Academy for Future Teachers: Transitioning to Virtual Delivery

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Abstract: The Academy of Future Teachers (AFT), a precollegiate teacher recruitment program, innovatively shifted from in-person to virtual delivery in order to provide equitable STEM career and teaching experiences for minority students during the COVID-19 pandemic. The AFT program is a collaboration between Georgia State University's College of Education & Human Development and public-school STEM faculty. This qualitative case study was informed by semi-structured interviews and virtual observations of faculty and staff during summer 2020 program implementation. Key aspects of the pivot included administrative and program structural changes, reimagining the curriculum, meeting students' social and emotional needs, building community in the virtual environment, and faculty reciprocal professional development.

KEYWORDS: Teacher pipeline, online learning, digital applications, reciprocal professional development, social-emotional health

NAPDS NINE ESSENTIALS ADDRESSED:
Essential One: A Comprehensive Mission. A professional development school (PDS) is a learning community guided by a comprehensive, articulated mission that is broader than the goals of any single partner, and that aims to advance equity, antiracism, and social justice within and among schools, colleges/universities, and their respective community and professional partners.

Essential Two: Clinical Preparation. A PDS embraces the preparation of educators through clinical practice.

Essential Three: Professional Learning and Leading. A PDS is a context for continuous professional learning and leading for all participants, guided by need and a spirit and practice of inquiry.

Essential Four: Reflection and Innovation. A PDS makes a shared commitment to reflective practice, responsive innovation, and generative knowledge.

Essential Eight: Boundary-Spanning Roles. A PDS creates space for, advocates for, and supports college/university and P–12 faculty to operate in well defined, boundary-spanning roles that transcend institutional settings.

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Academy for Future Teachers: Transitioning to Virtual Delivery

The Academy for Future Teachers (AFT) summer program at Georgia State University provides a three-week educational experience on the university campus for high school students who are interested in Science, Technology, Engineering and Mathematics (STEM) fields and teaching. While student participants come from various locations throughout the state, recruitment targets students attending high-need schools in the university's professional development school (PDS) partnership. Program organizers hope the experience will persuade participants to consider careers in teaching math and science.

The need for qualified math and science teachers has long been a focal point of policy initiatives from the 2000 National Commission on Mathematics and Science Report titled, *Teaching for the 21st Century*, to President Obama's investment of $250 million to recruit 10,000 STEM educators and provide training for 100,000 existing educators. (The White House, 2010). The shortage of math and science teachers was further documented by Ingersoll and May (2012), who found that over 50,000 STEM teachers who had been hired at the beginning of 2004 left their jobs by the end of the year. More recent teacher retention data from 2017-18 revealed that 47 states reported teacher shortages in math and 43 states reported teacher shortages in science (Cross, 2016).

Research shows that there is little difference between the number of racial-ethnic minority students and White students who declare STEM majors (Chen, 2009; Garrison, 2013; Reigle-Crumb et al., 2019). However, racial disparities do exist between students in terms of STEM education persistence (Griffith, 2020; Riegle-Crumb et al., 2019). For example, Riegle-Crumb et al. (2019) concluded that Black and Latinx students were more likely to abandon STEM majors than any other majors. When compared to White students, a Latinx student is 13% more likely to drop their STEM major, while a Black student is 19% more likely to drop their STEM major (Reigle-Crumb et al., 2019). Black and Latinx students show lower persistence rates when completing STEM majors than their White peers (Griffith, 2020; Reigle-Crumb et al., 2019). Lower persistence rates for students from underrepresented groups in STEM degree programs is a factor that necessarily limits the number of members of underrepresented groups who can work and teach in STEM fields.

Once students from underrepresented groups do become teachers, data show that they have higher rates of retention in low-income, high needs, and hard-to-staff school districts (Loeb et al., 2005; National Collaborative on Diversity in the Teaching Force, 2004; Villegas & Lucas, 2005). Villegas and Lucas (2005) emphasized the importance of recruiting ethnic minority students into the teaching profession before they graduate from high school. The present study examined the AFT, a precollegiate teacher recruitment program within a PDS partnership designed to recruit and provide STEM training for high school students from underrepresented groups to improve their skills, self-efficacy, and STEM identity. AFT is a long-standing teacher recruitment effort, founded on the idea that providing students with experiences learning and teaching STEM topics will encourage them to consider pursuing a STEM field and/or teaching after they graduate from high school.

Literature Review

Precollegiate Programs and Experiences

The AFT is an example of a precollegiate teacher recruitment program, one of the five categories of teacher recruitment described by Darling-Hammond and Sykes (1999). Precollegiate teacher recruitment programs are also known as teacher cadet programs or teaching career academies. The Urban Teacher Academy Project, commissioned by the U. S. Department of Education's Office of Vocational and Adult Education, conducted a survey in 1999 which concluded that precollegiate teacher recruitment programs have "collectively served over 175,000 students in 42 states" (Office of Vocational and Adult Education, 2000, p.5). Moreover, the programs often focus on the recruitment of underrepresented students. The Urban Teacher Academy Project conducted a national survey in 1999, which concluded that 67% of the students enrolled were from underrepresented groups (Office of Vocational and Adult Education, 2000).

Precollegiate teacher recruitment programs throughout the nation provide high school students with teaching experiences while helping them explore the teaching profession in an effort to strengthen the teacher career ladder. Precollegiate teacher recruitment programs seek to shift the career decisions of students while they are still in high school before they enter college and declare a major. Research has been conducted on the ability of precollegiate teacher recruitment programs to influence their participants to pursue teaching careers. Long standing pre-collegiate teacher recruitment programs such as The Hubbard School Teacher Academy and the South Carolina Teacher Cadet program have conducted studies that show that students do indeed become teachers as a result of participating in the pre-collegiate teacher recruitment programs. The Hubbard School Teacher Academy conducted research on past participants and concluded that attendees were likely to pursue education as a career (Glennen & Martin, 2000). The Urban Teacher Academy Project found that of the students who attended the academy, 53% were more likely to return and enroll in teacher preparation programs at that same university (Office of Vocational and Adult Education, 2000).

The Teacher Cadet Program in South Carolina operated by the Center for Educator Recruitment, Retention, and Advancement (CERRA) is the oldest precollegiate teacher recruitment program in the country (Center for Educator Recruitment, Retention, and Advancement [CERRA], 2019a). This program started in 1985 and has graduated more than 71,000 high school students in its 34-year history (CERRA, 2019b). Several research studies have been conducted on this long-standing program. A longitudinal study conducted on The Teacher Cadet Program, tracked a cohort of graduates from the 1987-1988 iteration of the program and concluded that 30% of the participants did teach in rural areas and 29% taught in high-needs school districts (Darling-Hammond & Sykes, 1999). The research from these long-standing programs provides evidence that high school participants of precollegiate teacher recruitment programs do enter into teaching professions.

