

Learning through place: Evaluation of a professional development program for understanding the impact of place-based education and teacher continuing education needs

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Abstract: We report an evaluation of a place-based education (PBE) teacher professional development program that aimed to understand the perceived impact of PBE on students and teachers, constraints to implementation of PBE in schools, and strengths and limitations of the professional development program, as identified by teachers. Nine teachers, the full 2014 cohort of participants in Wilderness Inquiry's PBE professional development program, completed a written reflection exercise and were interviewed following the implementation of a PBE lesson or unit developed as part of their professional development program. Findings indicate that teachers perceived PBE to have several important impacts on students, including stronger engagement in learning, enhanced collaboration, and heightened significance for the concepts learned. Teachers also perceived impact on themselves, including professional growth, sense of fulfillment and an expanded repertoire of teaching approaches. However, there were perceived constraints to implementing PBE, including support from peers and administrators, time, money, weather, and the composition of the class. This research adds to a growing body of research reporting positive impacts of PBE. Teachers' feedback on the professional development program highlighted specific aspects of an effective professional development program. An enhanced understanding of the benefits of and challenges to PBE and program characteristics that maximize teachers' time at a professional development program will help educators and curriculum developers to better support, develop, and encourage the implementation of PBE in standardized curriculum.

Keywords: place-based education, PBE, professional development, training, qualitative research, place, local

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Introduction

Place-based education (PBE) is one of the most effective approaches to promoting recognition in students of the interconnectedness of themselves, their environment, and the topics they learn in class (Smith, 2002; Theobald, 1997). As an interdisciplinary and experiential learning pedagogical approach, PBE is effective in enhancing student engagement with learning (McInerney, Smyth, & Down, 2011). Although PBE in natural settings is used within the broader field of environmental education (EE), PBE can be used in urban and built environments whereas EE focuses on the natural environment. By way of comparison, environmental education (EE) promotes as a primary aim learning about the sustainable systems of the environment and how humans can live in harmony with the earth (National Association of Environmental Education, 2015); PBE is an approach to education in which the local environment, both built and natural, is used as a context to reinforce ideas (Sobel, 2004). It has as its primary goal to enhance academic learning through connection to places that offer the opportunity to learn deeply and in an interdisciplinary manner (Wyner, 2013). The professional development program at the heart of this research focuses solely on PBE with an emphasis on natural environments.

By using specific locations – such as a river or a local park – teachers are better able to connect students with concepts. For example, a student that studies water quality in the Twin Cities at Minnehaha Creek, the Mississippi River, and at the confluence of the Mississippi and the Minnesota Rivers would have a better understanding of the differences in water quality at each site, as well as the opportunity to learn about the ecological, agricultural, geological, and human factors that influence water quality, than a student that tests water in a classroom. The direct, place-based experience can make learning more meaningful by putting it in a natural habitat and an interdisciplinary context.

Some teachers, particularly science teachers, receive adequate preparation in the pedagogy of EE. However, despite its usefulness for a variety of subjects, teachers across the disciplines are often unfamiliar with the concept and practice of PBE and are unsupported in attempts to implement place-based learning in their curricula (Wyner, 2013). Thus, comprehensive and well-executed professional development programs are necessary to assist and support teachers throughout this process. Additionally, an understanding of the constraints that teachers encounter in implementing PBE is necessary to acknowledge the limitations that even the best professional development program might face.

Wilderness Inquiry (WI) is a Minneapolis-based non-profit organization that aims to connect people of all abilities with nature. WI offers inclusive adventure travel ranging from a day on a local river to extended back country trips to the Canoemobile program that connects youth in urban centers across the country with their local waterways. In the Twin Cities-based youth programs, WI places particular emphasis on utilizing local resources, specifically the Mississippi River and Fort Snelling State Park, to engage schoolchildren in place-based learning. WI has been committed to increase the capacity of its local partners with PBE programming to connect youth to local natural resources through PBE.

During the 2014-15 academic year, WI offered Minneapolis and St. Paul public school teachers the opportunity to participate in its first PBE professional development cohort. The teachers all worked at public schools in St. Paul or Minneapolis and represented a variety of grades ranging from kindergarten to upper level high school. This professional development program sought to introduce teachers to PBE, particularly nature-based PBE, give them the tools necessary to develop a place-based unit for implementation within their school, and provide support throughout the process of implementation. This experience launched with a predominantly field-based and experiential PBE professional development course in August 2014, with support throughout the academic year.

The on-site five day course incorporated a variety of approaches that mainly focused on with inspiration, content knowledge, and skills through the opportunity to engage in the kind of PBE experiences that they in turn could provide to their own students. Hands-on learning activities included a canoe trip on the Mississippi River, water quality testing at the confluence of the Mississippi and Minnesota Rivers, and fort-building at Crosby Farm. Additionally, training provided curriculum development support and interaction with a variety of education and interpretive professionals. This course was supported by the National Park Service and several professionals from the Department of Natural Resources within the Twin Cities metro area (for a complete schedule, see Appendix A).

