

TEACHER PERSPECTIVES OF THE PARTNERS IN EDUCATION SINGLE-
SESSION OUTREACH LESSONS

A THESIS PROJECT
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DAVID STIELER

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Table of Contents

Chapter 1	1
Background	1
The Partners in Education Program	2
Statement of the Problem	3
Statement of Purpose	3
Research Questions	4
Definition of Terms	4
Significance	5
Chapter 2	6
Introduction	6
A Brief Overview of Outreach	6
The Role of Outreach	8
Outreach and Environmental Education	9
The Effectiveness of Outreach	10
Enjoyment	10
Knowledge	11
Career Choice	11
Teachers' Perceptions of Outreach	12
Summary	13
Chapter 3	15
Introduction	15
Strategy of Inquiry	15
Participants	16
Researcher's Role	17
Data Collection & Analysis Procedures	18
Chapter 4	20
Introduction	20
Study Population	20
Research Question 1: What are Teachers' Perspectives of the Outreach Lesson's Impact on their Students?	21
Theme 1.A.: Student Enjoyment	22
Theme 1.B.: Student Learning	23

Theme 1.C.: Student Interested/Becomes Interested in the Topic	25
Research Question Two: What Motivates a Teacher to Choose to Have the Outreach Lesson Taught in their Classroom?	26
Theme 2.A.: Expectations of the PIE Program	26
Theme 2.B.: Resources	30
Theme 2.C.: Teacher Learning	32
Summary	32
Chapter 5	34
Interpretation of Data	35
Research Question One: What are teachers’ perceptions of the outreach lesson’s impact on their students?	35
Research Question Two: What motivates a teacher to choose to have the outreach lesson taught in their classroom?	36
Recommendations	38
Recommendations for PIE	38
Recommendations for Outreach Educators	39
Further Study	40
Limitations	41
Conclusion	41
References	43
Appendix A: IRB Determination Form (Approval Page)	46
Appendix B: Interview Consent Form	47
Appendix C: Interview Guide Questions	49
Appendix D: Full Interview Quotes	50

List of Tables

Table 1. <i>Four major categories of PIE participants</i>	16
Table 2. <i>Categories of interviewed teachers</i>	21

Chapter 1

Introduction

Background

Organizations see outreach programs as an effective way to distribute information to students in the kindergarten through twelfth grade (K-12th) classroom (Lahm & Fortner, 1987; Rammapudi, 2006). Outreach literature covers a wide variety of programs, including programs that offer environmentally-focused lessons (Briggs, Miller & Hall, 2006; Newton, 2001; Rammapudi, 2006; Trainin, Wilson, Wickless, & Brooks, 2005).

According to Brewer (2002), outreach programs are programs designed to take scientific research information and distribute it in simpler terms to the general population. Researchers consider the role of outreach programs as opportunities for experts to share their knowledge of a subject with others (Lahm & Fortner, 1987; Rammapudi, 2006) or for those giving the outreach lesson to act as role models for youth still deciding on a career choice (Bottomley & Parry, 2002).

The literature for outreach programs has shown mixed results in terms of their effectiveness to meet program goals for participants. Researchers have assessed outreach effectiveness for achieving three primary outcomes in the student participants: enjoyment of the lesson, increased knowledge of the subject, and influence on career choice. Enjoyment has consistently been a positive result in studies (Koehler, Park, & Kaplan, 1999; Nelson & Philippe, 2009; Shanahan, Pedretti, DeCoito, & Baker, 2011). Knowledge gain has had mixed results. For example, in an evaluation project, Nelson & Philippe (2009) noted that only about half of the students who participated in a renewable energy program could correctly name a renewable energy source. However, Thomas (2012) and Long et al. (2012) found significant increases in

knowledge scores in the subject area from students who participated in short outreach programs. Bottomley & Parry (2002) showed that an outreach program can influence the choice of major of freshmen entering college.

Teachers' perspectives of outreach programs has also received attention in the literature. Teachers reported enjoyment of the programs (Nelson & Van Cleave, 2009; Rammapudi, 2006), noted the hands-on nature of many of the programs (Nelson & Van Cleave, 2009), and believed programs left a lasting impression (Rammapudi, 2006). Rammapudi also got feedback from teacher interviews and surveys recommending changes including keeping programs up to date, consulting with the teacher more before and after the lesson, clearer connections to the classroom curriculum, and more collaboration between outreach organizations.