Placed-Based Education and the Power of Place

Many precollegiate teacher recruitment programs take place on a college or university campus and provide pre-college experiences for academically disadvantaged students while closing social capital gaps. Place-based college experiences provide the student and their families with knowledge about academic resources available prior to attending college (Mishra, 2020). Placed-based immersive learning experiences which leverage cultures, landscapes, opportunities, and experiences are an important way to engage precollegiate students who may

be among the first in their families to consider attending college. (Broussard, 2009; Center for Place-Based Learning and Community Engagement, n.d.).

Place-based education promotes the power of place, and though often overlooked, is an influential way to connect students to institutions of higher education (Broussard, 2009). These distinct collegiate spaces provide students with memories that create a bond between them and the university (Broussard, 2009). By participating in placed-based educational opportunities such as precollegiate teacher recruitment programs involving college campus experiences, precollegiate, first generation students can develop their own memories of visiting a college campus (Boss, 2019). Leveraging the power of place cultivated through place-based education is an important way for colleges and universities to engage potential students.

Context

The Academy for Future Teachers (AFT)

The AFT is a precollegiate teacher recruitment program situated on the urban campus of Georgia State University's (GSU) College of Education & Human Development in Atlanta. GSU is ranked as the 10th most ethnically diverse national university, according to the *U.S. News & World Reports* (Jones, 2018). With a focus on providing STEM experiences within a PDS context and academic support for minority high school students, AFT seeks to provide innovative, experiential activities and reflective practices. Exposure to STEM experiences may lead to undergraduate work in STEM fields and the possibility of pursuing a STEM teaching career. The participants engage in team building activities, explore personal and professional aspirations, and use STEM to solve real-world problems (Academy for Future Teachers [AFT], 2020).

Over the years, the AFT program has incorporated two of the nine essentials for PDSs. The AFT program has provided a platform for ongoing reciprocal professional development between university and K-12 faculty through the sharing of innovative practices, which is reflected in the PDS Third Essential (National Association of Professional Development Schools [NAPDS], 2021). Through the sharing of innovative practices the pedagogy used in the AFT program was strengthened. Educational pedagogy was strengthened through the use of reflective practice, inclusion of experiential activities, and the innovative use of digital applications.

AFT opened in the summer of 2001, providing participants with a three-week, college campus experience. Prior to COVID-19, the program was taught face-to-face in university classrooms, providing students with experiential, STEM lab opportunities and providing them with the "power of place" (O'Conner & Bennett, 2005, p. 28). The program provided participants with STEM enrichment opportunities on a large, urban college campus during their high school years. This experience was important because many of the AFT participants were the first in their families to consider attending college or university. The AFT on-campus experience sought to empower the students and their families by providing them with first-hand knowledge of university life.

AFT is part of the PDS collaborative partnership between the faculty at GSU's College of Education & Human Development and local public-school districts within metropolitan Atlanta. The initial program was funded in 2001 by the National Science Foundation's Partnership for Reform in Science and Mathematics (PRISM), in partnership with the Atlanta Public School district. Since 2009, the program has been funded by the following U.S. Department of Education's Teacher Quality Partnership grants: Professional Development School Partnerships

Deliver Success (PDS2), Network for Enhancing Teacher Quality (NET-Q), Collaboration and Resources for Encouraging and Supporting Transformation in Education (CREST-Ed), and currently, the Network for Urban and Rural Teachers United for Residency Engagement (NURTURE). The program has also expanded the partnership to include additional metropolitan Atlanta school systems, such as Clayton, Cobb, DeKalb, Douglas, Fulton, and Gwinnett.

Participants for the AFT were recruited from metropolitan Atlanta school systems through materials such as electronic flyers, brochures, and applications. In addition to recruiting from metropolitan Atlanta public schools, recruitment efforts have also included religious-based schools and civic organizations, including the 100 Black Men, Big Brothers & Big Sisters of Atlanta, and the Young Men's Christian Association (YMCA). From 2005 to 2020, 834 participants successfully completed the program, including 220 students who returned during a second year for advanced STEM training. Over the years, the majority of student participants have been female at 76%, with 24% being male. Since its inception, the program has focused on recruiting underrepresented participants and has successfully met this goal at 91%.

Prior Research on the AFT

There have been several research studies conducted in collaboration with the AFT program. One qualitative study interviewed high school participants, teacher residents and instructors about their participation in the program. This study explored identity formation and framed AFT as a community of practice in the teaching profession (Fisher-Ari et al., 2019). Researchers concluded that AFT helped high school participants form their identities as future professional educators.

The research team conducted two quantitative studies that examined students' beliefs and attitudes about STEM and their understanding of math and science (Puvirajah et al., 2012; Verma et al., 2012). One study was grounded in the theoretical framework of identity. Key findings found that student self-efficacy to succeed in mathematics and science significantly increased after participation in the AFT program (Puvirajah et al., 2012; Verma et al., 2012). The other study researched potential college majors and found that 46% of participants intended to pursue a STEM major (Puvirajah et al., 2012).

A mixed methods research study also examined the attitudes of students towards science and math, and followed four cohorts of the AFT program from 2004, 2005, 2006, and 2007 (Ngari et al., 2009). This study focused specifically on underrepresented students. The attitudes of students towards math and science were only conducted for the 2007 cohort. Sixty-one percent of the 2007 cohort rate math as very important in their daily life, while 29% rated science as very important. The study also found that 69% of the participants intended to become teachers with 57% reporting an interest in STEM teaching (Ngari et al., 2008).

Organization of the Program Prior to the Pandemic

During in-person program delivery, the three-week summer program ran from 8:00 a.m. to 1:00 p.m. daily. The day was broken up into three 50-minute periods of instruction. Faculty members were paired in three teams of two. Each team consisted of a university and K-12 faculty member, which further supported the PDS third essential of ongoing reciprocal learning (NAPDS, 2021). Forty-five participants were divided into three cohorts of 15 students each. Two cohorts were first year participants, and one cohort consisted of second year participants. Student cohorts rotated each week to learn different topics (i.e., early childhood math and science; secondary math; and secondary science). Participants constructed lesson plans and learned the

pedagogy needed to implement their lessons. They implemented their lessons with early childhood and middle school students from the Suttles Child Development Center and After-School All-Stars Atlanta programs housed at GSU. Their learning occurred organically while they taught preschool and middle school students in authentic classroom environments.

