

## Overview

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As part of an ongoing effort to better understand the needs of the Advanced Technological Education (ATE) community and to strengthen and support the work of grantees, ATE Central conducted a set of interviews with a group of twenty-six ATE Principal Investigators (PIs) in 2020 and 2021. Most of the interviews were approximately an hour in length, though some lasted much longer.

These targeted interviews focused on a variety of questions, with some pertaining to the ATE program itself and the impacts of grantee work, and others focusing on how cross-cutting projects like ATE Central can support the goals of individual projects and centers. It is important to note that this report covers the period during the COVID-19 Pandemic, which has been, and continues to be, a difficult and unprecedented period for the ATE community and the larger education environment. As such, we included questions about the pandemic in our interviews.

Additionally, the project team included questions about the pandemic in ATE Central's two most recent Annual Community Services Surveys (in November 2020 and November 2021). Relevant information and results from those surveys are incorporated into this report.

This report, unlike previous ATE PI interview reports, also contains information about the community and its ongoing efforts gathered during ATE Central's newest service: ATE Office Hours. These one-hour interactive Zoom sessions have been held monthly and allow community members to learn from each other, interact with featured guests, and share stories, challenges, and impacts with other ATE grantees. PIs were guaranteed anonymity in their answers for surveys and interviews, and neither the interviews nor the ATE Office Hour sessions were recorded. This report is based on extensive notes taken during individual interviews, as well as information gathered during ATE Office Hours sessions.

The *2021 PI Interview Report* is the third in a series. Previous interviews with the community resulted in reports in 2011 and 2016. Both prior reports (as well as this current one) can be found online at <https://atecentral.net/reports>

In an effort to provide continuity between the reports and make it easier to compare and contrast, we have kept some of the elements and sections in this report the same as those in the prior reports, to allow the reader to more easily see shifts in community perspectives and perceptions over time.

This report, like those preceding it, is divided into three sections: the first is a set of **highlights** that touch on key findings from grantees; the second, which makes up the bulk of the report, provides an overview and **details** the responses given by project and center PIs; and finally, the third is a brief **conclusion** section that discusses issues raised and suggests possible avenues to pursue to further support the ATE community.

## Highlights

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- First and foremost, **PIs are passionate about the ATE program and community.** Grantees discussed how important the program has been to their institution, their partners, their colleagues, and their students. Grant funds have helped them improve curriculum, buy much needed technology, recruit a more diverse student body, and create educational pathways that connect students to meaningful work. There was a lot of positive conversation about the strength of ATE as a community and about the cross-cutting projects, like EvaluATE and ATE Central, that provide a variety of tools and services for grantees. The PI Conference was also seen as a huge positive, and while grantees missed having in-person gatherings, they were thankful that virtual opportunities had been provided. The National Science Foundation (NSF) was also brought up by PIs in multiple interviews and on ATE Office Hour sessions – grantees were proud to be funded by NSF, talked about how much their program officers helped them, and discussed the strength of being funded by such a well-respected organization, and the doors that opened to them by being aligned with NSF.
- **The pandemic had a huge impact on the ATE community** creating disruptions for grantees at every level; conversely, it also sparked innovation as ATE projects and centers considered alternative methods and pathways to accomplish their grant activities. In facing these new challenges, PIs relied on a variety of support systems on their own campuses, in the ATE community, and in their respective fields. They continued to collaborate with key partners and stakeholders and found alternate ways to deliver workshops, summer camps, and professional development opportunities, as well as an array of other programmatic and managerial activities.
- **Despite the pandemic, PIs reported an array of successes** and were excited to share them during the interviews and ATE Office Hour sessions. From new collaborations and resources to successful online workshops and more accessible labs, grantees had lots of exciting information to share. ATE projects and centers found innovative ways to counter the environment created by the pandemic and in some cases discovered new pathways and strategies that led to successful solutions that they feel they will continue even after the pandemic eases.
- **PIs discussed a variety of challenges** including, of course, the pandemic and its impact on every aspect of their work and personal lives. Several other types of challenges were also discussed, including, but not limited to, issues related to creating and sustaining strong collaborations with key stakeholders, outreach and dissemination challenges, and how working and teaching remotely during the pandemic created specific struggles from digital divide and technology issues to project management. Among all of these, **the biggest challenge for most PIs is time.** Feeling stretched thin and struggling to keep up with the demands of their teaching, project or center work, and other responsibilities was a challenge for grantees, and the pandemic only made this issue worse.
- **PIs have a real understanding of the need to make resources and activities accessible,** but some still struggle with implementation. While some grantees got a great deal of support from their institution, others felt isolated in their attempts to create a more accessible environment. Still other grantees reported a perceived lack of need, mentioning that they were not aware of any students with disabilities in their programs.

