



Impacts on STEM Teaching in Arizona K-12 Classrooms

Through the analysis of year one, post-program interview data, we aim to answer the following question, **“How has fellow’s participation in ASAP impacted or influenced their teaching, and particularly, how they teach STEM?”** The present analysis finds that fellows’ STEM teaching was primarily influenced by (1) an increase in one’s personal understanding of STEM and student perspectives, (2) the acquisition of resources that enable the facilitation of hands-on STEM learning, (3) improvements in and opportunities to teach STEM topics, (4) an evolution in one’s teaching style and/or pedagogy, and (5) notable student growth and improvement.

Understanding the Data

In the summer of 2023, Arizona State University’s (ASU) University Office of Evaluation and Educational Effectiveness (UOEEE) invited Arizona STEM Acceleration Project (ASAP) fellows (i.e., Arizona educators participating in the ASAP program) to participate in in-depth interviews about their participation in the first year of the ASAP program. Of the 413 fellows that participated in year one of the program (and consented to have their data utilized for research purposes), 125 ASAP fellows volunteered to participate in a year one post-program interview. Of this group, 55 were interviewed by UOEEE during the summer of 2023, illustrating a response rate of 44.0%. Interviews ranged in length from 09:14 minutes to 49:57 minutes, with an average interview length of 25:06 minutes and over 1,380 total minutes of interviews; all interviews were audio recorded to enable for future transcription.

During an initial round of qualitative analysis, these interview transcripts were attribute coded; attributes included characteristics such as school location (rural, urban, suburban); size of the school’s overall student population; grade level(s) and subject(s) taught by the ASAP Fellow; and more. During their participation in the first year of the ASAP program, 54 of the 55 interviewed fellows taught at one Arizona school, with the remaining fellow teaching at two Arizona schools. Thus, the present sample represents 55 unique, interviewed ASAP fellows and 56 Arizona schools.

During a second round of coding, the interview transcripts were randomly ordered and qualitatively analyzed via descriptive coding with simultaneous in vivo coding. Please note, when a presented theme or code is presented with quotation marks, this illustrates that it was the result of in vivo coding and reflects the direct wording of a participant’s, or participants’, response(s). Atlas.ti software was utilized to complete all qualitative analyses and a third-party transcription service transcribed all audio-recorded interviews.

Key Findings

During the interview process, fellows were asked, “How has your participation in the ASAP program impacted or influenced your teaching (and particularly, how you teach STEM)?” Interviewees’ responses to the aforesaid question, and any other applicable responses, were thematically coded and resulted in five major categories: (1) increased personal understanding of STEM and student perspectives, (2) the acquisition of resources to facilitate hands-on STEM instruction, (3) teaching style and pedagogy evolution, (4) notable student growth and improvement, and (5) improvements in and opportunities to teach STEM topics. These five categories and their associated themes will be discussed in more detail through the following sections.

Increased Personal Understanding of STEM and Student Perspectives

This category can be further divided into the following three themes: (1) general increased STEM understanding and learning, (2) understanding STEM education standards, and (3) understanding student perspectives and experiences.

General Increased STEM Understanding and Learning

Eight interviewees (14.5%) expressed a “general increased STEM understanding and learning” as a result of their participation in ASAP. Some participants described this as a transformation, “...that’s kind of what I guess the biggest transformation is. Now I know more.” Others described themselves as gaining “a total understanding of what STEM is” allowing them to pull STEM learning objectives into their “assignments and making it more aware in my grade level. We were able to accomplish so much within the last two weeks of school.” Another participant described themselves as finally knowing “what STEM really is...before it...just seemed like craft projects or whatever, but now, I understand the whole idea.”

Another interviewee described themselves as realizing, through the ASAP professional development workshops, that they “haven’t been doing STEM, not what STEM really is.” This interviewee described the professional development workshops as having “changed [their] perception of what STEM is...and created a whole new way for...[them] to produce STEM activities for...[their] kids” (i.e., students). Further, there was a shared sentiment among some interviewees that they learned far more content than they were able to initially implement. For example, one interviewee noted:

“There are a lot, many things I learned. So many things that I have to keep them as a record in my notebook so I can use. And honestly, I use 20% of what I learned...but in the coming time I’m going to use [what I learned].”

Understanding STEM Education Standards

Three interviewees (5.5%) expressed an increase in their personal understanding of Arizona educational standards, particularly related to STEM. Most notably, most of these interviewees overtly attributed this increased understanding to ASAP and their engagement as a fellow within the program. For example, one interviewee noted, “And another thing was I only had vague information about how the science standards changed and increase and became 3D and things like that. But through the training from the ASAP, I really got clear on what I should be doing.”

Understanding Student Perspectives and Experiences

One interviewee (1.8%) shared what they loved most about a professional development (PD) workshop and how that impacted their own understanding and learning. The interviewee shared, “What I loved about it [the PD] was how we went through things as a student, and talked about things from a student lens, and then went into teacher mode. And so, really exploring both sides of it, what is the experience like as a student, was really impactful as well.”