From Pandemic Pivot to Community Outreach: Homeschool Students as Participants for Course-Based Field Placements

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Abstract

The Covid-19 pandemic resulted in a pivot to online instruction for our university and the surrounding K–12 schools. The instructors of the Classroom Interactions course faced the challenge of developing an online version of a course we had never taught that included a class-based field experience. During the fall semester, we struggled to recruit secondary students to participate in preservice teacher (PST) lessons, so we invited homeschool students to participate in the spring semester. This article outlines our approach to inviting homeschool students to participate in online PST-developed lessons. We outline our approach to utilizing the 5 Practices for Orchestrating Task-Based Discussions in Science (Cartier et al., 2013) to develop lessons, and we share PST and parent feedback on the experience. Additionally, we share the lessons we learned from this experience and suggestions for other teacher educators who may be interested in inviting homeschool students to participate in PST-developed field experiences. PSTs were able to focus on their lesson objective, instruction, and discourse moves for leading productive discussions because the PSTs and students did not experience many of the typical classroom distractions or behavioral issues that can occur during in-person learning in a school setting. Teacher educators interested in having more autonomy and input into how course-based field placements are implemented are encouraged to explore options to include homeschool students in-person or virtually.

Problem

During the 2019–2020 academic year, the Covid-19 pandemic resulted in a pivot to online instruction for our university and the surrounding K–12 schools. For many instructors, this resulted in changing existing in-person courses to online courses in a short timeframe. However, for us, the fall 2020 semester was the first time we taught Classroom Interactions (CI), and the class was offered as an online course. CI is a UTeach course designed to provide preservice teachers (PSTs) with experience developing and implementing lessons designed around a high cognitive demand task. PSTs then orchestrate productive discussions based on student work, and after their teaching experience, they analyze their classroom interactions and discourse moves. The challenge of developing an online course we had never taught was exacerbated by the fact that CI contains a class-based field experience. Typically, the class would be in-person, and PSTs would observe a mentor

teacher at a local high school and then teach two different lessons in the mentor teacher's classroom. During the pandemic, this was not possible because local school districts did not permit our PSTs to teach their secondary students virtually as part of the CI course-based field experience.

Therefore, we sought opportunities for PSTs to teach virtual lessons to secondary students. From the start of the fall 2020 semester, PSTs had been developing lessons to teach virtually, but we had little success in recruiting secondary students to participate through our network of teachers and colleagues. Our PSTs were able to teach lessons; however, secondary student attendance was low. We knew we needed to make some changes to the course and the field experience component for the spring 2021 semester. Feedback from our network of educators indicated that the times when we offered lessons, which were limited by our PSTs' schedules, were not always conducive to secondary students enrolled in local public and private schools. A few weeks into the spring semester, we had an epiphany and invited homeschool students to participate in the math and science lessons our PSTs developed. To our surprise, parents of homeschool students signed their children up for the lessons almost immediately. In the following sections, we share our approach to engaging the homeschool community in math and science lessons taught by PSTs enrolled in the CI course.

Classroom Interactions

CI is one of seven courses implemented at UTeach replication sites, which include our university. The UTeach program was created in 1997 by faculty members at the University of Texas at Austin and was designed to increase the number of high-quality STEM teachers in the workforce (Backes et al., 2018). The CI course is typically the third or fourth course in a sequence of UTeach courses in the UTeach curriculum and meets for 75 minutes twice per week. One hallmark of the UTeach program is early and intensive field experiences. The required components of CI include, "Students participate in an intensive, highly coached high school field experience comprised of 3 observations and 2 coteaching events, including a multiple-day, connected lesson" and "Students prepare and present detailed analyses of their lessons and teaching events (at least one of which is videotaped) for instructional effectiveness, highlighting issues of equitable instruction" (Internal UTeach Document).

Before PSTs enter their own classrooms, it is critical that they experience teaching K–12 students in authentic contexts (Hunter & Botchwey, 2017). Field experiences provide the ability for PSTs to contextualize the knowledge and theories they read about and discuss in class (Darling-Hammond, 2014). "Face-to-face K-12 field experiences are an essential part of teacher licensure programs," providing the opportunity for PSTs "to provide content-specific tasks and analyze students' thinking" (Zolfaghari et al., 2020, p. 315). Moreover, the course-based field experience integrated into the CI course is designed to give PSTs the opportunity to develop and implement lessons designed to engage students in argument-based discussions that they then analyze in a discourse analysis.

