DEFINING AND MEASURING

DIVERSITY, EQUITY, AND INCLUSION

IN ADVANCED TECHNOLOGICAL EDUCATION (ATE) CONTEXTS

2019 EvaluATE PI and Evaluator Survey Findings
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INTRODUCTION

BACKGROUND AND CONTEXT

Historically, minoritized groups in the United States have typically had a much smaller presence in STEM professional fields than their peers (Madison, 2007; Marra, 2015; Osei-Kofi & Torres, 2015). Evidence suggests that STEM fields have been riddled with biases (Committee on Equal Opportunities in Science and Engineering, 2017; Lee, 2015) and a culture of exclusion and limited accessibility persists (Avendano et al., 2019; Packard, 2015). Policymakers, industry leaders, and scholars have pushed to improve STEM education and grow the number of diverse students interested in STEM majors and careers. As part of the Advanced Technological Education (ATE) program, the National Science Foundation (NSF) encourages faculty at two-year colleges to serve as principal investigators of ATE projects which aim to attract a more diverse student population into STEM (ATE Impact, 2020).

STUDY RATIONALE AND RESEARCH QUESTION

To better understand the extent to which STEM educational programming, including the ATE program, provides a pathway into STEM for underrepresented minorities, evaluators and PIs should attend to the topics of diversity, equity, and inclusion (DEI) within their projects and programs. The National Academy of Sciences report *Indicators for Monitoring Undergraduate STEM Education* calls on the nation to "strive for equity, diversity, and inclusion of STEM students and instructors by providing equitable opportunities for access and success" (NAS, 2018, p. 2). This study builds on developments in culturally responsive evaluation (Boyce, 2017; Chouinard & Cousins, 2009; Mertens & Hopson, 2006; Samuels & Ryan, 2011; Tillman, 2014) to investigate how these practices can be applied in two-year college contexts to improve assessment of, diversity, equity, and inclusion, particularly within ATE projects.

In this report, we focus on the following research question:

How are ATE external evaluators and principal investigators defining and measuring diversity, equity, and inclusion (DEI) in their projects and evaluation practices?

METHODS

Data collected for this report was included in existing EvaluATE, the evaluation learning and resource hub for the National Science Foundation's Advanced Technological Education (ATE) program, data collection procedures. To explore this DEI research question, two sets of sub-questions were embedded into the 2019 EvaluATE principal investigator (PI) survey and the 2019 EvaluATE evaluator survey. We analyzed the quantitative survey data using descriptive statistics. For the qualitative analysis, we utilized ATLAS.ti in a process of thematic analysis (Braun & Clarke, 2006). We also coded responses from both evaluators and PIs to see how well their responses aligned with the NAS definitions of diversity, equity, and inclusion provided in the survey. Responses were coded as *yes* if they matched the definitions closely, *maybe* if they included any ambiguity, and *no* if the response was not in alignment with the NAS definitions.

FINDINGS

EVALUATOR SURVEY FINDINGS

SUMMARY OF LIKERT RESPONSES

Evaluators reported that their projects often engaged in activities designed to increase diversity, equity, and inclusion. However, when it came to gathering evidence around these three concepts, equity and inclusion data were gathered less often. Diversity was most often measured, followed by inclusion, then equity.

SUMMARY OF QUALITATIVE RESPONSES

DIVERSITY: Evaluators were able to describe the type of data collected associated with this construct more frequently than with equity and inclusion. Evaluators surveyed most often utilized demographic data to measure diversity, usually through program documentation, surveys, and administrative/institutional data. Many evaluators listed interviews as a method of data collection, and very few respondents reported using observations. Evaluators also reported collecting data about project enrollment, participation, and outreach/recruitment efforts.

EQUITY: Evaluators most frequently reported using administrative data, institutional data, and program documentation to measure equity. Demographics were often included as a part of their explanation. When measuring equity, evaluators reported measuring access and project recruitment efforts most often.

INCLUSION: Inclusion was most often measured using surveys and interviews, while a handful of respondents reported using document review. Over twenty percent of respondents listed demographic information as a way to measure inclusion.

Alignment with NAS Definition: We examined the extent to which the answers provided correctly aligned with NAS definitions of diversity, equity, and inclusion. Responses for diversity data collection were more well-aligned. However, alignment varied greatly in equity and inclusion answers. Coding for definition alignment was highly related to a lack of clarity in participants' responses to the questions.

PRINCIPAL INVESTIGATOR SURVEY FINDINGS

SUMMARY OF LIKERT RESPONSES

Principal investigators reported that their projects often engaged in activities designed to increase diversity, equity, and inclusion. However, when it came to gathering evidence related to these three concepts, similar to the evaluators, PIs reported that equity and inclusion data were gathered less often. Principal investigators also rated their projects' engagement with diversity more highly than the collection of evidence about that engagement.

SUMMARY OF QUALITATIVE RESPONSES

DIVERSITY: Principal Investigators surveyed discussed specific activities and strategies they engaged in to measure diversity. Activities most often reported were paying attention to demographics, the involvement of specific populations, recruitment, access, outreach activities, engagement, training, and support. PIs also reported focusing on diversity through research, participation, funding/financial allocation, enrollment, and development of course materials.

EQUITY: Similar to diversity, PIs most frequently reported focusing on access, demographics, recruitment, and development of course materials as specific project activities to measure equity. PIs also reported targeting specific populations, training, participation, using an individualistic approach, financial assistance, resources, and materials when describing equity.

INCLUSION: Inclusion was most often focused on through demographics, support, supplemental activities, recruitment, professional development, engagement, and paying attention to a specific population; while a handful reported core values, participation, curriculum, enrollment, collaboration, and access while describing inclusion.

DISCUSSION

In our discussion we highlight five areas for further consideration. In the first three points we discuss each specific construct measured. In the last two points we reflect on how PIs and evaluators are motivated and attending to these issues (or not) in their work:

(1) Diversity Has the Spotlight in DEI Work

(2) How Ought We Define Equity?

(3) What Counts as Inclusion?

(4) PIs Have Attended to These Issues and Had More to Say

(5) What Gets Measured Gets Done

We also present limitations to this study, including addressing the ambiguity and contentiousness of the constructs, the limited space available in the survey for probing to get at such topics, and the difficulty of categorizing responses.

BACKGROUND AND CONTEXT

Our world increasingly relies on science and technology to solve many of society's most demanding problems. As challenges mount in the areas of national defense, climate change, health, energy, economic growth, food safety and accessibility, and environmental protection, so too does the demand for highly skilled scientists, engineers, and health professionals (National Academies Press, 2005). While employment in science, technology, engineering, and mathematics (STEM) professions is growing at a faster rate than any other occupation (Avendano et al., 2019), the need for qualified scientists and engineers is unmet and multifaceted (Jackson, 2013; National Science Board, 2018). In this report we provide a brief history regarding diversity and equity in STEM and situate our mixed-methods survey study in the context of the Advanced Technological Education program (National Science Foundation, 2018), then outline our rationale and key research question, and finally present detailed findings and a discussion of implications and limitations of this work.

HISTORY OF DIVERSITY, EQUITY, AND INCLUSION IN STEM

Historically, minoritized groups in the United States have typically had a much smaller presence in STEM professional fields than their peers (Madison, 2007; Marra, 2015; Osei-Kofi & Torres, 2015). Evidence suggests that STEM fields have been riddled with biases (Committee on Equal Opportunities in Science and Engineering, 2017; Lee, 2015) and a culture of exclusion and limited accessibility persists (Avendano et al., 2019; Packard, 2015). Women, ethnic minorities (African-American, Latinx, and American Indian), persons with disabilities, and individuals who come from economically disadvantaged backgrounds are the least well represented in STEM fields (National Center for Education Statistics, 2009). Over the past several decades, many STEM fields have witnessed a growth in participation and degrees earned by these groups, yet they remain disproportionately underrepresented in STEM fields (National Academies of Science, Engineering, & Medicine, 2018).

Scholars, policymakers, and laypeople argue the exclusion of certain groups has led to homogenous perspectives in STEM fields ultimately has hindered innovation and advancement in STEM (American Society of Higher Education, 2011; Charleston, 2012; Smith & Wingate, 2016). Recently, policymakers, industry leaders, and scholars have pushed to improve STEM education and grow the number of diverse students interested in STEM majors and careers (Avent, Boyce, Servance, et al., 2018; Avent, Boyce, Labennett, et al., 2018). The National Science Foundation's "Broadening Participation" initiatives aim to encourage and support individuals from underrepresented groups to pursue science-related degree programs and professions (National Science Foundation, 2008).

CONTEXT OF THE ADVANCED TECHNOLOGICAL EDUCATION PROGRAM

In 1993, the NSF created the Advanced Technological Education (ATE) program following the Scientific and Advanced Technology Act of 1992, which directed funding for advanced technical training programs towards associate-degree-granting colleges. The ATE program focuses on educating technicians for technology fields vital to United States economic growth through partnerships with two-year academic institutions, secondary schools, and industry (NSF, 2018). Fields of technology supported by the ATE program include, but are not limited to, agriculture and biotechnology, engineering technologies, security technologies, micro and nanotechnologies, and advanced manufacturing (ATE Central, 2021). As part of the ATE program, NSF encourages faculty at two-year colleges to serve as principal investigators of ATE

projects which aim to attract a more diverse student population into STEM (ATE Impact, 2020). According to ATE Impact (2020), two-year associate-degree-granting institutions enroll the highest number of minority and first-generation college students, with ATE programs influencing their career paths into the technical workforce. Therefore, the ATE program is playing a role in increasing the number of individuals qualified for STEM careers and the participation of minorities and women in advanced technological fields (Smith & Wingate, 2016).

EVALUATE

EvaluATE is the evaluation learning and resource hub for the National Science Foundation's Advanced Technological Education (ATE) program. The mission of EvaluATE is to partner with ATE projects and centers to strengthen the program's evaluation knowledge base, expand the use of exemplary evaluation practices, and support the continuous improvement of technician education throughout the nation. The majority of the EvaluATE team is housed at Western Michigan University's Evaluation Center, located in Kalamazoo, Michigan. This report and study was conducted by EvaluATE members located at the University of North Carolina Greensboro. Our overall goals are to conduct research on and provide strategies to the ATE community and beyond on how engage with diversity, equity, and inclusion within ATE evaluation and programming.

RATIONALE AND RESEARCH QUESTION

To better understand the extent to which STEM educational programming, including the ATE program, provides a pathway into STEM for underrepresented minorities, evaluators and PIs should attend to the topics of diversity, equity, and inclusion within their projects and programs. The National Academy of Sciences report *Indicators for Monitoring Undergraduate STEM Education* calls on the nation to "strive for equity, diversity, and inclusion of STEM students and instructors by providing equitable opportunities for access and success" (NAS, 2018, p. 2). The NAS defines the three constructs as follows:

DIVERSITY: Differences among individuals, including demographic differences such as gender, race, ethnicity, and country of origin.

EQUITY: Fair distribution of opportunities to participate and succeed in education for all students.

INCLUSION: Processes through which all students are made to feel welcome and are treated as motivated learners.

This study builds on developments in culturally responsive evaluation (Boyce, 2017; Chouinard & Cousins, 2009; Mertens & Hopson, 2006; Samuels & Ryan, 2011; Tillman, 2014) to investigate how these practices can be applied in two-year college contexts to improve assessment of equity, diversity, and inclusion, particularly within ATE projects. The comprehensive study investigates five research questions 1) How are ATE grantees currently defining and measuring equity, diversity, and inclusion in their research and evaluation practices? 2) To what extent do the current practices and data collection methods align with the NAS objectives and indicators? 3) What conditions or resources are necessary in order for ATE projects to successfully gather and report data on the NAS indicators? 4) What conditions exist in the ATE context (community colleges) that impede or facilitate the collection of sound data on equity, diversity, and inclusion? 5) What is the perceived validity and utility of project-level data on equity, diversity, and inclusion? In this report, we focus on the following research question:

How are ATE external evaluators and principal investigators defining and measuring diversity, equity, and inclusion (DEI) in their project and evaluation practices?

Understanding how DEI is conceptualized will facilitate understanding the ways in which ATE programs engage in and measure these constructs as part of their programs and in their evaluation endeavors.

METHOD

SURVEY INSTRUMENTS

Data collected for this report was included in existing EvaluATE data collection procedures. Two sets of sub-questions were embedded in the 2019 ATE survey of grantees and the 2019 ATE evaluator survey.

DEI SUBSECTION IN EVALUATOR SURVEY. During the survey data collection for the larger EvaluATE project, evaluators were asked a total of 10 questions regarding DEI. First, participants were told, if they evaluate multiple ATE projects, to respond to the questions thinking of the one most active in evaluating issues around DEI. Then they were provided with the NAS (2018) definitions of diversity, equity, and inclusion. Participants were asked two Likert questions: (1) "to what extent does the ATE project you evaluate directly engage in activities designed to increase equity, diversity, and inclusion?" and (2) "To what extent does the evaluation of this ATE project gather evidence related to equity, diversity, and inclusion?" Participants rated all three terms separately for both questions, on the following scale: (1) *not at all*, (2) *minimal extent*, (3) *moderate extent* (4) *substantial extent* (5) *very substantial extent*.

If participants responded that their evaluation of their ATE project engaged at all in gathering evidence related to diversity, equity, or inclusion, they were then provided with a separate qualitative box for each construct and asked to describe what kind of data they gather to document that construct in the ATE project they evaluate.