The main objectives of this evaluation research were to identify the impacts of PBE on both teachers and students, constraints experienced in implementation of PBE, as well as aspects of this particular professional development program that were effective or should be changed, all from the perspective of teachers. The following questions served as the major areas of focus for this study:

- How does PBE impact students?
- How does PBE impact the teachers that implement PBE in their classrooms?
- How do systems-level factors impact the implementation of PBE?
- How did the WI professional development program prepare / not prepare teachers to implement PBE in their classrooms?

The identification of perceived impacts and constraints provides information about the effectiveness and challenges of PBE. By identifying particular aspects of WI's professional development program that were more helpful than others, this study provides a framework for other organizations to design effective PBE professional development programs.

A Review of Place-Based Education and Professional Development

PBE, despite its long informal history, is a relatively new term in the field of education. Due to its cross-curricular potential, a comprehensive definition of PBE can be hard to find. In fact, PBE is often confounded with EE and thought of as only a tool to engage students in studies of the local environment. However, PBE is much more than that. It is an all-encompassing pedagogy, perhaps best described in the following way:

Place-based education is the process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, science and other subjects

across the curriculum. Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to their community, enhances students' appreciation for the natural world, and creates a heightened commitment to serving as active, contributing citizens. Community vitality and environmental quality are improved through the active engagement of local citizens, community organizations, and environmental resources in the life of the school (Sobel, 2004, p.6).

This definition, written by one of the leading experts in the field of PBE, captures the multi-faceted pedagogy of PBE. Both built and natural environments can be used to enhance students' learning of topics ranging from language arts and history to science and math. PBE must be thought of as a complement to many different subjects, rather than limited to science. This comprehensive understanding of PBE as a tool to be utilized across a variety of curricular areas also places PBE in a position to impact a broader range of students both in terms of grades and subjects.

PBE and Students. As seen from the comprehensive definition above, PBE can be used in a wide variety of situations. Although long believed to have a positive impact on students, it has only been relatively recently that empirical data has risen supporting the use of PBE in the classroom. Several studies have focused on the greater sense of community built when students undertake a lesson in PBE (Jennings, Swidler, & Koliba, 2005; Palmer, 1993; Smith, 2002; Sobel, 2004). This sense of community has benefits both within the classroom in fostering collaboration and also outside of the classroom in connecting students with the built and natural environments around them and the other people that utilize them. The connection to an individual place fostered through PBE can also be generalized to other areas (Witt, Peterson, & Trombulak, 2016).

Additionally, several studies have focused on the impacts on student learning through PBE. Students of all ages regularly displayed a heightened sense of engagement in the learning process and a greater understanding of the concepts presented through hands-on, experiential learning focusing on a single place (Berkowitz, Ford, & Brewer 2005; Capra, 2007; Hamilton-Ekeke, 2007; Howard, 2010; Surasinghe & Courter, 2012). This learning does not end with the lesson; following a PBE lesson, students in one study showed that they could apply the PBE knowledge in daily interactions, which demonstrated that the concepts could be beneficial beyond the classroom (Surasinghe & Courter, 2012). This increased connectedness between concepts learned in school and daily life is often associated with PBE (Jennings, Swidler, & Koliba, 2005).

PBE and Teachers. Despite PBE's potential use in a wide range of subjects, much of the current research focuses on its applications for science and ecological studies. Current research in terms of teachers and the utilization of PBE focuses on the environmental and science-based classes. Studies have found that elementary school teachers with no science background often struggle in science curricula to instill a sense of ecological literacy in their students; however the use of PBE has been shown to help the teachers with these concepts (Cutter-MacKenzie & Smith, 2003; D'Avanzo, 2003; Jennings, Swidler, & Koliba, 2005; Magntorn, 2007; Wyner, 2013). Although these studies particularly refer to PBE as a method of teaching local or regional environmental issues, the lack of understanding of how to use alternative pedagogies can be seen in many

different subjects. With some additional professional development, educators could use new teaching methods, such as PBE, to better connect with students (Magntorn, 2007; Smith, 2010; Wyner, 2013). Professional development programs involving support from PBE professionals along with a supportive atmosphere in the school for new ideas are effective methods to assist teachers (Powers, 2004).

Professional development. Professional development helps educators to gain the skills necessary to enhance their teaching methods. Teacher professional development is best defined as the “sum total of formal and informal learning experiences throughout one’s career from preservice teacher education to retirement” (Fullan & Steigelbauer, 1991, p. 326). Thus, it encompasses a wide range of experiences and programs. Teacher professional development in topics and pedagogies relevant to PBE is infrequent. For example, only about 10% of teachers report having any training at all in EE before beginning their careers, with even less knowing about PBE (University of Maryland Survey Research Center, 2000). Professional development programs interspersed throughout teachers’ careers are therefore critical for continued teacher learning.