The Partners in Education Program

The focus of this study was the Partners in Education (PIE) program. The PIE program was established by the University of Minnesota Duluth (UMD), Great Lakes Aquarium, and Minnesota Sea Grant in 2002. The PIE program has used single-session, one-hour outreach lessons to bring Great Lakes science into elementary school classrooms. The PIE lessons targeted third through fifth grade students, and each semester a new lesson plan was created that targeted learning objectives for these grades. This lesson was then modified to reach kindergarten through second grade students as well. The lessons were taught by UMD student volunteers from many different backgrounds. The volunteers were not required to have any previous teaching experience, but were trained to teach the featured lesson. Though the volunteers were coming into the program with varied teaching experience, they were all new to the specific lesson being taught, as the lesson taught by the PIE program rotated every semester. The goal of the PIE program has been to “provide volunteer students the opportunity to teach and

support science, cultural, and environmental education experiences for regional youth” (Partners in Education, 2011).

From its beginnings, the PIE program has sent out teacher feedback surveys after each lesson is taught in order to keep its programming focused on teacher wants and needs. The teacher feedback surveys were typically completed immediately after a program. The surveys asked seven questions that focused on teacher satisfaction with the program and requested ideas for future programs. While these are helpful for this purpose, there was a need seen by the partner organizations to get a better idea of what the program has achieved.

This study investigated teachers’ perceptions of these one-time, one-hour outreach lessons. To do this, the researcher completed qualitative interviews with seven teachers who participated in the PIE program. This research provides an overall picture of the value teachers found in these lessons for themselves and their students.

Statement of the Problem

There are few studies that have attempted to understand teachers’ perception of single-session outreach programs. More information is needed from teachers about their experiences with these programs, including how single-session outreach programs impact their classroom environments and what factors motivate teachers to invite these lessons to their classroom.

Statement of Purpose

This project investigated K-5th grade teachers’ perceived experience with the Partners in Education outreach lessons. The project was exploratory in nature and used a phenomenological design with open-ended interviews of seven teachers. Teachers were asked about their motivation for participating in PIE, how the lessons impacted their students, and how the lessons impacted them personally.

Research Questions

The questions that guided this study were:

1. What are the teachers' perceptions of the outreach lesson's impact on their students?
2. What motivates a teacher to invite the outreach lesson to their classroom?

Definition of Terms

Environmental Education:

Environmental education seeks to create environmentally literate citizens that have the awareness, knowledge, attitudes, skills, and opportunity to participate in solving environmental problems (UNESCO, 1978).

Outreach Program:

Outreach programs are programs designed to take scientific research information and distribute it in simpler terms to the general population including schools and other organizations (Brewer, 2002). Further, outreach programs “tend to connect scientists with an audience in a fairly unidirectional way: scientific knowledge is transmitted through venues such as seminars, discussions, or workshops” (p. 4).

While this definition is specific to using the term outreach for educational sessions originating from the scientific organizations, the researcher acknowledges that other definitions have been created for outreach. A definition by the EPA defines outreach as “information dissemination and requests or suggestions for action on a particular issue (often without the critical thinking, problem solving and decision making steps in between)” (EPA, 2013). This is different because it includes requests for education outside of the scientific organization and suggestions for action.

Single-session Outreach Program:

A single-session outreach program is an outreach program with the purpose of teaching one lesson to participants that lasts no longer than one day. This type of outreach program can teach multiple lessons to participants over a period of time, but the intent is to teach a new topic, not to build upon what was taught during a previous lesson.

The PIE single-session outreach lessons are taught in the participants' classrooms by University of Minnesota Duluth student volunteers. These are one-hour, one-time programs that teachers invite to their classrooms.

Volunteer Educator:

For the purpose of this study, a volunteer educator is a UMD student who has volunteered with the PIE program to teach PIE outreach lessons to students in the students' classrooms.

Significance

The information collected during this study contributes to the collective knowledge regarding teacher perceptions of outreach programs taught to their students in their classrooms. Since the PIE program is based on teachers self-selecting the lessons, this research also contributes knowledge about teachers' motivations to sign up for outreach lessons.

This research provides formative information for the PIE program. Though information gathered isn't generalizable beyond this specific program, these same factors can be looked at by other outreach educators to better understand their programming impacts as well.

