



Science Teacher Residency (STaR) Professional Development Program of the Arizona Science Center

Impact Statement

August 31, 2021

Introduction

Science Teacher Residency (STaR) is a teacher professional development program of the Arizona Science Center that expands access to high-quality teaching practice in science education for Arizona teachers. Over the past three years the program has served 112 teachers (spanning grades 3 - 8), representing 70 school sites in 44 districts.

The STaR program offers deep dives into science subject areas to promote content mastery and equip teachers with the pedagogical skills needed to effectively engage students. In its first three years of operation (2018 - 2021), STaR offered nine modules on topics on Life, Space, Earth, and Physical science.

STaR covers all costs related to attending the program—including teachers' travel and a stipend to fund a substitute for their classroom. Participants leave the residency with all materials needed to effectively implement the lessons and strategies learned.

External evaluators analyzed data from program applications, surveys administered during the modules and at field trips, observations of professional learning sessions, and interviews with program staff and participants. Additional data came from a survey measuring the impact of the COVID-19 pandemic on instructional practices and surveys administered to the students of participating teachers in 2019, 2020, and 2021. Unless otherwise indicated, quotes included in this report come from teacher participants in the STaR program, as shared with evaluators in interviews or in surveys.

This report summarizes evaluation findings:

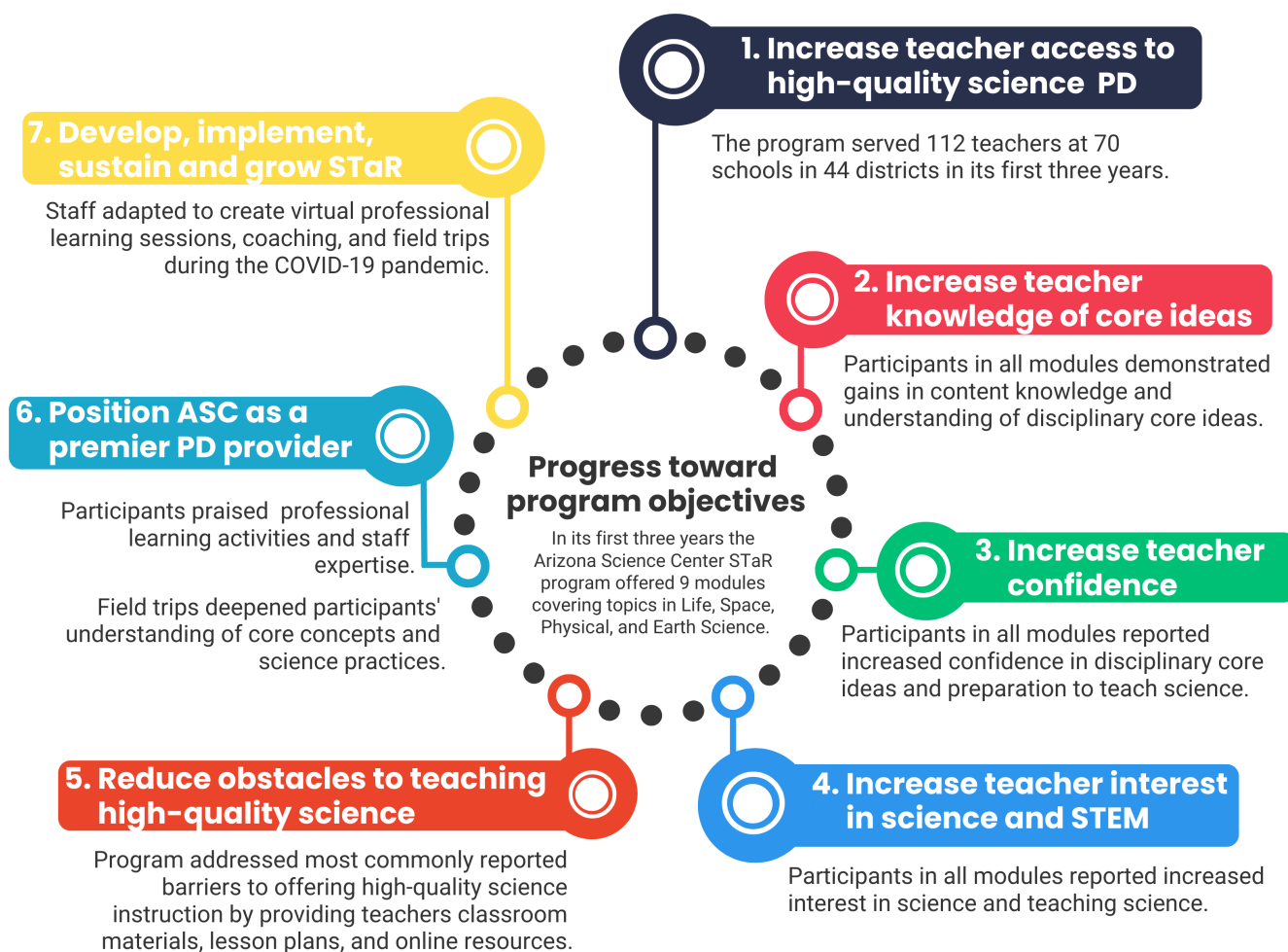
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Overview of Impact