While curriculum for the in-person program was well-developed and used for multiple years, it was delivered experientially, allowing students to be actively involved in all projects throughout the program. Instructors modeled how to teach lessons using manipulatives that could only be used in an in-person environment. For example, early childhood math and science was taught using physical activity stations and mathematics manipulatives. Secondary science was taught using the dissection labs at GSU, while secondary math was taught using in-person math simulations. Participants were encouraged to reflect on their learnings and share their critical self-reflections during classroom discussions.

Students gained additional STEM exposure through a weekly guest speaker series. Speakers were invited to share their perspectives on working in STEM fields. The weekly speaker series gave participants the opportunity to share and socialize with others outside of their cohort. Additionally, time between classes was provided to allow students to get to know one another and visit with faculty and staff in shared physical spaces at the university. The program included field trips and opportunities for the students to eat in the campus cafeteria, use the library, and tour the athletic center to encourage exploration of an urban university campus while experiencing the power of place.

The use of technology prior to the pandemic was minimal. In fact, the use of on-campus computer labs was limited because of the large number of summer school students at GSU. However, participants did work with technology outside of the computer labs and were able to record videos of themselves teaching lessons and constructed video presentations for use during the closing ceremony. The closing ceremony featured a keynote speaker and participant presentations. Parents and other family members of the participants were invited to attend.

Project NURTURE, another GSU program, is a teacher residency program that uses a PDS framework and is a collaborative partnership between GSU, Douglas County School District, Middle Georgia State University and Fort Valley State University. The NURTURE teacher residents, many of whom were career changers with STEM backgrounds, were also involved in the in-person AFT program. They provided academic support and mentored the participants. Again, reciprocal learning was the focus of the experience. Participants benefited from learning from individuals pursuing teaching as a career while the NURTURE teacher residents benefited from interaction with the participants and the professional development teaching opportunities afforded to them by participating in the AFT program. By participating in AFT, the NURTURE teacher residents were able to gain authentic classroom experience before they began their student teaching in the fall.

Program Transition

In March 2020, GSU and local public schools shut their doors and moved to online instruction in an effort to prevent the spread of COVID-19. The shutdown occurred amid planning and recruitment for the 2020 in-person AFT cohort, which prompted the program director to reconsider the method of program delivery. After much deliberation, a collaborative decision was made to transition the program from in-person to an online delivery platform at a time when many summer programs were closing.

The faculty and administration agreed to work collaboratively to transition the program from an in-person to a virtual format. Four tasks were collaboratively identified as needed for a successful transition. The first task was to onboard the faculty; the second to identify the platform; the third to recruit the participants; and the fourth task was to hire a technology coordinator.

Onboarding the faculty entailed the program director meeting with two long-term university faculty members to discuss the feasibility of transitioning the program. Once the transition was agreed upon by the university and school-based faculty members were contacted. Weekly meetings were scheduled and it was determined that a technology coordinator needed to be hired.

The next step was to determine the platform that would be used for program delivery. Ideally, the platform would be chosen based on the goals and objectives of the program. However, with little time, the options were narrowed to two choices: WebEx, used by GSU, or Google Classroom, primarily used by the school districts. Google Classroom was chosen because the majority of the faculty, staff, and students had prior experience using it during the school year.

The recruitment of student participants required changing the recruitment timeline, relaunching the newly formatted website, adapting student documents, and developing application forms. In-person recruitment had previously begun in February and ended in early May. However, the virtual program recruitment was launched in early April and ended the first week in June. Programmatic changes included a later start time (from 8 a.m. to 9 a.m.) and the number of participants was reduced from 60 to 45. The reduction in participants occurred for two reasons. First, the faculty were concerned about keeping students fully engaged using a virtual format and felt that a smaller number of participants would lead to greater interaction. Secondly, a smaller number of students applied to participate and while no applicants were denied, some chose not to participate.

The last task was to identify and hire a full-time technology coordinator for the program. The Technology Coordinator was hired to work with the College of Education & Human Development's Information Systems and Technology Department to ensure smooth program implementation. Additionally, the Technology Coordinator was responsible for assisting students and faculty with the log-in process to the Google Classroom platform and to coach, troubleshoot, and support the students and faculty technologically.

Program Elements Remaining the Same

One element that remained the same from the in-person to the virtual program was the interactive nature of the program. At the heart of the AFT implementation was the focus on active, student engagement. The basic structure of the 3-week program remained the same in terms of student cohorts, faculty partners, and weekly rotations. Students continued to be divided into three groups: two groups of first-year students and one group of second-year students. Student cohorts rotated each week to learn how to teach early childhood math and science, secondary math, and secondary science respectively. Collaborative teaching pairs of university and K-12 faculty were responsible for planning and implementing educational activities in both the in-person and virtual AFT. Both programs ended with a closing ceremony on the last day. An in-depth discussion of how elements of the implementation changed to meet the needs of participants in the virtual program will be provided in the findings section of this article.

Shared Commitment to Innovative and Reflective Practice

The transition of the AFT program from in-person to virtual delivery strengthened the faculty's shared commitment to innovative and reflective practice. This was shown through the successful adaptation of the AFT curriculum for virtual delivery. Innovative practices included experiential activities and use of multiple digital applications which led directly to reciprocal professional development for both faculty and students as embodied by the fourth PDS Essential (NAPDS, 2021). The AFT faculty remained committed to engaging in reflective conversations to "generate new ideas, expose fundamental assumptions about their practices, work together, and reflect deeply about their own work" (Yendol-Hoppey & Hoppey, 2013, p. 62).

Yendol-Hoppey and Hoppey (2013) identified multiple practices related to innovation and reflective practice. For AFT, those practices included co-teaching, an emphasis on inquiry, and reflection on teaching. By engaging in reflective dialogue among faculty, innovative practices were shared and implemented, which strengthened pedagogical approaches used in the virtual classroom.

Purpose and Methods

The purpose of this qualitative case study was to explore the perceptions of administrators, faculty and staff about how AFT was adapted for virtual delivery during the COVID-19 pandemic. A series of comprehensive, semi-structured interviews and virtual observations were used to gather data in an effort to understand the uniqueness and complexity of the case (Merriam, 2009; Stake, 1995; Yin, 2014). All personnel involved with the vision, direction, and implementation of AFT, including administrators, faculty, and the technology coordinator, were invited to participate in virtual interviews. Responses to the interview questions and classroom observations were analyzed to answer the overarching research question: *How did the Academy for Future Teachers' administrators, faculty and staff make a successful pivot from in-person delivery to online delivery?* Within the context of this research question, we sought to identify their perceptions of the administrative and programmatic changes needed to pivot from in-person delivery to online delivery for a PDS, summer, precollegiate teacher's academy.