Chapter 2

Review of Literature

Introduction

Outreach programs have been used by organizations for years to distribute scientific information to people outside of the organization. These organizations see outreach lessons as an effective way to disseminate their expertise and information to the general public (Lahm & Fortner, 1987; Rammapudi, 2006). However, there are few studies that have sought to ascertain what teachers in the K-12th grades perceive as the benefits of these programs. This study sought to build upon existing literature regarding teachers' perceptions of K-12th outreach programs, specifically those which are single-session outreach programs.

Outreach literature covers a wide variety of programs. This literature review begins with a discussion of the different ways outreach programs are used and the variety in their design. Next, ways that outreach can be used to achieve the objectives of environmental education are discussed. The final section explores past studies that have included teacher perceptions of outreach as well as any other outreach studies that can help to inform what motivates teachers to participate in outreach lessons. These outreach programs, though often aimed at achieving specific educational standards or outcomes, are conducted by wide range of people both within and outside the school community (Dolan, 2008). There is potential that the program will not only affect the students, but the presenters and teachers in the classroom as well.

A Brief Overview of Outreach

The term outreach has been applied to many different types of programs in the literature. Even narrowing it down to the definition in this study leaves a wide range of types of programs and places that use outreach to distribute knowledge. The definition of outreach used in this

study is: “outreach programs are programs designed to take scientific research information and distribute it in simpler terms to the general population (Brewer, 2002). Further, outreach programs “tend to connect scientists with an audience in a fairly unidirectional way: scientific knowledge is transmitted through venues such as seminars, discussions, or workshops” (p. 4). This definition still leaves different ways of delivery. Throughout the literature, educational outreach programs take many different forms. Outreach programs can be a quick visit to a school or longer stays. An example of a quick visit is the 1-hour outreach programs for assemblies of up to 250 people done by a science museum (Science Museum of Minnesota, 2013). An example of a longer stay is the day-long outreach lessons to schools in Botswana put on by the Botswana National Museum (Rammapudi, 2006).

A variety of organizations use outreach as a part of their education programs, including museums, non-profit organizations, universities, and research organizations (Bottomley & Parry, 2002; Brewer, 2002; Koehler, Park, & Kaplan, 1999; Nelson & Van Cleave, 2009; Shanahan, Pedretti, DeCoito, & Baker, 2011). Outreach is used as a tool for environmental education by arboretums, federal agencies, museums, and zoos (Briggs, Miller & Hall, 2006; Newton, 2001; Rammapudi, 2006; Trainin, Wilson, Wickless, & Brooks, 2005).

Even though scientists within the college system tend to view outreach as an auxiliary activity to their main responsibilities, they are being drawn into outreach activities by department liaisons, colleagues, and professors (Andrews, Weaver, & Hanley, 2005). Moskal & Skokan (2011) and Stamp & O’Brien (2005) looked at outreach programs that university graduate students participated in by assisting elementary teachers with science lessons. These studies found that having a graduate student involved led to more innovative programs due to the extra time they had to work on the lesson.

The Role of Outreach

Single-session outreach may serve to pass information on from experts to students. However, there can be other purposes for these programs as well.

The research cites that one reason outreach should be done is that the researchers and other experts from the outreach organizations have more knowledge on the subject than the elementary teachers. Lahm & Fortner (1987) state that when outreach program leaders work with teachers on outreach programming the outreach “can be a valuable method by which to impart important information about special environmental areas to schoolchildren” (p. 1). Rammapudi (2006) found that teachers were glad to have the program because the museum staff had more knowledge to offer students regarding cultural studies and the environment.

Bottomley & Parry (2002) state in their assessment of an engineering outreach program that the goal of a K-12th classroom visit should be to encourage students to pursue the discipline featured in the outreach lesson and to model professional roles for the students. Bottomley & Parry studied underrepresented groups and, in particular, female engineer presenters serving as engineer role models for female students. This study had the underlying assumption that role modeling would occur for whatever group the presenter represented, whether or not it was an intentional goal of the presentation.

In the field of conservation education, Brewer (2002) has worked to create objectives that all high-quality conservation outreach programs should strive to achieve. She stated three objectives: increasing participant knowledge to understand the issues being discussed, collecting ecological data with assistance of the community, and creating opportunities for communities to connect with scientists to learn more about the ecosystem.

Brewer (2002) continues with a list of ways to engage nonscientific audiences in science

including:

- Experiencing wonder and not only factual information;
- Collaboration with the teachers so they can prepare students for the outreach visit and continue to discuss the topic in class if they choose;
- Close collaboration with a science-educator who knows how to teach to the target audience and across different learning styles;
- Proper training of participants on accurate data collection;
- The program should be assessed in some way.