Facilitating classroom discussion is a key teaching practice (Danielson, 2014; Goodson et al., 2019). Classroom discussions provide teachers with opportunities to make student thinking visible and student talk is a way students engage in sense-making (Windschitl et al., 2018). In the remaining sections, we share our innovative approach of inviting homeschool students to participate in a virtual classroom environment.

Homeschool Students

In a 2016 national survey, the U.S. Department of Education found that 3.3% of school-age students were homeschooled (McPhee et al., 2018, p. 475). According to a 2012 survey, the most cited reason for homeschooling (91%) was concerns about the school environment, "such as 'safety, drugs, or negative peer pressure'" (Redford et al., 2017, p. 11). However, the percentage of children in home schooling has nearly tripled since mid-2019. By May of this year, the U.S. Census Bureau found more than 1 out of every 12 students were being home-schooled (Balingit & Rabinowitz, 2021). The growing number of homeschool students provides a large, untapped population of students who can be invited to participate in teacher education field experiences. Despite the number of homeschool students, there is noted hostility among educators toward homeschooling (Ray, 2013). Ray (2013) "identifies four classes of negativity expressed toward home-based education by the education profession" (p. 224), including claims that "homeschooling is fear based" and "cocoons children . . . from those in society who are different from them," it "is bad for the common good," and it leaves children vulnerable to abuse, neglect, or harmful environments as well as the belief that homeschooling "must be under considerable state control" for these reasons and others (p. 333). "The training of licensed public school teachers generates most of the revenue that supports faculty positions in colleges of education. Consequently there is little incentive to study homeschooling" (Howell, 2013, p. 355), leading to a dearth of information about homeschooling.

We are not the first teacher educators to partner with homeschool students for field experiences. Physical education programs, for example, have a long history of partnering with homeschool students and organizations to provide in-person, on-campus field experiences for students (Buns et al., 2017; Everhart, 1998; Everhart & McKethan, 2004). Partnering with homeschool groups is also not new to science teacher education, though such programs are less common. Boesdorfer (2019) reported on her experience providing on-campus clinical experiences for preservice chemistry students utilizing a homeschool association collaboration, concluding that the experience was "an effective alternative to traditional clinical experiences." Whereas Boesdorfer partnered with a local homeschool association to provide in-person chemistry lessons, we partnered with individual students and their parents to provide virtual math and science lessons.

Our Innovation

At our university, the Center for Professional Practice (CPP) oversees and coordinates all education-related field experiences and develops articulation agreements with surrounding school districts. In anticipation of the loss of field experiences during the Covid-19 pandemic, the CPP developed a virtual field experience for PSTs to tutor elementary students during the fall of 2020. However, the CI course requires PSTs to be more than tutors. PSTs are expected to develop lessons that are inquiry-based and lead to group and whole-class discussions based on student work.

During the fall 2020 semester, we had limited success in recruiting secondary students to participate in online lessons. None of the lessons we offered attracted more than four secondary students, and we had some lessons that were not attended by any students. For the spring 2021 semester, our second time teaching the course, we knew that the ability of the CPP to recruit secondary students for full lessons instead of tutoring was limited. However, we felt that if we could create and disseminate a list of lesson topics, lesson abstracts, and lesson times early in the semester, we could recruit secondary students using the CPP's contacts in addition to our network of university math and science education colleagues. We developed the Towson University UTeach Science and Mathematics Academy (henceforth, the Academy) to get more secondary students to enroll in multiple lessons. As an incentive, students who completed seven or more lessons received a certificate of achievement. We created a flyer (Figure 1) for the Academy and disseminated it as widely as we could through the CPP, our personal social media platforms, colleagues and friends, and our university-based Center for STEM Excellence, which provides professional development for K–12 teachers. We created a sign-up sheet for parents and students to enroll in sessions using Google Forms. Using the free software Canva (canva.com), we made a flyer that included a QR code (created using a free online QR code generator) and the URL link to the sign-up page. Initially, we provided a streamlined overview of the Academy on the landing page, followed by details. However, based on immediate feedback from parents and colleagues, we reversed the design of the sign-up homepage to include most of the details on the initial page so that parents could read the lesson descriptions and dates and times before proceeding to sign up for individual lessons (Table 1).

