Supporting Schoolyard Pedagogy in Elementary Methods Courses

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Abstract

Schoolyard pedagogy illustrates the theories, methods, and practices of teaching that extend beyond the four walls of a classroom and capitalize on the teaching tools available in the surrounding schoolyard. In this article, we describe the schoolyard pedagogy framework, which includes intense pedagogical experiences, opportunities and frequent access, and continuous support. We then provide an overview of how we are intentionally working toward developing schoolyard pedagogy in elementary preservice teachers at two universities. This includes providing collaborative experiences in the university schoolyard and nearby schools, individual experiences in nature, opportunities to see the possibilities in local schoolyards, and lesson planning that utilizes the schoolyard. We also discuss potential barriers and catalysts for schoolyard pedagogy during the induction years, future needs, and potential for continuous support.

Introduction

Schoolyard pedagogy describes the theories, methods, and practices of teaching that extend beyond the four walls of a classroom and capitalize on the teaching tools available in the surrounding schoolyard (Feille, 2019). Existing literature supports the use of learning experiences beyond the walls of the classroom for elementary students. When students are given opportunities to engage with science content in the schoolyard research has identified increased academic achievement (Klemmer, Waliczek, & Zajicek, 2005; Lieberman & Hoody, 2005; Skelly & Bradley, 2007) as well as improved beliefs and attitudes towards the environment (Graham & Zidenberg-Cherr, 2005; Lewis, Mansfield, & Baudains, 2008; Martin, 2003; Ozer, 2007).

The Next Generation Science Standards (NGSS) ask teachers to facilitate science learning where students grapple with disciplinary core ideas and engage in the science and engineering practices, while making connections through cross-cutting concepts (NGSS Lead States, 2013). The schoolyard, as a place for learning, offers students opportunities to engage in authentic scientific phenomenon within the 3-dimensions of the NGSS. However, most programs that prepare elementary teachers do not actively support the development of schoolyard pedagogy (Tal & Morag, 2009; Passy, 2012). A framework for schoolyard pedagogy development suggests that intense pedagogical experiences, opportunities and frequent access, and continuous support overlap to support teachers' use of the schoolyard as an intentional learning environment (Feille, 2019). Our innovative approach to address the

absence of schoolyard pedagogy development among preservice teachers (PSTs) has emerged and been refined over several semesters. We have worked towards the intentional inclusion of the recently defined framework for schoolyard pedagogy development in our elementary science methods courses. In this article, we will describe the schoolyard pedagogy framework through the lens of our methods courses, which support the use of the schoolyard as a venue for learning science for PSTs.

Context

Schoolyard pedagogy includes an underlying emphasis on place-based education, which incorporates the local environment and community to teach (Sobel, 2004). Our methods courses provide schoolyard-based experiences coupled with modeling pedagogy and reflective practice related to the place of students' schoolyard as a venue for learning science.

Kelly is located at a large public institution in the midwest. The elementary education program at the university graduates approximately 60-80 majors each year. Each elementary education major takes an introductory to inquiry-based science teaching course in their sophomore or junior year and an elementary science methods course in their senior year prior to full-time internship. Our suburban campus includes a variety of maintained areas that support plant, insect, and small animal life. Most of our students have childhood memories that include outdoor experiences such as playing outdoors, fishing with family members, and field trips to nature centers or outdoor areas. Less than half recall schoolyard-based learning experiences from their childhood.

Stephanie is located at a large land-grant institution in the midwest. The elementary education program at the university graduates approximately 80 majors each year, and each takes the science methods course in the semester prior to their internship. The campus location of our building is near a pond surrounded by a large lawn, dozens of trees, and a garden, in which students spend formal and informal class sessions. PSTs also work with students in an outdoor classroom at a local school. A majority of our PSTs come from suburban areas and have prior experiences with summer camps, visiting family who live on farms, and vacationing in the outdoors. Many have had at least one school-based experience in the outdoors, typically via a field trip. Very few report having been in their schoolyard for educational experiences.

Methods Course Experiences

Intense Pedagogical Experiences

Intense pedagogical experiences include moments in a teacher's career where the possibilities of teaching outdoors are realized. These may include immersive experiences as learners, intentional professional development, or reflections of field- or inservice-

experiences. Intense pedagogical experiences related to schoolyard pedagogy can 1) influence teachers' dispositions towards nature and both teaching and learning outdoors, 2) encourage a vision of students as engaged with their environment, and 3) develop understandings of students needs related to learning outdoors (Feille, 2019). In our methods courses, examples of intentional intense pedagogical experiences include moon and wonder journals, nature journaling lessons, and science lessons conducted outside the classroom or lab. Through these experiences, PSTs begin to understand the opportunities for and value of teaching science beyond the walls of a classroom.