Since professional development programs vary immensely, little literature has been written that lays the groundwork for programs that are actually worthwhile for teachers. Rather, attempts have been made to determine which programs were deemed ‘effective’ and commonalities were examined among them (Guskey & Yoon, 2009). After nine effective professional development programs were analyzed, Guskey and Yoon suggested that the commonalities include: workshops, outside experts, time, follow-up, hands-on activities, and content (2009). This aligns well with other research that suggests that the amount of time devoted to professional development is directly related to profound teacher changes (Garet et al., 2001). Other studies have broken successful professional development programs into key structural features (i.e. type of activity, duration, and collective participation) and core features (focusing on content, promoting active learning, fostering coherence, and focusing on teacher outcomes) (Garet et al, 2001). Teachers also commented how beneficial it was to have a supportive, collaborative learning group when they developed new curriculum (Kelley & Williams, 2013).

Professional development programs are often measured based on the impacts they have on the teacher participants (Meichtry & Smith, 2007). Most research focuses on teacher impacts in terms of confidence in the subject studied and changes in their classroom practices (Meichtry & Smith, 2007), since measuring student outcomes across a variety of subjects, ages, and other variables can be difficult.

Method

Study Area

The participants in this research were teachers within the Minneapolis and St. Paul (MN) school districts. Minneapolis and St. Paul are both urban school districts and have 67% and 77% minority student populations, respectively (MPS, 2014; SPPS, 2015). Additionally, roughly 70% of all students in Minneapolis and St. Paul Public Schools qualify for free and reduced lunch (MPS, 2015; SPPS, 2014). This number serves as a general proxy for poverty level in

discussions about public school districts. Minneapolis and St. Paul School Districts have access to a wealth of natural resources around and within them. Running through the heart of both cities is the Mississippi National River and Recreation Area, a designated National Park Service site. Additionally, Historic Fort Snelling and Fort Snelling State Park provide protected green space within city limits. Both cities have generous green space within the cities in local parks, forests, and neighborhood squares. At present, the City of Saint Paul operates 170 park properties that account for nearly 11% of Saint Paul's total land area (Saint Paul Parks and Recreation, 2008). Minneapolis was named the number one park system in the United States by the Trust for Public Land in 2013 and 2014 (Minneapolis Parks & Recreation Board, 2015). This vast amount of public land increases the potential for successful implementation of nature-based PBE in Minneapolis and St. Paul.

Study Design

This analysis focused on the major research questions noted earlier:

- How does PBE impact students?
- How does PBE impact the teachers that implement PBE in their classrooms?
- How do systems-level factors impact the implementation of PBE?
- How did the WI professional development program prepare / not prepare teachers to implement PBE in their classrooms?

The goal of this project was to identify impacts and constraints associated with these particular teachers and this specific professional development program. In order to answer these questions in an accurate and in-depth manner, a two-pronged qualitative approach was used involving written reflections and semi-structured interviews. Multiple approaches promote validity and help ensure that accurate information is gathered, which are key factors in qualitative research (Creswell, 2013). A passive consent information sheet was emailed to participants explaining the two activities requested of teachers. Written reflection prompts were then emailed to all participants before interviews were scheduled (Appendix B). Return of the reflection questions served as consent to be contacted to schedule an interview. Participants were instructed to answer a subset (of their choosing) of the reflection prompts to reduce burden on participants. Their reflection responses, and particularly the prompts they chose not to answer, served as the foundation for developing a tailored semi-structured interview for each participant. Interview questions were chosen from a semi-structured interview guide focused on impacts on students and teachers, constraints, and the effectiveness of WI's professional development program (Appendix C). Key research questions as well as topics for reflection and interview queries were identified by an examination of the literature and through dialogue between WI leaders and Dr. Jordan. This project was exempt from review by the University of Minnesota's Institutional Review Board under federal guidelines 45 CFR Part 46.101(b) category #2.

Interviews were conducted between December 2014 and June 2015 at a location of the participants' choosing, generally their own classroom during either a work period or after school. Before beginning, researchers ensured that the participant understood his or her role in this project and had read the consent information sheet. Additionally, researchers answered any questions that participants had at that time. Interviews were audio recorded and transcribed verbatim, then analyzed using a direct interpretation approach as described below.

Participant Recruitment

Nine teachers self-selected to participate in the PBE professional development program. Teachers were paid a \$1,500 stipend for their time spent at the professional development program in August 2014. Upon implementation of their lesson or unit during the 2014-15 academic year and completion of final paperwork due to WI, teachers received an additional \$1,500. Interviews and written reflection questionnaires were not required in order to receive the complete stipend; if teachers failed to complete and file all of their paperwork with WI in a timely manner and forfeited the second half of the stipend, an interview was still scheduled with a \$50 gift card as incentive. The informed consent document and meetings with the researchers made it clear to participants that they could opt out at any time and not experience any financial repercussions.