Figure 1

Recruitment Flyer for the Towson University UTeach Science and Mathematics Academy

TOWSON UNIVERSITY

UTEACH SCIENCE AND MATHEMATICS ACADEMY

We have spots available for students in grades 6-12.

WE ARE OFFERING TEN FREE ENRICHMENT SCIENCE AND MATHEMATICS LESSONS

Only 10 spots per lesson available

Interested? For more information and to reserve your spot, sign up online at

https://forms.gle/nZJZcFzmBZg8n4c66
or use the QR code

.

Table 1

Teaching Schedule, Lesson Title, and Lesson Abstract for Each Spring 2021 Semester Lesson

Teacher	Date	Time	Topic
Mr. W	3/22 4/12	11:00 11:00	**How effective are masks at protecting us from pathogens?** Students will explore how particles from a sneeze travel through the air and how masks affect the manner in which particles travel.
Mr. T	3/22 4/12	12:30 12:30	**Why π?** Students will derive the area formula for a circle. Even if you know the formula, this lesson will provide a visual understanding that will help you to make connections with other area formulas. Students often confuse formulas that include π, and we think this lesson will develop students' procedural fluency with geometry formulas.
Mr. U	3/24 4/7	9:00 9:00	**How far can I see?** Did you know that how far you can see to the horizon is not the same for everyone? In this lesson, students will use mathematics to determine the field of vision for some famous people and eventually themselves. Students will use problem-solving skills and algebraic representations to discover how far a person can see to the horizon.
Ms. S	3/24 4/7	10:30 10:30	**How does this pattern grow?** Students will explore a visual pattern and predict what other cases look like. Students will use virtual manipulatives, tables, graphs, and maybe even equations to make predictions and generalizations. Students at various levels of algebra will be able to engage with this interesting task that develops a visual understanding of a common function family in algebra.
Mr. G	3/26 4/9	9:00 9:00	**Who's running this ship?** Students will take on the role of a yacht captain who has to hire a chief steward. Students will analyze the qualifications of the applicants and decide who should be hired. The lesson is in the form of a game where students make and justify their decisions using mathematical reasoning. This lesson is best suited for 7th–9th grade students.
Mr. K	3/26 4/9	10:30 10:30	**Here's a riddle to solve…** Students will solve a riddle using mathematical reasoning and a virtual manipulative. Students will develop their problem-solving repertoire as they find a solution to a problem that has several parameters.
Mr. F	3/26 4/9	9:00 9:00	**Why is it that two people can have the same parents but look nothing alike?** Students will explore the genetic probability for traits in combination and how each trial does not affect future outcomes, resulting in an endless possibility of traits for each offspring.
Ms. G	3/26 4/9	10:30 10:30	**How do scientists know the order of past events on Earth?** Students will explore fossil specimens to create a geologic record of Earth's past events. Students will learn fundamental principles used to determine how old fossils are and the order in which they appear in Earth's history.
Mr. K	3/26 4/9	12:00 12:00	**Why do tornadoes happen frequently in some regions and less frequently in other regions?** Students will explore the conditions necessary for tornadoes to form and why some regions are more likely to have tornadoes.
Mr. T	3/26 4/9	1:30 1:30	**How are fireworks able to produce a variety of different colors?** Students will explore the chemical process resulting in fireworks producing a variety of colors. Students will complete activities to help them visualize the chemical process that results in fireworks exploding into beautiful colored lights.

As the date of the first lesson rapidly approached, we still had very low enrollment in the lessons. The feedback we received from colleagues was that students, including their own children, were engaged in their school-based classes and thus were unable to participate in the Academy lessons at the offered times. After a sleepless night on the part of the lead author, we had the idea to invite homeschool students to participate in our lessons.