Moon and Wonder Journaling. Over the course of the semester, PSTs maintain a few types of journals involving the outdoors experiences. We begin the semester with a 6-week moon study, which involves keeping a daily moon journal. This creates a regular practice of going outdoors to try to find the moon, and many students talk about it being their favorite part of the day once they have established the habit. Another form of journaling that takes place throughout the semester is wonder journaling (Gilbert & Byers, 2017), which asks students to view their world through new eyes. It serves as a formal attempt to tap into the wonder of the natural world and requires students to make ten journal entries in which they draw and write about their wonderings related to the natural world. Many of these come from outdoor experiences, though that is not a requirement. For example, the image in Figure 1 shows a student thinking about how photosynthesis works for grass. The date of this entry coincides with course experiences regarding photosynthesis, indicating that the student continued to wrestle with ideas about it after class. Sharing sessions occur throughout the semester, which often lead to great conversations about their personal interests in science. Wonder journaling culminates in a wonder investigation assignment, in which students choose one of their wonderings to expand upon and present in a poster-style session at the end of the semester. Figure 2 highlights a student who was intrigued by a murmuration of starlings she witnessed during the semester. She did not know what to call them in her initial journal entry, and was encouraged to talk with others, search for information, and begin to develop and understanding about what scientists currently know about murmurations. Her wonder investigation presentation included background, current, and continuing lines of research regarding this phenomenon.

Figure 1 (Click on image to enlarge)

Wonder Journal Entry Example

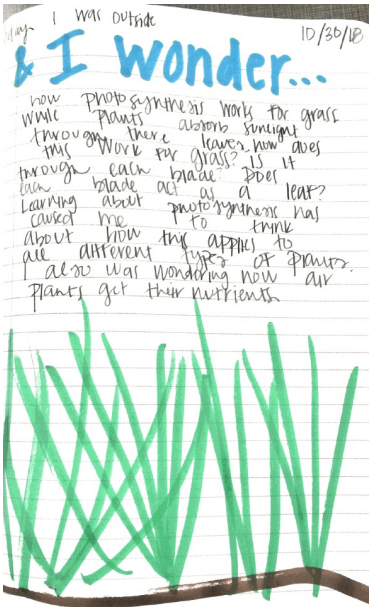
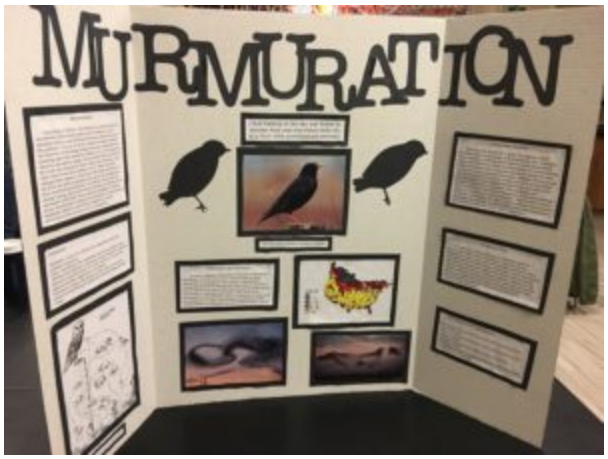


Figure 2 (Click on image to enlarge)

Wonder Investigation Example



Nature Journaling. Later in the semester, PSTs do a series of lessons on nature journaling, which includes drawing and writing observations, thoughts, and feelings about the natural world (Leslie & Roth, 2003). We also use outdoor spaces on campus to engage PSTs in lessons adapted from NSTA's Science and Children, National Wildlife Federation, Picture Perfect Science book series, and other sources to showcase standards-based lessons that utilize the schoolyard. For example, students participate in a 5E lesson targeted toward 4th graders that combines science (4-LS1-1) and poetry (CCSS.ELA-Literacy.W.4.2-3.d) through nature journaling (see Table 1).