Two administrators, five faculty members, and one staff member agreed to participate in the study. The sample included all personnel involved in the implementation of the AFT program, with the exception of one faculty member who chose to not participate. Institutional Review Board (IRB) approval was obtained along with informed consent of the participants. The interviews were completed in the fall of 2020, after the summer program ended. They were conducted via Zoom and lasted for approximately 30 minutes. Interviews were audio recorded and transcribed for a thematic analysis based on Stake's (1995) approach to single case study.

Once data were collected, an in-depth thematic analysis was conducted to gain a detailed explanation and deeper understanding of participants' perceptions. Researchers deconstructed the data, identifying patterns and themes. A direct interpretation of the data was used along with an aggregate analysis of the responses to determine the final thematic analysis (Stake, 1995).

Findings

Four main themes were identified: (1) curriculum program adaptations; (2) social-emotional program adaptations; (3) reciprocal teaching and learning and (4) teacher resident experience.

Curriculum Program Adaptations

Shortening Instructional Time

A significant change made to the program was the shortening or chunking of the information presented during instructional time. Prior to the virtual program, each session was 50 minutes in length. However, as part of the transition to the virtual format, sessions were broken into shorter segments with time for interaction. This was done in an effort to accommodate the participants' attention spans and to avoid burn-out and screen fatigue. One instructor explained that the instruction went from 50 minutes during the in-person format to "30 minutes of interaction with [the participants] on screen, and then a 20 to 30-minute assignment or a 40-minute teamwork project." Chunking the instruction provided more time for cohort interaction and experiential, peer-group work.

Absence of student teaching

Perhaps the most profound change was that the participants were no longer able to experience the authentic teaching of students. Because of the pandemic, the Suttles Child Development Center and After-School All-Stars Atlanta did not meet during the summer of 2020. There were no campus programs available for student teaching experiences. Prior to the pivot to virtual delivery, the student teaching component had generated additional excitement and engagement for participants in the program. AFT participants were able to implement the lesson plans and activities they had worked on collaboratively with their peers during the last day of each week. This was an important activity, one the program director described as "by far, a favorite among participants," that did not make the transition to virtual implementation.

AFT participants were not provided the opportunity to teach students in-person or virtually due to the pandemic. However, first-year participants did create one lesson for each week and topic of the program, while second-year participants created a full unit plan with three lessons and a culminating activity. Participants presented the components of their lesson plans to their cohort instead of actually teaching the lessons. One instructor explained that they modeled a "gradual release method which is the, I do, we do, you do model" and explained that the students were asked to incorporate modeled, guided, and independent practice activities into their lesson plans. In addition, students were challenged to differentiate their lessons to accommodate individual student needs.

Digital Applications

The in-person curriculum was adapted to include digital applications to encourage and support interactive student engagement. The goal was to ensure that engaging and interactive learning activities were built into the virtual program and "that the [students] were actually interacting with the slides, instead of just reading them and watching them," as one instructor stated. For example, digital applications such as Padlet, Nearpod, and Flipgrid created more interactive virtual experiences than static documents or PowerPoint presentations.

Digital applications were woven throughout the virtual program in order to provide interactive and engaging ways to teach early childhood math and science, secondary science, and secondary math. For the early childhood lessons, the instructors challenged the participants to create and demonstrate online lessons and modules to help parents teach their preschoolers at home. The secondary science lessons could no longer include the use of dissection labs, while the secondary math lessons could no longer use in-person math simulations. Instead, digital

applications were used to create interactive virtual simulations and lessons in various ways. Applications were used for interactive games, science experiments, presentations, 3D figures, math simulations, math vocabulary, and rap poem construction, among other activities. The applications also made virtual field trips possible during the pandemic.

The digital applications promoted the students' acquisition of modern technology skills, facilitated the use of collaborative learning environments, and included the use of video. The participants were able to work collaboratively using breakout rooms, social media, or other online platforms. For example, the secondary math team started each day with an engaging math "Problem of the Day." Using the Google documents, the students could see each other's individual approaches to solving the problems "in real time as it was happening," stated one instructor. One problem of the day, the Sierpinski's Triangle, was video recorded into movie animations of the students' drawings. A secondary math instructor recorded verbal instructions using a DocCAM on how to create the Sierpinski's Triangle, which is a series of triangles within a triangle created from mathematical algorithms. The animations of the Sierpinski Triangles were incorporated into student e-portfolios and presented during the program's closing ceremony.

Digital applications that could be used in the classroom were collaboratively identified not only by the faculty and staff, but also by the students. The use of digital applications provided reciprocal professional development for the faculty, staff, and students supporting the PDS notion of reciprocal learning. Reciprocal learning was encouraged and occurred at multiple levels throughout the program. For example, technology savvy students shared their digital application knowledge with their peers, faculty, and staff. Many of the instructors were so impressed with the digital applications shared by the students that they decided to use them in their own classrooms outside of the AFT program. Reciprocal learning around digital application usage provided a robust number of experiential learning options for use in the virtual AFT program. See Table 1 for a list of digital applications used during the program.

Table 1. Digital Applications

Digital App	Program Use
Quizlet	Makes flashcards, quizzes, and study guides
GimKit	Facilitate games similar to Kahoot, but to win money
Padlet	An online discussion and posting board
Light Box	Edits and shares photos in virtual environments
PhET Labs (Science)	Creates science and math simulations online
FlipGrid	Records and share short videos
Nearpod	Makes interactive lessons
Quizizz (Math)	Creates math quizzes, assignments and presentations
DesMos (Math)	An online graphing calculator
Snapchat	A messaging app to share photos and videos

Source: AFT Program Coordinator Laurie Forstner

Science, Technology, Reading, Engineering, Arts and Mathematics (STREAM) Units

Previously, during the face to face program, faculty and participants did not organize early childhood math and science lessons into a particular unit. The virtual AFT program introduced a STREAM unit approach into the early childhood math and science component. This unit approach integrated several facets of STREAM into a single lesson. Incorporating the STREAM unit concept improved both faculty and participant lesson planning while increasing student engagement and curiosity. This approach improved lesson planning by encouraging the faculty and participants to focus their internet research to fit the respective unit. One instructor told us:

> By focusing on life cycles and specifically the life cycle of the butterfly, the students were able to find math activities for field trips or science activities or writing activities or music that would complement life cycles.

Additionally, focusing the lessons into a specific unit which could be built upon increased student engagement and piqued their curiosity to learn more. One faculty member stated that "the unit focus was easier for planning purposes, as well as exploratory purposes for the students." They explained:

> It kept the students interested because they were continuing to build on the knowledge . . . that they were learning about the life cycle. The idea is for kids to continue to be curious and learn about other life cycles. We focused on the butterfly, so they were like, What about life cycles of humans and dogs and plants?

