



ASAP Impact on STEM Teaching Efficacy and Identity

Through the analysis of year one pre-survey, post-survey, and year two mid-program survey data, the present data brief aims to address the following evaluation questions:

- » How have teachers' STEM identities changed as a result of being an ASAP fellow?
- » How has participating in ASAP impacted fellows' STEM teaching efficacy?

Thus, there are two core concepts pertinent to ASAP that are discussed throughout this report: **(1) STEM Teaching Identity** and **(2) STEM Teaching Efficacy**. These two concepts, and their associated survey items, are explored in more detail below. The reader will notice that these items were originally conceptualized as separate evaluation scales and are presented as such.

STEM Teaching Identity

ASAP aimed to “increase STEM opportunities for building STEM identity amongst educators and students on a massive scale.” Applied exclusively to teachers, this objective refers to building the STEM teaching identity of ASAP fellows; more specifically, the degree to which fellows view themselves as STEM educators. This objective is particularly meaningful given the context of ASAP, as fellows' teaching backgrounds and the subjects they taught ranged widely, from traditionally non-STEM subjects (e.g., art) to subjects overtly within the realm of STEM (e.g., mathematics).

A scale was developed by the Center of Science and Industry (COSI, 2022) to measure fellow's STEM teaching identity. The scale was composed of the following four items:

- (a) “I continually find better ways to incorporate or teach STEM in my classes.”
- (b) “I know how to teach STEM concepts effectively.”
- (c) “I can incorporate or teach STEM effectively in my classes.”
- (d) “I look for opportunities to teach additional STEM concepts in my classes.”

STEM Teaching Efficacy

Corresponding with the aforementioned aim to build fellows' personal STEM teaching identities, ASAP also focused on building fellows' sense of effectiveness at teaching STEM lessons in their Arizona K-12 classrooms. A scale was developed by COSI (2022) to measure changes in fellows' STEM teaching identities. The scale was composed of the following five items:

- (a) "I see myself including more STEM in my classroom."
- (b) "Other teachers think I do well in teaching STEM content."
- (c) "My friends/family think I do well in teaching STEM content."
- (d) "I am aware of STEM in my daily life."
- (e) "I understand how I use STEM in my daily life."

Key Findings

- » Evaluators compared fellows' mean scores on each item measuring identity and efficacy and found that for all items, the differences from Year 1 (Y1) Pre-program to Y1 Post-program surveys for all fellows and Y1 Pre-program to Y2 Mid-program surveys for Returning Fellows were found to be statistically significant.
- » At Y1 post-program, more than **80%** of all fellows "agreed" or "strongly agreed" to all of the STEM teaching identity/efficacy items (as demonstrated by a response of six or higher on a 7-point scale).
- » There was a statistically significant increase in fellows' STEM teaching identity/efficacy from Y1 Pre to Y1 Post. Mean response increased from Y1 pre-program to Y1 post-program by an amount of 0.78 (95% confidence interval: 0.69 - 0.89)
- » At Y2 mid-program, **74%** or more of all Returning Fellows "agreed" or "strongly agreed" to all STEM Teaching Identity/Efficacy items.
- » At Y2 mid-program, there was an increase in fellows' STEM teaching identity/efficacy items for both Returning fellows and Y2 Only Fellows in comparison to retrospective pre-program data (collected at Y2Mid). For the four applicable survey items, the mean response increased by 2.20 for Returning Fellows (95% confidence interval: 2.00 – 2.39) and by 1.78 for Y2 Only Fellows (95% confidence interval: 1.55 – 1.99).
- » There was a statistically significant increase in agreement from Y1 pre-program to Y2 mid-program on all STEM teaching identity/efficacy items for Returning Fellows. For Returning Fellows, the mean response increased from Y1 pre-program to Y2 mid-program by an amount of 0.73 (95% confidence interval: 0.62 - 0.85).
- » Factor analyses supported a one-factor solution for all nine STEM teaching efficacy/identity survey items. Therefore the items effectively measure the construct of STEM teaching identity/efficacy.

Thus, **participation in ASAP is associated with statistically significant increases in the perception of one's STEM Teaching Identity/Efficacy.** Following a year or more of participation in ASAP, fellows reported growth in their sense of effectiveness at teaching STEM (i.e., STEM Teaching Efficacy) and a stronger personal teaching identity related to the facilitation of STEM topics (i.e., STEM Teaching Identity).