CADRE report: From California State University, East Bay (CSUEB): "Aligning the Science Teacher Education Pathway (ASTEP)" (NSF: 1908900)

This summary is provided in response to the following prompts:

How did you change your research questions, design, methodology, and/or measurements to adapt to the COVID-19 pandemic? *Please describe the original research elements, the changes you made to those elements, and why you made the changes. To make the changes in your approach clear to others, we welcome as much detail as you are able and willing to share. You may also need to also provide background or contextual information to situate the changes you describe.*

Summary

The project, "Aligning the Science Teacher Education Pathway (ASTEP)" (NSF 1908900) at California State University East Bay (CSUEB)(Hayward, CA) is comprised of a Networked Improvement Community (NIC) including 6 campuses in the California State University system (CSU) and 2 campuses outside of California (Weber State in Utah and University of Kentucky). A goal of ASTEP is to examine four key steps along the teacher education pathway where the Next Generation Standards (NGSS) are implemented. These four steps are during: 1) preservice teachers enrollment in science teaching methods courses, 2) preservice teachers fieldwork experiences and training for inservice participating cooperating teachers, 3) induction program experiences for early career teachers, and 4) school district professional development for inservice teachers. These steps follow the traditional trajectory for a teacher from credential program through their career in a school district. During our previous NSF project (DRL-1418440), the NIC designed, implemented, and improved a toolkit (www.nextgenaset.org/toolkit) that allowed NIC members to integrate instruction to support preservice teacher understanding of the NGSS in their courses while studying their own pedagogical shifts as well as preservice teacher progress in planning NGSS-based lessons and units for K-12 teaching. This same toolkit is used in the ASTEP project as a common source of vernacular and concepts to drive dialogue around curriculum and pedagogical strategies for the NGSS.

Upon receipt of funds (Summer 2019), the NIC began addressing research questions and protocol to begin in the Fall of 2019, with participating campuses securing their existing and new partnerships within our designated steps in the science teacher education pathway that impact teacher preparation: science methods courses, professional development for inservice teachers, support for teacher mentors and university supervisors. However, in the Spring 2020 semester COVID obviously interrupted most of the in-person plans for training. Although most were able to shift to virtual platforms, data collection became compromised as most NIC members planned to administer surveys and reflections during professional development time. This proved to be stressful and inefficient (fatigue from surveys or being in Zoom meetings non-stop added a layer of drain on the entire system).

Following the lockdowns related to COVID at all of our sites, all ASTEP NIC members convened virtually for an all-day meeting (annual NIC meeting, June 2020), to assess what research goals

were possible and how to find reasonable ways to engage participants (especially when science teacher training involves much hands-on modalities). Each campus partner shared concerns, solutions and ideas for moving forward. This included shifts in data collection methods while avoiding survey burnout, maximizing time of our synchronous remote training sessions, and general overstimulation of having to plan for everything that was brand new to all teachers/ professors/ teaching candidates. We still desired a mode of getting high returns on research artifacts in remote modes. One week following our annual meeting, the research lead team at CSU East Bay met with our External Review Panel (EEP) to share outcomes and take inventory of resources and focus on reasonable and attainable data sources. The EEP strongly urged us to engage in "heavy pruning, better yields." We took this to heart and narrowed our research questions to those which truly met our original goals and were most relevant to our desired outcomes. We then revised our research methods, considering this focus. One major shift that resulted was to utilize our NIC members as respondents to report results and collect artifacts, thus reducing the burden at the participant level. The NIC members are consistent in attending monthly meetings, are committed to the success of the project and therefore are our greatest stakeholders in gathering information and reporting changes at each pathway step. They are also the individuals working in direct contact with our partners in the local pathway steps for each site. The other major shift we made was to move away from large scale collection of artifacts from all participants and instead focus on more in depth responses through interview collection from a sampling of participants participating from the work at each site. This focus on interviews with both teacher participants and those partnering with our NIC faculty from within the local pathway to make this work possible will provide more depth on the individual experiences happening. This shift also creates opportunities for longitudinal data collection from interviewing participants and pathway step partners over time.

