF Principal Investigator teams with a vast amount of successful experience with NSF projects, networks, and collaborations.

The NSF PAPPG (Proposal and Award Policies and Procedures Guide) [3] contains information about proposal preparation instructions, submission guidelines, NSF proposal processing and review, budget information, allowability of costs, financial requirements, post award requirements, grant administration, and more. Just about everything people need to know about NSF grants is included in the PAPPG and it is invaluable to anyone preparing an ATE proposal. The PAPPG is updated annually the most current version was effective as of October 4, 2021.

ATE Mentoring Projects

Mentoring opportunities for grant proposal development or program improvement are available through multiple ATE project and center grants such as MentorLinks, Mentor-Connect, Project Vision, MNT-EC (Micro Nano Technology Education Center), Mentor Up, Pathways to Innovation, CCPI-STEM, and FORCCE-ATE. Each of these projects has a unique approach and a different focus to help their mentees successfully submit NSF ATE grant proposals.

MentorLinks

The MentorLinks program (part of DUE# 1838419) [4] is an ATE project based at the AACC (American Association of Community Colleges). MentorLinks is intended to assist colleges in improving, developing, or strengthening undergraduate technician education programs in STEM (science, technology, engineering, and mathematics) fields through mentoring, technical assistance, and professional development opportunities. MentorLinks also helps to provide networking opportunities for establishing new connections and professional relationships through program meetings and at the annual ATE PI (Principal Investigators) Conference. The ATE PI Conference is held in Washington, DC each fall and brings together PIs from projects and centers across the United States.

As part of the mentoring process, MentorLinks mentors do a site visit to their mentee college campuses to learn about their culture, administration, technical programs, challenges, and opportunities. Mentees then do a reverse site visit to their mentor's college or an alternate college to learn some best practices, tour laboratory facilities, and see how other colleges operate internally. Site visits may include meetings with administrators, faculty, industry advisory committees and employers, student services, academic advisors, and others as relevant to the program. MentorLinks first began in 2002 and has been helping dozens of colleges improve or establish programs across the United States.

Table 2. ATE Mentoring Projects

ATE Mentoring Projects (In Chronological Order)	Project Descriptions & Websites [4,5,6,7,8,9,10,11]
MentorLinks Inception 9/1/2002 DUE# 1838419	MentorLinks is designed to help colleges develop or strengthen technician training programs in STEM fields through mentoring, professional development opportunities, and technical assistance. Website: https://www.aacc.nche.edu/programs/mentorlinks/
Mentor-Connect Inception 9/1/2012 DUE# 1840856	Mentor-Connect is a leadership development and outreach initiative project that offers team mentoring for ATE grant proposal development along with supportive resources such as workshops, webinars, and an extensive library. Website: https://www.mentor-connect.org/
Project Vision Inception 5/15/2020 DUE# 2018198	Project Vision is intended to broaden the diversity of institutions supported by the ATE program by engaging college Presidents and Boards of Trustees and supporting the development of innovative grant proposals through mentoring. Website: https://projectvis.org/
MNT-EC Mentoring Inception 7/1/2020 DUE# 2000281	The MNT-EC offers faculty mentoring with attentive interaction and grant writing strategies provided by experienced Principal Investigators to support development of Micro Nano related ATE grant proposals and new Principal Investigators. Website: https://micronanoeducation.org/
Mentor Up Inception 9/1/2020 DUE# 2032835	Mentor Up offers a 2.5-day intensive workshop accompanied by on-on-one mentoring with experienced Principal Investigators and past NSF Program Officers for the purpose of increasing the quality and quantity of ATE proposals. Website: https://atementorup.org
Pathways to Innovation Inception 9/1/2020 DUE# 2039395	*Building Pathways to Innovation* builds on the ATE-supported Business & Industry Leadership Team (BILT) model with three complementary initiatives: BILT Academy, Grant Seeker Academy, and ATE Answers platform. Website: https://www.pathwaystoinnovation.org/
CCPI-STEM Inception 10/1/2021 DUE# 2132510	CCPI-STEM is intended to engage community college administrators with regard to STEM (Science, Technology, Engineering, and Mathematics) education issues and associated action items as well as strengthening business collaborations. Website: https://www.ccpi-stem.org/
FORCCE-ATE Inception 10/15/2021 DUE# 2055250	FORCCE-ATE offers an intensive 3-day workshop fortified with mentoring by expert mentors trained as coaches for enhanced effectiveness to prepare faculty teams to develop and submit competitive ATE grant proposals. Website: https://www.force-ate.org/