DEI SUBSECTION IN PI SURVEY. At the end of the yearly survey of ATE grantees, project PIs were asked nine questions regarding DEI. First, participants were provided with the NAS (2018) definitions of diversity, equity, and inclusion., They were then asked, "To what extent does your ATE project directly engage in activities designed to increase equity, diversity, and inclusion?" Participants rated each term separately on the following scale: (1) *not at all*, (2) *minimal extent*, (3) *moderate extent*, (4) *substantial extent*, (5) *very substantial extent*.

If participants responded that their project engaged at all in activities around any of these terms, they were provided with a separate qualitative box and asked to "describe and provide examples of how you address [equity/diversity/inclusion] in your ATE project." Finally, PI's were asked, "To what extent does your ATE project's evaluation gather evidence related to equity, diversity, and inclusion?" Participants again rated each of the three terms separately, on the same five-point scale indicated above.

DATA COLLECTION

The respective sets of DEI-related questions were included with the 2019 survey of ATE grantees and the 2019 ATE evaluator survey. Each of the surveys was sent out to the appropriate ATE program participant audiences by the EvaluATE team members at Western Michigan University (WMU). The 2019 ATE PI survey launched on March 4, 2019, and closed on April 19, 2019, and the ATE evaluator survey was

administered from June 25 to July 31, 2019. Raw survey responses to the DEI-related sets were provided by Western Michigan University to the UNCG team.

DATA ANALYSIS AND THEMES

We analyzed the quantitative survey data using descriptive statistics. For the qualitative analysis, we engaged in a process of thematic analysis (Braun & Clarke, 2006). We also coded responses from both evaluators and PIs to see how well their responses aligned with the NAS definitions of diversity, equity, and inclusion provided in the survey. Responses were coded as *yes* if they matched the definitions closely, *maybe* if there was any ambiguity in their response's relationship to the NAS definitions, and *no* if the response was not in alignment. Utilizing ATLAS.ti, we coded the data using an iterative process and multiple coders. Research team members engaged in independent coding of the qualitative responses from both the evaluator and principal investigator surveys. Upon completion of the independent coding, team members reviewed the individual codes, engaged in dialogue to come to a consensus in understanding, and combined the codes that were similar in nature, grouping them into themes for each of the surveys/constructs based on the similarity of the codes in conjunction with the activities/domains under which the codes fell. In an iterative manner, the research team met to build further consensus, refine, and deliberate regarding diverging and conflicting codes.

Descriptive statistics and qualitative responses are paired together in our findings in order to understand perceptions of PIs and evaluators regarding the use and understanding of DEI in their work.

PARTICIPANTS

Participants for this report were respondents to two surveys implemented by the EvaluATE evaluation hub at Western Michigan University. These two surveys were distributed to project evaluators and Principal Investigators (PIs).

ATE EVALUATORS. Evaluators who were working on at least one NSF-funded ATE program (some evaluators worked on multiple projects) were invited to participate in this survey. The survey response rate was 48.3% (n = 69/143). Participants were 56.5% female and 37.7%, male. Their number of years worked as an evaluator ranged from 1 year to 40 years. Most of them (98.6%) were external evaluators. Participants worked in settings such as independent consulting practice (41.2%); consulting, research, or evaluation firms (33.8%); higher education (19.1%); and others (5.9%). Most of them (82.6%) evaluated between one and three projects. Detailed demographic information is presented in below.

EVALUATORS' DEMOGRAPHICS

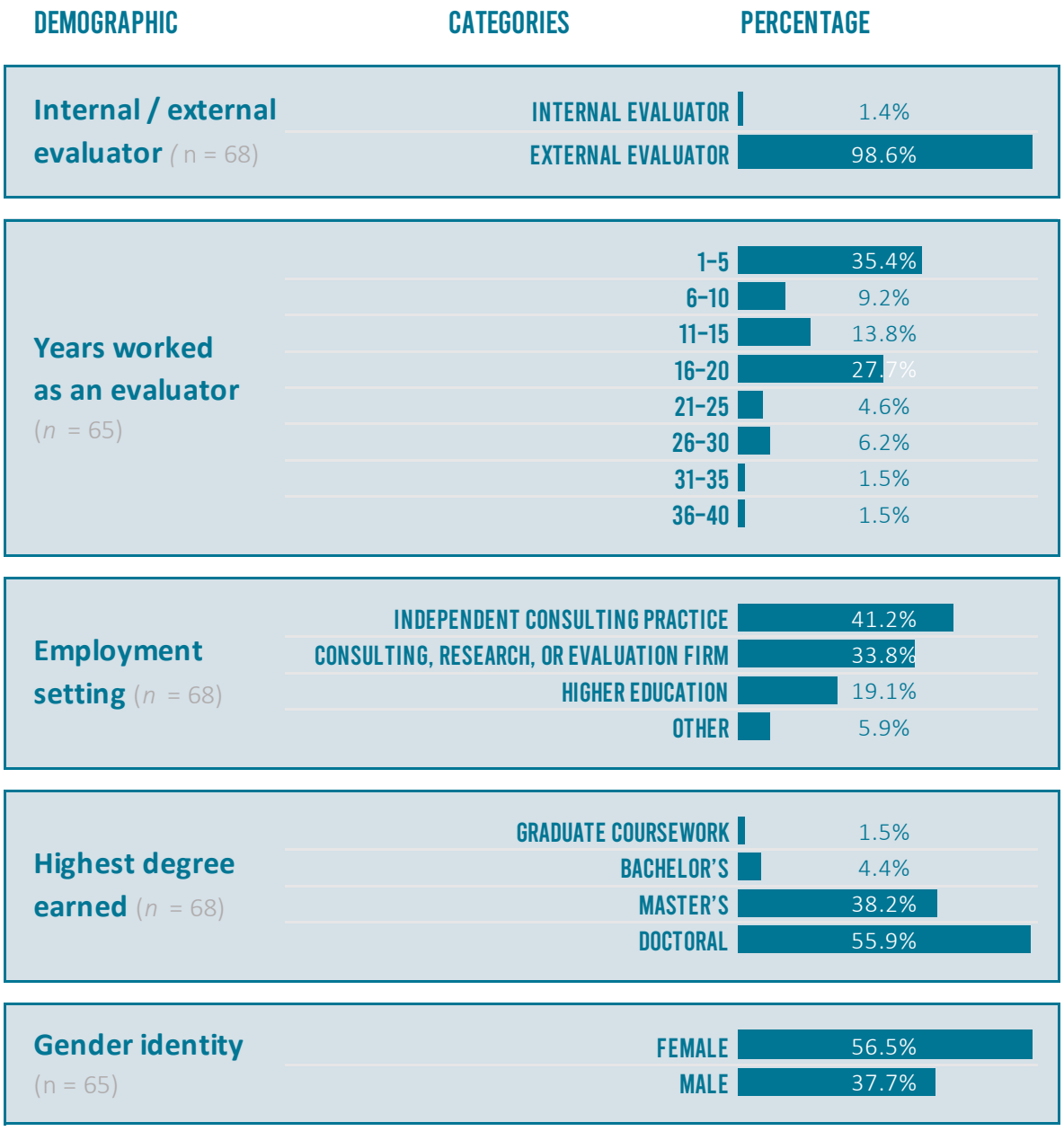
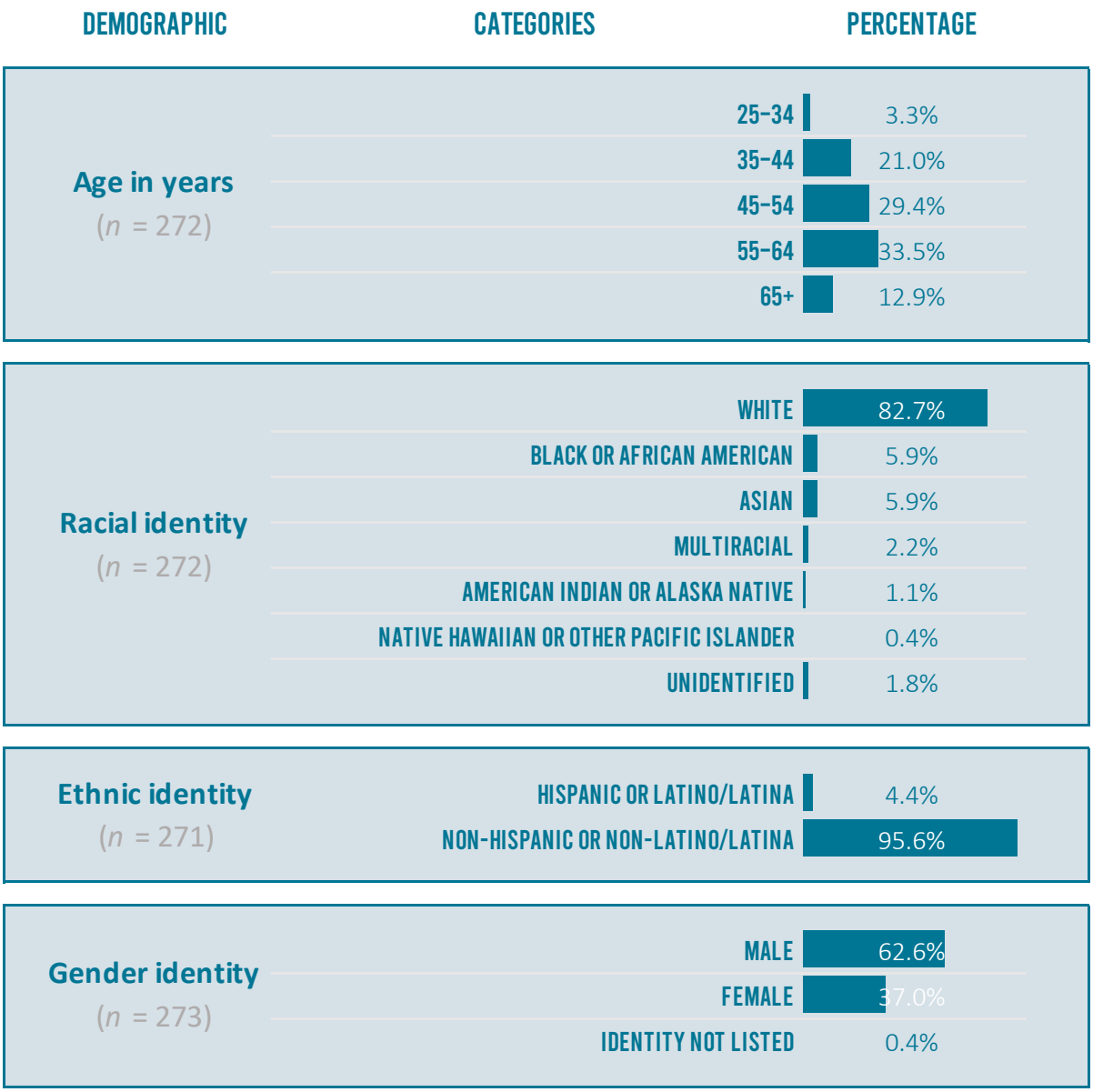


Table 1

PRINCIPAL INVESTIGATORS. The survey was sent to all project PIs with active grants, and 92% (n = 279) responded to the survey. In some cases, the principal investigators were working on multiple ate projects. They were aged between 25 years and 65+ years and were mainly white (82.7%). Most of the ate grants they engaged in were project-based (61.6%). Project PIs were mainly located in 2-year colleges or 2-year college systems. A little above half (51%) of the institutions the project PIs were located in were not designated as minority-serving institutions (MSIs). The most frequently reported number of years covered by the grants ranged from 1 to 5 years (97.7%). Detailed demographic information for PIs is presented in Table 2.