Therefore, the attached data table shows a slight shift in research questions to encompass our original research goals, but to tighten the modes of collection. This will, as we hope, yield "bigger fruit" as we dig deeper into fewer artifacts from each NIC site. We are moving forward with each campus currently and given the time to prepare over the summer (2020), NIC members are reporting more confidence in being able to collect quality data along most pathway steps. We still struggle in some venues due to placement of student teachers with appropriate mentors. Studying this group and their progress remains to be seen. The sites studying university supervisors and shifts in pedagogy during inservice teacher training appears to be progressing as teachers are eager for support in these times. Our toolkit offers a common set of terms and practices for NGSS that may provide clarity for teachers as they seek to refine their assessment strategies in remote learning conditions. Following the table that outlines the shifts in our research questions and data collection methods, we have included monthly updates that are prepared by our research team and shared with the NIC and our EEP.

See the following pages for evidence of shifts in our research plans post-COVID.

A-STEP Project Original and Revised Goals, Topics, and Research Questions

Goal	Topic	Original Research Question(s)	Revised Research Question(s)
1 NIC as mechanism of reform	Facilitation of the NIC	1a. How do NIC members interact as they negotiate meaning of (a) Goals for teacher training (b) key components of NGSS? 1b. What structures of interaction facilitate these negotiations?	
	Influence of Participation	4a. How does participation in the NIC affect individual members' knowledge of drivers related to facilitation of teacher training? 4b. How does participation in the project affect relationships between stakeholders at each NIC site?	1a. What did each NIC member perceive as the value of participation? 1b. How did each NIC member perceive the pathway steps and connections over time?
2 ASET Toolkit	Pathway Steps 1 – 4 *Shared Language	3a. What are effective (and ineffective) ways to use the Toolkit within the four steps of the science teacher pathway? 3b. What other mechanisms or training tools are necessary to aid implementation of the Toolkit in each of the pathway steps?	2a. How does participation with tools affect PSTs understanding of the SEPs 2b. How did sites use the toolkit in terms of fostering shared vision and language in different steps?
3A Understanding the pathway *Characterization of the teacher education pathway	*Individual Experiences *Pathway-level experiences	2a. To what extent (how many and which steps) is the teacher pathway affected by bridging efforts in the local context of each NIC site?	3a. Which individuals (how many and which steps) do our efforts affect as part of the bridging work in the local context of each NIC site? (who do we really affect?) 3b. What challenges are identified of aligning the pathway (within and across) each step 3c. What is the experience of an individual going through these steps (longitudinal case studies)
3B Understanding the pathway *Alignment of the teacher education pathway	*Needs within steps *Needs across steps *Effect of alignment	2b. What infrastructure components emerge as critical to sustainability of these bridging efforts in the local context of each NIC site? 2c. How does participation in this project affect preservice and inservice teachers?	3d. What infrastructure components emerge as critical to sustainability of these bridging efforts in the local context of each NIC site? 3e. To what extent do individuals along the pathway show alignment in thinking over time (use of shared language through tools)
	Influence of Context (assumed above)	5a. Which drivers of teacher preparation emerge as similar across NIC member sites? 5b. Which drivers of teacher preparation are unique to specific contexts within NIC member sites 5c. What contextual conditions foster or constrain bridging efforts in the local context of each NIC site?	

A-STEP Update

August 2020

Updates

Our website for the ASET Toolkit has been updated to include video introductions for the tools. These can be shared with students or potential pathway partners to help introduce them to the 3D Mapping Tool and SEP Tools.

- The 3D Map Introduction video can be found here
- The SEP Tool Introduction video can be found here

The ASET Toolkit has been updated online to help support remote instruction.

- You will now find links to both pdf and fillable-pdf versions of the SEP Tools.

Our partner from SFSU had two great training sessions this summer with STAR workshop leaders. They explored how the SEP Tools could be used within the STAR program. It was great to see this extension of how the SEP Tools can help support thinking about links between K-12 science instruction and real world research experiences.