Outreach and Environmental Education

The objectives of environmental education were defined by UNESCO in the Tbilisi Declaration (1978) as aiming to create people who have an awareness of environmental issues, knowledge of the environment and associated problems, pro-environment attitudes, skills for solving environmental problems, and the opportunities to participate in solving environmental problems.

Single-session outreach programs can be a strategy for accomplishing some of these environmental education objectives. In a recent framework for environmental education strategies laid out by Monroe, Andrews, and Biedenweg (2007), it is stated that, “Environmental education is a complex and broad umbrella that incorporates a variety of strategies and content from natural science to social science and top-down to bottom-up with little to great audience participation” (p. 215). In this framework, they give four intervention categories including: conveying information, building understanding, improving skills, and enabling sustainable actions. Due to the constraints of single-session outreach, these programs usually only have elements in the first two categories. The category of conveying information includes one-way

transmission of information and is used when people are simply lacking the information given to them. This is often the pre-planned lesson that the organization creates to offer to schools. The category of building understanding involves two-way transmission of information and can occur in outreach programs depending on how receptive the educator is to interacting with the participants. It involves skills such as “remembering, recognizing, interpreting, summarizing, and explaining” (p. 211).

The Effectiveness of Outreach

In order to narrow the scope of literature on outreach programs, this literature review focused specifically on outreach programs taught in the students’ classroom but not by their classroom teacher and programs which are a day or less in length. In the literature the effectiveness of outreach programs focuses on four outcomes. These are enjoyment, change in attitude about the subject, knowledge of the subject, and influence on career choice.

Enjoyment. Enjoyment has consistently been seen as a positive outcome for single-session outreach programs according to student surveys. According to a student post-lesson survey done by the Science Museum of Minnesota (Nelson & Philippe, 2009) of a one-hour outreach lesson, about 90% of students from grades four through six indicated that they enjoyed the lesson. The positive enthusiasm brought to the learning environment through outreach programs is consistent with the findings of Koehler, Park, & Kaplan (1999), who wrote about a university outreach program where university students taught science lessons to fourth grade students. They illustrate student enthusiasm after the outreach lessons, describing examples of students going home and repeating the experiments that they learned during the outreach lesson.

This level of enjoyment may move the attitudes of the students regarding the subject from a less interested to more interested perspective. As part of a two-year study of the *Scientist in*

School outreach program in Ontario, Canada which offered one-time, half-day lessons to students, Shanahan, Pedretti, DeCoito, & Baker (2011) examined student enjoyment and change in attitudes after participating in an outreach lesson at their school. Though they were looking specifically at demographic groups underrepresented in science, they stated that there were positive changes in attitude for all levels of students, including underrepresented groups. Enjoyment of the program was measured as high by all groups as well.

Knowledge. Knowledge gains through short-term outreach programs have been assessed in several studies but have been less conclusive. For example, though most could define a renewable and non-renewable energy source in the Science Museum survey, about half of the time they couldn't provide a correct example of a renewable energy source even after these were discussed during the lesson. A majority of students, however, could list ways to conserve energy and reasons why we should conserve energy (Nelson & Philippe, 2009). This program was conducted in a large assembly format, allowing direct interaction with only a few students. Outreach using hands-on techniques seemed to have a greater effect on knowledge. Thomas (2012) assessed an outreach lab taught by a mobile educator with expertise in the subject. The study used a pre-test and post-test to assess student learning. Scores on the knowledge test did improve after the outreach program. Long et al. (2012), similarly found that students who participated in a very hands-on lesson had statistically higher scores than a peer group that did not participate, though the program was only fifty-five minutes long.

Career Choice. There is also evidence that single-session outreach lessons to classrooms or entire schools may have an impact on student choice of a major in college. Bottomley & Parry (2002) provided an example of this in a survey of incoming freshmen to the College of Engineering at North Carolina State University. Out of about 600 students returning the survey,

155 listed single visit outreach lessons they participated in during their K-12 years as having an impact on their choice of major. When asked to rate this impact it received a 2.7 Likert-like overall score on a scale that ranged from 1 (some impact) to 5 (large amount of impact).

Teachers' Perceptions of Outreach

The literature that captures teacher perceptions of outreach highlights the positive aspects of outreach as well as the changes teachers would recommend.