PRINCIPLE INVESTIGATORS DEMOGRAPHICS



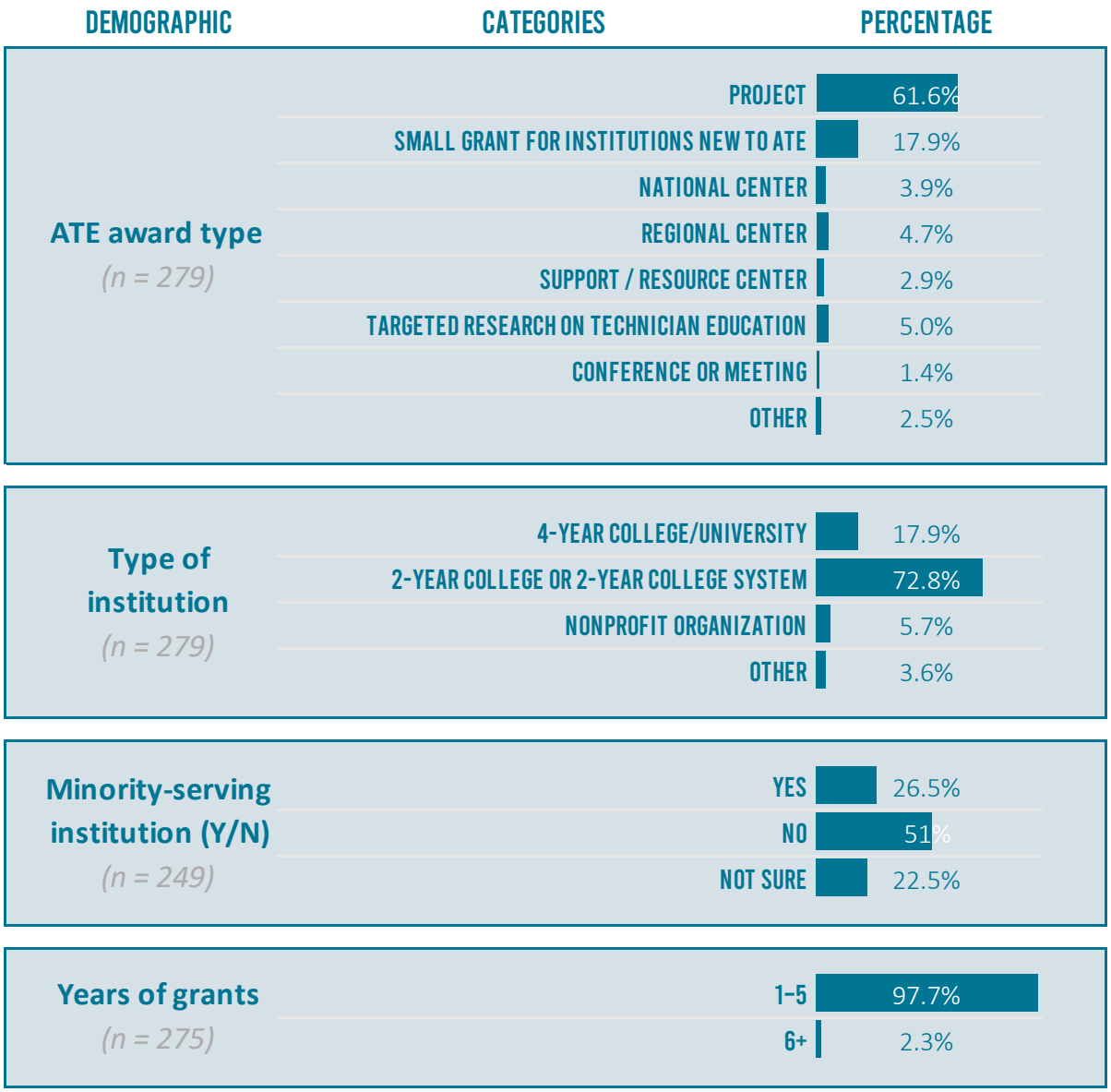

DEMOGRAPHIC
CATEGORIES
PERCENTAGE
ATE award type
(n = 279)
PROJECT 61.6%
SMALL GRANT FOR INSTITUTIONS NEW TO ATE 17.9%
NATIONAL CENTER 3.9%
REGIONAL CENTER 4.7%
SUPPORT / RESOURCE CENTER 2.9%
TARGETED RESEARCH ON TECHNICIAN EDUCATION 5.0%
CONFERENCE OR MEETING 1.4%
OTHER 2.5%
Type of institution
(n = 279)
4-YEAR COLLEGE/UNIVERSITY 17.9%
2-YEAR COLLEGE OR 2-YEAR COLLEGE SYSTEM 72.8%
NONPROFIT ORGANIZATION 5.7%
OTHER 3.6%
Minority-serving institution (Y/N)
(n = 249)
YES 26.5%
NO 51%
NOT SURE 22.5%
Years of grants
(n = 275)
1-5 97.7%
6+ 2.3%

Table 2

EVALUATOR: SURVEY FINDINGS

How are ATE external evaluators defining and measuring diversity, equity, and inclusion in their research and evaluation practices?

Evaluators of ATE projects were asked two survey questions regarding (1) to what extent the ATE project they evaluate engaged in activities designed to increase equity, diversity, and inclusion and (2) to what extent the evaluation of the project gathered evidence related to equity, diversity, and inclusion. Findings indicate that projects are directly engaging in diversity, equity, and inclusion work to a moderate to substantial extent, but the extent to which evidence is gathered around these topics is not as prominent.

EVALUATOR: QUANTITATIVE FINDINGS

According to ATE evaluators, their projects directly engage in DEI work to a moderate to substantial extent on average, which is slightly higher than the midpoint. Hardly any evaluators (between 1.5% and 6%) indicated that the projects they worked on did not engage in these activities at all. See Figure 1 for a detailed display of these findings.

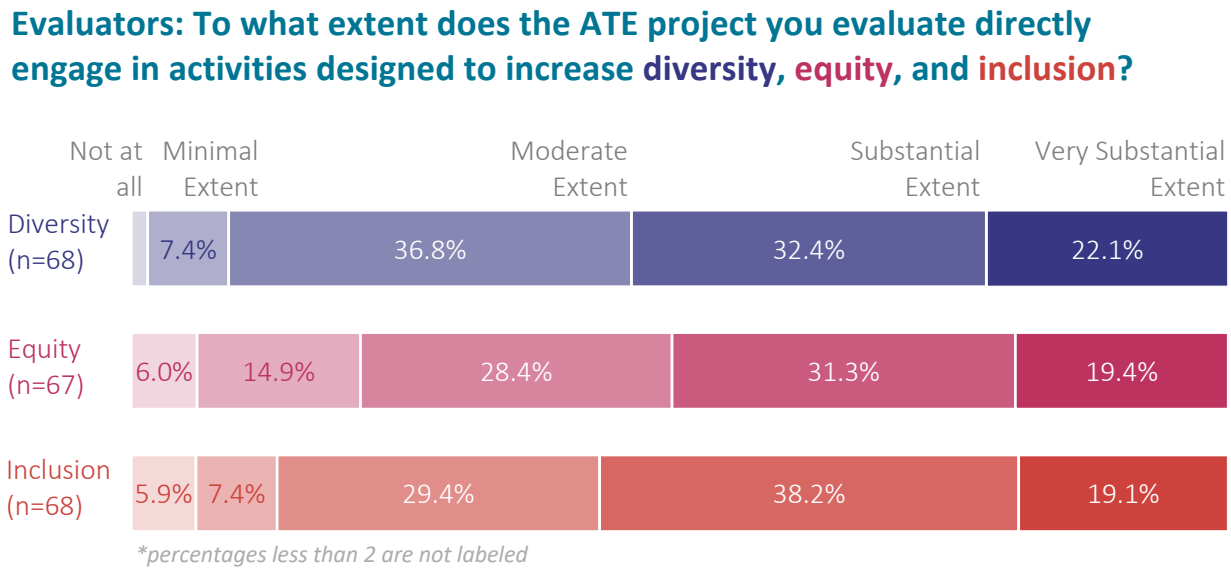


Figure 1

However, when we look at the extent to which evaluators gather evidence related to these three terms, the story is a little bit different. Evaluators gathered the most evidence related to diversity (M = 3.43, SD = 1.04). It is also notable that 16.4% of evaluators did not gather evidence related to equity and 14.7% did not gather evidence related to inclusion. Only 4.4% of participants did not gather any diversity evidence. See Figure 2 for a detailed look at these findings.

Evaluators: To what extent does the evaluation of this ATE project gather evidence related to diversity, equity, and inclusion?

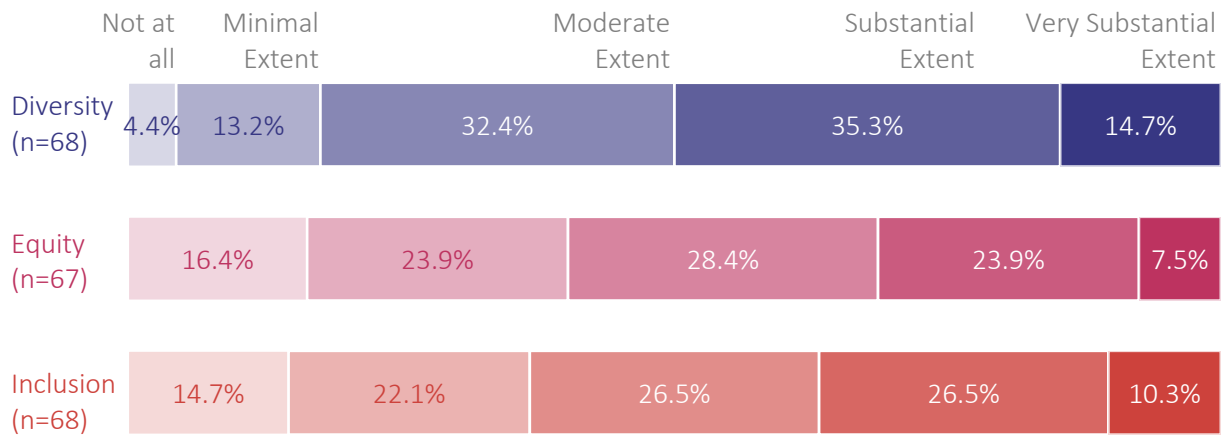


Figure 2

EVALUATOR: QUALITATIVE FINDINGS

Evaluators who reported collecting any evidence related to each of the three constructs were asked to describe what kind of data they gather to document DEI. Descriptions of their qualitative remarks are separated by each construct below.

DIVERSITY. Sixty-five participants (95.6%) reported that they collect data on diversity as a part of the evaluation of their ATE project. Of those who reported having collected any evidence related to diversity, 61 participants provided qualitative remarks. Participants who noted that they collected data on diversity overwhelmingly reported that they collect demographic information to address this topic (68.85%). Other methods or types of data collection listed were surveys, focus groups and interviews, institutional or administrative data, program documentation, and observational data. In addition, participants sometimes explained specific project activities, the most common one being specific enrollment activities (13.11%). Finally, the research team coded responses according to their alignment with the NAS definition of diversity:

NAS Definition of Diversity: Differences among individuals, including demographic differences such as gender, race, ethnicity, and country of origin.

Participants' responses regarding diversity were most often coded as *maybe* or *yes* (both 47.54% of responses each for a total of 95.08%) in terms of whether the responses aligned with the NAS definition. A *maybe* response meant there was not enough explanation in the survey responses to deem them to be correctly aligned with the definition. Interestingly, diversity received the most responses categorized as being in alignment to the NAS definition, in comparison to equity and inclusion. See Table 3 for a summary of these findings and applicable quotes.

DIVERSITY: EVALUATOR QUALITATIVE FINDINGS

Table 3. Evaluators' descriptions of the data they collect regarding diversity including selective quotes.

THEME	SUB-THEME	PERCENTAGE
Data collection method or "type"	**DEMOGRAPHICS** (n=42) "Demographic information for groups underrepresented in STEM workforce"	68.85%
	SURVEYS (n=12) "Survey data from program participants"	19.67%
	INTERVIEWS OR FOCUS GROUPS (n=9) "Interviews with students, interviews with faculty"	14.75%
	ADMINISTRATIVE OR INSTITUTIONAL DATA (n=8) "Administrative data are broken down by race/ethnicity and gender"	13.11%
	PROGRAM DOCUMENTATION (n=6) "Review of student projects and team membership"	9.83%
	OBSERVATIONAL DATA (n=4) "Participant surveys, interviews, and participant-observation."	6.55%

Table 3

DIVERSITY: EVALUATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies	**ENROLLMENT ACTIVITIES** (n=8) "Enrollment into the ACC MET program is analyzed by gender and racial subgroups"	13.11%
	OUTREACH ACTIVITIES (n=5) "Monitor student demographics & document specific outreach to special populations"	8.20%
	DATA ANALYSIS ACTIVITIES (n=5) "Administrative data are broken down by race/ethnicity and gender"	8.20%
	PARTICIPATION IN THE PROGRAM (n=4) "We look at the participation of students and faculty, as it is an area with high diversity"	6.56%
	RECRUITMENT INTO THE PROGRAM (n=3) "Recruit women and veterans"	4.92%
	TRAINING ACTIVITIES (n=2) "Post-workshop data"	3.28%

Table 3.

DIVERSITY: EVALUATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Correct definition of construct	YES (n=29) "Demographic data on student & faculty participants in ATE activities"	47.54%
	MAYBE (n=29) "Notes regarding the composition of groups of students interviewed about their experience of the advanced technology"	47.54%
	NO (n=1) "This is the focus of the [name redacted] University so the ATE classes were designed to be a general education course that would be available to the entire campus"	1.64%
	DON'T COLLECT (n=2) "We aren't involved directly in gathering this data, but we document (via meeting notes) discussions that we have with the P.I."	3.28%

Table 3.

EQUITY. Fifty-six respondents (83.6%) noted that they collected data on equity in the evaluation of their ATE project. These participants gave a wide variety of responses regarding what data they collected around the topic. The most frequent types of data collected regarding equity were program documentation (24%), surveys (24%), demographic information (22%), and interviews/focus groups (20%). Specific project activities associated with collecting data about equity included recruitment (12%) and marketing and outreach (12%). Participants sometimes (10%) mentioned a particular population served in their responses to this question, as well. The research team coded responses according to their alignment with the NAS definition of equity:

NAS Definition of Equity: Fair distribution of opportunities to participate and succeed in education for all students.

Participants' responses regarding equity were most often considered *maybe*s (74%) in terms of whether the responses aligned, meaning that their responses to the questions were not clear or explanatory enough to make specific determinations about their alignment. However, only one individual (2%) provided an explanation in their survey response that fit the definition of equity established by NAS. See Table 4 for a summary of these findings and applicable quotes.

EQUITY: EVALUATOR QUALITATIVE FINDINGS

Table 4. Evaluators' descriptions of the data they collect regarding equity.