Networked Improvement Community August Meeting

This month during our NIC meeting we reviewed the changes that have been made to our project and spending due to COVID-19. We then spent most of our time reviewing and discussing our Year 2 data collection plans. Over the summer the project leadership team worked to focus our research questions. Based on these we then refined our plans for data collection. For NIC members you can login to the website and access our data collection plans and instruments here.

Many of our NIC members are starting their own courses in a distance learning environment while also supporting teacher candidates who are experiencing field experiences and teaching at the the K-12 level in distance learning modes. While our goals for science instruction remain the same, we realize the need to adapt our approaches and supports for these distance learning environments. Many of our members shared ideas they have and are working together to redesign many components of their courses.

The table below outlines these revised research questions mapped to the original research questions for the A-STEP project.

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https://www.nextgenaset.org

A-STEP Update

May - June 2020

Updates

Congratulations to each of our NIC members who quickly shifted this semester to remote instruction and continued to support their students through these changing times!

During the 2019 - 2020 academic year our NIC members implemented the ASET Toolkit with 610 pre-service teachers enrolled across our 28 science teaching methods courses!

In May our Networked Improvement Community came together for a virtual gathering

The A-STEP project leadership team met with our external evaluation panel in June to review our accomplishments and discuss ways to further improve our project

May Networked Improvement Community Virtual Gathering

Our yearly gathering was hosted virtually this year due to COVID-19 related travel restrictions. We spent the day switching between whole group activities and smaller break-out groups that allowed for more in depth discussions by pathway step. Everyone enjoyed having this extended time together to reflect and learn from each other.

During the gathering our NIC members broke out into smaller meeting rooms by the pathway step their campus is focusing efforts around and reflected on the lessons learned this year. Many campus partners shared some similar struggles over the year and this was reflected in our time spent revising the project fishbone and driver diagrams focused on each pathway step.

A few common struggles that surfaced across campuses in working with pathway partners were:

Fieldwork Pathway

- Cooperating teachers are generally not paid and so it is hard to require more
- Time is limited and competing agendas (handbook for program requirements, CTC requirements, etc.)
- Each subject area wants time for training of mentors/supervisors with single-subject candidates (training for new standards in every subject)

Induction Pathway

- Need to find our voice in mentor training
- Need to increase Science Trellis mentors and participants