- Industry partnerships are central to ATE project and center work, and PIs recognize how critical these partnerships are to the success of their programs and students. **While many project and centers have created solid industry partnerships, support in this area is still a real need.** Figuring out strategies for connecting and maintaining these partnerships, especially during the pandemic, was a critical issue for several PIs. Also, PIs recognized the need for more professional development on the topic and were eager to dive into opportunities available within the ATE community. One PI specifically noted how helpful the Working Partners Workshop series had been to her and her team; another raised the Business and Industry Leadership Team (BILT) methodology as particularly helpful.
- New to this set of interviews was a focus on whether PIs would apply for another round of ATE funding and what, if any, hurdles they faced when applying. **Most PIs report that they would apply for more ATE funding** but many also faced challenges with the process. At the top of that list was how much time and work the process of applying takes – for new grantees this was a real hurdle. Another top challenge was the writing itself, with several PIs expressing frustration that they did not have grant writers or other types of support on their campus that could provide help.
- **PIs are comfortable with the concept and practicalities of sustainability.** This seems to be a trend that is continuing from the 2016 report. More grantees have a clear understanding that not everything needs to be sustained and that they should consider multiple pathways when thinking about how to sustain project and center deliverables. However, despite this shift, PIs would still like further support with their sustainability efforts, particularly in generating ideas and strategies.

## Details

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The following questions served as focal points for discussion, and serve to group and organize the more detailed notes included below:

1. *What do you think is most important to get across to educators about the ATE program? What are the program's strengths?*
2. *In what areas of your own project or center are you seeing the most success, or the biggest impact?*
3. *Who have been your biggest supporters?*
4. *What challenges are you and your project facing?*
5. *What avenues do you use for outreach and dissemination, and do you have a plan?*
6. *How satisfied are you with your sustainability plan and strategies?*
7. *To what extent do you consider accessibility in your ATE-related work and how is it incorporated into your project/center?*
8. *What were the biggest hurdles for you when you applied for your ATE funding, and would you apply for ATE funding again?*
9. *How can ATE Central and other cross-cutting projects help support the work of your ATE project or center?*

### **1. What do you think is most important to get across to educators about the ATE program? What are the program's strengths?**

PIs were excited to share their thoughts about the NSF ATE program and its influence on their institutions, their own professional growth and development, their communities, and of course on their own applied STEM offerings and programs. How they viewed the ATE program and the community varied, depending in part on how long they had been involved with ATE – newly funded PIs were still learning how to manage and implement their newly funded grant and exploring the community whereas more experienced PIs had a longer tenure to draw upon.

### **ATE IS CRUCIAL TO A VARIETY OF STAKEHOLDERS**

**The importance of ATE was raised by many PIs** – that the focus of the program is crucial to the US economy; that the monies provided create demonstrative improvements to individual programs on their campus; and that students benefit exponentially from the programs developed with ATE funding. PIs shared that the innovative components and deliverables developed by ATE funding was a real strength of the program. PIs mentioned the life changing quality of the program for their students and that it helped retain students who might otherwise have given up. The critical nature of the program was also discussed in terms of the strength of the community and the support received by grantees from other ATE projects and centers, as well as from the National Science Foundation as a funder.

### **ATE HELPS PROMOTE DIVERSITY AND INCLUSION**

Grantees discussed the breadth and depth of the program – that it covers a variety of fields of study, has projects or centers in most states, and covers both rural and urban areas – as a huge strength of the program. **PIs recognized the ongoing need to make the program as diverse as possible**

**with mention of inclusivity and diversity** coming up during the interviews. PIs talked about the pivots made during COVID and how the move from in-person to remote to hybrid made them consider and reconsider student and faculty needs – technologically, pedagogically, financially, and otherwise – as their programs shifted and changed in response to state and institutional directives. Several grantees talked about the diversity of students at community colleges in general and at their own institutions in particular, and their ongoing work focused on bringing more students from underrepresented groups into ATE and STEM programs.

### ATE IS REWARDING FOR GRANTEES, INSTITUTIONS, AND STUDENTS

A dimension of ATE mentioned by many PIs was **how rewarding the program is – not only in terms of its impacts on their programs and students, but also on their own professional growth**. The process of being involved with ATE – learning about how grant funding works, interacting with people on campus that they had never worked with before, and exposure to a national community of other grantees – were all mentioned by PIs as rewarding and exciting experiences. Some PIs mentioned that receiving an ATE grant was stressful in that it created more work and a new set of responsibilities but, in the same breath, they also brought up the rewards of being involved in ATE. Rewards at a personal level included feeling more confident and more engaged; at an institutional level, grantees discussed the ability of the ATE program to improve their programs and ultimately, and most importantly, lead to better long-term outcomes and opportunities for students.