THEME	SUB-THEME	PERCENTAGE
Data collection method or "type"	PROGRAM DOCUMENTATION (n=12) "All materials that relate to the program are vetted by the college for equity."	24.0%
	SURVEYS (n=12) "Student data (surveys)"	24.0%
	DEMOGRAPHICS (n=11) "Demographics from surveys conducted at events and workshops"	22.0%
	INTERVIEWS OR FOCUS GROUPS (n=10) "Interviews with students, interviews with faculty"	20.0%

Table 4.

EQUITY: EVALUATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Data collection method or "type" cont.	**OBSERVATION** (n=3) "Participant-observation"	6.0%
	COURSE MATERIALS (n=3) "Content of the curriculum"	6.0%
	ADMINISTRATIVE OR INSTITUTION-LEVEL DATA (n=2) "Administrative data are broken down by income/financial aid"	4.0%
Specific project activities and strategies	**RECRUITMENT ACTIVITIES** (n=6) "Project records on recruitment and student engagement activities within the community, among K–12 partners, and across the college's main and satellite campuses"	12.0%
	MARKETING AND OUTREACH (n=6) "Enrollment and outreach statistics and questionnaires"	12.0%
	FOCUS ON A PARTICULAR POPULATION (n=5) "Specifically, females and people of color in STEM"	10.0%
	ENROLLMENT ACTIVITIES (n=5) "Enrollment of young women into STEM technical career tracks"	10.0%
	ACCESS TO PARTICIPATE (n=3) "Access to opportunities"	6.0%

Table 4.

EQUITY: EVALUATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**ENGAGEMENT AND PARTICIPATION** (n=2) "Student engagement activities"	4.0%
	PROGRAM TRAINING (n=2) "Tough...we do look at their training of instructors along these lines."	4.0%
Correct definition of construct	**YES** (n=1) "Increasing participation of autistic students in STEM/ATE programs"	2.0%
	MAYBE (n=37) "Expansion of program to under-served populations. Specifically females and people of color in STEM"	74.0%
	NO (n=8) "All materials that relate to the program are vetted by the college for equity"	16.0%
	DON'T COLLECT (n=4) "I don't believe the evaluation measures equity."	8.0%

Table 4.

INCLUSION. Fifty-eight participants (85.3%) reported having collected data on inclusion in their evaluations of ATE projects. Of those who reported having gathered any evidence related to inclusion in their ATE projects, 44 participants provided qualitative comments regarding these efforts. These respondents also provided a variety of data collection methods or types that were associated with this construct. The most frequent method of collecting data about inclusion was surveys (36.36%), followed by interviews or focus groups (22.72%), and many respondents noted demographics (20.45%) specifically again for inclusion. A handful of respondents noted particular program activities related to the construct of inclusion, including outreach (11.36%) and enrollment activities (4.55%). Responses to this question were again coded for their alignment with the NAS definition of inclusion:

NAS Definition of Inclusion: Processes through which all students are made to feel welcome and are treated as motivated learners.

Participants' responses regarding inclusion were again most often considered *maybe*s (75%), while only two responses (4.5%) received a *yes* categorization. Table 5 below elaborates further on these findings and applicable quotes.

EQUITY: EVALUATOR QUALITATIVE FINDINGS

Table 5. Evaluators' descriptions of the data they collect regarding inclusion.

THEME	SUB-THEME	PERCENTAGE
Data collection method or "type"	SURVEYS (n=16) "Survey of students to assess the perception of inclusion"	36.36%
	INTERVIEWS OR FOCUS GROUPS (n=10) "Interviews with students, faculty, project leads; observations"	22.7%
	DEMOGRAPHICS (n=9) "We typically strive to do at least some analysis of who is being included in the activities, their demographics, and their support for students with different needs, such as veterans."	20.5%
	DOCUMENT REVIEW (n=4) "Case study review from program participants"	9.1%
	OBSERVATION (n=3) "Direct observation of segments of the in-person course delivery"	6.8%

Table 5.

EQUITY: EVALUATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Data collection method or "type" cont.	**COURSE MATERIALS** (n=1) "Content of the curriculum"	2.3%
	CASE STUDY (n=1) "Case study review from program participants"	2.3%
	ADMINISTRATIVE OR INSTITUTION-LEVEL DATA (n=1) "Persistence rates of non-neurotypical students toward graduation / completion"	2.3%

Table 5.

Specific project activities and strategies	**OUTREACH ACTIVITIES** (n=5) "Evidence of the schools and employers they have outreached" college's main and satellite campuses"	11.4%
	ENROLLMENT ACTIVITIES (n=2) "Deliberate inclusion efforts related to enrollment and outreach"	4.6%
	INSTRUCTOR EVALUATIONS (n=1) "Instructor evaluation"	2.3%
	EXPERT REVIEW (n=1) "Feedback received from consultants or advisors on these issues"	2.3%
	RECRUITMENT ACTIVITIES (n=1) "Student recruitment"	2.3%
	PROGRAM TRAINING (n=1) "Look at their training of instructors"	2.3%

EQUITY: EVALUATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Correct definition of construct	**YES** (n=2) "Survey responses related to a sense of belonging in program settings"	4.6%
	MAYBE (n=33) "Questions relating to actions and outcomes related to making more people feel included, particularly by knowing what options are available to them and being able to see themselves in the roles they are learning about"	75.0%
	NO (n=6) “We really aren't collecting much other than demographic data”	13.6%
	DON'T COLLECT (n=4) "We report on the project's efforts in this area, but do not have any evaluation activities specifically focused on inclusion."	6.8%

Table 5.

PRINCIPAL INVESTIGATOR: SURVEY FINDINGS

How are ATE principal investigators (PIs) defining and measuring diversity, equity, and inclusion in their practices?

Principal Investigators of ATE projects were also asked two questions regarding (1) to what extent their ATE project engaged in activities designed to increase equity, diversity, and inclusion and (2) to what extent their project's evaluation gathered evidence related to equity, diversity, and inclusion. Findings indicate that projects are directly engaging in equity, diversity, and inclusion work to a minimal to moderate extent, though the extent to which evidence is gathered around these topics is not as prominent.

PRINCIPLE INVESTIGATOR: QUANTITATIVE FINDINGS

According to project PIs, on average their ATE projects engaged in activities designed to increase equity, diversity, and inclusion to between a moderate and a substantial extent, with the highest-rated item being diversity (M = 3.80, SD = 1.35). A larger number of project PIs noted that they don't engage in these activities at all (between 11.1% and 15.1%). In the same way, PIs also indicated a five on this scale very frequently for all three terms (this was the mode response). See Figure 3 for details of these findings.

Figure 3. Principal Investigators: To what extent does your ATE project engage in activities designed to increase diversity, equity, and inclusion?

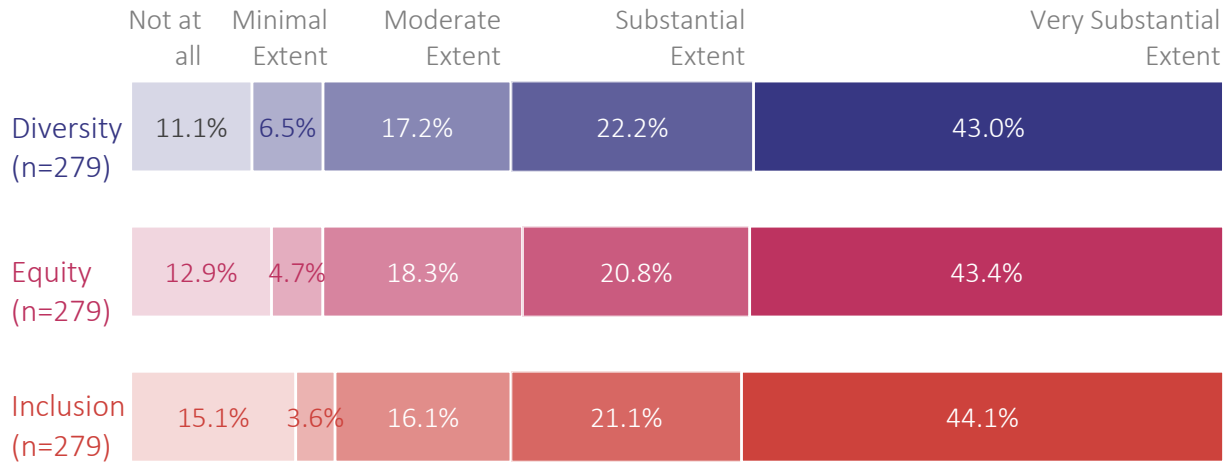


Figure 3.

When looking at the perspectives of PIs on the extent to which their project's evaluation gathers evidence related to DEI, we see that on average they rated diversity the highest, at just above the midpoint (*M* = 3.09, *SD* = 1.35), though average ratings were similar across the constructs. Similarly, mode responses were also at the midpoint for all three. Figure 4 provides the details of these findings.

Figure 4. Principal Investigators: To what extent does your ATE project's evaluation gather evidence related to diversity, equity, and inclusion?

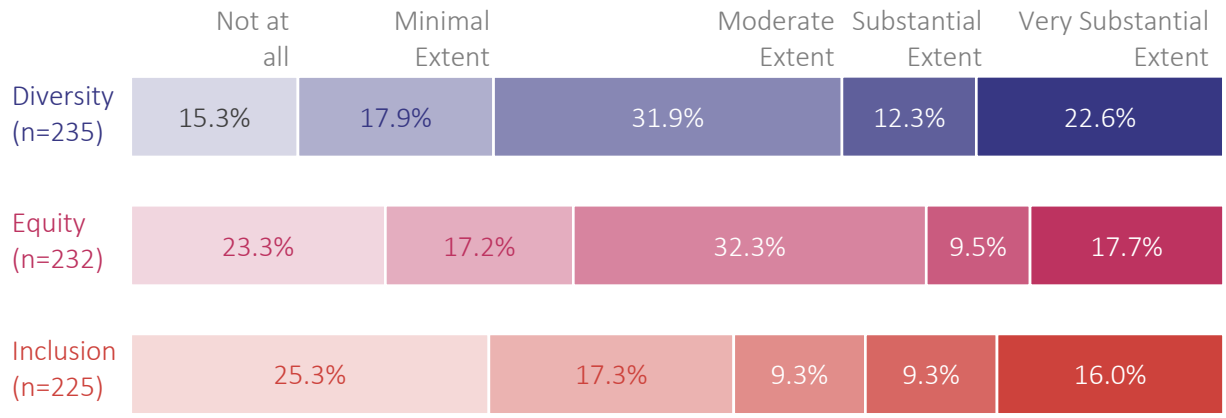


Figure 4.

PROJECT INVESTIGATOR: QUALITATIVE FINDINGS

When PIs were asked to describe how their projects focused on diversity, equity, and inclusion, their responses contained and shed light on some of the patterns seen in the quantitative data.

DIVERSITY. 199 participants (84.7%) reported that they focus on diversity as a part of their ATE project (see Figure 3 above). Of those participants who reported at all engaging in activities related to diversity, 214 provided qualitative remarks. Participants noted specific project activities they employed in addressing this topic, with the most common activity focusing on the demographics of project participants (59.81%). Other strategies noted were targeting a specific population for their program (43.93%), recruitment efforts (30.84%), outreach (16.82%), and training (14.95%). Finally, the responses were coded for their alignment with the NAS definition of diversity:

NAS Definition of Diversity: Differences among individuals, including demographic differences such as gender, race, ethnicity, and country of origin.

Principal Investigators' responses regarding diversity were most often considered *maybe*s (42.52%) in terms of whether the responses correctly aligned with this definition. A *maybe* response meant there was not enough explanation in the survey response to deem it to be aligned with the definition. Compared to equity and inclusion, diversity received the most responses categorized as *maybe*s. See Table 7 for a summary of these findings and applicable quotes.

DIVERSITY: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

Table 7. Principal Investigators' descriptions of how they focus on diversity within their projects.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies	**DEMOGRAPHICS** (n=128) "...In terms of gender and ethnicity, we have ensured that we have hired a good balance of gender and ethnically diverse faculty. Establish a Women in Technology group made up of female faculty, women from industry, current and alumni female students to help plan and increase the number of females entering the program. We have two of our department faculty and staff work with our STEP program which brings ethnically diverse economically challenged and underrepresented 5–12 grade students to the college on Saturdays throughout the year. These students are provided opportunities in learning about science and technology, specifically cybersecurity and technology that they do not have at their K-12 school."	59.81%
	SPECIFIC POPULATION (n=94) "We actively recruit underrepresented populations, women, and veterans into our program."	43.93%
	RECRUITMENT (n=66) "We actively promote and recruit women and minorities in order to address diversity. We also partner with multiple organizations which show our programs and campuses for the purpose of increasing diversity (e.g. Men of Color events where students are partnered with mentors and gain an understanding of our programs and STEM fields in general, or Women in STEM videos and outreach)"	30.84%

DIVERSITY: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**OUTREACH** (n=36) "We actively promote and recruit women and minorities in order to address diversity. We also partner with multiple organizations which show our programs and campuses for the purpose of increasing diversity (e.g. Men of Color events where students are partnered with mentors and gain an understanding of our programs and STEM fields in general, or Women in STEM videos and outreach)."	16.82%
	TRAINING (n=32) "Instructors in Clean Energy program participate in continuing ed training regarding diversity awareness and pedagogy."	14.95%
	MATERIALS (n=28) "We have created specialized campaigns for recruiting specific minorities, such as women or veterans, into the industry. We make sure all of our literature and media is populated with diverse images."	13.08%
	ACCESS (n=25) "There is a diversity in communication needs among our students. Some prefer sign language, mixed, or strictly oral communication. We make every effort to give students access to learning as well as communications by providing instructors that can maximize their potential for success."	11.68%
	ENGAGEMENT (n=21) "All of our campuses have people from different backgrounds, regions of the world, and we proactively engage with women to enter the field of technology-- through programs, workshops, and mentoring."	9.81%

Table 7.