Similar to the student surveys, enjoyment of outreach programs has been an important outcome in these studies. This enjoyment included both teachers' personal enjoyment and their perception of their students' enjoyment of the outreach lessons. In an evaluation survey project done by Nelson & Van Cleave's (2009), all of the 28 teachers who responded agreed that they enjoyed the lesson and that their students seemed to enjoy the lesson. Rammapudi (2006) reported that teachers made comments that the outreach lesson they had was highly educational as well as entertaining. It was not clear whether the teachers meant entertaining to themselves, or whether they perceived the lesson was entertaining for their students.

In one study, outreach lessons were seen as leading to an emotional response in students and teachers. According to Rammapudi (2006), one or more teachers interviewed stated that the one-day outreach lesson, "leaves a deep and lasting impression on pupils, teachers and the community" (p. 24).

In Rammapudi's study (2006), teachers gave feedback as to what should be changed to make the outreach lessons better. The first theme that emerged was that programs should be up-to date and adapted to what is going on and important in the field right now. This was also supported in the survey done by Nelson & Van Cleave (2009). Other themes that emerged from Rammapudi's study included: more hands-on sections of the lesson to keep students engaged,

those providing the lessons should be in closer consultation with the teachers, there should be clear suggestions for teachers to connect outreach lessons to classroom lessons, and there should be more collaboration and less competition between organizations doing classroom outreach.

Summary

Outreach is seen by scientific organizations as an effective way to disseminate their expertise to the general public including schools and other organizations. While there are many types of programs labeled “outreach” in the literature, this study focused on single-session outreach. The role of single-session outreach has been seen as a way to pass on knowledge, a way to encourage students to pursue a specific career, and as a way of professional role-modeling for under-represented groups. Brewer (2002) has worked in the conservation field and created a list of objectives that high-quality outreach programs should strive to achieve. These are increasing participant knowledge, increasing participation in scientific data collection, and creating opportunities for the general public to connect with scientists.

Single-session outreach can be used to achieve environmental education objectives. Monroe, Andrews, and Biedenweg (2007) created a recent framework for environmental education and stated that, “Environmental education is a complex and broad umbrella that incorporates a variety of strategies and content from natural science to social science and top-down to bottom-up with little to great audience participation” (p. 215). While single-session outreach can only achieve conveying information and possibly building understanding within this framework, Monroe, Andrews, and Biedenweg accept this as a necessary part of the environmental education a student will receive throughout their life.

The literature regarding the effectiveness of outreach programs highlighted three main outcomes for students. First, enjoyment has consistently been seen as a positive outcome of

outreach programs. Second, knowledge gains of single-session outreach have been assessed and it has been found that students can increase knowledge through outreach programming. Lastly, single-session outreach programs given to students during the elementary through high school years have had an influence on a student choice of major in college.

Research into teachers' perceptions of outreach included identification of positive outcomes and desired changes. Positive outcomes included high enjoyment of the program by teachers, teachers viewing the program as highly educational, and teachers finding the program emotionally engaging. Desired changes requested by teachers included up to date and adaptive programming, more hands-on lessons, closer consultation with teachers, and more collaboration between outreach organizations.

Chapter 3

Methodology

Introduction

This study was exploratory in nature. In order to better understand teachers' perceptions of single-session outreach programs, this project investigated K-5 teachers' perceived experiences with the Partners in Education (PIE) outreach lessons. To study the teachers' perceptions of these lessons, a phenomenological approach was used. This was an appropriate technique because it describes what participants in an event thought of their experience.

Studies of outreach programs have tended to focus only on the level of student and teacher reactions to a program. This study went further in identifying the reasons that teachers perceived the lesson would benefit their classroom environment and what motivated them to choose the PIE outreach lessons. This chapter describes the methodology used including a description of the design, selection of participants for the study, the researcher's role in the study, data collection procedures, and analysis of the data.

Strategy of Inquiry

As stated above, this study used a phenomenological methodology in order to investigate the teachers' perceived impacts of a short outreach program on their classroom environment and motivations to choose PIE outreach lessons. According to Creswell (2009, p. 13), a phenomenological study is "a strategy of inquiry in which the researcher identifies the essence of human experiences about a phenomenon as described by participants." A phenomenological approach was appropriate for this exploratory study because phenomenology is focused on ideas and perceptions that people form and therefore judge events against. It only seeks to describe events in as complete and accurate of terms as possible, not explain or analyze them (Moustakas,

1994). This study sought to provide a better concept of the value teachers put on short outreach lessons and how they perceived the outreach lesson was connected to what was being studied in their classroom.