Mentor-Connect

Mentor-Connect (DUE# 1840856) [5] is a leadership development and outreach initiative project for ATE that offers mentoring on Small Projects for Institutions New to ATE grants, Second Chance, Moving-Up, and Co-mentoring, which provides additional subject matter expertise for specific technology areas. Mentor-Connect started in 2012 with a focus on Small Grants for Institutions New to ATE. A combination of mentoring, technical assistance, and newly developed resources specific to ATE grant development helped prospective ATE grantees and newly awarded grantees. 2-year colleges were recruited at a time when 2/3 of the nation's 2-year colleges had not yet benefited from the NSF ATE Program. These new colleges were shown how they, too, could be successful when most awards were made to those who had previously been successful in acquiring ATE funding. Mentor-Connect provides individual mentoring throughout the entire process from proposal development to grant start up with technical assistance from designated mentors who are experienced ATE grantees. Mentor-Connect provides a 3-day Technical Assistance and Grant Writing workshop, webinars, tutorials, online workshops, a help

desk, an online resource library, leadership development, and NSF onboarding process with start-up guidance.

Since 2012, Mentor-Connect has worked with 10 mentee cohorts and cohorts 1-8 have completed the process. Cohort 9 is in the pending process after submitting proposals in October 2021 and cohort 10 started the training and proposal development process in early 2022. As shown in Figure 1 for cohorts 1-8, 251 colleges applied and 164 were accepted as mentees (65%). Of those 164 mentees, 141 of them submitted proposals (86%) which exceeded the Mentor-Connect target goal of 80%. Of the 141 submitted proposals, 134 of them were Small Projects for Institutions New to ATE. The other 7 were projects submitted to other ATE funding tracks not addressed by Mentor-Connect training and none of the 7 proposals were awarded. Of the 134 New-to-ATE proposals, 94 were awarded (70%). Of the cohort 1-6 mentees that had their proposals declined, 12 of them have since submitted additional proposals on their own and have received awards. Additionally, of cohort 1-6 mentees, 18 of the 71 mentees that received New-to-ATE awards while working with Mentor-Connect, have since submitted regular project proposals and received project awards. In the new-to-ATE funding track, those who are new only compete against others who are submitting a first proposal. In other ATE funding tracks, first time prospective grantees compete against prospective grantees with previous experience and success in the program.

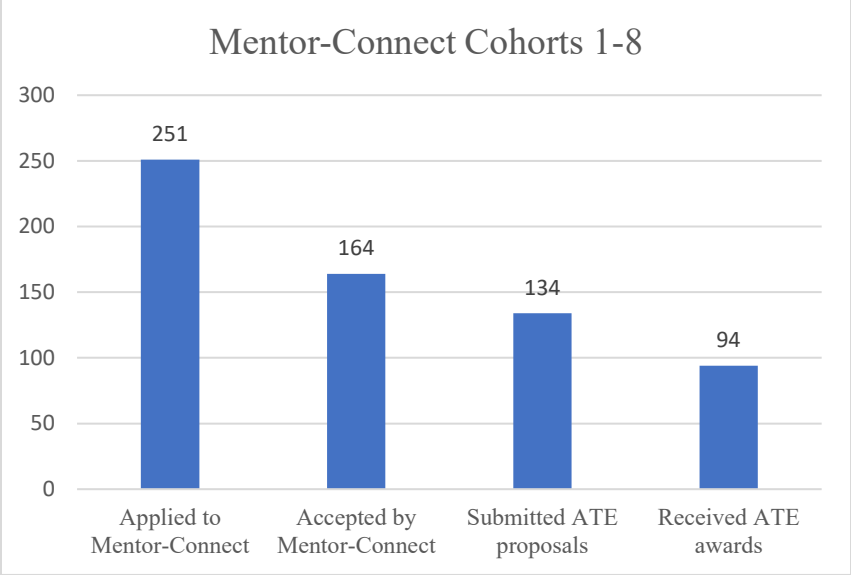

Figure 1. Mentor-Connect Cohorts 1-8 Applicants and Mentees

Starting with cohorts 7 and 8, two new M-C initiatives were introduced as Second-Chance mentoring and Moving-Up mentoring. Second Chance mentoring was intended for mentees that had proposals declined the first time and wanted to try again and Moving-Up mentoring was intended for those that had proposals awarded as New-to-ATE grants and wanted to "move up" and submit project proposals. Of the 8 Second-Chance mentees, 5 submitted New to ATE proposals and 2 were awarded while 3 submitted project proposals and 1 was awarded. Mentor-Connect did not restrict Second-Chance mentoring to those who had been Mentor-Connect participants, and the difference in success or failure of Second-Chance submissions directly correlated to whether the prospective grantee had previously benefited from Mentor-Connect

grant development training and associated support. There were 3 Moving-Up mentees that submitted project proposals and all 3 of them were awarded.