Participants

All nine teacher participants from WI's professional development program participated in this study. Additionally, one passionate principal agreed to be interviewed upon request of a study participant who was a teacher in the school. This principal interview provided more in-depth insights into systems-level constraints to PBE implementation. The teachers all worked at public schools in St. Paul or Minneapolis. They represented a variety of grades ranging from kindergarten to upper level high school. Furthermore, although PBE is often thought of as a science-based pedagogy, three of the nine teachers taught subjects that were not science including English, music, and statistics.

Data Management and Analysis

Interviews were recorded and then transcribed verbatim in Microsoft Word. QSR NVivo 10 software was used to manage and analyze the transcriptions.

This analysis is grounded in the direct interpretation method of a case study. Using this approach, a single case, or in this research the 2014 professional development program, is analyzed in its entirety (Creswell, 2013). Researchers note patterns through the process of analysis, and eventually develop naturalistic generalizations. These generalizations can either be used to improve the case being studied or can be applied to other similar cases (Creswell, 2013).

In order to find these generalizations, researchers used QSR NVivo software. NVivo allows the researcher to code phrases into categories, thus creating a collection of thoughts from all the interviews that share similar sentiments. Additionally, sub-nodes can be created to consolidate similar ideas within an even more narrow focus. For example, the research question "How does PBE impact students?" would become a node called "Impacts on Students" and then responses from teachers that show a similar theme, such as "Increased Significance", would be combined under that category. By using these themes and breaking each interview down into sections that relate to the other interviews, converging and diverging opinions became more clear and easier to analyze. Sub-nodes were created when multiple teachers referenced the same theme and did so in a targeted manner, as opposed to a casual, offhand comment.

Results

In the sections that follow, insights gained through the analysis described above are presented using quotes to illustrate participants' opinions. The interview quotes have been cleaned of filler words such as "uh" and "um" and any identifying information in reflection and interview quotes has been removed. Data from the both interviews and written reflections are integrated below.

Impacts on Students

The teachers reported that PBE had important effects on student engagement, collaboration and ease of learning.

Teachers reported that student engagement during the PBE lesson was much higher than in a normal classroom. This became especially obvious when talking about students that struggle in a typical classroom setting. The social and activity-based nature of PBE provided an excellent forum for students who tend to hold back or be overlooked in the traditional classroom environment.

- ❖ It was great, all students were engaged. I was shocked by all the great questions that students had and how much fun they had actually learning. It was great to see so many kids actively engaged who are not engaged in the classroom. I have a couple of students who really struggle with being in class day to day. They have a hard time sitting down and concentrating. It was great to see them really flourishing by being able to move and explore.
- ❖ Student engagement was up as they were actively "doing" instead of trying to passively "absorb."

Teachers also reported an increased sense of collaboration among students in their classes. Several referenced the fact that implementing their place-based lessons at the beginning of the school year allowed students, particularly starting either middle school or high school, to form stronger bonds with their classmates immediately.

- ❖ I think they felt a little camaraderie with their group. And they were in the canoes with their groups so they were kind of filled with some camaraderie that way also. That collaboration piece was nice.
- ❖ I was also impressed at how this PBE unit gave a sense of community to this new freshman class. Friendships were formed and insecurities lessened as students worked together in groups at the Creek.

The last, important reported student impact of the PBE unit was related to increased significance regarding the topics they were learning. Through hands-on activities, students were introduced to concepts in a memorable and significant manner. The use of local sites further increased significance for the students as they were more fully able to directly connect the information to a tangible and sometimes personally significant location. Through the use of local habitats, ecosystems, and historic sites, students were able to witness the PBE concepts. Teachers

witnessed this many times, and several mentioned that the increased significance stretched beyond their particular subject into other corresponding classes.

- ❖ And I saw a lot of kids have a lot of really profound, like “That’s how I apply it.” Right, like this is how it applies to the real world. This is how I make that bridge from the classroom to the real world. And a lot of kids did make that leap, which is cool. That oftentimes doesn’t happen.
- ❖ And I think it was a very meaningful context to them. We never really left St. Paul, so this is kind of where they live. And I think they could see the impact and kind of the reasoning of their work, so it was real to them.

Impacts on Teachers

The students were not the only recipients of the benefits of a PBE lesson. Teachers reported noticing changes within themselves as a result of the professional development program and the implementation of the unit they developed. These changes began with the challenge posed by WI to step outside of their comfort zones in the professional development program. Teacher’s felt the implementation of their PBE unit was quite rewarding for them personally and they expressed perceived growth in their capacity for effective teaching.

- ❖ I certainly had a really positive experience with the implementation of the project, and thought the day was, probably, one of the best days I’ve had teaching.
- ❖ I was excited to have a reason/need to move outdoors with my students; this in itself was worthwhile for me since I have wanted to be outdoors with students and have not felt that it would truly benefit students in their music learning. I feel this is an important time period for my students and I want to be sure I use that time to best advantage.