### ATE SUPPORTS COMMUNITY AND COLLABORATION

*“The barriers disappear when you say ‘I’m part of ATE’. Everyone is open to helping each other.”*

As in past years, the concept of community was central throughout discussions with PIs. Consistently across types of institutions, fields of study, and geographical location, PIs reported that **the ATE community is unique and supportive**. For some PIs, it was a newly discovered source of support and resources, particularly for those who had never had grant funding before. For more experienced PIs, the ATE community has become an extended network of colleagues and resources providing ongoing collaboration. The fact that the program brings together institutions from all over the country and that they can work together through the ATE community network was also mentioned.

## 2. In what areas of your own project or center are you seeing the most success, or the biggest impact?

### FOCUSING ON PEOPLE AND PARTNERSHIPS

ATE PIs were eager to share their successes, and despite the many obstacles thrown at them during the pandemic, there were lots of successes to share. **First and foremost were their successes related to strong partnerships, ongoing impacts on students, staff, and faculty, and the successful relationships they had built with others** – on their own campuses, regionally, and even nationally.

Some examples of the successes reported by participants included:

- Working collaboratively with local high schools to create strong pathways
- Seeing students work together to support each other in their educational experience

- Bringing leadership from several professional associations to work together on national standards
- Providing students with opportunities to help small local businesses strengthen their cybersecurity
- Exposing high school summer day-camp students to 3D printing and showing them how exciting and easy it is to use
- Recruiting a more diverse set of students for their program
- Successfully leveraging other work from the ATE program to strengthen their own curriculum and activities

## FOCUSING ON ACTIVITIES AND DELIVERABLES

As in previous reports, PIs discussed the high impact of many of the key activities and deliverables laid out in their grant. From summer camps to newly developed curriculum to professional development for faculty, these were at the heart of discussions about what they felt were their key successes.

- **Educational materials** including curriculum and other types of resources were brought up as being a key success, with a lot of discussion about having to pivot due to COVID and modify existing curriculum so that it could be used in a remote or hybrid environment. One PI discussed the success of three math games that their project had created in collaboration with three gaming companies and the strong community that developed among the students involved.
- **Newly developed or improved program components, student competitions, internships, summer camps, and other activities** were consistently mentioned by PIs as having been successful and of high impact for their students, campus, and industry partners. One PI mentioned refurbishing a lab on campus with help from both ATE and industry partners. Some PIs felt very supported by their campuses and others were struggling to get more institutional support – but either way they recognized the value of these critical grant-funded activities.
- **Online activities and outreach opportunities** were discussed often as having a great deal of impact on their work, and being critical to their success during the pandemic. While PIs had mixed feelings about anything Zoom-related as the pandemic continued into its second year, most agreed that online opportunities to share information, present at conferences, and interact with others were critical to their project and center work. One PI reported that their online workshop series, which had originally been designed to be in-person, was so successful as a virtual event that they decided to continue the series online, even after the pandemic is over.

## FOCUSING ON NEW TECHNIQUES, TECHNOLOGIES, AND APPROACHES

There is always a lot of discussion in the ATE PI community about innovation and technology. These focal areas are critical to STEM education in general and the ATE program in particular. Given that many proposals include innovative approaches as well as integration of new technologies and pedagogical approaches, it is not surprising that during both the targeted interviews and the ATE Office Hours sessions **the discussion repeatedly turned to techniques, technologies, and approaches**. Unsurprisingly, the pandemic only increased this focus as PIs and their colleagues and institutions experimented with new strategies to deal with social distancing in labs, teaching remotely, virtual conferences and meetings, and so much more.

Several PIs brought up successful innovations related to working with students remotely. One PI said that she encouraged her students to help innovate as the pandemic continued. As a result, her classes decided to work collaboratively to figure out how they could conduct experiments and re-create a certain amount of lab work from home. Students also supported each other and used platforms like Zoom to study together. Other PIs discussed successes at an institutional level. A PI shared that a big part of the focus of his ATE-funded project had been on transitioning his curriculum online and that he ended up unexpectedly in a leadership role at his institution supporting less-experienced faculty and staff as they made the transition to a virtual environment. Another PI discussed that due to the pandemic his project team were unable to conduct industry tours and decided to do virtual tours instead, creating a series of videos with their industry partners. This pivot has turned out to be a success with the PI mentioning that “the physical tours can only touch so many people whereas the videos can impact a much broader audience.” And the videos will do double duty as the team expects to not only use bits of this footage throughout their curriculum but also for recruiting purposes.

### **3. Who have been your biggest supporters?**

A new topic for this round of interviews focused on who ATE PIs felt they had received the most support from, and **grantees were eager to talk about the people and organizations that provided support and help** over time, both prior to and during the pandemic. The categories below provide some distinctions although often the lines between these categories blurred and overlapped.

