

Aligning the Science Teacher Education Pathway: A Networked Improvement Community

Project Overview

The A-STEP project fosters collaboration between university faculty and pathway partners (Figure 2) to implement common set of tools (Next Gen ASET Toolkit) across a science teacher training and development pathway (Fig.1 & Table 1). Partnerships across theses steps function under shared goals and paradigm shifts for pedagogical reform along the teacher pathway. Data is collected at various points across the pathway (Fig. 3). A-STEP promotes change across our NIC and the local pathway partners, ultimately moving beyond awareness of NGSS and into impacting the enactment of the NGSS in respective K-12 classrooms.



Figure 1: Development of NSF projects from ASET Toolkit to current A-STEP NIC

Theoretical Background

The Alliance for Science Educators NIC (ASE-NIC) is an interdisciplinary collaborative of researchers and practitioners highly-focused on identification and continuous improvement of key supports and practices that increase capacity to reform science teacher preparation. Further, this alliance crosses traditional academic barriers by coupling research and practice and prioritizing practical know-how (that is generalizable across diverse settings) over theoretical knowledge that might improve practice (Bryk, et al, 2015). The **ASE-NIC** represent eight universities across the country serving as a robust mechanism for accelerated learning, improvement, and dissemination at scale (Bryk, et al, 2015), by leveraging interdisciplinary expertise of NIC partners, prioritizing practice over theory, and making knowledge (i.e., findings from PDSA cycles) a "live resource" (Dolle et al., 2013, p. 444). Data produced in PDSA cycles across the NIC enables NIC partners to collectively 1) examine variation in diverse teacher preparation programs and 2) continue to improve the tools and the processes for using them. Generalizability increases by understanding this variation and by using variation as an important data source for subsequent PDSA improvement cycles.



nature of NICs) https://www.nextgenaset.org/

Step 1: Science Teach Pre-Service Teachers	Step 1: Science Teaching Methods Courses Pre-Service Teachers			Step 3: I
	Year 1	Year 2	Total	
Multiple Subject (Elementary)	158	106	264	Pre-Service Teac
Single Subject (Secondary)	452	468	920	Program Liaison



Table 1: Pathway steps represent impact of project activities in Y1 and Y2 with participants from the teacher pathway indicated who have been trained with the ASET Toolkit. The toolkit provides a common stage for dialogue and analysis of NGSS planning and enactment at any step of the pathway.

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Research design, data collection & analysis methods

NIC Members Goal 1 : NIC as a Mechanism for Reform

Reflection

Tool Use

Form

Map/SEP

stering a shared vision a

language in pathway

IIC Members Pathway Partners Goal 2 : ASET Toolk

(Influence of Participation)

NIC

nterview

PSTs

derstanding of the

SEPs

This project focuses on the **pathway that science teachers follow** in their development, more specifically in their movement from awareness of the NGSS to enactment of the NGSS. We are interested in the mechanisms that promote, support or prevent this movement. Figure 2 outlines the tools, methods and participants along this pathway (see attached documents for SIPS survey and Toolkit links on the website). Figure 3 illustrates where the data collection points align with the goals of the project. The attached documents to this poster provide a deeper look at the theoretical groundings of this work (fishbone and driver diagrams). The project is evaluated monthly within NIC meetings (see ASTEP info sheet attached) as well as yearly via an External Evaluation Panel (see box insert below).

External Evaluation Panel Dr. Helen Quinn, Stanford University Dr. Cindy Passmore, University of CA, Davis Dr. Nathan MacNeill, Colorado Mesa University Dr. Catherine Cooper, University of CA, Santa Cruz

Project impacts



the NGSS.

NSF

A one-page graphic organizer to help ground discussions of curriculum and instruction in the dimensions of the NGSS, while linking these to larger topics generally discussed as part of instructional planning.

The ASET SEP tools are designed to guide critical analysis of how students are meaningfully engaged in the *specific components* of the SEP selected for lessons or units. Specific components are outlined within the tool for each SEP.

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Findings and Implications

Since the inception of the ASTEP project in June 2019, NIC members have met monthly (virtually) to plan, do, study and act (PDSA cycles) on grant goals. NIC members working on the same pathway step (fieldwork supervisors, induction (early teaching years) and professional development with school districts) share strategies at monthly meetings. This provides real-time feedback to data collection and results New teacher mentor training and adaptations were delivered on Zoom, summer PD was delivered with online adaptations, and videos of the Toolkit were added to adapt for virtual presentations and workshops. Although COVID decreased some activity and expected participation at some NIC sites, others increased their participation by adapting outreach and formats online. Table 1 summarizes the numbers of participants in each pathway. Since this project builds on a previous NSF project, implementation of the Toolkit in methods courses was established. Paths 2, 3 and 4 required more planning and eventual implementation in Y2. Further analysis of the overlay of partner interviews, NIC member interviews, patterns in tool usage across steps and monthly meeting reveals that successes and problems are similar in each step: although there are materials and resources for science instruction, the time allotted for covering science or providing appropriate PD (especially at the elementary levels) is minimal. At all levels (K-12), data indicates that the goals of members at each step are the same: enact science and NGSS as it is meant to be implemented – yet barriers continue to persist. The emphasis emerging is to train mentor teachers and university supervisors to more closely connect the steps in supporting the enactments in the teacher preparation pathway. We continue to study how the ASET Toolkit provides common dialogue for this process. We also continue to refine our data collection methods (increasing tool use reporting, examining the relevance of SIPS survey questions and integrating survey tools from newer research related to coherence where preservice teachers are surveyed to capture their perspectives on how knowledge and practices from their teacher preparation program transfer to their teaching experiences in the field (Hall, J.L., Campbell, T., & Lundgren, L. (2021); Canrinus, E.T., Klette, K., & Hammerness, K. (2019)). Given our focus on improvement science, we are able to pivot our data collection to capture the essence of progress at each NIC site, each serving varied demographics, yet with the same goals related to teacher preparation and the enactment of

For more on our research: <u>https://www.nextgenaset.org/research</u>

Project Website and Toolkit:

(designed under NSF NextGenASET Project DRL-1418440)

3-Dimenional Mapping Tool & video

https://www.nextgenaset.org/3d-mapping-tool/

Science And Engineering Practices (SEP) Tools & video

https://www.nextgenaset.org/science-and-engineering-practicesseps/

Acknowledgements