Mentor-Connect has continued to expand its reach and impact by working on a new co-mentoring initiative with several ATE National Centers. The Micro Nano Technology Education Center (MNT-EC), The National Biotechnology Education Center (InnovATE Bio), and The National Center for Autonomous Technologies (NCAT) have all committed to work directly with Mentor-Connect by providing subject matter expertise for mentees that are planning to submit proposals in their respective technology areas.

Micro Nano Technology Education Center

The Micro Nano Technology Education Center (DUE# 2000281) [6] offers project proposal mentoring or co-mentoring (in partnership with Mentor-Connect) with an emphasis in Micro Nano Technology and related fields such as Engineering Technology, Materials Science, Biotechnology, and Photonics. MNT-EC mentors are experienced ATE Principal Investigators. Mentoring services include reviewing proposals, providing subject matter expertise, providing guidance on the ATE Solicitation, PAPPG, NSF New Awardee Packet, and assisting with the NSF onboarding process. In MNT-EC's first year of operation (2020) and first mentee cohort, MNT-EC mentored or co-mentored 5 community colleges. All 5 colleges submitted proposals and all 5 received awards. In MNT-EC's second cohort, MNT-EC mentored or co-mentored another 5 community colleges and all 5 submitted proposals.

Mentor Up

Mentor Up (DUE# 2032835) [7] is an NSF project awarded in 2020 with a purpose of increasing the number and quality of ATE proposals submitted annually. Mentor Up utilizes a process similar to the Mentor-Connect mentoring and leadership development model. Mentor Up hosts a 2.5-day intensive summer workshop accompanied by one-on-one mentoring and supplementary webinars to help community college faculty write and submit an NSF ATE proposal. The application process opens in October and mentoring is provided by experienced Principal Investigators and former NSF Program Officers. College faculty receive stipend support for travel and grant writing. Mentor Up focuses on Projects, Small Projects for Institutions New to ATE, and Instrumentation Acquisition Projects.

Project Vision

Project Vision (DUE# 2018198) [8] is an ATE project awarded in 2020 and aimed at broadening the diversity of institutions supported by the ATE program by engaging college Presidents and Boards of Trustees, to leverage their influence on their colleges efforts to pursue ATE funding. Project Vision mentors, composed of experienced Principal Investigators and a former Senior College Administrator, and a former NSF Program Officer will mentor and support colleges to identify growth opportunities within their institutions, generate ideas for projects, and to develop the infrastructure, knowledge, and expertise that are needed to submit high-quality proposals to the ATE program. Project Vision intends to support innovative proposals in existing and emerging technologies that help meet the industry needs of the skilled technical workforce.

Building Pathways to Innovation Through Strategic Employer Engagement

The Building Pathways to Innovation Through Strategic Employer Engagement project (DUE # 2039395) [9] builds on the BILT (Business & Industry Leadership Team) model, a proven method for strategic employer engagement developed by the National Convergence Technology Center. Through this project, colleges develop employer partnerships for continuous program improvement and innovation, and each participant learns how to develop a high quality ATE proposal.

CCPI-STEM

The CCPI-STEM (Community College Presidents Initiative – Science Technology, Engineering, and Mathematics) project (DUE# 2132510) [10] focuses on engaging community college administrators and trustees in developing local STEM initiatives that are important to their community. CCPI-STEM plans to develop curricular materials that are focused on STEM education issues for community college leaders. CCPI-STEM also seeks to strengthen local business collaborations.

FORCCE-ATE

The mission of the FORCCE-ATE (Fortifying Cybersecurity and Computing Education through ATE grants) project (DUE# 2055250) [11] is to transform the elements of fear and reluctance in pursuing a competitive ATE proposal into a team-produced, compelling NSF grant application. FORCCE-ATE, with its proven track record of funded ATE grants, specializes in all aspects of cybersecurity and computing/IT workforce education.

Each year, up to twelve community and technical college teams of two faculty members and a grant writer participate in this team-based professional development and mentoring program. Essential elements of the program, including mentor training with coaching skills, pre-workshop mentee preparation, a multi-day workshop at Prince George's Community College in Largo, MD, and post-workshop webinars, are all designed to help participants crystalize their innovative ideas and develop competitive NSF ATE proposals.

ATE Central

Based at Internet Scout Research Group at the University of Wisconsin-Madison, ATE Central (DUE# 1744627) [12] is an ATE project that is dedicated to highlighting the work of the NSF ATE projects and centers. ATE Central acts as an information hub for the NSF ATE grantee community by providing a free online portal of resources to showcase ATE products. On the ATE Central website at https://atecentral.net/, there is an online portal of resources created through the ATE program that includes curriculum, professional development materials, webinars, videos, podcasts, learning objects, and more. There is an interactive map where you can find information about every project and center grant. The website also includes the ATE impacts blog, upcoming ATE events (many of which are free to attend) and a newsletter that features projects and centers.