Systems-Level Information

In order to fully understand the significance of the impacts on both students and teachers described above, it is necessary to gain a comprehensive view of the role PBE currently has in schools. The systems-level research question highlights aspects that affect the implementation of PBE that are beyond the scope of an individual classroom teacher.

Teachers reported mixed usage of PBE in their schools. Two of the schools are environmentally-focused, so nature-based learning is heavily utilized already. However, even in those schools, the extent to which PBE is implemented varies.

- ❖ I think there’s a hesitancy to utilize PBE.
- ❖ In science, no. We all feel very pressured to cram in standards. It’s so much faster to give examples and show videos than take the time to find them in the environment around us.

In addition to an accepting environment in which PBE is valued, teachers also expressed a need for support from coworkers in order to successfully implement a PBE lesson in their classrooms, particularly one that involves a field trip or excursion. Most teachers reported feeling supported and encouraged by their coworkers; some even had coworkers express interest in being a part of the project. However, one teacher in particular acknowledged that the term “PBE” would have deterred coworkers who were uninterested in learning a new pedagogy or disillusioned with

educational “fads” and instead introduced the lesson developed as a time-filler instead of a new unit.

- ❖ I found my non-science teaching partner to be more interested and invested than I thought she would be.
- ❖ No, if you throw them the terms they’re kind of like “Yeah, I’ve seen that come and go.” They just sort of can’t be bothered.

Coworkers are not the only support system necessary according to the teachers. Administrative support from principals and superiors is critical to ensure successful implementation of a PBE lesson.

- ❖ Whatever we want to do and we’re willing to write grants for, whatever we’re willing to sort of pursue and write curriculum for, as long as we can show how it ties to the standards, they’ll let us do whatever we want. Our administration is very open to whatever we feel like we need to do to get kids up to standard.
- ❖ It was actually my principal’s idea to develop this class.

Although several teachers commented that they had direct, personal support from their principal in regards to their participation in the professional development program and the implementation of their unit, this same support was not available to everyone. In fact, one teacher would not speak on the record about the school’s unsupportive principal and mentioned having to participate in the professional development program ‘under the radar’.

Even with support from coworkers and administrators, there are a variety of constraints that can hinder the implementation of a PBE unit. Most often referenced were issues dealing with time and scheduling. Weather was also listed as a constraint by several teachers, although some mentioned that weather is never a deterrent for them. Personal struggles also served as a constraint that changed the original PBE lesson of one particular teacher.

- ❖ Life happens no matter what you do. So in one class the principal came out and wanted to videotape us doing the school song, so their class project was much abbreviated. Things like that. One class it was so cold and it started to rain so we had to come in. One class there was an autistic boy who was a run risk so we had to stay in. So life goes on regardless of what your plans are, so we had to alter it.
- ❖ Money, and time, because if we’re going to take away time from math class and reading class, we’re told those are the primary things we need our children to get to become proficient in, then we have to make sure everyone understands the value.
- ❖ For myself, I came out with a lot of ideas, goals, and hopes that fell pretty flat. I took several professional development classes last summer and didn’t realize the amount of post-summer commitment they were going to require. Also, I had more responsibilities at work that I didn’t know about until the school year started. Add in a train of significant illness and injuries that spanned most of the school year and, well, some things had to fall by the wayside.

In order to attempt to overcome some of these constraints, teachers were questioned about what they would need in the future to continue or expand their PBE unit. The most common responses included additional financial support and resources. Several teachers also stressed a desire to incorporate a stronger cross-curricular program in schools. One teacher suggested the possibility

that the Minneapolis school district become much more self-sustaining in terms of its ability to provide experiential education and PBE without needing outside sources. Another mentioned consistency in the state education regulations.

- ❖ Time. Time. Time. Time. More access to resources. And not physical resources, but places and people to guide you through it. Because if I had to plan all of this and then like go to the garden and lead it myself, forget about it.
- ❖ I would really need clear directives from the state, the district, whomever, as to what they want taught and what they're going to measure. Because really my job is to teach whatever they tell me to teach.

Place-based Education Unit

Despite mentioning some constraints they encountered or aspects of their devised unit that did not work, every teacher interviewed had plans to enhance their program in the next school year. One teacher cited the timing of standardized tests next year that could impact implementation but still had plans to make this year's lesson better. Often, the focus for future lessons included being more intentional in choosing activities to include and finding ways to make the unit interdisciplinary.

- ❖ And I think that I can be even more intentional about selecting activities that truly pertain to the place-based experiences that the kids are having, so that I'm not doubling up on learning of concepts.
- ❖ I would like to, if you asked me, "Hey how do you want to make it bigger or better?", then I would like to include a financial component to this, so kids understood what's necessary financially to implement a restoration plan. And then I'd also like to incorporate a historical component of Minnehaha Creek, and what it was before Minneapolis went through here. And what did it look like. And looking at "Hey what was this creek like 100 years ago, and 50 years ago?"