#### **MENTORS AND LEADERS**

Whether formal, through projects like Mentor-Connect and MentorLinks, or informal via the ATE community or other stakeholder networks, **mentors were repeatedly brought up in discussions as a source of support for ATE grantees.** In some cases, these were the same mentors who helped the PI craft and submit their original proposal. In others, these were mentors who grew organically from meetings, conferences, or other connections but, either way, this type of relationship was seen by PIs as being extremely beneficial. Also mentioned in this category were campus administrators including college presidents and deans, as well as heads of professional associations. Getting support from leaders at their own institution or from organizations that are well-respected in their field helped provide PIs with connections, networks, and access to information and resources to help their ATE project or center flourish.

#### **COLLEAGUES AND CO-WORKERS**

Another source of support mentioned often by PIs during interviews and on ATE Office Hours were their own colleagues and co-workers, including those on their own campus, from the broader ATE community, and colleagues from the wider education community. These critical players helped develop curriculum, produce professional development materials, and also provided ongoing day-to-day support. **During the pandemic, colleagues supported each other at many levels both professionally and personally** as grantees helped each other deal with everything from work-related challenges like setting up labs to complying with social distancing and implementing COVID testing on campus, to personal issues related to childcare and working from home.

## PARTNERS AND STAKEHOLDERS

From large organizations like AARP and Target to small local businesses and high-schools, **partners and stakeholders were strong sources of support for grantees.** These key stakeholders actively participated on advisory boards, provided placements for internships, helped with student recruitment, and brainstormed during the pandemic about innovative ways to solve the many challenges that arose for grantees. State and local government were also mentioned by several PIs as sources of support, with one PI mentioning that their college president and deans work very closely with their city council and with the local small business association and that they have been able to utilize those pathways to share out information and also to connect with local business partners. Finally, PIs discussed how supported they felt by the National Science Foundation, and the strength of being aligned with such an esteemed organization. Several grantees mentioned the letter sent out by ATE lead program officer Dr. Celeste Carter during the pandemic and the sense of reassurance it provided them that NSF understood the challenges they were facing and that the organization and staff was there to support them during a difficult time.

*“Business associations have been critical – our center worked closely with our state Business and Industry Association that represents a variety of industry including a subgroup that focused on over 200 manufacturing companies. Our center was able to do surveys to all of the subgroup members to ask about topics like workforce needs, perception of community colleges, and other issues key to our work.”*

### 4. What challenges are you and your project facing?

#### THE PANDEMIC

**The ATE community has always faced an assortment of challenges but the pandemic created difficulties no one could have expected.** It touched on every aspect of project and center work: recruiting students, creating professional development opportunities, maintaining robust industry partnerships, working collaboratively with colleagues, disseminating results, and much more. The pandemic created an extremely challenging environment for grantees and as one PI said in referring to the pandemic and its impact on their students, “It’s life issues – more than just classroom issues with students and it’s challenging for faculty.” PIs found themselves juggling an assortment of extraordinary circumstances personally and professionally.

#### PEOPLE AND PARTNERSHIP ISSUES

Unsurprisingly, particularly given all of the challenges raised by the pandemic, **a host of issues arose related to partnerships and working with others.** PIs mentioned difficulties with finding and sustaining industry partnerships as business and industry colleagues had their own struggles during the pandemic making it more difficult to connect and collaborate with them. PIs who were hoping to partner with K-12 had a host of problems as the pandemic continued and schools faced all kinds of difficulties with remote learning, and then masking. One PI brought up the challenges of engaging faculty in professional development and that faculty are incredibly busy and do not have time for professional development even with remuneration. A center PI talked about difficulties with their National Visiting Committee (NVC), reporting that they had been unrealistic about what the center could accomplish and that they were more combative than supportive.



PIs also discussed that they wanted more ways to connect with others in the ATE community, particularly during the period without face-to-face opportunities like the ATE PI Conference. Several PIs mentioned that connecting with other grantees provided them with opportunities to learn from others who are facing the same challenges, and share ideas and best practice for how to approach and/or solve an array of issues from student recruiting to annual reporting.

As has been the case in past reports, college administrators and their level of support was a source of frustration for a portion of those interviewed. While some PIs felt very supported by their chairs, deans, and presidents, others felt that their administration did not understand the challenges they faced as a grantee. Several PIs raised issues related to turnover – that a previous dean or president had been supportive but that their replacement was not. With all the difficulties and disruptions caused by the pandemic, it was often hard to get time with new administrators to help them understand the value of ATE-related work.