DIVERSITY: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**PARTICIPATION** (n=18) "The project focuses on increasing the number of women and veterans in cybersecurity, and supports women students through funding to attend the National Women in Cybersecurity conference, the formation of student chapters, sponsoring of workshops for girls in K–12, and opportunities for women students including leading cybersecurity workshops for girl scouts and participating in other activities such as the cyber defense team"	8.41%
	INCLUSION (n=14) "During the project, two two-day IWITTS training events occurred for faculty, staff, and administrators for recruiting and retention of women in STEM fields. Additionally, Sinclair has specific outreach and success programs for minorities and other disadvantaged groups that are available and employed for the benefit of all students in the college, including students in this program."	6.54%
	SUPPORT (n=14) "In addition to conducting a variety of outreach activities to enhance student diversity in our academic programs and project activities, we encourage students of different demographic characteristics to work in groups, and also invite industry guest speakers from underrepresented groups to speak to our classes. Moreover, we actively seek scholarship opportunities and support targeted at students from underrepresented groups, and encourage our students to take advantage of these opportunities to present their work or strengthen their professional networks."	6.54%

Table 7.

DIVERSITY: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**ENROLLMENT** (n=12) "NSF funded scholarships and relationships with some minority student groups on some of our partner campuses are used to encourage diversity in enrollment."	5.61%
	RESEARCH (n=9) "The targeted research gathers ideas about the types of materials required that specifically address the distinctive employability skill development needs of nontraditional populations in technician fields."	4.21%
	FUNDING/FINANCIAL (n=8) "We allocate special funding to our regional competition coordinators to spend on underserved audiences. We talk to faculty and ask them specifically (1 on 1) to ask their underserved audiences to apply for internships."	3.74%
	CORE VALUE (n=1) "...Diversity is a fundamental element of all three colleges' core themes and values. YVC addresses the needs of its diverse communities by providing learning opportunities in basic literacy; academic, professional, and technical education; and lifelong learning. Mission Statement."	0.47%

Table 7.

DIVERSITY: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Correct definition of construct	**YES** (n=79) "We address diversity in the ATE program by asking projects to report on the race, gender, and ethnicity of their students on the ATE survey. We bring attention to this issue by creating special reports on gender, race, and ethnicity-based on survey data."	31.85%
	MAYBE (n=91) "underrepresented students participate in REU."	36.69%
	NO (n=36) "We do not discriminate on any basis."	14.52%
	DON'T COLLECT (n=8) "It is not part of our project but our campus puts great effort into Equity, Diversity, and Inclusion. If I had to list one example--our program puts much effort into recruiting and providing opportunities to all students. The college is/has put a lot of effort into having a diverse population, equity for all, and a welcoming environment. We (college) are working in collaboration with our community on inclusivity within our area."	3.23%

Table 7.

EQUITY. 243 (87.10%) of respondents noted that they focus on equity as part of their ATE project (see figure 3 above). Of those who reported engaging in activities associated with equity, 210 provided qualitative remarks. These participants gave a wide variety of responses to what specific project activities and strategies they employed to address equity. The most frequent types of strategies reported around equity were creating access (36.19%), understanding demographic information (22.38%), the development, use, or sharing of materials (18.10%), recruitment (15.71%), and providing support (15.24%). Participants sometimes (11.43%) mentioned a specific population served during their responses to this question as well. Finally, the responses were coded for their alignment with the NAS definition of equity:

NAS Definition of Equity: Fair distribution of opportunities to participate and succeed in education for all students.

Participants' responses regarding equity were almost evenly spread across *yes*- (34.76%), *maybe*- (30.48%), and *no*- (33.33%) coded responses, with *yes* meaning that their responses to the questions fit the NAS definition of equity; *maybe* meaning that their responses to the questions were not explanatory enough to make specific determinations about their alignment; and *no* meaning that their responses to the question showed no alignment to the definition. See Table 8 for a summary of these findings and applicable quotes.

Table 8. Principal Investigators' descriptions of how they focus on equity within their projects.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies	ACCESS (n=76) "We offer courses on multiple campuses and via a range of instructional modalities. We offer classes to dual enrollment students off-site at a local high school."	36.19%
	DEMOGRAPHICS (n=47) "We specifically target women and minorities in our recruiting activities."	22.38%
	MATERIALS (n=38) "Our materials are free of charge, so all students can access them freely"	18.10%
	RECRUITMENT (n=33) "This is an important aspect of our college and student recruitment in all programs."	15.71%

Table 8.

EQUITY: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**SUPPORT** (n=32) "Instructors in Clean Energy program participate in continuing ed training regarding diversity awareness and pedagogy."	15.24%
	SPECIFIC POPULATIONS (n=24) "While the Center's efforts are aimed at advancing technician education, the Center's goals are embedded with an emphasis on addressing underserved populations including veterans, women, HSI, and historically black institutions. Outreach efforts attempt to include institutions and individuals who will advance technology education among underrepresented populations."	11.43%
	TRAINING (n=23) "We went through training early on in the grant (IWITS) to learn how to make our program more inclusive, especially in terms of gender, but also race and ethnicity."	10.95%
	FINANCIAL (n=22) "We work with companies to offer scholarships and loan to scholarship programs for our students and try to make sure all of our students that need financial assistance are guided through the process of applying for all that is offered."	10.48%
	CURRICULUM (n=21) "Course work is designed to be flexible so that all students can successfully complete."	10.00%
	INCLUSION (n=18) "We encourage participation by all students in all laboratory exercises, and work with students directly who are less likely to participate."	8.57%

Table 8.

EQUITY: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**ENROLLMENT** (n=17) "The programs recruit and accept all students with no limits or requirements for enrollment on any semester."	7.00%
	INDIVIDUALISTIC APPROACH (n=17) "I address equity by getting to know my students so that I can customize instruction. I also address equity by working with students to adapt assignments as needed."	7.00%
	OUTREACH (n=17) "We conduct outreach in a variety of settings (e.g. schools, colleges, restaurants, model RC plane clubs) in different geographical locations to attract diverse participants to the various drone-related courses and activities hosted by our ATE project."	7.00%
	PARTICIPATION (n=11) "All students are given the opportunity to participate in lab activities, events, and conferences. Every student is required to participate in an internship which allows them to utilize their skills gained during their degree."	4.53%
	RESEARCH (n=5) "The project conducts research designed to uncover deficiencies and gaps in opportunities for students."	2.06%

Table 8.

EQUITY: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
	COMMUNICATION (n=3) "One way we address equity is to provide the information on our handouts for our activities in both Spanish and English. This way the parents of the students, especially the middle school students, can have an equal understanding of and opportunity for their child to participate in the activities. We also provided a Spanish translator for the FAFSA night we held at the high school with our financial aid director. This gave the parents and students an equal opportunity to ask questions and complete their forms. Some of our math tutors speak Spanish and are tutoring Spanish speaking students."	1.43%
Correct definition of construct	**YES** (n=73) "Students are evaluated on their progress/effort--not in comparison to their peers."	34.76%
	MAYBE (n=64) "The project conducts research designed to uncover deficiencies and gaps in opportunities for students."	30.48%
	NO (n=70) "Equal opportunities."	33.33%
	DON'T ADDRESS (n=8) "I am not aware of the need to address equity in a VR project. It is in another artificial world."	3.81%

Table 8.

INCLUSION. 237 respondents (84.95%) noted that they focused on inclusion as part of their ATE project (see figure 3 above). Of those PIs who reported engaging in activities related to inclusion as a part of their ATE project, 196 provided qualitative remarks. These respondents also provided a variety of specific project activities associated with this construct. Similar to diversity and equity, the most reported activities related to inclusion were collecting demographic information (24.49%), providing support (21.43%), supplemental activities (16.33%), and recruitment (13.27%). Other activities and strategies reported by participants included professional development (11.73%), creation of materials (11.73%), engagement (11.22%), focusing on equity in activities (8.16%) and individualistic approach (7.65%). Participants sometimes (9.69%) mentioned a specific population served during their responses to this question as well. Responses to this question were again coded for their alignment with the NAS definition of inclusion:

NAS Definition of Inclusion: Processes through which all students are made to feel welcome and are treated as motivated learners.

Participants' responses regarding inclusion were most often considered *maybe*s (44.90%). Inclusion received fewer responses categorized as *yes* than did either diversity or inclusion. See Table 9 for a summary of these findings and applicable quotes.

Table 9: Principal Investigators' descriptions of how they focus on inclusion within their projects.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies	DEMOGRAPHICS (n=48) "All students training for nuclear field jobs have a common culture and this common, safety-focused culture is the defining aspect of the program rather than other socio-economic, gender, race, or religious identities. Teamwork (mirroring the industry) helps a lot in addressing inclusion and creating the right culture."	24.49%
	SUPPORT (n=42) "Classes successfully provide safe space for all genders, races, and sexual orientations, and have equal starting positions for skills and knowledge. Avenues to provide help in knowledge gaps and lab time are available to students."	21.43%

Table 9.

INCLUSION: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**SUPPLEMENTAL ACTIVITIES** (n=32) "As a result of this ATE project, all students are provided with the opportunity to participate in STEM events, workplace environment, hands-on training, mentoring, and are treated with respect. Through the workshops, open house, invited speaker seminars and conferences, students were motivated to continue learning and expanding their knowledge."	13.50%
	RECRUITMENT (n=26) "We have been involved with recruiting underrepresented populations into the automotive service technician field. We recently presented to the Girl Scouts and the Boy Scouts of America on automotive care and Automated and Connected Vehicles. We have presented at schools where the minority groups are actually the majority group within that school district to engage those individuals as well. Our focus is to recruit underrepresented populations into the automotive service technician career path."	10.97%
	PROFESSIONAL DEVELOPMENT (n=23) "Professional development focused on effective mechanisms to address culture in the classroom (building cultural competence); culturally responsive teaching; and inclusive methods for working with students with disabilities, especially deaf and hard of hearing students (because of the inclusion of the NTID cohort)."	11.73%
	MATERIALS (n=23) "The program is marketed to all students countywide using material that has diversity represented."	11.73%

INCLUSION: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**ENGAGEMENT** (n=22) "We look at the individual--not the disability--and work to foster a greater understanding, involvement, and success in their chosen fields of study."	11.22%
	SPECIFIC POPULATION (n=19) "A deliverable of our grant is to increase diversity through equity and inclusion of underrepresented minorities. We will be targeting recruitment at this population of students."	9.69%
	EQUITY (n=16) "We encourage participation by all students in all laboratory exercises, and work with students directly who are less likely to participate."	8.16%
	INDIVIDUALISTIC APPROACH (n=15) "We make our students aware of the importance of being self-motivated learners as well as lifelong learners. We show honest appreciation at the attempts and if they are less than successful, encourage them. We strive to establish realistic expectations, goals, and accommodations that respond to the unique strengths and needs of each student and have multiple communities whose goals are to help them succeed."	7.65%
	OUTREACH (n=14) "We promote the summer workshop by reaching out to a wide range of institutions across the nation and we attempt to include participants from different backgrounds and geographical locations"	7.14%

INCLUSION: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**ACCESS** (n=13) "The center sponsors a virtual career fair for all CAE colleges in the country, providing an opportunity for all students to participate regardless of circumstances or location."	6.63%
	COLLABORATION (n=12) "Every effort is made to create an inclusive environment through individual collaboration and communication as required. We did have one faculty member with a disability attend the summer workshops."	6.12%
	RESEARCH (n=11) "The targeted research reports on methods and materials used to help nontraditional populations in technician fields feel greater comfort and confidence in pursuing a career in these fields."	5.61%
	ENROLLMENT (n=9) "The project looks at student motivations for enrollment and persistence and how campus accommodates their needs."	4.59%
	CURRICULUM (n=8) "By addressing the infusion of employability skills into projects, the curriculum so-modified is able to better equip all students with confidence and interpersonal skills to be employable."	4.08%
	PARTICIPATION (n=8) "As a result of this ATE project, all students are provided with the opportunity to participate in STEM events, workplace environment, hands-on training, mentoring, and are treated with respect. Through the workshops, open house, invited speaker seminars and conferences, students were motivated to continue learning and expanding their knowledge."	4.08%

Table 9.

INCLUSION: PROJECT INVESTIGATOR QUALITATIVE FINDINGS cont.

THEME	SUB-THEME	PERCENTAGE
Specific project activities and strategies cont.	**CORE VALUE** (n=6) "This is an expectation for all our staff and faculty regardless of the program or situation and it is one of our institutional core values. The importance is stressed throughout our professional development and ongoing employee meetings and newsletters."	3.06%
Correct definition of construct	**YES** (n=34) "Inclusion happens on several levels. 1) Class size--we make an effort to keep class sizes to a very manageable level (typically 15 or less for lab classes). This size class gives the instructor a better opportunity to learn more about each and every student. 2) Group projects--most of our lab activities are completed by small groups. These groups help all students feel like active contributors to the common goal. 3) Personalized advising--we have a full-time lab manager who advises every student in the program on a bi-annual basis"	17.35%
	MAYBE (n=88) "Structure of social gatherings."	44.90%
	NO (n=70) "Ensuring diverse and equitable representation and participation."	35.71%
	DON'T ADDRESS (n=4) "Just started in September and have not offered courses yet. Will welcome all students that are interested."	2.04%

Table 9.