The STaR program offers in-depth science modules, consisting of five days of professional development, the option of attending at least one industry-based field trip, and targeted opportunities to receive mentorship and coaching from content experts from the Arizona Science Center throughout the academic year. During the residency component of each module, participants engage in activities designed to increase their disciplinary content knowledge and comfort with instructional

strategies. STaR professional learning activities are hands-on and make use of the Arizona Science Center's exhibits and resources.

Through a focus on four facets of the program—pedagogical approaches, advanced content learning, access to expertise, and high-quality materials and resources—the STaR program was able to achieve the following goals and objectives:



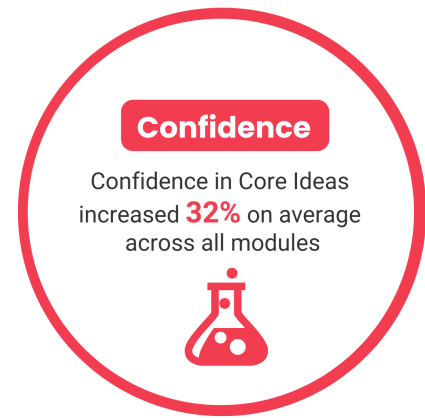
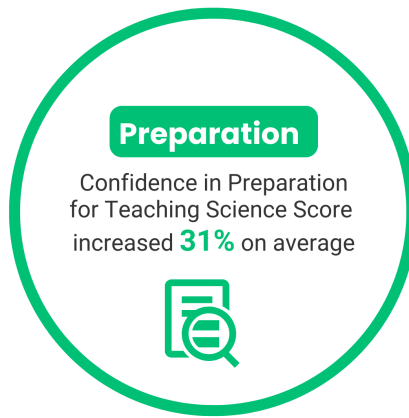
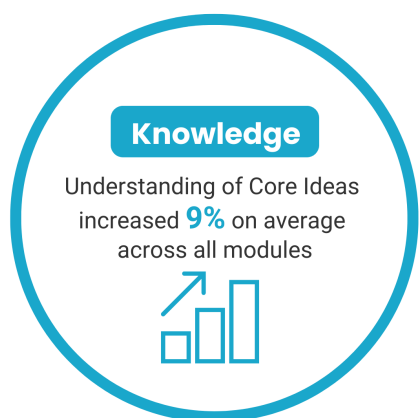
Impact on Teacher Practice

STaR Increases Teacher Knowledge and Confidence, Expanding Capacity

- Participants in all nine modules developed stronger content knowledge and a deeper understanding of core concepts in the module’s area of focus, as demonstrated on content assessments. **“I no longer feel nervous about student questions. I worked through misconceptions of my own and can now help students do that too.”**
- Participants reported greater confidence in their ability to help students construct their understanding of scientific topics. In particular, STaR increased participants’ capacity to employ a wide variety of pedagogical strategies and resources. **“If something doesn’t work at first, I don’t get frustrated. I know that I have lots of techniques left in my toolkit to help that student.”**
- Teachers relied on lesson planning frameworks and pedagogical strategies learned during the residency when they needed to rapidly adapt lessons at the onset of the COVID-19 pandemic and engage students in an online context. **“I am more in-tune with my students.”**

STaR Elevates Teacher Fascination with Science, Benefitting Student Engagement

- Across all modules, participating in STaR increased teachers’ fascination with science. **“This was the most enjoyable PD I have ever attended... From the minute we arrived we were engaged and learning.”**
- Participants’ enthusiasm impacted their students, in turn. **“The greatest impact is on how excited I am. Science is now fun. And when I’m having fun, the students are having fun.”**
- Across all modules, participants reported an observable difference in their students’ science fascination. **“In the past, science was not an exciting practice for my students...With STaR, I have embraced the joy of science again. Students enjoy coming to my classroom and discovering...Students recognize that each day is a day of scientific discovery.”**
- After participating in STaR, teachers reported that they offered science instruction more frequently—typically as a result of integrating science material into lessons for other subjects.