## PROCESS AND PROCEDURAL ISSUES

**A variety of processes came up when talking about challenges with PIs, some of them related to the pandemic and some that were pre-existing but exacerbated by the situation.** Recruiting students came up more than once with PIs – trying to connect with high school counselors and students and figuring out how to do virtual versions of recruiting events were two examples of the frustrations and challenges in this area. Several PIs raised the issue of trying to get feedback and/or consensus from groups – examples included industry partners, national visiting committees, advisory boards, and professional associations. At the height of the pandemic, it had been particularly challenging to get people to respond to email and phone calls. Others talked about how difficult it was to find and set up relationships with collaborators like contractors and sub-awardees. One PI in particular spoke about the difficulties of internal processes on their campus with curriculum approval, and how frustrating it was to their team that it takes at least two years to get a degree program in place.

Several PIs mentioned how difficult it has been for them to work with their campus on process and procedural issues related to outreach and dissemination components, sharing stories about struggles to get websites launched, problems with printing and/or mailing, or issues related to getting access to webinar or meeting software for project and center work rather than teaching. These outreach and dissemination difficulties were often heightened and complicated by the pandemic.

## ENVIRONMENT AND TIME ISSUES

*“The cool thing that happens when you have a problem or a challenge is that you have to come up with creative solutions and sometimes those are even more innovative than your original idea.”*

**Time was mentioned by almost all PIs as a challenge. Even if everything was going fairly smoothly for them, they felt “stretched thin” as one PI succinctly put it.** For new grantees who were struggling with trying to understand how to set up and run a new grant, coping with pandemic related difficulties, plus teaching and other responsibilities, the time pressures felt overwhelming.

For many PIs, the environment they were dealing with was also a source of frustration. Whether it was moving to a virtual environment, working from home, or conditions on their particular campus, they faced a host of challenges from lack of support, to childcare, to technology issues. Challenges related to being in a rural area were also raised by several PIs including helping students

who were struggling with broadband and technology needed to access online classes and, when classes were in-person, difficulties with students getting to labs and classes because of drive time. One PI in particular mentioned how difficult it was to provide students and faculty with opportunities for hands-on experiences with new technology when living in a rural area.

### **5. What avenues do you use for outreach and dissemination, and do you have a plan?**

As the pandemic lengthened, PIs all agreed that outreach became an area, like many other grant related activities, that required some ingenuity and creativity. In-person events switched to Zoom and some activities, like summer camps, took a lot more planning if they were held at all because of masking, social distancing, and general concerns about safety.

### **OUTREACH & DISSEMINATION PLANNING**

As in past reports, most PIs reported that they did not have a formal outreach plan. More experienced PIs relied on what has worked consistently for them – often a known set of conferences, meetings, recruiting methods, etc. Newer PIs had a plan in their grant and were hoping to follow that as they began to carry out their project activities. **For all PIs, outreach planning changed radically as the pandemic progressed: many events and outreach activities were canceled outright, postponed, or shifted to a virtual environment.** In past interviews, PIs mostly felt confident about their outreach efforts; however, during the pandemic, many PIs felt worried or frustrated about this critical project component as many conferences went virtual and PIs had a harder time connecting with colleagues and stakeholders.

### **OUTREACH & DISSEMINATION ACTIVITIES**

PIs talked about a variety of events and activities that they engaged in or were planning to engage in before the pandemic hit. These ranged from summer workshops (for both faculty and students) to presenting at conferences and meetings to open houses. PIs discussed the diverse audiences involved in ATE – students, parents, colleagues, industry partners, or a variety of other stakeholders – and shared their various strategies for connecting with them. Few PIs mentioned any use of physical mailings; this pathway has been dwindling steadily and the pandemic made this dissemination strategy even more difficult with educators and others working from home rather than on campus. Social media was raised but seemed to be, for many PIs, a pathway with mixed results, as one PI mentioned, “I know we should be using [social media] but we just haven’t seen a lot of interaction or gains from using it so far.” Websites were raised as a central outreach tool, and several PIs mentioned ATE Central’s Microsite Service as a helpful resource for grantees. PIs discussed the difficulties of getting help from their campus in creating and hosting sites; the Microsite Service came up again in these conversations.

Many PIs brought up HI-TEC as an important venue for outreach and dissemination, but by far the most-mentioned event was the ATE PI Conference. **Grantees extolled the virtues of the ATE PI Conference and how helpful it has been to them in sharing out information about their own work as well as networking with others in the community.** While they missed in-person conferences, most PIs were very pleased that both HI-TEC and the ATE PI Conference proceeded with virtual events.