Table 1 (Click on image to enlarge)

5E Nature Journaling Lesson

Phase of 5E	Learning activities
Engage	-Read the poem, Step Outside. What Do You See? by Allan Wolf (2003). Small group discussions about what the poem makes students think of and what types of things they notice outside.
Explore	-Choose a flora or fauna outdoors to investigate in 3 scales and observe how the features move into and out of focus at each scale. The goal is to have 3 levels of focus on the same page - life-sized, magnified, and distant views. Small group sharing with a focus on what you noticed at each scale. This activity is modified from Zoom In, Zoom Out (Laws et al., 2012). See Resource
Explain	-Using your observational data, consider what types of **structures** you observed (i.e., what features does your subject have - bark, leaves, feathers, flowers, etc.); How do these structures help the subject survive (**function**)? Small, then whole group sharing with a focus on the language of the discipline and comparisons across subjects. -Communicate structure and function in an interesting, meaningful, and creative way with The Giving Tree (Silverstein, 1964). Read aloud and then have small groups identify the structures and functions of the tree described in the poem.
Elaborate	-Use Six-Room-Image Poem organizer (modified from Bricker et al., 2015) to consider six different perspectives to help shape thoughts about observations. Write and refine poems. See Resource
Evaluate	-Publish and perform poems in poetry jam sessions. -Poems can be evaluated for their proper use of structure and function properties of the subject (science) as well as poetry features (literacy).

School-based Outdoor Classroom Lessons. PSTs work with an elementary class at a local school that has a large outdoor classroom. PSTs meet and work with the elementary classes at least two times each semester to implement lessons in the outdoor classroom. We partner with a teacher who uses the outdoor classroom and is comfortable with having 15-25 preservice teachers observe him and work with his students. An example of our work there is PST groups creating stations to look at the health of the outdoor classroom, including water quality testing, soil testing, and looking for animal tracks. The teacher groups students prior to our arrival and PSTs work with them as they go through the stations. Based on their findings, they determine the current health of the outdoor classroom and make recommendations for maintaining and improving it over the next year. PSTs participate in small group reflections on the experience, discussing how being outdoors made them feel, what they noticed about the students while outdoors, and how we were able to conduct 3-dimensional lessons based on the state standards while in the outdoor classroom.

Opportunity and Access

To further develop schoolyard pedagogy, preservice teachers need to begin to consider existing opportunities and access to areas beyond the classroom walls for teaching. This includes the areas where they are learning to teach science at both the university and in their field placement. We also encourage students to begin to think forward about the potential opportunities that are likely to exist once they leave the university setting. To this end, PSTs construct an aerial map of their field-placement site highlighting areas on and near their schoolyard where they identify opportunities for teaching science content. In addition, PSTs create 3-dimensional instructional sequences in the methods course. This provides a venue for them to plan to implement science teaching in the schoolyard and consider how their practice is impacted by teaching outside the walls of the traditional classroom.

Mapping the Schoolyard. Using satellite map images of their field-placement site, students draw an aerial map of their school and surrounding schoolyard. Thinking of grade-level science content, students identify areas beyond the classroom walls that support science learning across the disciplines of physical, life, and earth-space science. Constructing these

in a group setting allows for students to share sites on their own campus and see possibilities that exist on others. Considering the opportunities and access for schoolyard pedagogy in this way develops a disposition in PSTs that encourages thinking outside of the traditional constraints of science teaching as well as introducing them to the tools of the schoolyard for teaching.

Example schoolyard maps show the ways in which PSTs identify unique areas within and near the schoolyard for teaching. In Example A (see Figure 3) the PST titled her map “Science Map of Opportunities.” She identified areas within the school as well as extending into the schoolyard for science teaching that fall outside of the walls of her classroom. Schoolyard areas include the Outdoor Learning Center, school garden, multiple playground areas, and a “mystery location” which she later discovered was an inaccessible pond. Completing the mapping activity allowed her to consider, and later understand, which areas around her campus provide access for science learning. Example B shown in Figure 4 also includes inside locations for science learning along with schoolyard opportunities. By identifying and describing each distinct outdoor area in her map, it became easy for this student to consider the diversity of science topics she could include in schoolyard-based teaching. In contrast to Example A, the map in Example B is more restricted in scale. Where Example A zooms out to include areas that are beyond the bounds of the schoolyard, Example B does not include the fields and park that are adjacent to the campus.