Social-Emotional Program Adaptations

The AFT program faculty catered to the social-emotional needs of the participants in the virtual environment. This was done in several ways, including using the Remind 101 application, facilitating virtual icebreakers and check-ins, encouraging creative expression, allowing participants to make the camera on/off choice, and modeling empathy about the pandemic, including enlisting a trauma-informed speaker.

Remind 101 Application

The faculty and staff used the Remind 101 application to keep students on track during the program. The Remind 101 application supported communication, but did not necessarily increase or improve the communication from the in-person program, according to one faculty member. The Remind 101 application provided a virtual means to remind students how much time was left during the frequent breaks and small group sessions. Additionally, a countdown clock was posted on the class page to provide students and observers with the time left before returning to the larger class. The Remind 101 application also facilitated communication among students, faculty, and administrators, providing an outlet for students to express individual concerns confidentially.

Virtual Icebreakers and Check-ins

Faculty and staff sought to establish relationships with the students by facilitating virtual icebreakers and check-ins. Instructors were used to building rapport for each new student cohort as they rotated to a new subject of instruction. During the virtual program, instructors had to identify and develop icebreakers using digital applications if applicable. One instructor stated they used "Padlet or Flipgrid . . . doing things like two truths and a lie about yourself or Tweet, where you [respond to a] Twitter feed." Faculty could no longer rely on the physical icebreakers previously used.

The use of morning check-ins was introduced during the virtual program as a way to model empathy and concern for others during the pandemic. There were a variety of ways that the students could choose to check-in and share their feelings. For example, "the [students] could interactively, without having to say anything out loud, click and drag or put an emoji based on how they felt or grab a GIF based on how they felt that specific day," explained one faculty member. Participants could also talk with faculty individually if needed. Because of the additional stress created by the COVID-19 pandemic, faculty allocated time for students to share their concerns and discussed how to meet life challenges.

Encouraging Creative Expression

Although AFT faculty always encouraged students to demonstrate content mastery using a variety of creative outlets, during the virtual program they were more intentional about giving students this opportunity. According to one faculty member, they increased the opportunity for students to use creative outlets to complete assignments in order to reduce the monotony of the online experience and to make it more engaging. Participants could choose different modalities to express themselves and complete assignments based on their moods, interests, and learning styles. Participants frequently responded using drawings, songs and raps, or videos. This allowed the faculty and staff to assess students' learning in different ways: "[Participant learning was] not assessed in a paper and pencil or multiple-choice format, but through creation of song or rap that

[the participant] would make to demonstrate . . . understanding of the vocabulary words," stated one faculty member. They also mentioned that by allowing students to complete assignments creatively, "[we] were able to speak to some of the strengths of our students. For some, singing was a time for them to shine . . . for others, art or drawing."

Participant camera On/off Choice

Faculty and staff determined that it was important not to require or pressure students to share or turn their cameras on. One faculty member stated that the intention was to "respect people's emotions and the different states that they are in." Another instructor stressed the importance of allowing the students' privacy and the ability to decide to turn on their camera or not,

> While we wanted students to have their cameras on, we also did not strongly enforce and push students to do so because we also know that sometimes people may not feel comfortable having their home . . . on the screen or knowing where they are. Allowing students to determine whether they would share/turn their camera on was an additional way that faculty and staff showed their concern for social and emotional issues.

Faculty and staff believed that the structure and implementation of the program would encourage authentic and organic student responses with or without a camera feed.

Trauma-informed Speaker

AFT faculty and the technology coordinator were aware of the multitude of challenges and emotional discomfort that the students could be facing during the pandemic. To meet this need, a speaker presented on issues of trauma during the secondary science rotation. One administrator described potential student challenges caused by the pandemic,

> When everything was really banned and people could not go outside, to stay in the house weeks upon weeks, nobody knows what is happening at home . . . Parents might have lost their jobs and do not know with certainty where they are going to get food or whether they are going to maintain shelter . . . That is why we included the trauma-informed speaker because we knew that the students were experiencing [trauma] for the most part. Most of the [AFT students] experienced some emotional discomfort, whether you call it trauma or not, in their lives.

Faculty and staff openly acknowledged the pandemic as a universal challenge for AFT participants. In addition to the speaker on trauma, the AFT team continued to offer social-emotional support through check-ins and individual meetings with the AFT participants.

Building Community

To build a sense of community, faculty and staff incorporated an experiential science project that also served as an innovative way to build community among the participants working remotely. Building a sense of community was one of the most important yet difficult things to do when working with students remotely. Faculty and staff intentionally chose to implement a butterfly metamorphosis project that involved nurturing a live caterpillar until it morphed into a butterfly over a three-week period. Each high school student received a butterfly kit several days before the program started, which generated a sense of excitement and anticipation. The butterfly kit experience provided the AFT students with a new and shared experience that fostered ongoing dialogue between the students and faculty. The unit on the lifecycle of the butterfly was

primarily covered during the early childhood week. However, the early childhood faculty prepared instructional videos for all students to use to care for their butterflies regardless of their weekly rotation. One instructor explained the value of a common, shared experience:

> Every week we were able to have conversations about what is happening with our butterfly gardens . . . This was really helpful because it was a conversation entry point for students that we have never met. I think that was very important, especially in an online space, to have a shared experience that we could all talk about.

Closing Ceremony

At the end of the three-week program, students shared their collaborative final projects. Each teaching pair gathered examples of the final teaching projects to showcase in short video presentations. The presentation included participant poems, e-portfolios, philosophies of teaching, journal entries and exemplary lesson plans. To summarize the participant experience of the AFT program, a program administrator told us,

> [The participants] learned what it's like to be a teacher and how to work effectively with teachers, faculty and staff. If the students go to GSU or another university, [we hope] they'll think about teaching as a career and we will love having an impact on increasing the number of Black and Brown teachers in our schools and around the country.

While the closing did occur during the virtual program, it did not include family members and was for faculty, staff, and students only.

Reciprocal Teaching and Learning

Reciprocal professional development, aligned with the Third PDS Essential, was present in both the in-person and virtual programs (NAPDS, 2021). One teacher described how the partnership between the university and K-12 faculty continued from the in-person program to the virtual one: "It was a . . . fluid mosaic type of passing on knowledge back and forth and so that really did not change just because we were virtual." The collaboration between the AFT faculty also served as a model for the participants. One instructor stated that the great working relationships between the instructors "just flowed on to the students, too." Therefore, the participants were also motivated to engage in collaborative teaching to complete their assignments and projects.

Reciprocal professional development occurred organically through the weekly team meetings between the university and K-12 faculty. The higher education faculty brought expertise in theory, while the K-12 faculty brought practical classroom management. During the team meetings, many of the teachers were introduced to digital applications that they now use every day. At the end of the program, faculty and staff left with a wealth of resources and ideas to implement in the classes they teach at both the university and K-12 levels. One university faculty said, "It was very helpful to learn and try out some things, not only during AFT, but also things that I tried and played around with in my own teaching, whether it is my methods courses or my content courses."