## UNEXPECTED OPPORTUNITIES

As has been the case with various areas of ATE work, the pandemic caused lots of challenges but also resulted in innovation. Several PIs shared stories about this as it related to outreach and dissemination, with workshops being raised several times as a key example of an often-used dissemination strategy, particularly for professional development. As workshops transitioned from in-person to online events, grantees feared the worst – participants would not want to sit through long Zoom calls, workshop components would not work well in an online environment, etc. Many of these fears were, however, unrealized. In fact, for some grantees, the change to an online workshop brought unexpected benefits. Some of the benefits mentioned included:

- A **larger and potentially more diverse audience** pool, from the ability to bring attendees in from across the country for what was originally supposed to be a local or regional workshop
- Ability to **spread content out over time** – an in-person workshop happens over a day or two; an online workshop can be stretched out over weeks or months allowing participants to dig more deeply into subject matter
- Potential to **bring in more panelists and speakers** – flying in panelists or speakers is expensive; an online workshop allows content experts to pop in to meetings easily
- **Broader dissemination** – project leads realized they could do more workshops per year than expected because costs associated with the workshop were lower (no travel, hotels, food)

### 6. How satisfied are you with your sustainability plan and strategies?

*“Over the years we have built up our educational collaborators and they are starting to strengthen and grow their own programs – so the work we are doing is sustained through our partnerships.”*

Awareness and understanding around sustainability has grown and changed over the last decade, with PIs becoming much more aware of what is expected of them and, in particular, understanding that they do not need to sustain everything they are doing to be successful. In fact, they may be more successful by picking only what is most valuable and impactful to sustain.

**Most PIs who were interviewed seemed comfortable with where they were in their sustainability process and were able to speak more confidently about that process**, with many describing a mixed approach to sustainability that included

industry partners, grant funding, and institutional support. Embedding grant-funded programmatic elements at their own institution was by far the most often mentioned method for sustainability.

Some PIs brought up the difficulties they faced related to sustainability, for example one raised their concern that a particular deliverable was not going to be sustained long-term by their home institution. How PIs spoke about these challenges were mixed – with some feeling deeply frustrated and others seeing it as a challenge and something to be innovative about rather than being confused about how to move forward. Multiple PIs acknowledged that they may not be able to sustain everything, but many acknowledged that they were exploring options and support systems that could help them make decisions and prioritize which activities and deliverables they should concentrate on sustaining. Interestingly, several PIs raised the connection between sustaining their grant-funded deliverables and ATE Central’s Archiving Service, highlighting their understanding that the materials they created will be available long-term to educators within, and beyond, the ATE community.

## **7. To what extent do you consider accessibility in your ATE-related work and how is it incorporated into your project/center?**

Asking PIs about their activities related to accessibility was a new topic for the interviews this cycle, and many grantees were eager to share their experiences and views. Many PIs brought up their institution's support for students – what services were offered on campus, the accessibility of their learning management system, or institutional requirements related to curriculum development. As one PI put it, "We have to consider accessibility – there was a major push on campus to make everything ADA compliant... we work closely with our campus support team."

Several PIs mentioned that they did not have very many students with disabilities in their classes and one PI mentioned that the discussion around accessibility during the interview made them consider strategies for specifically recruiting students with disabilities. Another PI explained that while their campus has a fairly robust disability service center, it is still a difficult process for his team to ensure accessibility for their students. Their program is related to gaming and mobile app development and they have modified desktops and customized interfaces for students with visual impairments. The PI discussed that they try and work through any accessibility challenges as the issues arise for students; they have had deaf students in the program with interpreters, and they have quite a few autistic students enrolled in the program, too.

### **ACCESSIBILITY AS A PROCESS**

**Several PIs brought up that they consider accessibility as a process.** One PI mentioned that they had two students in their program who were in wheelchairs and that working with those students made the project team realize that the lab space was not accessible for these students as they were not able to wheel up to the bench. As a result of this, the project team constructed a short-term plan and a longer-term plan aimed at making the lab more accessible. Another PI discussed the fact that much of what they do is accessible, but there are issues that they struggle to address – for example, some of the lab equipment cannot be modified which has made accessibility difficult for students who need to use that equipment. One PI mentioned that the AccessATE Universal Access Lab (a hands-on lab held at the ATE PI Conference to help attendees learn more about accessibility) was very helpful and hoped that these sorts of opportunities related to accessibility would be offered again in the future.

## **8. What were the biggest hurdles for you when you applied for your ATE funding, and would you apply for ATE funding again?**

Another new area for this most recent set of interviews related to grantee experiences with applying for ATE funding, and whether they would consider applying again. Many of the issues discussed were consistent across projects and centers with a variety of challenges raised by grantees. **Despite any hurdles or difficulties, most PIs said that they would apply for ATE funding again,** many of them discussing upcoming submissions and ideas during the interviews.

*"Yes, we would apply for funding again. Beyond obtaining funding for our project, having the opportunity to network with other ATE grantees at the conference in DC was a real blessing to me in developing a broader perspective on education across the United States, particularly at the community college level."*

## TIME AND RESOURCES

Unsurprisingly, **having enough time and support were mentioned often as real challenges for PIs when they discussed applying for ATE funds.** For those new to grant writing this was particularly true, as many did not really understand the time commitment involved in writing and submitting a proposal. Several PIs talked about the challenge of getting help from those on their own campus, as well as difficulties in finding and integrating key external partners into the process. Evaluators and industry partners were both raised as examples.