COMPARING FINDINGS:

FROM THE SURVEYS OF EVALUATORS AND PRINCIPAL INVESTIGATORS

When looking at both groups together, we see interesting distributions between evaluators and PIs in terms of the ways they responded to the quantitative questions. When examining the extent to which evaluators and PIs believe their project engaged in DEI, we see differences in the modes and standard deviations, with slight differences in the means. Evaluators are more conservative in their estimations of engagement with DEI. When comparing responses about the extent to which evaluators and PIs believe they collect evidence of DEI in their projects, again, evaluators were more conservative. See Figure 5 and Figure 6 for details.

Figure 5. Comparative descriptive statistics for the extent to which evaluators and PIs believe their projects engage in Diversity, Equity, and Inclusion (range 1–5).

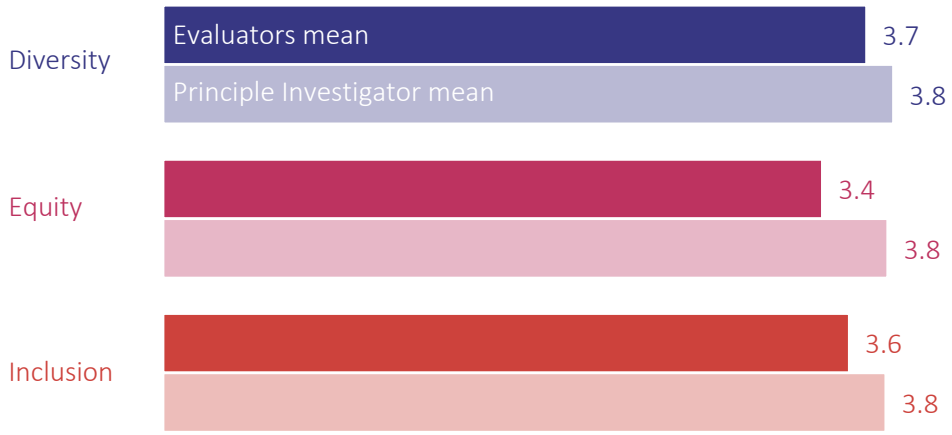


Figure 5.

Figure 6. Comparative descriptive statistics for the for the extent to which evaluators and PIs believe they collect evidence about Diversity, Equity, and Inclusion (range 1–5).

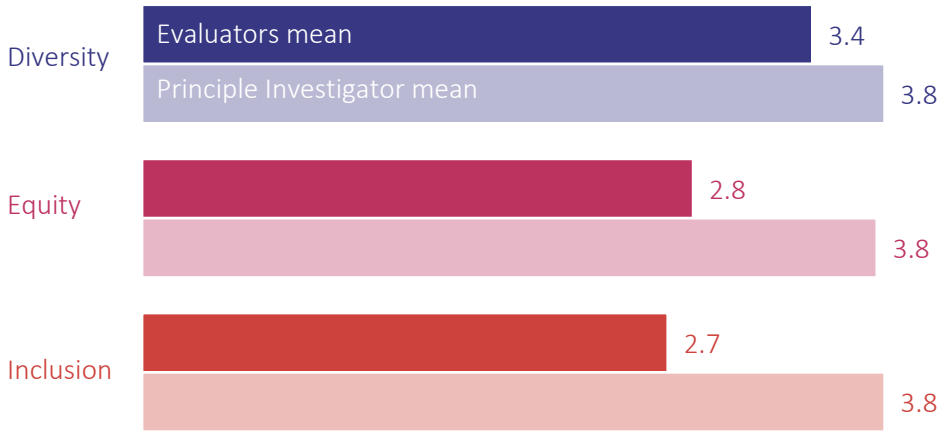
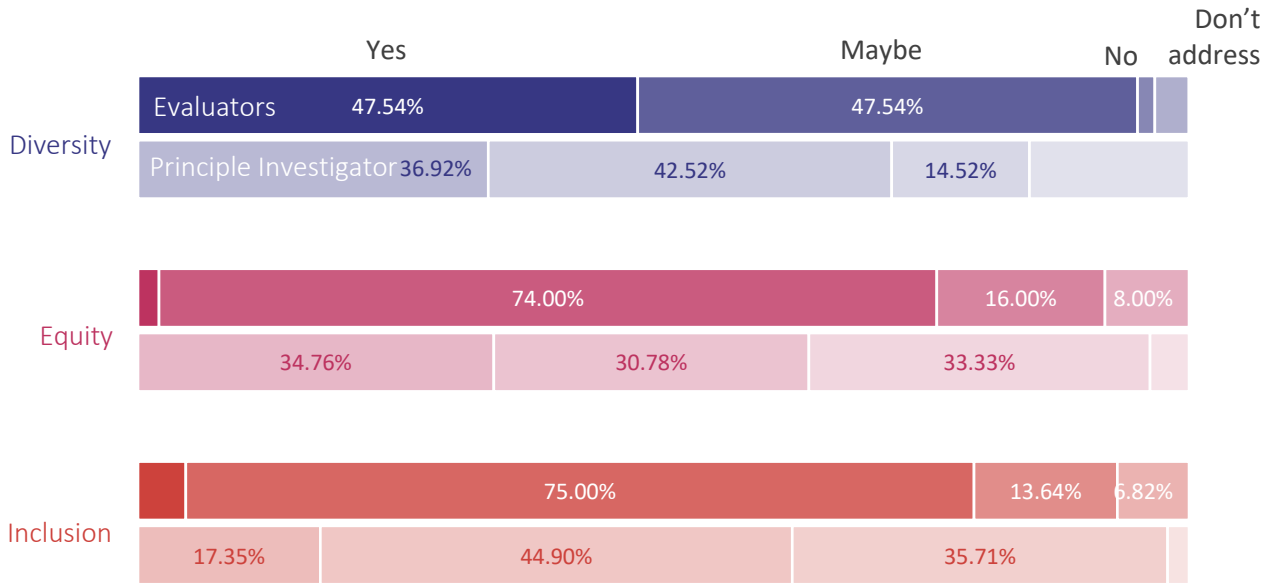


Figure 6.

When considering open-ended responses to this survey, PIs provided richer, more descriptive examples and meaningful engagements with these topics in their work than did evaluators, as indicated by the detailed quotes in the PI thematic tables above. In comparing both PIs' and evaluators' responses on the survey to the NAS definitions of each term, we saw some fascinating differences between the two groups. We categorized PIs' responses to the diversity question as *yes* more often than the evaluators' responses. However, when we look at equity and inclusion, this flips. More PIs than evaluators seem to be describing equity and inclusion in alignment with the NAS definition. Only two percent of evaluators who indicated that they measured equity provided responses that were clearly aligned with the NAS definition, as compared to PIs at 34.76%. With inclusion, though we categorized fewer respondents in alignment for both groups, we see the same pattern, with 17.35% of PIs, and only 4.6% of evaluators, providing responses in alignment.

Figure 7. Alignment with NAS Definition



*percentages less than 5 are not labeled

Figure 7.

DISCUSSION

In this section, we highlight five areas of discussion and further consideration. In the first three points we discuss each specific construct measured. In the last two points we reflect on how PIs and evaluators are motivated and attending to these issues (or not) in their work. At the end of this section we discuss some limitations to the study.

DIVERSITY HAS THE SPOTLIGHT IN DEI WORK?

The case for attention to and an increase of diversity within many fields has been sustained for the past two decades (American Society of Higher Education, 2011; Kulik, 2008). As such, diversity initiatives within universities and organizations continue to gain traction (Klenk et al., 2015). Anecdotal conversations and data in our surveys suggest that diversity is the construct easiest to define, engage with, and measure. Respondents' answers about diversity most correctly aligned with NAS definitions (for both evaluators and PIs). Further, upon examination of averages of responses to quantitative questions, both PIs and evaluators reported engaging and measuring diversity more than equity and inclusion. As a reminder, the NAS (2018) defines diversity as:

> Differences among individuals, including demographic differences such as gender, race, ethnicity, and country of origin.

PIs were asked to describe how their projects focused on diversity, and evaluators were asked to describe what kind of data they gather to document diversity. Evaluators responded that they measure diversity with surveys, administrative data, interviews, and focus groups. PIs conceptualize their focus on diversity through identifying specific populations to work with, recruiting under-represented minorities, and developing outreach efforts.

While diversity is a fine starting point, ultimately diversity is not enough (Puritty et al., 2017). If projects only engage with and/or measure diversity, it is problematic. If there is a focus on increasing diversity, but no attention to the climate or inclusivity or no focus on ensuring equity across participation, access, and outcomes, then projects could be in danger of doing more harm than good.

HOW OUGHT WE DEFINE EQUITY?

Equity was harder to conceptualize and measure than diversity for both Pis and evaluators. We rated the alignment of PIs' responses related to equity to the NAS definition of equity almost as positively as we rated their responses' related to diversity. However, evaluators' alignment was much lower, at only two percent. This may be because we didn't probe for enough/specific information for evaluators to provide a targeted response; thus, the vast majority of responses ended up in the *maybe* category. It could also be that it is harder for evaluators to articulate or operationally define equity within the scope of the evaluation work to be done. As a reminder, the NAS (2018) defines equity as:

> Fair distribution of opportunities to participate and succeed in education for all students.

Evaluators reported measuring equity through program documentation, surveys, and gathering demographic information. PIs most often reported addressing equity in their projects through focusing on access, demographics, materials, and recruitment. Evaluators were less confident that they gathered data related to equity (M = 2.82) compared to PIs (M = 3.76). It is worth noting that PIs' standard deviation for this item was quite high, meaning that there was a broad range in how they answered this question.

Upon reflection we believe that the NAS definition for equity could use some refinement. We think of equity as parity in program access, participation, and accomplishment for all program participants, especially those least well-served in the context (Greene, Boyce, & Ahn, 2011). The key difference here being the focus on those least well-served. We believe that in order to be equitable it cannot just be about making fair or equal opportunities for participants. Rather, in order to make opportunities or accomplishments equal, there will need to be differentiation of access and resources, especially for those who traditionally have not received them.

WHAT COUNTS AS INCLUSION?

While inclusion is relatively less difficult to conceptualize than equity, its complexity does make it difficult to measure. Scholars and educators have argued that inclusivity is especially important when diversity is one of the aims of a project (Klenk et al, 2015). When broadening participation, especially in STEM, if efforts are not made to increase positive climates, then as the context is diversified, underrepresented individuals may not feel valued, welcomed, or like they belong (Puritty, 2017). As a reminder, the NAS (2018) defines equity as:

> Processes through which all students are made to feel welcome and are treated as motivated learners.

Evaluators most often reported measuring inclusion through surveys, interviews, and demographic information. PIs most often reported focusing on inclusion in their projects through focusing on demographics, support for students, supplemental activities, and recruitment strategies.

Again, upon reflection we believe that the NAS definition for inclusion could use some refinement. The current definition focuses on what is supposed to be done, and less on the voices of participants or students or faculty for whom the efforts are being made. We would argue the definition of inclusion should encompass not only the processes to make students feel welcome, but also the outcomes of those efforts.

PIS HAVE ATTENDED TO THESE ISSUES AND HAD MORE TO SAY

Overall, when looking at the data, we see that evaluators' responses to the open-ended questions regarding DEI issues contained less detail and richness in explanation than the PIs' responses. Evaluators were specifically asked how these constructs are evaluated, and PIs were specifically asked how they address these issues in their work. From the PIs' perspective, this makes sense due to (1) the intimate nature of their knowledge of the program, its purpose, and its operations and (2) the fact that they are required by NSF to focus on broadening the participation of those in STEM disciplines, including women, underrepresented minorities, people from rural areas, and persons with disabilities. Evaluators' requirements to focus on these issues in their work are less explicit, thus their responses tend to be more vague and less descriptive. On the basis of this observation, it appears that ATE projects are attending to

issues like this in their operations, but evaluators may not have met that effort with sufficient tactics for measuring and describing program work in these areas.

WHAT GETS MEASURED GETS DONE

The timing of this report is salient, as soon after this data collection occurred, the societal and political relevance of these issues was highlighted by the killing of George Floyd in May 2020. Our sensitivity as professionals to these issues has heightened, and further exploration into these areas has become more necessary and pertinent than ever. During conversations (formal and informal), presentations, and panels at numerous ATE and other evaluation conferences, we have been made aware that evaluators and PIs aren't attending to DEI holistically in their work. Adding questions to the 2019 EvaluATE survey shone a light on these topics for both PIs and evaluators. After the initial survey, further informal and formal conversations began with PIs and evaluators of these projects who were concerned with DEI-related issues in their contexts. Our inquiry into this process has led to further reflection by ATE PIs and evaluators on how to better focus on these issues in our work—put simply: what gets measured gets done. Similarly, as ATE evaluators become more knowledgeable regarding how to examine and measure these issues, project PIs may be further motivated to put effort into broadening participation work.