Program Learnings

High-quality Materials Address Barriers to Teacher Success

Evaluators found that lack of high-quality learning materials, lack of equipment, and lack of supplies were among the greatest challenges Arizona teachers faced to offering high-quality science learning experiences. This finding held true at all 70 school sites represented by participants in the program's first three years of operation, but especially impacted teachers at schools with less funding.

- STaR addresses this challenge by providing participants access to lesson designs, online resources, activity kits, and materials for labs. **“We have a lot of students that are on free and reduced lunch. Budget plays a large role in our abilities to teach science...The missing aspect is the materials themselves. The Arizona Science Center supplied all the materials that we need to actually teach science.”**
- Teachers consistently listed the resources supplied by the program among the primary benefits of participating in STaR.
- Evaluators found that STaR is distinct from other available professional development programs in the extent of resources it provides participants. **“We go to [other] trainings...but can't actually implement what we learned because we don't have the materials. STaR sets us up to actually utilize [the strategies] we learn by giving us the materials.”**
- Teachers reported that the materials from STaR have contributed to their students' engagement with science lessons. **“I used to buy materials myself, so I would only have enough stuff to do a demonstration at the front of the room...the students at the back of the class would barely be able to see.**

Because of the boxes from STaR, my students can do hands-on science. They're making connections. They're talking about what they see. They're asking questions...It's a world of difference.”

- Lack of supplies became a particularly severe challenge for teachers during the COVID-19 pandemic. The Arizona Science Center staff supported current and former STaR participants with the transition to online learning by connecting them to computer-based resources, ideas for online lessons, and other downloadable documents.

Coaching Equips Teachers with Personalized Guidance

STaR participants received targeted opportunities for coaching from science education experts at the Arizona Science Center throughout the academic year.

- Participants praised the Arizona Science Center staff's knowledge, enthusiasm, and support. **“[Arizona Science Center Staff Members] were the best part of STaR...They know everything! But they don't make you feel like you're less than others for having a question or not knowing something...They treat us with respect; they talk to us like adults who have knowledge of our own.”**
- STaR participants especially valued the emotional support coaches provided.

“I have never felt more valued or supported as a science educator.”

– STaR Participant, 2020

- Rural teachers, especially, expressed deep gratitude for the efforts the STaR staff took to support them in the classrooms and facilitate their coaching sessions. **“Rural schools don’t usually get these types of opportunities. STaR coaches made sure we weren’t left out...I felt like a priority for once.”**
- Coaching took on an even greater meaning during the pandemic, when coaches served as thought-partners to help STaR participants create science lessons that could be executed online or in classrooms with strict guidelines about the use of physical materials due to the pandemic. **“Having been provided a coach has been most treasured for my teaching in this COVID era. Knowing that I can connect with someone has lessened the mental anguish this pandemic has generated. The individuals in the STaR program have not only provided me with foundational science support but have been a greater comfort because they can relate to teachers. I am forever grateful for them.”**

Successful Virtual Model Expands Professional Learning Opportunities

During the pandemic, all components of the STaR program took place virtually through live video conferencing. STaR offered two online modules, both with modified schedules to better meet the needs of participants.

- One module also included opportunities to participate in activities asynchronously. **“I felt like I needed professional development more than ever, but so many PDs that are usually offered weren’t because of the pandemic...it was great to have such a high-quality PD this year with STaR.”**
- The virtual STaR modules introduced participants to pedagogical strategies for online learning environments and digital learning tools. **“They showed us how to use**

so many free online resources for science...really good stuff to keep kids interested. Every week, I showed my teaching partners, ‘look at this tool’ or ‘here’s what I learned at STaR!’”

- STaR participants benefited from newsletters and regular communications with the STaR community. **“The folks from STaR were always reaching out...I knew I had a network going through remote teaching with me.”**
- Teachers also favorably rated virtual field trips coordinated by STaR. The virtual field trips seemed especially valuable for rural teachers, who saw opportunities to engage their students in similar activities in the future. **“It doesn’t make a lot of sense to take students on field trips normally. There is not money to fund far away trips...but we could do a virtual field trip.”**
- Transitioning STaR to a virtual format highlighted the potential value of continuing some STaR modules or activities virtually in the future. One staff member described: **“Offering the program virtually could open doors to participation...especially in rural communities. Before [teachers] might have been hesitant to attend because they have to drive two, three hours [to the Arizona Science Center]. They could now attend virtually.”**

“There is no other program like STaR... Every teacher should have this experience.”

– STaR Participant, 2019