## WRITING AND SUBMITTING

**For many ATE PIs the actual writing of the proposal posed the biggest challenge** – several mentioned that their campus did not employ grant writers and particularly new PIs felt very confused about how to write the proposal itself. PIs brought up not understanding the construction of the proposal (i.e. what sections should be included) as well as not realizing that there were all kinds of other documents and forms that they needed to fill out in Fastlane. One PI mentioned that “it felt hard to know how to tell the story, we just needed more help and guidance.” PIs mentioned that understanding how many and which programmatic components should be included was confusing when writing their first proposal (should they prioritize professional development over recruiting underrepresented students?). PIs also discussed that it was stressful to try and decide things like how long the different sections should be and how to clearly tie in the evaluation section which was often written by an external evaluator.

## KEY SUCCESS FACTORS

PIs talked a lot about what helped them overcome the various challenges outlined above, and ultimately be successful in writing their ATE proposal. Here are a few of the factors that were mentioned most often:

- **Mentoring** – whether through a formal program like Mentor-Connect or through a less formal relationship, PIs agreed that it made a huge difference to have guidance from someone who had been through the process and that this was a key factor in submitting a successful ATE proposal.
- **Institutional resources** – grant writing support, financial services, helpful administrators, and supportive colleagues were all mentioned by PIs as having made a big difference during the proposal writing and submission process.
- **ATE community support** – EvaluATE, ATE Central, Mentor-Connect, and the ATE PI Conference were all mentioned as ways that grantees got help understanding the proposal process, connecting with solid partners and support, and ultimately being successful in their submission. PIs discussed how important these cross-cutting internal support systems are for the community, especially for those new to ATE.

### ***9. How can ATE Central and other cross-cutting projects help support the work of your ATE project or center?***

One of the questions asked in the interview was a two-tiered question that asked PIs if they were familiar with ATE Central and how ATE Central and other cross-cutting projects could support their work. Most PIs reported being familiar with ATE Central and also mentioned that they had used ATE Central tools or services - that they used the website, attended ATE Office Hour sessions, read the ATE Central Connection newsletter, or utilized the Microsite or Archiving Service in the last year.

**Given ATE Central's longevity, most PIs are now familiar with the project and its offerings.** The second part of the question, related to how ATE Central and other cross-cutting projects in the ATE community could support grantees' work, led to more in-depth discussion. The topics raised during the interviews (and outlined below) are consistently raised in surveys, ATE Office Hours, and in the PI interviews. They are some of the core areas most grantees grapple with at some point or another when managing a grant and, as such, were raised as important topics by many PIs, especially those new to the community.

## CONNECTING & COLLABORATING

Particularly during the pandemic, but also prior to it, **PIs are eager to connect and collaborate with others in the ATE community.** For many PIs, there is still a certain amount of isolation on their own campuses; several discussed being the only PI on their campus. For those feeling this type of isolation, the ATE community is a source of support, information, ideas, and collaborators. PIs also wanted help with their industry partnerships and opportunities to learn more about how to recruit and sustain the right mix of industry partners for these critical collaborations. Several PIs mentioned struggling with connecting with high school partners during the pandemic. PIs praised the ATE Office Hours sessions as a very helpful way to connect with the community, particularly during the pandemic. While most PIs agreed that they missed in-person conferences, they were glad to have virtual versions of HI-TEC and the ATE PI Conference to attend. One PI mentioned the virtual Getting Started workshop as especially helpful.

## SUSTAINABILITY & ARCHIVING

While many PIs felt more comfortable with their sustainability plan, several discussed that they would like more professional development in this area and more help understanding archiving as well. Given that new PIs enter the community each year, this is an ongoing need for grantees. As one PI put it: "Being new I do need help with sustainability, and with archiving. And also learning more about what resources are available." Many PIs interviewed were aware of and utilizing the Archiving Service, but new PIs were often still somewhat confused about what they were supposed to archive, or when to approach ATE Central about archiving.

## OUTREACH & DISSEMINATION

The pandemic complicated outreach and dissemination plans (as discussed throughout this report) and PIs were looking for other pathways and strategies that could help them connect to critical audiences and stakeholders. Several issues were raised in areas where PIs wanted more support:

- **Social media** – as in past interviews PIs felt unsure about best practice and were concerned that they were not doing "enough" tweeting, posting, etc. They also raised issues about whether they should be using newer platforms like TikTok and, if so, how.
- **Virtual conferences and meetings** – during the initial phase of the pandemic, PIs were all concerned about which tools to use for virtual meetings and many were transitioning to teaching online. As the pandemic wore on, understanding how to navigate virtual conference platforms also became an issue as PIs tried to figure out whether these events were a good dissemination pathway.