LIMITATIONS

The terms equity, diversity, and inclusion are highly ambiguous and contentious. We were limited in our space to ask questions on the survey, as this inquiry into use and definitions of DEI is one of four research studies within the EvaluATE project, where all of the studies share the same participant population of ATE PIs and external evaluators. In order to not overtax the research participants, quantitative data collection options were limited. Our team was given space within surveys that included questions from the three other research teams as well. While it has been useful to be a part of a larger research team, it has been difficult to only have access to quantitative data collection methods on the timeline of the larger EvaluATE project. Thus, we had to reduce our measurement of DEI to just a handful of closed- and open-ended questions for each survey. This resulted in responses that were hard to understand and categorize. For example, in the evaluators' descriptions of the types of data they collected, there may have been no indication of who the sample was, how the data was collected, the type of data collected, or the data source. When it comes to constructs like equity and inclusion, we have to understand access (equity) and belonging (inclusion) as these terms relate to who is being served or reached. This left the research team unable to determine whether their responses met the NAS definitions of diversity, equity, and inclusion.

In addition, many of the evaluators indicated that they work on multiple ATE projects, and we asked them to conceptualize, or focus on, a single project in their responses. Therefore, we do not have an equivalent representation of evaluation projects when compared to the PI survey, where respondents provided information on each of their projects separately.

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APPENDIX

TABLE 1. EVALUATORS' DEMOGRAPHICS

Demographic	Categories	Descriptive Statistic
Internal / external evaluator (*n* = 68)	Internal evaluator External evaluator	1.4% 98.6%
Years worked as an evaluator (*n* = 65)	1–5 6–10 11–15 16–20 21–25 26–30 31–35 36–40	35.4% 9.2% 13.8% 27.7% 4.6% 6.2% 1.5% 1.5%
Employment setting (*n* = 68)	Higher education Independent consulting practice Consulting, research, or evaluation firm Other	19.1% 41.2% 33.8% 5.9%
Highest degree earned (*n* = 68)	Bachelor's Graduate coursework Master's Doctoral	4.4% 1.5% 38.2% 55.9%
Gender identity (*n* = 65)	Female Male	56.5% 37.7%

TABLE 2. PROJECT PIS' DEMOGRAPHICS

Demographic	Categories	Descriptive Statistics
Age in years (*n* = 272)	25–34 35–44 45–54 55–64 65+	3.3% 21.0% 29.4% 33.5% 12.9%
Racial identity (*n* = 272)	White	82.7%

	Black or African American Asian Multiracial American Indian or Alaska Native Native Hawaiian or other Pacific Islander Unidentified	5.9% 5.9% 2.2% 1.1% 0.4% 1.8%
Ethnic identity (*n* = 271)	Hispanic or Latino/Latina Non-Hispanic or non-Latino/Latina	4.4% 95.6%
Gender identity (*n* = 273)	Male Female Identity not listed	62.6% 37.0% 0.4%
ATE award type (*n* = 279)	Project Small grant for institutions new to ATE National center Regional center Support / resource center Targeted research on technician education Conference or meeting Other	61.6% 17.9% 3.9% 4.7% 2.9% 5.0% 1.4% 2.5%
Type of institution (*n* = 279)	4-year college/university 2-year college or 2-year college system Nonprofit organization Other	17.9% 72.8% 5.7% 3.6%
Minority-serving institution (Y/N) (*n* = 249)	Yes No Not sure	26.5% 51.0% 22.5%
Years of grants (*n* = 275)	1–5 6+	97.7% 2.3%

TABLE 3. EVALUATORS: TO WHAT EXTENT DOES THE ATE PROJECT YOU EVALUATE DIRECTLY ENGAGE IN ACTIVITIES DESIGNED TO INCREASE DIVERSITY, EQUITY, AND INCLUSION?

	Not at All	Minimal Extent	Moderate Extent	Substantial Extent	Very Substantial Extent	M	SD
Diversity (*n* = 68)	1 (1.5%)	5 (7.4%)	25 (36.8%)	22 (32.4%)	15 (22.1%)	3.66	.96
Equity (*n* = 67)	4 (6%)	10 (14.9%)	19 (28.4%)	21 (31.3%)	13 (19.4%)	3.43	1.14

Inclusion (*n* = 68)	4 (5.9%)	5 (7.4%)	20 (29.4%)	26 (38.2%)	13 (19.1%)	3.57	1.07

TABLE 4. EVALUATORS: TO WHAT EXTENT DOES THE EVALUATION OF THIS ATE PROJECT GATHER EVIDENCE RELATED TO DIVERSITY, EQUITY, AND INCLUSION?

	Not at All	Minimal Extent	Moderate Extent	Substantial Extent	Very Substantial Extent	M	SD
Diversity (*n* = 68)	3 (4.4%)	9 (13.2%)	22 (32.4%)	24 (35.3%)	10 (14.7%)	3.43	1.04
Equity (*n* = 67)	11 (16.4%)	16 (23.9%)	19 (28.4%)	16 (23.9%)	5 (7.5%)	2.82	1.19
Inclusion (*n* = 68)	10 (14.7%)	15 (22.1%)	18 (26.5%)	18 (26.5%)	7 (10.3%)	2.96	1.23

TABLE 5. EVALUATORS' DESCRIPTIONS OF THE DATA THEY COLLECT REGARDING DIVERSITY.

Theme	Sub-Theme	*N* (%)	Selected Quotes
Data collection method or "type"	Demographics	42 (68.85%)	"Demographic information for groups underrepresented in STEM workforce"
	Surveys	12 (19.67%)	"Survey data from program participants"
	Interviews or focus groups	9 (14.75%)	"Interviews with students, interviews with faculty"
	Administrative or institutional data	8 (13.11%)	"Administrative data are broken down by race/ethnicity and gender"
	Program documentation	6 (9.83%)	"Review of student projects and team membership"
	Observational data	4 (6.55%)	"Participant surveys, interviews, and participant-observation."
Specific project activities and strategies	Enrollment activities	8 (13.11%)	"Enrollment into the ACC MET program is analyzed by gender and racial subgroups"
	Outreach activities	5 (8.20%)	"Monitor student demographics & document specific outreach to special populations"
	Data analysis activities	5 (8.20%)	"Administrative data are broken down by race/ethnicity and gender"
	Participation in the program	4 (6.56%)	"We look at the participation of students and faculty, as it is an area with high diversity"

	Recruitment into the program	3 (4.92%)	"Recruit women and veterans"
	Training activities	2 (3.28%)	"Post-workshop data"
Correct definition of construct	Yes	29 (47.54%)	"Demographic data on student & faculty participants in ATE activities"
	Maybe	29 (47.54%)	"Notes regarding the composition of groups of students interviewed about their experience of the advanced technology"
	No	1 (1.64%)	"This is the focus of the [name redacted] University so the ATE classes were designed to be a general education course that would be available to the entire campus"
	Don't collect	2 (3.28%)	"We aren't involved directly in gathering this data, but we document (via meeting notes) discussions that we have with the P.I."

TABLE 6. EVALUATORS' DESCRIPTIONS OF THE DATA THEY COLLECT REGARDING EQUITY.

Theme	Sub-Theme	*N* (%)	Selected Quotes
Data collection method or type	Program documentation	12 (24%)	"All materials that relate to the program are vetted by the college for equity."
	Surveys	12 (24%)	"Student data (surveys)"
	Demographics	11 (22%)	"Demographics from surveys conducted at events and workshops"
	Interviews or focus groups	10 (20%)	"Interviews with students, interviews with faculty"
	Observation	3 (6%)	"Participant-observation"
	Course materials	3 (6%)	"Content of the curriculum"
	Administrative or institution-level data	2 (4%)	"Administrative data are broken down by income/financial aid"
Specific project activities and strategies	Recruitment activities	6 (12%)	"Project records on recruitment and student engagement activities within the community, among K–12 partners, and across the college's main and satellite campuses"

	Marketing and outreach	6 (12%)	"Enrollment and outreach statistics and questionnaires"
	Focus on a particular population	5 (10%)	"Specifically, females and people of color in STEM"
	Enrollment activities	5 (10%)	"Enrollment of young women into STEM technical career tracks"
	Access to participate	3 (6%)	"Access to opportunities"
	Engagement and participation	2 (4%)	"Student engagement activities"
	Program training	2 (4%)	"Tough...we do look at their training of instructors along these lines."
Correct definition of construct	Yes	1 (2%)	"Increasing participation of autistic students in STEM/ATE programs"
	Maybe	37 (74%)	"Expansion of program to under-served populations. Specifically females and people of color in STEM"
	No	8 (16%)	"All materials that relate to the program are vetted by the college for equity"
	Don't collect	4 (8%)	"I don't believe the evaluation measures equity."

TABLE 7. EVALUATORS' DESCRIPTIONS OF THE DATA THEY COLLECT REGARDING INCLUSION.

Theme	Sub-Theme	*N* (%)	Selected Quotes
Data collection method or "type"	Surveys	16 (36.36%)	"Survey of students to assess the perception of inclusion"
	Interviews or focus groups	10 (22.72%)	"Interviews with students, faculty, project leads; observations"
	Demographics	9 (20.45%)	"We typically strive to do at least some analysis of who is being included in the activities, their demographics, and their support for students with different needs, such as veterans."
	Document review	4 (9.09%)	"Case study review from program participants"

	Observation	3 (6.82%)	"Direct observation of segments of the in-person course delivery"
	Course materials	1 (2.27%)	"Data on instructor practices in ATE related courses"
	Case study	1 (2.27%)	"Case study review from program participants"
	Administrative / institutional	1 (2.27%)	"Persistence rates of non-neurotypical students toward graduation / completion"
Specific project activities and strategies	Outreach activities	5 (11.36%)	"Evidence of the schools and employers they have outreached"
	Enrollment activities	2 (4.55%)	"Deliberate inclusion efforts related to enrollment and outreach"
	Instructor evaluations	1 (2.27%)	"Instructor evaluation"
	Expert review	1 (2.27%)	"Feedback received from consultants or advisors on these issues"
	Recruitment activities	1 (2.27%)	"Student recruitment"
	Program training	1 (2.27%)	"Look at their training of instructors"
Correct definition of construct	Yes	2 (4.55%)	"Survey responses related to a sense of belonging in program settings"
	Maybe	33 (75%)	"Questions relating to actions and outcomes related to making more people feel included, particularly by knowing what options are available to them and being able to see themselves in the roles they are learning about"
	No	6 (13.64%)	“We really aren't collecting much other than demographic data”
	Don't collect	3 (6.82%)	"We report on the project's efforts in this area, but do not have any evaluation activities specifically focused on inclusion."

TABLE 8. PRINCIPAL INVESTIGATORS: TO WHAT EXTENT DOES YOUR ATE PROJECT ENGAGE IN ACTIVITIES DESIGNED TO INCREASE DIVERSITY, EQUITY, AND INCLUSION?

	Not at All	Minimal Extent	Moderate Extent	Substantial Extent	Very Substantial Extent	M	SD
Diversity (*n* = 279)	31 (11.1%)	18 (6.5%)	48 (17.2%)	62 (22.2%)	120 (43%)	3.80	1.35
Equity (*n* = 279)	36 (12.9%)	13 (4.7%)	51 (18.3%)	58 (20.8%)	121 (43.4%)	3.77	1.39
Inclusion (*n* = 279)	42 (15.1%)	10 (3.6%)	45 (16.1%)	59 (21.1%)	123 (44.1%)	3.76	1.43

TABLE 9. PRINCIPAL INVESTIGATORS: TO WHAT EXTENT DOES YOUR ATE PROJECT'S EVALUATION GATHER EVIDENCE RELATED TO DIVERSITY, EQUITY, AND INCLUSION?

	Not at All	Minimal Extent	Moderate Extent	Substantial Extent	Very Substantial Extent	M	SD
Diversity (*n* = 235)	36 (15.3%)	42 (17.9%)	75 (31.9%)	29 (12.3%)	53 (22.6%)	3.09	1.35
Equity (*n* = 232)	54 (23.3%)	40 (17.2%)	75 (32.3%)	22 (9.5%)	41 (17.7%)	2.81	1.37
Inclusion (*n* = 225)	57 (25.3%)	39 (17.3%)	72 (32%)	21 (9.3%)	36 (16%)	2.73	1.36

TABLE 10. PRINCIPAL INVESTIGATORS' DESCRIPTIONS OF HOW THEY FOCUS ON DIVERSITY WITHIN THEIR PROJECTS.

Theme	Sub-Theme	*N* (%)	Selected Quotes
Specific project activities and strategies	Demographics	128 (59.81%)	"...In terms of gender and ethnicity, we have ensured that we have hired a good balance of gender and ethnically diverse faculty. Establish a Women in Technology group made up of female faculty, women from industry, current and alumni female students to help plan and increase the number of females entering the program. We have two of our department faculty and staff work with our STEP program which brings ethnically diverse economically challenged and underrepresented 5–12 grade students to the college on Saturdays throughout the year. These students are provided opportunities in learning about science and technology, specifically cybersecurity and technology that they do not have at their K-12 school."
	Specific population	94 (43.93%)	"We actively recruit underrepresented populations, women, and veterans into our program."