Locating and Inviting Homeschool Students

We located a few state-based homeschool groups on social media and contacted the group administrator of the homeschool group containing the most members (13.9K). In a direct message, we asked the group administrator if they could share the Academy flyer and URL to the sign-up page with their members. To our surprise, the group administrator responded within 30 minutes and asked that we join the group so we could post information about the Academy and respond to questions. Within an hour or two of our initial request to the group administrator, we posted the flyer and some information about the Academy to the homeschool social media group. The post received immediate attention, and we quickly started filling available slots for lessons. By the end of the first day, about half of the 200 spots (virtual seats) had been filled. The comments posted on the social media page indicated that parents were enthusiastic about their children receiving instruction from our PSTs under the supervision of university faculty. One parent posted, “As a former education major, THIS IS GENIUS!! I’ve been trying for YEARS to get [Other Local University] to do the same.” Another wrote,

> I have a 7th grader who has set her sights on a career in microbiology and genetics. She’d love to take classes like this. Please add us to any distribution list and/or please contact us if there are any opening[s] for this session. Sending you a private message with my contact info. Thank you!”

During the fall semester, too few students participated in our lessons. We now had the opposite concern in the spring: that too many students would sign up for each section, making it difficult for our PSTs to effectively manage them. Given the fact that our PSTs would be teaching the lesson online and the inherent challenges in doing so, both the PSTs and instructors agreed that we would limit lesson sessions to 10 students. One negative aspect of using the Google Forms sign-up page was that each lesson needed to be closed manually because we could not find a setting in Google Forms to automatically close each session after 10 students enrolled. We closely monitored the sign-up page and manually closed sessions with around 10 secondary students enrolled, but we often had to prematurely close sessions for fear that enrollment would surge when we were unable to monitor enrollment. After we closed sessions, we had numerous parents of homeschool children contact us asking if they could still enroll in a session or be put on a list for the next time we offered lessons. We added a few students after sessions were closed, but we quickly determined that this was not an efficient process and stopped filling such requests.

What began as a quick pivot to provide PSTs with a field placement experience became a critical component of the CI course that provided outreach to a population of students that our PSTs may otherwise not have an opportunity to interact with.

Preparing and Implementing Lessons for Homeschool Students

We learned from our fall experience, and when the spring semester began, we invited homeschool students to participate, as described above. To effectively communicate with secondary students and their families and plan out our support structures for the semester, we required PSTs to submit lesson ideas by the second week of class (Table 2). PSTs developed and submitted a list of two to three lesson topics that could be completed in 45–60 minutes. The instructors then met with PSTs to discuss topics and select one that was well aligned with the course goals and to brainstorm tasks that addressed the topic objective. We frontloaded the first half of the CI course to provide the necessary support for PSTs to develop their own lessons. We needed to have enough time to provide PSTs with the knowledge and skills needed to develop a high cognitive demand task-based lesson from scratch, something they had yet to do in previous courses. By the end of the second week of the semester, each PST developed a title for their lesson and a short summary to be shared with the secondary students and their parents ahead of the lesson via the Google Forms sign-up page.

Table 2

Semester Timeline of Course Activities for Teacher Educators (TEs) and Preservice Teachers (PSTs)

Week	Course activity
1	TEs contact the homeschool group on social media and announce upcoming lessons. PSTs develop a list of 2–3 possible lesson topics.
2	PSTs begin *5 Practices* readings and class discussions. TEs model *5 Practices* lessons and debrief.
3	PSTs select a topic, learning goals, and a high cognitive demand task. TEs create a Google Form for lesson sign-up and post on social media.
4	PST peer sharing of teach tasks. TEs introduce lesson plan template.
5	PSTs develop anticipated responses to tasks, construct a monitoring chart, and develop selection and sequencing protocols. TEs introduce talk moves and discourse analysis using recorded lesson examples.
6	TE and peer feedback on draft lesson plans. PSTs send an informative email to parents and students.
7	PSTs revise lesson plans based on feedback. PSTs practice teaching lessons.
8	PSTs practice teaching lessons. PSTs send a reminder email to parents and students. TEs address parent inquiries.
9	PSTs teach lessons to secondary students (Teach 1). TEs observe Teach 1. Teach 1 debrief in class.
10	PSTs revise lessons and write Teach 1 reflections. PSTs send an informative email to parents and students. TEs address parent inquiries.
11	PSTs teach lessons to secondary students (Teach 2). TEs observe Teach 2. Teach 2 debrief in class.
12	PSTs write Teach 2 reflection.