Teacher Resident Experience

The involvement of the NURTURE teacher residents in the virtual program was more limited than in previous years because of the COVID-19 pandemic. NURTURE residents were,

however, able to participate in a two-part experience, which first included attending the AFT program to obtain first-hand knowledge of virtual learning. During the virtual program, residents observed AFT faculty as they taught lessons and provided expert models of remote teaching. Residents were encouraged to think about the lessons from a child's perspective and to learn first-hand from the AFT instructors as they modeled educational pedagogy. The second part of their experience included faculty-led discussions about their observations of the program. These discussions provided additional insights around effective virtual teaching methods. Participating in the AFT program provided the teacher residents with classroom experience prior to beginning their own residency in the fall. One AFT administrator stated, "The AFT program gave Project NURTURE residents an opportunity to get to know what teaching is before they start delving into their own classroom in the fall . . . This sets them apart and ahead."

Discussion

The transition from in-person to on-line delivery of the AFT program provided many challenges and opportunities for the implementation team. Two unique challenges cited by the team included building authentic relationships with the participants and planning lessons for a virtual environment.

Challenges

Relationship Building

The inability to converse with the students in a shared space negatively affected relationship building and decreased faculty satisfaction in getting to know the participants personally and academically. One instructor stated, "When it is a virtual environment and we only see the students for a week, by the time you really know them, they are moving [on to the next rotation]." Another instructor said, "We did not have time to build the relationships, and we do not get to see them again in all of the other shared spaces that we typically would have [during an in-person program]." The value of faculty, staff, and student interactions in shared spaces, often taken for granted during in-person programs, was particularly noticeable within the restrictions of the virtual environment.

An additional challenge for faculty in building relationships was allowing the students to decide to have their cameras on or off. Allowing participants the choice to have their cameras off was intentional to be empathetic to their personal situations. For several faculty, it negatively affected their ability to build relationships with the participants. Although the faculty learned the participants' voices, some were concerned that they would not be able to recognize the participants after the program ended because they had never seen or only briefly seen the participants. One faculty member explained, "this year, if I saw the majority of the [participants], . . . I would not recognize them." Another stated that allowing the participants to decide to keep their cameras off "limits you in the full development of the student-teacher relationship where you really get to understand and know the personality of the students."

Lesson Planning

Several faculty members mentioned the challenge of planning lessons when transitioning from an in-person program to a virtual one. When teaching in-person, additional activities can be used to further support or supplement classroom activities should students finish early. However, when teaching virtually, detailed, collaborative lesson plans need to be intentionally developed

prior to implementation. With few teachers having virtual collaborative teaching experience, this proved to be a challenge. One faculty member stated, "Everything has to be planned in advance and it has to have all of the elements for what if this doesn't work then what do we do?" Another noted that, "When [the program is] virtual, every aspect has to be planned just in case something does not go right or something goes faster than it should have, or something took longer than it should have." When teaching virtually, it is important to have the videos, PowerPoints and activities clearly identified and ready for use. One instructor stated, "So, [teaching virtually] can't be a thing that you do on the fly, like you can when you're in person." Faculty found that the pacing for delivery of virtual instruction was different and took some time to understand. Stated another instructor, "The greatest challenge was coming up with the right activities [for each lesson] and hashing it out between [the faculty] so that the activities would be beneficial to the students." AFT faculty worked collaboratively to ensure that lesson plans included intentional activities that fit into the predetermined time frames, and were designed to engage and support participants interested in becoming STEM teachers.

Successes

Although there were significant challenges, there were also successes with transitioning the program from an in-person to virtual delivery. Identified successes included technology, relationship building, culturally responsive student learning and collaborative communication. The faculty's ability to shift to online instruction in a short period of time was a testament to their commitment to AFT and the PDS partnership with local K-12 schools.

Technology

While many of the faculty had not previously used technology as a pedagogical tool in their in-person classrooms, it was necessary to use technology when transitioning to virtual delivery. Faculty successfully transitioned the in-person curriculum to virtual over a two-month period maintaining an emphasis on experiential delivery. Providing these types of activities in a virtual environment took additional time and the use of many different types of digital applications. Hiring a Technology Coordinator further supported the faculty in their transition to virtual delivery. The Technology Coordinator worked collaboratively between the faculty and the GSU Instructional Technology Department to ensure smooth program implementation and was responsible for obtaining access for both faculty and students to the Google Classroom platform. The Technology Coordinator stated, "I was able to help the [faculty], because the [faculty] were a little bit more hesitant about going [virtual]. But once we got up and running and [the faculty] saw how smoothly things could go, they were very comfortable with it." The Technology Coordinator also was available full time to coach, troubleshoot and support students and faculty when needed. "Just being available [to help]. I was in attendance every day for the whole time that the class was ongoing and whoever had issues contacted me and I helped resolve any [technical] problem for them," stated the Technology Coordinator. The addition of the Technology Coordinator further supported the smooth implementation of the virtual program.

Relationship Building

Building relationships with students was of primary importance when transitioning to virtual delivery. Ice breaker activities were used to help build relationships with the students. In addition, the faculty built relationships by asking for student feedback in the chat and having virtual conversations with students whenever possible. One faculty member shared:

> One of my favorite parts of the program is seeing [the students] grow just within a week and then keeping tabs on them as they float to other classes for the next two weeks. But the awesome thing about it was that you still got that relationship building. You still were able to connect, even though it was virtual, it was still good.

While building relationships in a virtual environment can be challenging, one faculty member described their success, "I feel like that was a big accomplishment just to be able to make it seem as normal as it would be if we were face-to-face." Providing support and being authentic with the students made a difference in being able to connect with the students virtually. Stated one faculty member, "I feel like just being yourself [is important]. If you are passionate about what you're doing, it allows you to be more transparent and also just genuine and authentic." Genuine connections with students can be made when respect is mutual. Once students begin to trust their teachers, "[Students] open up a little more and it was pretty easy to build the relationships," stated one instructor.

Culturally-responsive Student Teaching and Learning

The faculty engaged the AFT participants in activities to strengthen their sense of STEM identity while promoting equity, inclusivity and supporting critical thinking skill development. This was successfully accomplished through activities that allowed the participants to draw on previous lived experiences and knowledge. For example, one instructor described how she applied math to a culturally relevant aspect of everyday life:

> Thinking about mathematics and how it is part of our everyday lives and how it is connected to who we are . . . I was showing different images . . . different braid patterns. . . It was just nice that they were starting to have a broader view of what mathematics can be.