	Recruitment	66 (30.84%)	"We actively promote and recruit women and minorities in order to address diversity. We also partner with multiple organizations which show our programs and campuses for the purpose of increasing diversity (e.g. Men of Color events where students are partnered with mentors and gain an understanding of our programs and STEM fields in general, or Women in STEM videos and outreach)"
	Outreach	36 (16.82%)	"We actively promote and recruit women and minorities in order to address diversity. We also partner with multiple organizations which show our programs and campuses for the purpose of increasing diversity (e.g. Men of Color events where students are partnered with mentors and gain an understanding of our programs and STEM fields in general, or Women in STEM videos and outreach)."
	Training	32 (14.95%)	"Instructors in Clean Energy program participate in continuing ed training regarding diversity awareness and pedagogy."
	Materials	28 (13.08%)	"We have created specialized campaigns for recruiting specific minorities, such as women or veterans, into the industry. We make sure all of our literature and media is populated with diverse images."

	Access	25 (11.68%)	"There is a diversity in communication needs among our students. Some prefer sign language, mixed, or strictly oral communication. We make every effort to give students access to learning as well as communications by providing instructors that can maximize their potential for success."
	Engagement	21 (9.81%)	"All of our campuses have people from different backgrounds, regions of the world, and we proactively engage with women to enter the field of technology—through programs, workshops, and mentoring."
	Participation	18 (8.41%)	"The project focuses on increasing the number of women and veterans in cybersecurity, and supports women students through funding to attend the National Women in Cybersecurity conference, the formation of student chapters, sponsoring of workshops for girls in K–12, and opportunities for women students including leading cybersecurity workshops for girl scouts and participating in other activities such as the cyber defense team"

	Inclusion	14 (6.54%)	"During the project, two two-day IWITTS training events occurred for faculty, staff, and administrators for recruiting and retention of women in STEM fields. Additionally, Sinclair has specific outreach and success programs for minorities and other disadvantaged groups that are available and employed for the benefit of all students in the college, including students in this program."
	Support	14 (6.54%)	"In addition to conducting a variety of outreach activities to enhance student diversity in our academic programs and project activities, we encourage students of different demographic characteristics to work in groups, and also invite industry guest speakers from underrepresented groups to speak to our classes. Moreover, we actively seek scholarship opportunities and support targeted at students from underrepresented groups, and encourage our students to take advantage of these opportunities to present their work or strengthen their professional networks."
	Enrollment	12 (5.61%)	"NSF funded scholarships and relationships with some minority student groups on some of our partner campuses are used to encourage diversity in enrollment."

	Research	9 (4.21%)	"The targeted research gathers ideas about the types of materials required that specifically address the distinctive employability skill development needs of nontraditional populations in technician fields."
	Funding / financial	8 (3.74%)	"We allocate special funding to our regional competition coordinators to spend on underserved audiences. We talk to faculty and ask them specifically (1 on 1) to ask their underserved audiences to apply for internships."
	Core value	1 (.47%)	"…Diversity is a fundamental element of all three colleges' core themes and values. YVC addresses the needs of its diverse communities by providing learning opportunities in basic literacy; academic, professional, and technical education; and lifelong learning. Mission Statement."
Right definition of construct	Yes	79 (36.92%)	"We address diversity in the ATE program by asking projects to report on the race, gender, and ethnicity of their students on the ATE survey. We bring attention to this issue by creating special reports on gender, race, and ethnicity-based on survey data."
	Maybe	91 (42.52%)	"underrepresented students participate in REU."

	No	36 (16.82%)	"We do not discriminate on any basis."
	Don't address	8 (3.74%)	"It is not part of our project but our campus puts great effort into Equity, Diversity, and Inclusion. If I had to list one example—our program puts much effort into recruiting and providing opportunities to all students. The college is/has put a lot of effort into having a diverse population, equity for all, and a welcoming environment. We (college) are working in collaboration with our community on inclusivity within our area."

TABLE 11. PRINCIPAL INVESTIGATORS' DESCRIPTIONS OF HOW THEY FOCUS ON EQUITY WITHIN THEIR PROJECTS.

Theme	Sub-Theme	*N* (%)	Selected Quotes
Specific project activities and strategies	Access	76 (36.19%)	"We offer courses on multiple campuses and via a range of instructional modalities. We offer classes to dual enrollment students off-site at a local high school."
	Demographics	47 (22.38%)	"We specifically target women and minorities in our recruiting activities."
	Materials	38 (18.10%)	"Our materials are free of charge, so all students can access them freely"
	Recruitment	33 (15.71%)	"This is an important aspect of our college and student recruitment in all programs."

	Support	32 (15.24%)	"This project focuses on recruiting female students into traditionally male-dominated careers. Female students are supported through the application process, the transition to college, and throughout their time at the College. Applicants are personally called during their application process, the College has opened a Women's Center, and there are mentoring events throughout the year."
	Specific populations	24 (11.43%)	"While the Center's efforts are aimed at advancing technician education, the Center's goals are embedded with an emphasis on addressing underserved populations including veterans, women, HSI, and historically black institutions. Outreach efforts attempt to include institutions and individuals who will advance technology education among underrepresented populations."
	Training	23 (10.95%)	"We went through training early on in the grant (IWITS) to learn how to make our program more inclusive, especially in terms of gender, but also race and ethnicity."
	Financial	22 (10.48%)	"We work with companies to offer scholarships and loan to scholarship programs for our students and try to make sure all of our students that need financial assistance are guided through the process of applying for all that is offered."
	Curriculum	21 (10%)	"Course work is designed to be flexible so that all students can successfully complete."
	Inclusion	18 (8.57%)	"We encourage participation by all students in all laboratory exercises, and work with students directly who are less likely to participate."

	Enrollment	17 (8.10%)	"The programs recruit and accept all students with no limits or requirements for enrollment on any semester."
	Individualistic approach	17 (8.10%)	"I address equity by getting to know my students so that I can customize instruction. I also address equity by working with students to adapt assignments as needed."
	Outreach	17 (8.10%)	"We conduct outreach in a variety of settings (e.g. schools, colleges, restaurants, model RC plane clubs) in different geographical locations to attract diverse participants to the various drone-related courses and activities hosted by our ATE project."
	Participation	11 (5.24%)	"All students are given the opportunity to participate in lab activities, events, and conferences. Every student is required to participate in an internship which allows them to utilize their skills gained during their degree."
	Research	5 (2.38%)	"The project conducts research designed to uncover deficiencies and gaps in opportunities for students."
	Communication	3 (1.43%)	"One way we address equity is to provide the information on our handouts for our activities in both Spanish and English. This way the parents of the students, especially the middle school students, can have an equal understanding of and opportunity for their child to participate in the activities. We also provided a Spanish translator for the FAFSA night we held at the high school with our financial aid director. This gave the parents and students an equal opportunity to ask questions and complete their forms. Some

			of our math tutors speak Spanish and are tutoring Spanish speaking students."
Right definition of construct	Yes	73 (34.76%)	"Students are evaluated on their progress/effort—not in comparison to their peers."
	Maybe	64 (30.48%)	"The project conducts research designed to uncover deficiencies and gaps in opportunities for students."
	No	70 (33.33%)	"Equal opportunities."
	Don't address	3 (3.81%)	"I am not aware of the need to address equity in a VR project. It is in another artificial world."

TABLE 12. PRINCIPAL INVESTIGATORS' DESCRIPTIONS OF HOW THEY FOCUS ON INCLUSION WITHIN THEIR PROJECTS.

Theme	Sub-Theme	*N* (%)	Selected Quotes
Specific project activities and strategies	Demographics	48 (24.49%)	"All students training for nuclear field jobs have a common culture and this common, safety-focused culture is the defining aspect of the program rather than other socio-economic, gender, race, or religious identities. Teamwork (mirroring the industry) helps a lot in addressing inclusion and creating the right culture."
	Support	42 (21.43%)	"Classes successfully provide safe space for all genders, races, and sexual orientations, and have equal starting positions for skills and knowledge. Avenues to provide help in knowledge gaps and lab time are available to students."
	Supplemental activities	32 (16.33%)	"As a result of this ATE project, all students are provided with the opportunity to participate in STEM events, workplace environment, hands-on training, mentoring, and are treated with respect. Through the workshops, open house,

			invited speaker seminars and conferences, students were motivated to continue learning and expanding their knowledge."
	Recruitment	26 (13.27%)	"We have been involved with recruiting underrepresented populations into the automotive service technician field. We recently presented to the Girl Scouts and the Boy Scouts of America on automotive care and Automated and Connected Vehicles. We have presented at schools where the minority groups are actually the majority group within that school district to engage those individuals as well. Our focus is to recruit underrepresented populations into the automotive service technician career path."
	Professional development	23 (11.73%)	"Professional development focused on effective mechanisms to address culture in the classroom (building cultural competence); culturally responsive teaching; and inclusive methods for working with students with disabilities, especially deaf and hard of hearing students (because of the inclusion of the NTID cohort)."
	Materials	23 (11.73%)	"The program is marketed to all students countywide using material that has diversity represented."
	Engagement	22 (11.22%)	"We look at the individual—not the disability—and work to foster a greater understanding, involvement, and success in their chosen fields of study."
	Specific population	19 (9.69%)	"A deliverable of our grant is to increase diversity through equity and inclusion of underrepresented minorities. We will be targeting recruitment at this population of students."
	Equity	16 (8.16%)	"As a result of this ATE project, all students are provided with the opportunity to participate in STEM events, workplace environment, hands-on training, mentoring, and are treated with respect. Through the workshops, open house, invited speaker seminars and conferences,

			students were motivated to continue learning and expanding their knowledge."
	Individualistic approach	15 (7.65%)	"We make our students aware of the importance of being self-motivated learners as well as lifelong learners. We show honest appreciation at the attempts—and if they are less than successful, encourage them. We strive to establish realistic expectations, goals, and accommodations that respond to the unique strengths and needs of each student and have multiple communities whose goals are to help them succeed."
	Outreach	14 (7.14%)	"We promote the summer workshop by reaching out to a wide range of institutions across the nation and we attempt to include participants from different backgrounds and geographical locations"
	Access	13 (6.63%)	"The center sponsors a virtual career fair for all CAE colleges in the country, providing an opportunity for all students to participate regardless of circumstances or location."
	Collaboration	12 (6.12%)	"Every effort is made to create an inclusive environment through individual collaboration and communication as required. We did have one faculty member with a disability attend the summer workshops."
	Research	11 (5.61%)	"The targeted research reports on methods and materials used to help nontraditional populations in technician fields feel greater comfort and confidence in pursuing a career in these fields."
	Enrollment	9 (4.59%)	"The project looks at student motivations for enrollment and persistence and how campus accommodates their needs."
	Curriculum	8 (4.08%)	"By addressing the infusion of employability skills into projects, the curriculum so-modified is able to better equip all students with confidence and interpersonal skills to be employable."

	Participation	8 (4.08%)	"As a result of this ATE project, all students are provided with the opportunity to participate in STEM events, workplace environment, hands-on training, mentoring, and are treated with respect. Through the workshops, open house, invited speaker seminars and conferences, students were motivated to continue learning and expanding their knowledge."
	Core value	6 (3.06%)	"This is an expectation for all our staff and faculty regardless of the program or situation and it is one of our institutional core values. The importance is stressed throughout our professional development and ongoing employee meetings and newsletters."
Right definition of construct	Yes	34 (17.35%)	"Inclusion happens on several levels. 1) Class size—we make an effort to keep class sizes to a very manageable level (typically 15 or less for lab classes). This size class gives the instructor a better opportunity to learn more about each and every student. 2) Group projects—most of our lab activities are completed by small groups. These groups help all students feel like active contributors to the common goal. 3) Personalized advising—we have a full-time lab manager who advises every student in the program on a bi-annual basis"
	Maybe	88 (44.90%)	"Structure of social gatherings."
	No	70 (35.71%)	"Ensuring diverse and equitable representation and participation."
	Don't address	4 (2.04%)	"Just started in September and have not offered courses yet. Will welcome all students that are interested."

TABLE 13. COMPARATIVE DESCRIPTIVE STATISTICS FOR THE EXTENT TO WHICH EVALUATORS AND PIS BELIEVE THEIR PROJECTS ENGAGE IN DEI (RANGE 1–5).

Project Engaged	Evaluators Mean (*SD*)	Evaluators Mode	PIs Mean (*SD*)	PIs Mode
Diversity	3.66 (.96)	3	3.80 (1.35)	5
Equity	3.43 (1.14)	4	3.77 (1.39)	5
Inclusion	3.57 (1.07)	4	3.76 (1.43)	5

TABLE 14. COMPARATIVE DESCRIPTIVE STATISTICS FOR THE EXTENT TO WHICH EVALUATORS AND PIS BELIEVE THEY COLLECT EVIDENCE ABOUT DEI.

Project Collects Evidence	Evaluators Mean (*SD*)	Evaluators Mode	PIs Mean (*SD*)	PIs Mode
Diversity	3.43 (1.40)	4	3.80 (1.35)	3
Equity	2.82 (1.19)	3	3.76 (1.43)	3
Inclusion	2.69 (1.23)	3.5	3.80 (1.35)	3

TABLE 15. ALIGNMENT WITH NAS DEFINITION

Term Alignment	Respondent	Coding for Alignment with NAS Definition			
		Yes	Maybe	No	Don't Address
Diversity	Evaluators	47.54%	47.54%	1.64%	3.28%
	PIs	36.92%	42.52%	16.82%	3.74%
Equity	Evaluators	2.00%	74.00%	16.00%	8.00%
	PIs	34.76%	30.78%	33.33%	3.81%
Inclusion	Evaluators	4.55%	75.00%	13.64%	6.82%
	PIs	17.35%	44.90%	35.71%	2.04%