PSTs developed lessons based on the *5 Practices for Orchestrating Task-Based Discussions in Science* (Cartier et al., 2013), hereafter referred to as *5 Practices*. The *5 Practices* approach entails instructors selecting or developing a high cognitive demand task for students to complete, and then the instructor uses the students' work to initiate a discussion that leads to a consensus model of the phenomenon being studied. The *5 Practices* include *anticipating*, *monitoring*, *selecting*, *sequencing*, and *connecting* (p. 28). In the *5 Practices* model, the instructor (1) "anticipat[es] how students are likely to respond to a task," (2) creates a monitoring chart to monitor student work, (3) selects specific artifacts of student

work to be presented to the class, (4) sequences the order in which students share those selected artifacts, and (5) connects student work to the consensus model agreed upon by scientists (p. 28).

As we worked through the *5 Practices* book (Cartier et al., 2013), the PSTs were able to apply what they read and discussed in class by creating supporting documents for their lessons as class assignments. For example, as PSTs read Chapter 3, “Getting Started: Anticipating and Monitoring Students’ Work,” they were required to develop a list of anticipated responses to their tasks that their peers critiqued and workshopped during class time. They then created a monitoring sheet to use as the homeschool students worked through the task.

In the fall 2020 semester, we did not have enough time to digital learn tools for teaching online and relied on iterative feedback on Word documents and PDFs, but by the spring of 2021, we identified and modeled tools better suited to the online learning environment for monitoring student work. PSTs used One Note, Google Slides, Google Docs, Desmos, Jamboard, or Peardeck as platforms to monitor student work as they completed cognitively demanding tasks. PSTs created a document to explain how they would select and sequence students’ work as well as questions connecting that work to the learning objective. We incorporated practice teaching sessions into our class meetings in which PSTs served as students to their peers and provided feedback about task setup, content, and instructional strategies. During peer teaching, PSTs developed a better sense of how secondary students might react to their lesson and the extent to which their anticipated responses were provided by actual students, in this case, their peers. During the peer-teaching experience, PSTs were also able to ask for help from their peers and instructors. These sessions became workshopping sessions in which each lead teacher would ask peers for help with very specific aspects of their lesson. The workshop sessions led to new ideas that were then included in the final lesson plan and implemented lesson and seemed to produce better results than peer teaching alone.

Each PST then taught their lesson to secondary students during Week 9 with support from their partner. Having experienced the challenges of teaching online the previous semester, we paired up PSTs so that they could support one another in the virtual setting. Each PST was responsible for developing their own 5E lesson plan using a provided lesson plan template. Their partner provided feedback on lesson planning and was present during the lesson to help manage the chat, send links to students, monitor time, and set up breakout rooms in Zoom.

Course instructors did not participate in the lessons, but they were present during each teaching session to observe and complete observation forms to provide feedback to each PST. The PSTs did not have the opportunity to meet the students prior to the first lesson, as they would have prepandemic when observing the class. This change resulted in two new experiences for PSTs. First, the PSTs gained the experience of communicating with parents

by sending informative emails in advance of the lessons. The PSTs were provided with the contact information for the secondary students and their parents and sent multiple emails with the date and time of the lesson, lesson descriptions, and links to the Zoom meeting and introduced themselves as the instructor. The second positive aspect was that PSTs were able to incorporate icebreaker activities to help them get to know students as they joined the lesson via Zoom because some joined earlier than others. These activities often segued into the engagement segment of the lesson. For example, Mr. T asked each student to introduce themselves and share what they like or dislike about fireworks (his lesson topic) as they entered the Zoom session, creating a growing list as more students joined the lesson. These changes from previous semesters also increased PSTs' ownership of the lessons.

PSTs recorded their lessons in Zoom, which also provided transcripts of the sessions, and completed teaching reflections and a discourse analysis. A whole-class debrief took place after the first round of teaching, and then PSTs modified their lessons based on their self-reflection, their partner's feedback, and instructor feedback. After their reflection, PSTs revised their lessons, though the topic remained the same. We then provided time for another practice teaching session for the PSTs to try out new lesson components or to workshop alternative ideas, activities, and approaches for the lesson prior to the second teach with secondary students. PSTs taught their revised lessons in Week 11. Finally, PSTs completed a second reflection and a discourse analysis. The remaining 4 weeks of the course contained required content unrelated to the focus of this article, which included topics such as equity, social justice, and learning differences.