Wilderness Inquiry's Professional Development Program

Overwhelmingly, teachers spoke very positively about the professional development program. When asked about the benefits of this particular program over others they had participated in, the time provided to write curriculum and get feedback was a key component. Additionally, the connections forged with local National Park Service rangers and park workers were high on the list. Lastly, most teachers mentioned the stipend provided by WI as an important benefit of this professional development program.

- ❖ It was really a nice balance of sort of new experiences and looking at opportunities within the Twin Cities but also some time to sort of think about how that might work in a classroom.
- ❖ Just spending our time outdoors, time with the other teachers and with Ranger Dave, and some of the other WI staff so that we were focusing on specific parts of the outdoors- both history and culture and physical science part of it.
- ❖ So it was nice to have time and you know, to be compensated for that time as well is huge. Because most of the time you put in all these hours and you're not compensated for it. It's not like it's tons of money but it really does help to be compensated for your time.

Even though the feedback was overwhelmingly positive, the teachers did offer some suggestions for WI to continue improving their professional development program. Teachers preferred the outdoor activities over time spent indoors, with the exception of lesson development time. Suggestions ranged from minor clarifications about logistics to incorporating a follow-up program for cross-curricular development.

- ❖ You know they talked about if they do a similar cohort next year, to pull in some of the teachers from the past year, to do some mentoring or maybe you know, sit with people while they're writing their lessons, or be resources. And I think that would be really strong. Because I've benefitted from folks that have been in similar programs in the past and I can think that now that there's more of us we can probably offer even more support.
- ❖ Maybe grouping some people together with common goals. And then having some cross-curricular development, I think, would be a really neat phase two to this particular WI training that we had.

Discussion

The student impacts reported in this evaluation are consistent with previous research. Teachers reported a greater sense of community and collaboration in the PBE lessons than in traditional classroom style learning (Jennings, Swidler, & Koliba, 2005; Palmer, 1993; Smith, 2002; Sobel, 2004). Additionally, consistent with prior studies, teachers participating in this evaluation reported an increased sense of engagement among their students throughout the implementation of the lesson (Berkowitz, Ford, & Brewer 2005; Capra, 2007; Hamilton-Ekeke, 2007; Howard, 2010; Surasinghe & Courter, 2012). This sense of engagement in what they were learning was also extended into a realization that lesson did not end in the classroom but was applicable beyond it as well (Jennings, Swidler, & Koliba, 2005; Surasinghe & Courter, 2012).

Previous research rarely mentioned the use of strategic, intentional professional development as a method of increasing comfort and knowledge in PBE among teachers. Participating teachers in this study reported that the opportunity to learn a new pedagogy in such a supported manner during the professional development course was highly beneficial. Thus, our research highlights a need for development of effective PBE professional development and attention to evaluation of impact on teachers resulting from these programs.

The WI PBE professional development program and its evaluation offer the unique perspective of non-science teachers, in contrast to much of the existing literature. In our research, three of the nine participating teachers taught non-science classes: English, music, and statistics. Each of these teachers was able to use the local area – whether natural or manmade – as the focal point for their implemented unit. These teachers highlight that PBE can be cross-curricular and their experiences reinforce the need for PBE professional development to be available to non-science teachers as well as science teachers.

Study strengths and limitations

One of the main questions that arises in discussions of qualitative research is that of validity. There are a variety of methods that can be utilized to enhance validity in qualitative research (Creswell, 2013). Several methods were used in this study, thus strengthening the results. First,

triangulation involves the use of multiple data sources, interviewees, or researchers. By using both written questionnaires and in-person interviews, we were able to extract data from the participants using two different methods. Additionally, two researchers were involved in the interview and analysis process allowing for a discussion of ideas, codes, and themes. This manner of open communication and transparency between researchers helps maintain validity in the data analysis.

Some limitations of this evaluation lend themselves to development of recommendations to other programs interested in offering and evaluating similar professional development experiences. First, only two days of the professional development program were attended by one of the researchers. Although attendance by the researchers was not critical to the implementation of the evaluation, witnessing the professional development program in its entirety might have strengthened the background knowledge of the case focused on in this research, aiding interpretation.

In terms of participation, the sample size was small, although it did represent a census sample, meaning all participants in the professional development program were included. It is important to note that these teachers had self-selected to attend this professional development offering hosted by WI and were compensated for their involvement. As a result, they do not provide an accurate representation of all public school teachers in the Twin Cities, but rather those that were interested in learning more about PBE and the implementation process. These teachers also represent only public schools. Additionally, they have a variety of background experiences that may influence their beliefs in ways not related directly to the professional development. Lastly, the wide variety of subjects and grade levels taught by the cohort of teachers complicates this study. Many of the teachers have professional demands that are grade or subject specific, and thus some of the constraints identified by one teacher might not be felt by all teachers. Despite these limitations, this study aimed to analyze the singular case of WI's professional development program, and the results reflect this objective.