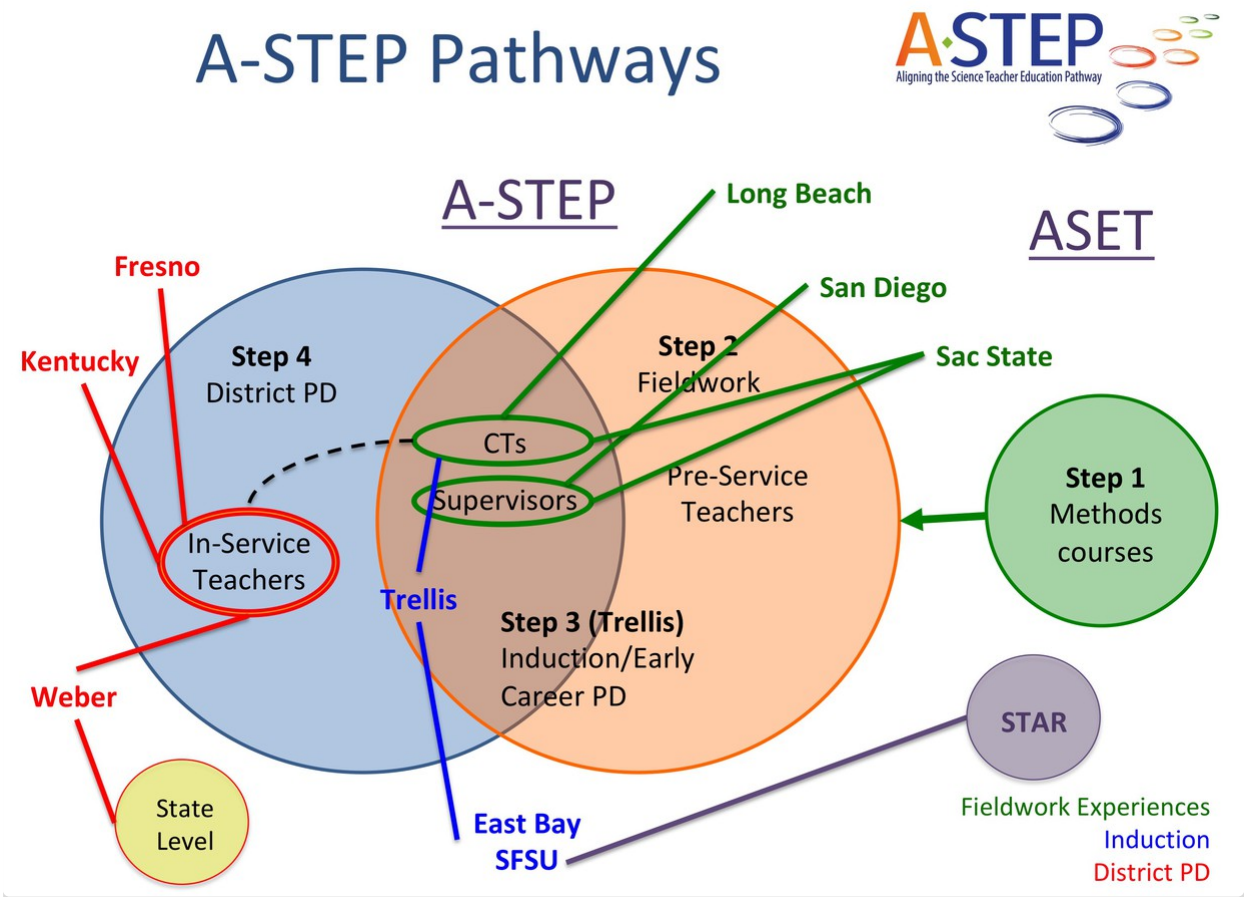
District Professional Development

- Many events are single day interactions, not sustained
- Many different influencers (state level, county, district)…how to have our voices heard

Our time included sharing of ideas for how to teach our science teaching methods courses remotely since many of our campus partners will be making this shift in the Fall 2020 semester. We also shared ideas for professional development opportunities with teachers. Other discussions during the day included considerations around data collection and what is needed and realistic given the types of interactions we are having in each pathway step.

We also discussed who the direct participants are in each pathway step and how this maps across the entire pathway (identifying overlaps and differences). Our ideas are shown below in the Venn Diagram.

As a result of our discussions we are continuing to evaluate our current efforts and plans for more focused data collection moving forward.



Current Influence of COVID-19 on Project Activities

Due to the current COVID-19 pandemic, many of the universities in our NIC and K-12 schools they partner with have moved to remote or hybrid instruction. This means that students are not regularly attending classes in-person. This has altered the science methods courses we are teaching as well as fieldwork activities happening in local K-12 school settings.

Our current teacher professional development activities have been modified to synchronous or asynchronous virtual meetings (usually conducted via zoom).

At this time our project is focusing efforts on maintaining the current partnerships formed and finding ways to continue our planned activities in ways that comply with local and state orders as well as ensure participants safety.

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A-STEP Update

April 2020

Updates

The ASET Tools will be integrated this summer as an integral component of the STAR Education seminars!

This month many of our members submitted proposals for the CSTA California Science Education Conference planned for October 2020

The yearly gathering and CSU East Bay for our Networked Improvement Community (NIC) members will be held virtually this year on May 28th. This change was made because of travel restrictions and social distancing requirements due to COVID-19.

Data Efforts

This month each campus received an excel file detailing the data we have collected from their campus. This included data for each year they participated in the ASET project (Fall 2016 - Spring 2019) as well as data collected this year for the A-STEP project. These include SEP tools, 3D Maps, reflections, and other items collected from students enrolled in our science teaching methods courses. These files also include coding of what science topic each 3D Map and unit plan relate to. Geri is working with each campus partner to confirm if any data is unaccounted for. Geri plans to continue updating them each semester as we collect more data.