Table 3

Number of PSTs and Secondary Students Per Semester

Semester	PSTs enrolled in CI	Lessons provided by PSTs[a]	Seats available	Seats filled
Fall 2020	9	18	180	26
Spring 2021	10	20	200	135

[a] PSTs taught their lesson during Week 9, revised the lesson, and then taught the revised lesson during Week 11.

Table 4

Number of PST-Developed Lessons Attended by Secondary Students in Spring 2021 (n = 29)

	Number of lessons completed									
	1	2	3	4	5	6	7	8	9	10
Number of students	8	1	1	2	3	3	8	0	3	0

Over the course of the field placement, the PSTs taught a total of 20 lessons to 29 different homeschool students, filling 135 of 200 (67.5%) available seats for the lessons in contrast to 14.4% of seats filled during the fall semester (Table 3). Table 4 shows the number of students who completed multiple lessons. For example, eight students completed one lesson, and one student completed two lessons (Table 4). Eleven students completed more than seven lessons and received a certificate of accomplishment for participating in the Towson University UTeach Math and Science Academy. Although some students did attend seven or more lessons, most students attended six or fewer lessons.

Feedback on Experience

Over the course of the semester, the PSTs and instructors communicated with students and their parents, some of whom also attended sessions. The PSTs often met the same student more than once because many of them also attended their partner's lesson. During whole-class debriefs, the PSTs would often talk about how particular students engaged with or were challenged by the lesson. Although the lessons covered a variety of topics in math and science, the PSTs were able to share some common student experiences across lessons and subjects. PSTs and instructors felt as though we got to know many students and came to better understand their personalities, strengths and needs, levels of background knowledge, and willingness to participate in lessons. After the sessions, several parents provided feedback about the lessons. For instance, one parent shared the following:

> In her own words, she wants to share with you that your students are very tech savvy. She loves that! [Student 1] enjoys the Jamboard a lot. I myself have not had a chance to sit through one complete lesson; however, I can tell you that your students did a phenomenal job to make the virtual classroom safe and fun for [Student 1] to share her thoughts.

Another parent stated,

> I just want to say that Mr. G did an awesome job today. He gave helpful details in the message he sent last night, including the One Note link. Then he took the time to explain specifically what they would be doing and how to participate, etc. It was a tough audience, but he did a great job of attempting to connect with each student. I thought it was great to teach a concept through discovery and then give it a name, much more engaging.

These comments meant a lot to both the instructors and the PSTs because many of these parents have been serving as their child's teacher and were willing to turn over that responsibility to our PSTs for a few lessons. This particular comment was received at a time when Mr. G was contemplating his ability to "be the teacher" and whether he was prepared to do so. The feedback provided additional motivation and affirmation for Mr. G that he is, and will be, an engaging and effective teacher.

Another parent sent us a note stating:

> A little general feedback is that as homeschoolers, we may not be as familiar with some of these educational technology tools (never heard of Jamboard before). But the use of One Note was a great choice because it had an easily accessible way to use speech-to-text. This is particularly important for [Student 2] as, while he is incredibly bright and above average in intelligence, he is also diagnosed as Slow Cognitive Tempo (were he to require an IEP, he would be classified under ADHD-Inattentive only because SCT does not have IDEA coverage). Additionally, he is mildly dyslexic. Thus, typing out responses takes a significant amount of time, even though he may have all the right thinking.

Unlike traditional school-based field experiences in which our PSTs are more likely to be informed about students with IEP or 504 plans, our students designed inclusive lessons to try to address possible modifications and accommodations. Their approach to designing lessons centered around a task with a "low floor and high ceiling." In other words, the PSTs were taught to select or develop high cognitive demand tasks that could be accessed by students with little prior knowledge while still permitting the PSTs to connect student work to the learning goals and build consensus models of the phenomenon at the center of the lesson.

Organizing the Academy was a lot of work and time-consuming, but based on course evaluation feedback, the PSTs appreciated the experience. One PST wrote, "I thought the way the student teaching was orchestrated during virtual learning was well done. The class was a lot of fun, and I learned a lot." Another PST simply stated, "I liked that they [instructors] were able to set up a way for us to actually teach students online." These unsolicited responses about the field placement were rewarding, particularly because both instructors spent an enormous amount of time setting up the Academy structure and corresponding with the parents of the homeschool students.