Figure 3 (Click on image to enlarge)

Schoolyard Map Example A

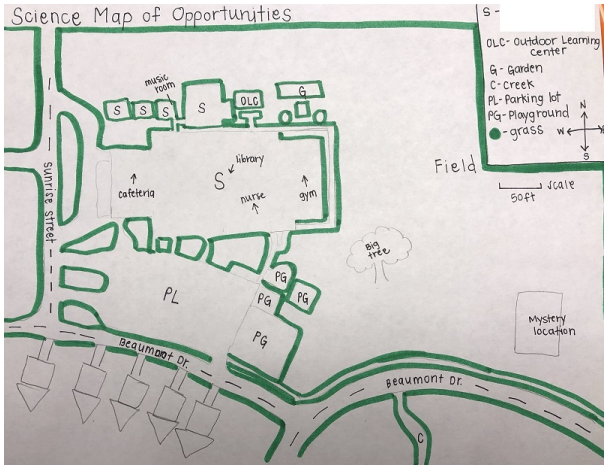
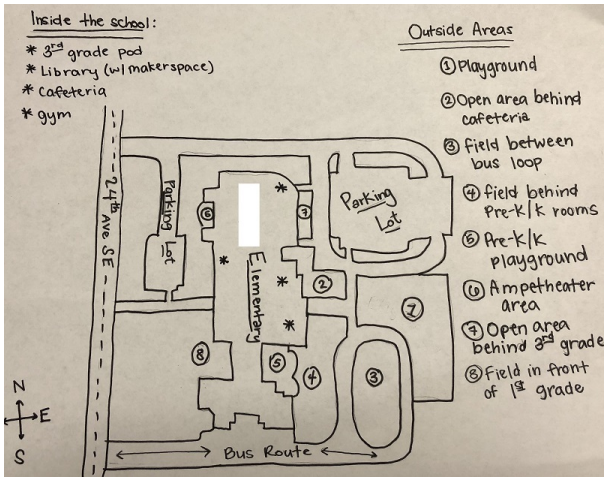


Figure 4 (Click on image to enlarge)

Schoolyard Map Example B



Student-designed Instructional Sequences. PSTs construct instructional sequences and daily lesson plans informed by their field-placement context. Although it is not a requirement, approximately one-fifth of students include an outdoor component in their instructional sequences. The intense pedagogical experiences paired with the schoolyard mapping activity encourage PSTs to consider the outdoor opportunities within the state science standards.

In one PST-constructed instructional sequence, fifth-grade students use graphical displays of data to reveal changes in length and direction of shadows (5-ESS1-2). The Engage activity includes a visit to the schoolyard where students explore areas looking for shadows and then investigating for ways they can manipulate or change the shadows (133_IS1_Fall2018). In a second example instructional sequence where students work towards planning and conducting an investigation to determine if plants need sunlight and water to grow (2-LS2-1), the Elaborate portion of the instructional sequence involves a trip to the small “nature preserve” in the schoolyard. There, second-grade students work to identify where plants are able to survive well and not well and use learning experiences from the Engage through Explain portion to argue why (192_IS2_Fall2018). In these instances and others, students have the opportunity to consider and incorporate science safety practices applicable to the outdoor setting as the assignment requires the inclusion of safety considerations. For example, PSTs mention noting student allergies to stings or plants, asking students to wear closed-toed shoes, and clarifying expectations for outdoor classroom behavior.

Ongoing Support

Ongoing support takes the form of intensive professional development, curricular support through embedded lessons that make use of the schoolyard and surrounding environment, administrative support that encourages schoolyard-based teaching through professional development, and community support of an educational culture that is committed to encouraging learning in and about students’ place. Support can also include a facilitation of

schoolyard enhancement that increases the opportunities for schoolyard-based learning. Ongoing support goes beyond the scope of our elementary science methods course semester, but we do have some assignments in place that allow us to capture future needs.

Science Teacher Philosophies & Autobiographies. At the end of the semester, we ask students to update their autobiographies and write science teaching philosophies. We do not specifically ask for them to talk about outdoor experiences but find that approximately one-third to one-half of them do each semester. Our analysis of these provides an indication that many are interested in using the outdoors to teach science, but that they will need ongoing support to do so. For example, when discussing the most meaningful portions of the methods course, students often write things like:

> "When our class went outside even for just a few minutes it was very meaningful to me. I have always wanted to be able to take my students outside when it is a nice day and you allowed us to see from both the students and teacher's perspective what that might actually look like. I don't know how often I will actually be able to take my class outside or for how long we would get to spend, but I hope I am able to do it often" (021817).

Draw-a-Science-Teacher-Test. In addition, at the end of the semester when students are asked to draw themselves as a science teacher using the Draw-a-Science-Teacher-Test (DASTT) (Thomas, Pedersen, & Finson, 2001) many include the schoolyard in their visions of teaching. For some, this simply includes bringing the outside in while students engage in content related to natural surroundings (see Figure 5). But for others, their drawings depict students investigating in groups throughout the schoolyard or natural environment while the teacher facilitates student observations and investigation (see Figure 6).