Programmatic Recommendations

For other programs looking to implement a PBE professional development program, there are several key aspects from the WI program to include. First, the manner in which it was conducted, largely focusing on experiential activities and taught by knowledgeable professionals, was appreciated by the teachers. Additionally, the teachers benefitted from the time designated during the professional development to develop their unit. Without this, many said it would have been difficult to find time on their own. Lastly, other organizations that wish to develop this type of professional development program should remember that teachers should be compensated for their time spent in the program. A stipend also serves to attract participants to the program.

Based on teacher and principal feedback about the WI teacher professional development program, several recommendations can be offered to inform the development of similar programs by other organizations. To maximize effectiveness for teachers of different grades, the professional development program should be divided into two separate cohorts - one for K-8 and one for high school teachers. In this way, programming can be adapted more easily to the grades that are taught. Furthermore, there tends to be more ability for interdisciplinary teaching in lower

grades, and by creating a cohort of those grades, professional development programs could help facilitate cross-curricular program development.

Similar, cohort-based programs should consider inviting teachers back for a follow-up workshop a year after their experience in the professional development program. This would serve as a means to exchange information and ideas with their cohort as well as mentor the new cohort. This would also encourage teachers to think about enhancing their PBE unit for the upcoming school year as well as continue building a network of like-minded professionals with whom to share ideas and lesson plans.

Lastly, an intentional, targeted recruitment process is recommended. This could be done in two ways. First, teachers of non-science subjects might be directly targeted as participants for the professional development program. Science teachers are both more likely to self-select to participate in PBE offerings and tend to have more opportunity to learn about PBE in other professional development programs. Secondly, a targeted recruitment of teachers from the same school might be considered. By increasing the critical mass of teachers interested in and comfortable with using PBE in a particular school, the entire teaching style of that school might be impacted. Both of these means of targeted recruitment would benefit the professional development program overall.

Recommendations for Future Research

One topic that warrants additional research is the use of PBE within credit recovery programs (summer school). Although all of the teachers interviewed for this evaluation implemented a PBE unit within the regular curriculum, two had previously also used PBE in summer credit recovery programs for high schoolers. Both mentioned casually that the students enrolled in the summer school displayed similar levels of engagement and collaboration as those students participating in the teachers' PBE units this year. An in-depth analysis of credit recovery programs that utilize PBE versus those that utilize more standard methods would be necessary to make generalizations about the use of PBE in high school credit recovery programs.

Additional research might also focus on how best to create systems-wide change that promotes PBE as a valuable tool for enhancing student learning. Many teachers in this study discussed the importance of peer and administrator support in the successful implementation of their PBE unit, or conversely, that pushback from peers or administrators presented challenges. Similarly, aligning their PBE lessons with curriculum standards or school, district or state expectations was of concern for some. Evaluation of interventions aimed at the building, district or state department of education levels, rather than, or in addition to the teacher level, would contribute deep knowledge of the constraints to implementation of PBE and of training teachers to effectively use place-based pedagogy.

Conclusion

The professional development program implemented by WI provided valuable skills to teachers that enabled them to implement PBE in their own classrooms. Evaluation of their experiences implementing PBE offers a window into the benefits of PBE for students and educators' teaching

experience, as perceived by teachers. Overall, teachers reported stronger engagement, collaboration, and significance for the concepts learned in their units among students than at other times throughout the year. The implementation also had impact on the teachers themselves by providing an opportunity for growth and an expanded repertoire of teaching approaches. Furthermore, the teachers enjoyed learning about the opportunities available in the Twin Cities for outdoor experiential and place-based learning. The information discovered through the evaluation of this program also provided fodder for recommendations to other organizations for developing strong teacher professional development programs to increase the effective use of PBE.

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Appendices

Appendix A

Agenda Overview

Monday, August 4th

8:00AM

Meet at Hidden Falls Regional Park – North Gate
(1313 Hidden Falls Dr, Saint Paul, MN 55116)

Free parking available

8:30AM-3:00PM

Mississippi River Day Trip

- Focus on place-based education along the Mississippi
- **Picnic lunch – bring your own**
- Gear needs: closed toe shoes that can get wet, layers, water bottle, lunch, something to take notes and/or pictures

3:00PM-3:45PM

Reflection and Closing at Harriet Island

3:45PM

Shuttle back to your cars at Hidden Falls (Arrive by 4:15)

Tuesday, August 5th

8:00AM

Meet at Wilderness Inquiry Office
(808 14th Ave SE, Minneapolis, MN 55414)
Street parking only

8:00AM-8:30AM

What is place-based education? (Chad Dayton)

8:30AM-11:30AM

Evaluation and Research with U of M (Tim Sheldon and Cathy Jordan)

11:30AM-12:30PM

Lunch (on your own) – bring a lunch or walk to Dinkytown area

12:30PM-4:00PM

Curriculum Overview and Writing

- Supply needs: Computer, lesson you would like to modify or enhance (optional)

Wednesday, August 6th

8:00AM

Meet at Coldwater Spring
(5601 Minnehaha Park Dr S, Fort Snelling, MN 55111)
Free parking available