- **Website design and management** – this topic was raised during interviews, and during ATE Office Hours sessions, with PIs requesting help in getting a website online and then maintaining it over time. While many PIs take advantage of the Microsite Service provided by ATE Central, others who choose not to use the service struggle with campus support, hosting issues, and design conundrums.
- **General outreach** – from branding to planning to student recruiting, various other outreach topics were touched on as possible areas for support during the PI interviews and ATE Office Hours sessions. Outreach support is also an area highly requested by grantees in ATE Central’s Annual Community Services Survey.

## Conclusions

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This report has been created to help provide an overview of the successes and challenges facing the National Science Foundation's Advanced Technological Education (ATE) community. These grantees are primarily based at two-year community and technical colleges and are focused on helping educate the next generation of the skilled technical workforce, and supporting those who teach in applied STEM programs at these institutions. It is our hope that the information summarized in this report from the ATE PI interviews, ATE Office Hours sessions, and ATE Central's Annual Community Services Survey proves useful to a variety of audiences including ATE grantees, the National Science Foundation, ATE industry partners, professional associations, and many others. ATE Central relies on this information to help shape and improve the project's tools, services, and resources as part of its mission to provide support for the ATE community and other educators as they go about the critical work of educating tomorrow's workforce. Many of the interviews conducted as part of this process led to follow-up emails and conversations, ideas for improvements, and potential collaborations. The challenges and issues raised during the interviews and highlighted in survey responses and during discussions on ATE Office Hours sessions, suggest several possible avenues to pursue for community leaders and cross-cutting projects and centers, to further support the ATE community.

### **CONTINUING TO FIND WAYS TO FOSTER COMMUNITY COLLABORATION AND KNOWLEDGE SHARING**

The ATE community is a true community – consistently supporting each other and working collaboratively to improve STEM programs. But for some PIs, particularly those at smaller and rural institutions, there is still a feeling of isolation. For many PIs, the pandemic heightened issues related to feeling isolated despite efforts on multiple fronts by NSF and community leaders. And while there are a variety of webinars, online meeting offerings, chat systems, and other services in place, it's worth considering how else cross-cutting projects and the large national centers can ensure that PIs understand the various ways they can reach out to others, connect with fellow grantees, and find answers to their various and varied questions throughout the lifecycle of their grant.

### **SUPPORTING THE GRANT WRITING AND SUBMISSION PROCESS, PARTICULARLY FOR THOSE WHO DO NOT HAVE ACCESS TO A MENTOR OR MENTORING PROGRAM**

While many PIs expressed interest in applying for another round of ATE funding, they also shared the difficulties they encountered in the process of applying. They talked about struggling with the process of grant writing – some of them had little or no support on their campus. Grantees also brought up that they did not really understand how much time the process of applying for a grant took and that it was overwhelming when stacked on top of all their other responsibilities. Time was probably the biggest challenge at every level for grantees during this set of interviews – in an environment where ATE project and center teams were already extremely busy, the pandemic added significant new burdens and taxed resources at every level. This begs the question of whether there are methods or systems for helping support PIs (particularly those who do not enter a formal mentoring program) while they are writing their proposal. While there are already resources available in the community, it may be worth considering what else can be done.



## PROVIDING CONSISTENT AND ONGOING SUPPORT AND INFORMATION IN CORE AREAS THAT COME UP OVER AND OVER AGAIN

It's worth acknowledging that there are a core group of areas that PIs consistently raise when asked about needed support. These invariably include sustainability, outreach and dissemination, evaluation, and grants management issues like report writing or understanding fiscal responsibilities. New PIs enter the community each year and eventually many of these new PIs move into more experienced roles; with this evolution the specific way they experience needs in these areas also shifts. A new PI with a small grant will have a different set of concerns related to sustainability than a PI who has successfully moved from creating a medium-sized project to being funded to develop a national center. These core areas of need will always exist, which means cross-cutting projects and large national centers must work together to create solid content that is updated consistently and helps support all grantees no matter their circumstance or where they are in their grant progression journey.

In closing, **we want to give thanks and credit to the ATE PIs** who took the time (when time was very much at a premium) to fill out surveys, take part in ATE Office Hours sessions, and in particular to spend an hour or two talking openly about their concerns, challenges, collaborations, and successes in interviews. We hope that this report will help all of us in the ATE community, as well as our funders at the National Science Foundation, envision and build more new and innovative ways to strengthen our partnerships, foster new pathways for collaboration, and create exciting opportunities for our partners, students, and colleagues to grow and learn.

*While the PI interviews were conducted with assurances of individual anonymity, ATE Central welcomes inquiries and discussion about the aggregate information gathered in this report. Please do not hesitate to get in touch by emailing [info@atecentral.net](mailto:info@atecentral.net) if you have questions or comments.*

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