The faculty used an assets-based mindset when developing a curriculum that was rigorous and student-centered. Including the butterfly kits for science not only provided a springboard for scientific discovery, but also encouraged students to think critically. It provided the participants with an experience that could be explored and discussed from their own perspective as a potential scientist.

Collaborative Communications

Collaborative communications were the key to a successful program for both the faculty and the participants. The faculty worked together in teams to implement the program. Each university faculty member was partnered with a K-12 teacher. The collaborative partnerships gave each of the faculty members an opportunity to gain experience and expertise that was shared from the two different teaching contexts. One faculty member stated:

> The weekly team meetings helped a lot because it helped keep everybody on track. It helped everybody communicate where they were when it comes to their own individual collaborations. It allowed us to tag team as far as how we were going to collaborate and how we were going to instruct the students in their lessons and how we were going to communicate what we were actually doing in the group.

An instructor said, "We worked together last year so we already had a great relationship, a great working relationship. We bounced [back and forth] and we just worked well with each other." Having a previous relationship with a faculty partner made the transition to virtual delivery

easier. Together the faculty partners shared teaching strategies and digital applications that worked for them in their own unique space.

Collaborative communications were extended to the participants as well. Faculty worked hard to build relationships with students, meeting them where they were and moving them forward in their interest in teaching. Stated one faculty member, "I kept up with [the previous year's participants] and they kept up with me throughout the year and now [some of the participants] are back. Hey, great seeing you again. You joke, you laugh with them." One administrator said:

> I think [the program's success] speaks to the students that were involved and how committed they were and attentive and willing to participate, as well as the instructors who were able to shift and to make a change almost seamlessly and still offer the same level of excitement and energy and dedication to it.

Recommendations

In their interviews, faculty and staff had a strong recommendation regarding the technology used in the program. Keeping in mind that the faculty and staff were interviewed well into the next school year and that they were more experienced with the different platforms, they suggested that consideration should be given to changing platforms or using additional platforms when appropriate and available. Many faculty recommended using the Zoom platform to facilitate the virtual program because of the ease of transitioning in and out of breakout rooms. Additionally, the camera choice issue could be simplified through the use of a platform that allows for the personal choice of backgrounds. The use of virtual backgrounds could allow for student privacy while having their cameras on to facilitate relationship building. At the time of the program implementation, background choices were not available.

Choosing to use platforms that are easy to use has potential implications for future implementations of the AFT program. AFT program administrators may want to consider offering a blended program as opposed to an on-campus only program. This would allow students who live in the rural areas of Georgia to participate in the program. Offering high quality STEM experiences to both urban and rural students simultaneously would provide more diverse and inclusive learning experiences for all students.

The second recommendation is to schedule socialization time so that faculty and participants can interact across all three cohorts. Scheduling informal breaks where multiple cohorts of participants, faculty, and staff could meet and get to know one another would further facilitate relationship-building. Faculty spoke of missing the contact with participants over the three-week period of time and requested that for future programs, socialization time be built into the schedule. Having time to socialize was a part of the in-person program through scheduled time between classes and on-campus lunches. The intentional socialization experience also provided the faculty with additional time to interact with students and get to know them. In the future, AFT program administrators should consider using the in-person socialization schedule as a model for the virtual program. Participants enjoy interacting with one another on a personal level. Providing a scheduled time and space for informal breaks during the virtual program would further support faculty and participant interaction. Scheduling intentional socialization time is an activity that is important for both in-person and virtual program delivery.

The third recommendation is for university and K-12 faculty to continue to build upon their knowledge of the use of digital applications for learning purposes. The pandemic has forced program providers to reconsider delivery methods. It is safe to assume that because of the

positive experiences both faculty and participants have had using digital applications during virtual delivery, that there will be an increased usage of digital applications during in-person delivery. Both faculty and participants shared positive outcomes from the innovative and interactive learning experiences provided when using digital applications. The use of digital applications is an innovation brought on by the pandemic that is relevant for use in both in-person and virtual program delivery.

The final recommendation is to continue providing universal learning experiences across cohorts. The shared experiences help to improve critical thinking skills while providing an opportunity to build relationships. The butterfly kits that the students received prior to attending the program successfully provided a unique shared experience. The shared experiences helped the participants to build community. The butterfly kit was used in the early childhood component of the program. Faculty in high school math and science also would like to provide a shared experience in some way for next year's cohorts.

Conclusion

Our case study highlights some of the characteristics of online programming for secondary students that may be helpful in similar programs throughout the nation, as we are all dealing with the COVID-19 pandemic. Within a PDS framework, AFT faculty, staff and administrators transitioned their long-running summer program to a virtual environment and provided STEM-based activities for secondary students from the metropolitan Atlanta area. Key issues identified by program faculty, staff, and administrators were restructuring the program, adapting the curriculum with the use of digital applications, attending to participants' social-emotional needs, building a sense of community, providing professional development, and cultivating collaborative teaching and learning. Lessons learned included identifying the most appropriate platform for virtual program delivery, the importance of scheduling socialization experiences within the program, the use of innovative digital applications to support interactive learning and providing universal learning experiences across cohorts. The lessons learned can be used to enhance learning for in-person, virtual or blended methods of program delivery of future AFT programs.

The COVID-19 pandemic brought about many changes in program delivery for students in the United States. Because the AFT program was able to transition to on-line program delivery in a short time, students in the Atlanta area were able to attend virtually. Many of the innovations required to make the virtual AFT program successful can be used for in-person and blended delivery as well. The innovations may also be used to expand the program to include both urban and rural participants providing for a more diverse and rich learning experience.

References

Academy for Future Teachers. (2020). Academy for Future Teachers: Coming June 2021. Georgia State University, College of Education & Human Development. https://education.gsu.edu/research-outreach/academy-for-future-teachers/

Boss, S. (2019, March 4). *College prep for first-generation students*. Edutopia. https://www.edutopia.org/article/college-prep-first-generation-students

Broussard, E. (2009, May 1). The power of place on campus. *Chronicle of Higher Education*, *55*(34), p. B12. https://www.chronicle.com/article/the-power-of-place-on-campus/

Center for Educator Recruitment, Retention, and Advancement. (2019a). About us. https://www.teachercadets.com/about.html

Center for Educator Recruitment, Retention, and Advancement. (2019b). Overview. https://www.teachercadets.com/about.html

Center for Place-Based Learning and Community Engagement (n.d.). What is place-based education? Promise of place. http://promiseofplace.org/what-is-pbe/what-is-place-based-education

Chen, X. (2009). *Students who study science, technology, engineering, and mathematics (STEM) in postsecondary education* (Report No. 2009-161). National Center for Education Statistics. https://nces.ed.gov/pubs2009/2009161.pdf

Cross, F. (2016, August). *Teacher shortage areas nationwide listing 1990-1991 through 2016-2017*. U.S. Department of Education Office of Post-Secondary Education. https://www2.ed.gov/about/offices/list/ope/pol/tsa.pdf

Darling-Hammond, L., & Sykes, G. (Eds.). (1999). *Teaching as the learning profession: Handbook of policy and practice.* Jossey-Bass Education Series.