8:00AM-9:30AM

National Park Service Overview at Coldwater (Ranger Dave Wiggins)

10:00AM

Meet at Ruttan Hall – University of Minnesota, Saint Paul

Campus

(1395 Gortner Ave, Saint Paul, MN 55108)

Park in Gortner Ave Ramp – Next to STEM Center – Bring in ticket

10:00AM--11:00AM

Socioscientific issues (SSI)

11:00AM-12:00PM

Lunch and Showcase (lunch provided)

- Supply Needs: successful lesson or activity in the outdoors that you have facilitated and would like to share (optional)

12:00PM-4:00PM

Curriculum Writing (bring computer)

Thursday, August 7th

8:00AM

Meet at Saint Anthony Falls Lab

2 Third Ave SE, Minneapolis, MN 55414

Free parking available

8:00AM-10:00AM
Heitkamp)

Saint Anthony Falls Lab Research Overview and Tour (Barbara

10:00AM-10:45AM

Drive to Fort Snelling State Park

(101 Snelling Lake Rd, Saint Paul, MN 55111)

Ample Parking Available \$ 5 daily rate or State Park Pass

required

10:45AM-12:00PM

Overview of the Park and Camping

12:00PM-1:00PM

Picnic lunch (bring your own)

1:00PM-3:00PM

Department of Natural Resources Programming

3:00PM-5:00PM

Curriculum Writing

5:00PM-6:00PM

Break

6:00PM-7:30PM

Dinner (provided)

7:30PM

Networking, Campfire, Reflection of the Week

Friday, August 8th

7:30AM

Breakfast (provided) and Camp Clean-Up

8:30AM-10:30AM

Geomorphology, Rivers and Research (Patrick Belmont)

10:30AM-11:30AM

Next Steps Discussion

Appendix B

Written Reflection

Please respond to two questions (or more) WITHIN EACH category. Please insert your responses under the appropriate questions below. Please write in sufficient detail to give a thorough picture of your thoughts, feelings, and opinions in response to the question. Use examples if you can (but avoid using student names). Please email this document as an attachment to jorda003@umn.edu.

PBE = place-based education

Impact on teachers

1. What changes did you observe in yourself as you designed and implemented your PBE unit/lesson? If you've previously done this lesson in a traditional setting or using a traditional approach, how was this time different?
2. When you were planning and/or delivering this lesson/unit, what is something new that **you** learned about your chosen subject? How did you come to learn it?
3. Was it easier or more difficult to plan/deliver this lesson/unit than you expected? Why?
4. Why did you want to participate in this PBE professional development opportunity, and what was your experience? Did it meet your goals and expectations – why or why not?

Impact on students

1. What did you notice about your students during the lesson/unit you implemented using PBE? Were there changes in behavior, classroom dynamics, energy level, etc.?
2. Describe what students learned from this lesson. Was it different than what other students have learned in the past with regard to this content area or standard?
3. Did your students express that they liked the PBE style or disliked it – do they want to do it again? What was their favorite part? Least favorite part?

Systems level

1. What or who was helpful to you in implementing this lesson/unit? What or who was a barrier or made it more difficult?
2. Before or after the lesson did you share your PBE experience with other teachers, staff, or administration – how? What was their reaction or feedback?
3. Do you think other faculty/staff in your school are ready to start using PBE – why or why not? What do you think needs to happen for your school to start using PBE more often?

Pros/Cons

1. What did you like the most about this PBE lesson/unit? What did you like the least?
2. Which part(s) of your lesson/unit worked especially well, or not as well as you planned? How is this compared to past lessons – why do you think that is?
3. If you did another PBE lesson (the same one or different) what would you do the same? What would you do differently?

Appendix C

Semi-Structured Interview Format Impact of Place-based Education Teacher Professional Development

Thank you for agreeing to meet to follow up on your experience designing and implementing place-based education and your written responses to the reflection questions sent earlier. The purpose of this interview is to dive deeper into some of the areas you talked about in your reflection, explore some of the questions you chose not to write about, and overall, just get a sense of your opinions about your experience designing and implementing place-based education, your plans for using it in the future, and your needs for future support to sustain your use of this approach.

1. Why did you decide to participate in the place-based education teacher professional development program at Wilderness Inquiry?
2. What was your previous experience with place-based education? Is place-based education something you were trained on in your teacher preparation program? Is it utilized already in your school setting?
 - a. Have you been using place-based education in your teaching? What prepared you to do that?
3. *Clarification of any written reflection responses that are unclear* (Question wording depends on responses to written reflection).
4. *Probes about questions teacher chose not to answer* (Question wording depends on written reflection responses).
5. Did you feel the Wilderness Inquiry program prepared you to design and implement your place-based education lesson/unit? Why/why not?
6. What would you need by way of professional development or support to be able to implement place-based education in the future?
7. To what degree do you feel place-based education is/would be supported within your school building? By other teachers? Administrators? What would help these colleagues see the value in this approach?