Figure 5 (Click on image to enlarge)

DASTT Example A

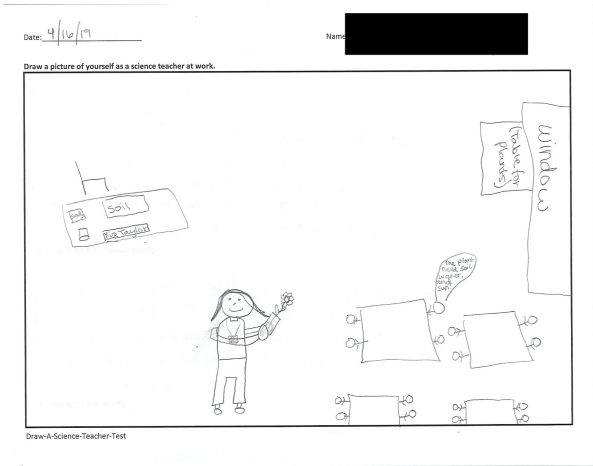
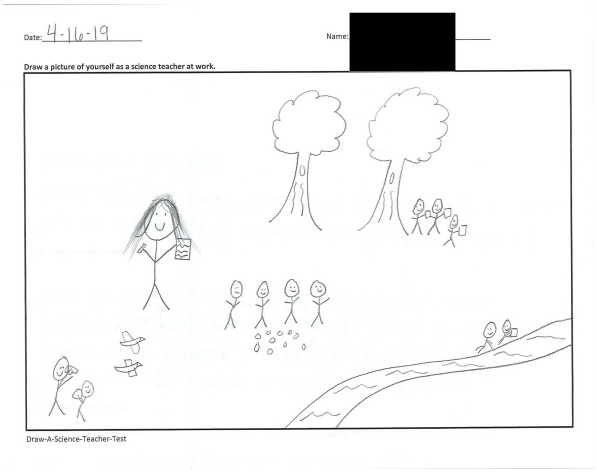


Figure 6 (Click on image to enlarge)

DASTT Example B



While PSTs envision schoolyard pedagogy in their future teaching, they also indicate the need for ongoing support to take advantage of the tools included in the schoolyard and the practices of supporting student learning outdoors. To further understand these needs we conducted interviews with three former methods course students. Two interviews with preservice teachers during their internship placement semester revealed that the pedagogical practices of the cooperating teacher had the most influence on their use of the schoolyard for teaching. One PST interviewed worked with a cooperating teacher who regularly took her students outside and used the areas for teaching. Therefore, the continuation of her development of schoolyard pedagogy was natural due to the ongoing support paired with opportunities and access to areas for outdoor teaching (301_Interview). Another PST worked with a cooperating teacher who rarely incorporated schoolyard pedagogy on a campus where she was unaware of any teaching opportunities in the schoolyard but looked ahead to the possibilities for teaching beyond the walls of her classroom (156_Interview).

The third interview with a first-year teacher led to many interesting discussions regarding the possibilities associated with the outdoor classroom at her school, but it was mixed with a heavy dose of existing barriers. These included the current state of the outdoor classroom, which was battling an overgrowth of poison ivy, and previous reports of a tick infestation. While she was truly interested in using the outdoor classroom, she did not feel that she had time or resources to do so presently. She did, however, speak of many other opportunities for using the schoolyard to teach science, and welcomed collaboration from the university to do so (18210_Interview).

Conclusion

Although our students are not free from the barriers associated with outdoor teaching (Skamp & Bergmann, 2001; Carrier, 2009), the intense pedagogical experiences and opportunities and access they experience in our elementary science methods courses may help to support their development of schoolyard pedagogy. Outdoor and nature-based education has been tied to children’s development in areas such as critical and creative

thinking, problem solving, spatial awareness, and visual processing (Heerwagen & Orians, 2002; Sobel, 2002), as well as physical and mental well-being (Wells et al., 2014). Our role as methods instructors is to enhance preservice teachers' outdoor experiences such that they are excited, willing, and seeking opportunities to use the outdoors in their teaching (Gross et al., 2019). Our future plans include innovating the ways in which we can support the development of schoolyard pedagogy through the inclusion of intense pedagogical experiences in PSTs college-level science learning as well as ongoing support during the induction years.

Supplemental Files

Zoom-In-Zoom-Out.pdf
Six-Room-Image-Poem.docx.pdf

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