Fisher-Ari, T. R., Martin, A., Cox, V., Granville, H. G., & Forstner, L. (2019). Community-oriented PDS programs: Professionalizing teachers, supporting learners, and reshaping discourses around teaching. *School-University Partnerships, 12*(2), 17-30.

Garrison, H. (2013). Underrepresentation by race-ethnicity across stages of U.S. science and engineering education. *CBE Life Sciences Education*, *12*(3), 357-363. doi: 10.1187/cbe.1212-0207

Glennen, R. E., & Martin, D. J. (2000). *The Hubbard summer academy for future teachers: Implications for teacher education*. Emporia State University, Jones Institute for Educational Excellence.

Griffith, A. L. (2010). Persistence of women and minorities in STEM field majors: Is it the

school that matters? *Economics of Education Review*, *29*(6), 911–922. https://doi.org/10.1016/j.econedurev.2010.06.010

Ingersoll, R. M., & May, H. (2012). The magnitude, destinations, and determinants of mathematics and science teacher turnover. *Educational Evaluation and Policy Analysis*, *34*(4), 435–464. https://doi.org/10.3102/0162373712454326

Jones, A. (2018, September 19). Georgia State rises to no. 2 in nation in *U.S. News* innovation, commitment to teaching rankings [Press release]. https://news.gsu.edu/2018/09/09/georgia-state-rises-to-no-2-in-nation-in-u-s-news-innovation-commitment-to-teaching-rankings/

Loeb, S., Darling-Hammond, L., & Luczak, J. (2005). How teaching conditions predict teacher turnover in California schools. *Peabody Journal of Education*, *80*(3), 44-70. https://doi.org/10.1207/s15327930pje8003_4

Merriam, S. B., (2009). *Qualitative research: A guide to design and implementation.* John Wiley & Sons.

Mishra, S. (2020). Social networks, social capital, social support and academic success in higher education: A systematic review with a special focus on 'underrepresented' students. *Educational Research Review [online]*, *29*, Article 100307. https://doi.org/10.1016/j.edurev.2019.100307

National Association for Professional Development Schools. (2021). *What it means to be a professional development school: The nine essentials (2nd ed.)* [Policy statement]. https://3atjfr1bmy981egf6x3utg20-wpengine.netdna-ssl.com/wp-content/uploads/2021/05/What-it-Means-to-be-a-PDS-Second-Edition-2021-Final.pdf

National Collaborative on Diversity in the Teaching Force. (2004, October). *Assessment of diversity in America's teaching force: A call to action*. Author. http://ftp.arizonaea.org/assets/docs/HE/mf_diversityreport.pdf

Ngari, M. H., Despriet, L. H., & Monsaas, J. A. (2008, March 24-28). *The effectiveness of a summer program to attract minority students into mathematics and science teaching, their attitudes towards science, mathematics and teaching, and their decision to attend college* [Paper presentation]. American Educational Research Association, New York.

O'Conner, R. A., & Bennett, S. (2005). The power of place in learning. *Planning for Higher Education*, *33*(4), 28-30.

Office of Vocational and Adult Education. (2000). *High school teacher career academies: Profiles and practices.* Urban Teacher Academy Project. Recruiting New Teachers, INC., Council of Great City Schools.

Puvirajah, A., Martin-Hansen, L. M., & Verma, G. (2012). Creating a pipeline to STEM careers through service learning: The AFT program. *Education Publications, 16*. https://ir.lib.uwo.ca/edupub/16

Riegle-Crumb, C., King, B., & Irizarry, Y. (2019). Does STEM stand out? Examining racial/ethnic gaps in persistence across postsecondary fields. *Educational Researcher*, *48*(3), 133-144. https://doi.org/10.3102/0013189X19831006

Stake, R. (1995). *The art of case study research*. Sage Publications.

The White House. (2010, January 6). *President Obama expands "Educate to Innovate" campaign for excellence in science, technology, engineering, and mathematics (STEM) education* [Press Release]. The White House Office of the Press Secretary. https://obamawhitehouse.archives.gov/the-press-office/president-obama-expands-educate-innovate-campaign-excellence-science-technology-eng

Verma, G., Puvirajah, A., & Martin-Hansen, L. (2012, October 9). Recruiting minority students into STEM through experiences in being a teacher [Conference Session]. epiSTEMe 5 conference, Mumbai, India.

Villegas, A. M., & Lucas, T. F. (2005). Diversifying the teacher workforce: A retrospective and prospective analysis. *Yearbook of the National Society for the Study of Education*, *103*(1), 70-104. https://doi.org/10.1111/j.1744-7984.2004.tb00031.x

Yendol-Hoppey, D., & Hoppey, D. (2013). Generating PDS possibility and practicality thinking using a case and protocol tool to enhance PDS development. *School-University Partnerships*, *6*(1), 59-75.

Yin, R. K. (2014). *Case study research: Design and methods.* (5th ed.). Sage.

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Appendix
Interview Questions: Administrators and Faculty

1. How long have you been working with the AFT program?
2. Tell me about your role in the AFT program prior to COVID-19?
3. How was the AFT program originally delivered?
4. How was the AFT program changed during the transition to online delivery?
5. How did your role in AFT change as a result of the shift to virtual learning?
6. How did you perceive the shift from offering an in-person Academy to an online one?
7. How was the curriculum altered to fit into an online environment?
8. Reciprocal professional development was an important part of the team meetings. How was reciprocal professional development cultivated?
9. How did the program meet the social and emotional needs of the students in the online environment?
10. What was your greatest challenge during the virtual AFT program?
11. What was your greatest accomplishment during the virtual AFT program?
12. What are your recommendations for improvement of the online format for next year's AFT?
13. Is there anything else you would like to share about the AFT program's shift from in-person to online?

Interview Questions: Technology Coordinator

1. Describe your role as Tech Coordinator for the AFT program?
2. How did you support the professional development of teachers for online usage?
3. How did you support the students for online usage?
4. What were your greatest challenges during the virtual AFT program?

5. What were your greatest accomplishments during the virtual AFT program?
6. What ways did you use digital applications to enhance the online experience?
7. How was the sense of community addressed for the students in the online environment?
8. What changes would you recommend to improve the online format for next year's AFT?
9. Is there anything else you would like to share about the AFT program's shift from in-person to online?