Since 2011, and funded via a separate ATE project, ATE Central's sister project (DUE# 2032738) has produced the *ATE Impacts* book and the most recent version (2020-2021), as well as archived editions are available on the website. The ATE Impacts book highlights key activities, impacts, and information about the ATE Centers of Excellence and features selected projects in each technology field. ATE Central also provides resources for newly funded grantees and an outreach kit and provides activity reports for all ATE grants. ATE Central's archiving service helps with the long-term preservation of deliverables for the ATE community by ensuring ongoing access to project and center created resources and materials.

Journal of ATE

The *Journal of Advanced Technological Education (J ATE)* [13] is a new peer reviewed ATE technical journal focused on technician education at community colleges. The journal is intended to provide an opportunity to disseminate work, promote technical education programs, and share research and best practices with like-minded educators and the wider technical education community. *J ATE* authors include ATE projects and centers, community college faculty, university education researchers, professional associations, and industry representatives.

The target audience includes community and technical college faculty and staff, as well as K-12 educators, industry representatives, and anyone interested in micro-nano technology or related fields, other ATE supported technologies, and 2-year technician education. Articles include topics relevant to teaching and learning in technician education, pedagogical methods, related research, educational activities, lab experiments, and more. There is no cost to submit, publish, access, subscribe, or read the journal.

The *J ATE* is published and was created by MNT-EC (Micro Nano Technology Education Center) with partnerships and support from InnovATEBIO (National Biotechnology Education Center), NCAT (National Center for Autonomous Technology) and NCNGM (National Center for Next Generation Manufacturing). The inaugural hard copy edition of the J ATE will debut at HI-TEC (High Impact Technology Exchange Conference) 2022 in Salt Lake City, UT. To read the J ATE or submit an article, the website is https://micronanoeducation.org/journal-of-advanced-technological-education/ .

EvaluATE

Evaluation is a critical part of every ATE grant project. EvaluATE (DUE# 1841783) [14] is the evaluation hub for the ATE program. EvaluATE educates the ATE community about everything related to evaluation. Evaluate offers resources, webinars, newsletters, blogs and other helpful information at https://evalu-ate.org/.

EvaluATE conducts an annual survey [15] to report on project activities and results for the previous year. According to the 2021 EvaluATE annual survey of 268 projects, 17 centers, 6 conferences, and 12 targeted research projects (313 total respondents), over 39,500 students were served by ATE projects. These students benefitted through enrolling in programs, attending academic programs, participating in transition programs or student competitions, receiving mentoring or business/entrepreneurial skills development, or engaging in workplace learning. A

total of 130-degree programs, 370 courses, and 6,830 educational materials were developed through ATE projects. Articulation agreements between high schools and 2-year colleges or between 2-year colleges and 4-year colleges are an important component of some ATE projects. In 2020, 114 articulation agreements were developed and 517 were maintained by 50 ATE projects. 8,620 educators participated in 860 professional development activities in 2020. Of those educators, 5,750 were from 2-year colleges, 1,720 were from 4-year colleges, and 1,150 were from secondary schools.

ACOE Project Outreach

Outreach is an important component of the ACOE project and the ATE Community hosts exhibit booths at multiple national, regional, and state conferences for the purpose of sharing ATE resources and information as well as proposal mentoring opportunities with conference attendees. Poster sessions or presentations are often given at conferences if the opportunity is available, and the session proposal is accepted. Examples of conferences attended include the ASEE (American Society for Engineering Education) annual conference, the ACTE (Association for Career and Technical Education) CareerTech Vision conference, the HI-TEC (High Impact Technology Exchange Conference), the NCPN (National Careers Pathway Network) Connect conference, the League for Innovation in the Community College Innovations conference, the NCATC (National Coalition for Advanced Technology Centers) conference, the NISOD (National Institute for Staff and Organizational Development) conference, AACC (American Association of Community Colleges) Workforce Development Institute, HACU (Hispanic Association of Colleges and Universities) conference, the Four State Regional Technology conference, the ITEEA (International Technology and Engineering Education Association) conference, and additional local/regional conferences. The ATE Community exhibit at these conferences have ATE center/project flyers, the *ATE Impacts* book, and additional information available for booth visitors. Exhibit booth staff are ATE Principal Investigators that can answer questions for visitors. Connecting new community college people with others in the existing ATE Community is a goal of the ACOE project and conferences are an excellent place to network and form new relationships or partnerships.

Conclusion

There are many opportunities for grant funding and mentoring within the ATE program for community and technical colleges that offer 2-year technician education programs. Technician program development or improvement are a primary focus of the ATE program. As listed in the NSF 21-598 solicitation, a wide variety of technical program areas are supported by ATE. Mentoring opportunities for leadership and grant proposal development are also available through multiple ATE projects. Broadening the impact of ATE projects and centers by networking and resource sharing among faculty is an ongoing effort by members of the ATE Community.

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