In addition to the unsolicited PST and parent comments, PST scores on lesson plans and teaching reflections provided additional support that the PSTs had a more meaningful field-based experience in the spring as compared to the fall (Table 5). Though our instruction, course preparation, and implementation may have been better in the spring, PST scores on lesson plans and teaching reflections were also moderately higher during the spring semester, which may suggest the course changes for spring 2021 were beneficial.

Table 5

Min, Max, and Mean PST Scores on Lesson Plans and Reflections for Each Semester

	Fall 2020			Spring 2021		
Assignment	Min	Max	*M*	Min	Max	*M*
Lesson plan	43	71	58.33	52	71	62.90
Reflection 1	28	36	33.00	31	36	34.25
Reflection 2	60	73	68.56	60	75	70.55

Although not a goal of the Academy, this experience provided an opportunity for homeschool families to connect with our university in a meaningful way. According to a 2003 study, 75% of homeschool students attend college, and their success rate is equal to or better than their public-school counterparts (Rey, 2003, as cited in Aasen, 2010). Thus, providing university-based field experiences that include homeschool students may also serve as an outreach experience for introducing homeschool students to the university, science department, education department, and majors or careers in science or science education.

Lessons Learned

Both the PSTs and instructors were impressed by the level of enthusiasm and participation of the homeschool students. By partnering with homeschool students, our PSTs were able to design and implement a lesson based on a high cognitive demand task and engage students in a whole-class discussion. In other words, they were able to complete the CI course as intended, despite being in the middle of a global pandemic.

Developing and managing the Academy increased the workload for instructors but also allowed them greater flexibility and control of the field experience. PSTs were able to focus on their lesson objective, instruction, and discourse moves for leading productive discussions. This was primarily because PSTs and students did not experience many of the typical classroom distractions that can occur during in-person learning in a school setting, such as announcements, hallway distractions, students asking to visit the restroom, taking roll, and working with students who were absent.

We learned a few valuable lessons about supporting PSTs in virtual class-based field experiences with homeschool students. Normally, the PSTs would be paired with a local mentor teacher to observe their classroom practices and then plan lessons with the support

of the mentor teacher. Because that was not an option during the pandemic, the PSTs viewed numerous, freely available lessons found online and analyzed those lessons in VoiceThread and in written reflections. By doing so, the instructors and PSTs all observed and discussed the same lessons, which provided an opportunity for a richer analysis of the instructors' use of specific talk moves to facilitate group and whole-class discussions. Additionally, without oversight from a mentor teacher, PSTs were able to design lessons that were completely in accord with the *5 Practices* (Cartier et al., 2013), something not always possible when mentor teachers have real or perceived barriers that may limit the input of PSTs on lesson development and implementation. When in person, university instructors and our PSTs are guests in the schools in which PSTs are placed and sometimes must modify our plans and teaching to be compliant with the mentor's routines and approach to teaching or school and district policies. Partnering with homeschool students permitted the PSTs to have a lot more input in all aspects of lesson design and implementation, though the course instructors provided final approval of all lessons.

We view the Academy as an outreach event in which we are able to connect with homeschool students to provide high-quality, student-centered science instruction. Both parents and students expected a detailed description of the lessons and required ongoing communication leading up to the lessons. As a result, PSTs had to be much more deliberate in emailing parents and students throughout the semester to communicate information about the upcoming lessons. We learned that the parents of homeschool students are eager to enroll their children in university-based lessons, and many of these parents have indicated a willingness to participate in future semesters. In fact, the unsolicited parent feedback was so positive that we wondered if the Academy created the unexpected benefit of positive PR about our university and our teacher training program. The experience went so well that we are considering using this model even after our PSTs are permitted to participate in face-to-face, course-based field placements postpandemic.

Conclusions

Inviting homeschool students to participate as the student population for PSTs planning and implementing course-based field experiences has been underutilized and underreported in teacher preparation literature. Teacher educators interested in having more autonomy and input into how course-based field placements are implemented are encouraged to explore options to include homeschool students in-person or virtually. PSTs were able to focus on their lessons without many of the distractions and challenges of a physical classroom: reluctant learners, students arriving late, teaching in an unfamiliar classroom with unfamiliar technology, meeting the needs of mentor teachers, and larger class rosters. Not only did the PSTs have the opportunity to teach enthusiastic and engaged homeschool students, but the PSTs also provided outreach to a population of students they may not have otherwise had the opportunity to teach.

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