These files will be shared across our NIC sites to help support our research efforts. Campus partners interested in looking at a specific SEP tool or other data will now be able to quickly assess which campuses collected related items and what is available for analysis.

April Networked Improvement Community Videoconference

This month our meeting began with three campus partners sharing updates from their campus progress on their planned pathway step work. It was great to hear progress that has been made at each campus and how they have taken ideas from our other NIC members to improve their own practice.

Lesson Adaptation from the NIC

We learned about a lesson adaptation made at Fresno State based on the apple tree pollinators lesson developed at Sacramento State. It was interesting to see how this lesson instead of concluding about

the importance of bees, found that tomatillo plants do not self pollinate so the issue in this garden was that a single tomatillo plant would not produce fruit.

Using SEP Tools during Field Work
One campus shared how they are using the SEP tool in field work observation reflection to identify how students engaged with the SEP. This was inspired from past conversations of how other campuses are finding new ways to utilize the ASET tools in the field and how they can best support our students in this area of our programs.

After hearing from these campuses, we discussed our recent data organization efforts and sharing ideas for future data collection. We also spent some time sharing our hopes for the virtual gathering in May.

Current Influence of COVID-19 on Project Activities

Due to the current COVID-19 pandemic the universities in our NIC and K-12 schools they partner with have all moved to remote instruction. This means that students are not attending classes in-person and have been asked to stay away from campus to comply with national stay-at-home or local shelter-in-place orders. This has altered the science methods courses we are teaching as well as fieldwork activities happening in local K-12 school settings.

Any teacher professional development activities have been modified to virtual meetings (usually conducted via zoom) or are being postponed until we can safely meet in-person. University supervisors are currently working on how to meet virtually and complete the fieldwork requirements with their credential candidates.

At this time our project is focusing efforts on maintaining the current partnerships formed so our planned activities can continue in the near future.

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March 2020

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At this time our project is focusing efforts on maintaining the current partnerships formed so our planned activities can continue in the near future.

March Networked Improvement Community Videoconference

This month our meeting started with three campus partners sharing updates from their campus progress on their planned pathway step work. It was great to hear progress that has been made at each campus and comforting to realize some shared struggles across campus partners. After these campus updates, we spent some time discussing our campus efforts to meet our students current needs given the move to remote instruction and social distancing requirements due to COVID-19. This included the move to teaching our own courses online or remotely along with supporting our credential candidates to complete their fieldwork experiences by participating and creating online lessons for remote instruction within their K-12 placements.

Three of the main topics that emerged during conversations from our campus updates of shared struggles are described below:

How to increase our individual influence within our partnerships

Some campuses have realized that within their pathway partnership their are many players who influence decisions. It was discussed by one campus of how to make our A-STEP voice a little louder so we can make more of an influence in decisions being made around NGSS and implementation at higher levels. It was shared that this is something multiple campuses struggle with and while it can be frustrating, once we share our work and tools with teachers, their praise and interest has been shown to make a difference. We hope that once our work is shared with the teachers and other classroom stakeholders the momentum will grow and our voices will begin to be heard.

Working with Partners: Recruitment and Planning

With the realization that it is difficult to find time for teachers and other partners to meet us in person, it may be beneficial to create some virtual tutorials and examples around the use of our tools. This would allow for some interaction with target groups to increase awareness and engagement around our work. It would help our partners understand their use and how these could best fit into their other efforts. The suggested topics were exemplar videos introducing how to use the 3D Mapping tool and how to implement the Science and Engineering Practices (SEP Tools). These videos could be used to educate individuals about how our tools can be used and also to provide more concrete context to begin conversations to recruit partners (educational and promotional). We plan to begin working on these videos and hope to create some short videos for release during the Fall.

What will summer look like this year?

It was shared that our universities plan to continue distance learning/remote instruction through the summer and most likely our K-12 partners will be the same. Given this it was messaged that our goal at this time is to maintain the partnerships and connections we have made. While work such as teacher professional development may stay on hold through the summer the most important piece for our project at this time is to make sure it stays simply on hold and will continue once things get back to normal.

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