This study was shaped by the phenomenological approach because this approach looks at an event from multiple perspectives until a complete picture of that event is achieved. After all the perspectives are gathered, it then focuses on finding connections between all of these perspectives to form the essence of the phenomenon being studied (Moustakas, 1994). The researcher interviewed several K-5 teachers in order to describe this phenomenon.

Participants

Participants for the interviews included seven K-5 teachers in the Duluth area who participated in the PIE program between fall 2010 to spring 2013. These participants were chosen from a pool of approximately 100 teachers. The sampling method was criterion-based, as the participants must have participated in PIE. It then used maximum variation sampling to increase the likelihood that different perspectives were reflected in the results (Creswell, 2007). To achieve maximum variation, the teachers were first separated into four major categories as shown in Table 1 below. Next, two teachers from each category were selected. All teachers selected taught in different schools.

Table 1

Four major categories of PIE participants

3 rd -5 th grade teachers who have participated in PIE more than 1 time	3 rd -5 th grade teachers who have participated in PIE only 1 time
K-2 nd grade teachers who have participated in PIE more than 1 time	K-2 nd grade teachers who have participated in PIE only 1 time

The PIE lessons have been designed for third through fifth grade students. This lesson was then modified for kindergarten through second grade students. Because of this, teachers who taught these two age groups were divided in order to have a representation from both populations. These two categories were further divided by teachers who had participated in the program once in the past three academic years and those who had participated more than once. This was done because of the changing nature of the lessons and the differences in performance from one volunteer educator to the next. These two factors may have influenced the quality of each lesson. Teachers who only had seen one would have to assess the program based on their one experience, while teachers who had seen the lesson multiple times would be able to generalize across the range of their experiences.

Before the participants were sought, permission was sought from the Institutional Review Board to ensure that the rights of the participants were protected. It was determined that this project did not require IRB approval (Appendix A). All interviewees' information was kept anonymous. This was done through a use of the pseudonym assigned to each interviewee instead of using her real name when using quotes from the interviews. All participants in the study were informed of the purpose of the study and recruited to participate via direct email. Those willing to participate filled out a written consent form (Appendix B). The researcher worked from a list of the names of teachers who had participated in PIE and the number of semesters they had participated.

Researcher's Role

The researcher fully acknowledges the potential for biases in this study due to his relationship with the PIE program. The program has been led each semester by the PIE Coordinator, a Master's of Environmental Education graduate. The researcher was in this

coordinator position for the 2012-2013 and 2013-2014 school year. Although every attempt was made to avoid bias, the close connection means bias was possible. There are also reliability issues in a small-sample qualitative interview design. Therefore, this study is not meant to be generalizable beyond this specific program.

Data Collection & Analysis Procedures

Reliability in this study was ensured by following the following data analysis approach. The qualitative interviews in this study used a general interview guide approach (Turner, 2010). This ensured that the same type of information was collected from interviewees, but allowed for flexibility in the timing of the questions based on the flow of the interview and in the exact wording of questions (McNamara, 2009). The interview questions asked during this study can be found in Appendix C. A limitation of this interview type is the lack of question consistency, which can cause interviewees to respond inconsistently (Turner, 2010). Before these interviews were given, a pilot run of the questions was done with two teachers from the pool of candidates for this study. This provided the opportunity to gather feedback, assess questions, and rework difficult questions (Chenail, 2009).

The interviews were conducted and tape-recorded by the researcher. These interviews were then transcribed and re-checked for accuracy after the initial transcription. Hand-written notes were taken during and immediately after the interview to accompany the tape-recordings.

The transcribed data was analyzed according to Creswell's method of phenomenological analysis (2007). Transcribed data was first read through to get a general sense of what the big ideas were in the interviews. The transcribed data was then split into a list of significant statements for each individual interview. Significant statements were then categorized based on the researcher's interpretation of the meaning of each statement for each individual interview.

Categories from individual interviews were then grouped to form non-overlapping categories that contained all significant statements from teachers. From this list, themes emerged. Themes that were unrelated to the research questions were discarded. Using these themes, a description of the phenomenon was created.

Validity in this study was ensured through the use of various strategies laid out by Creswell (2009). This study used triangulation through the use of multiple interviews, used of original data from interviews to support the themes (Lacey & Luff, 2007), clarification of researcher bias as laid out above, and presentation of all information within each major theme including discrepant information in chapter 4.

Chapter 4

Results

Introduction

In order to study teachers' perceptions of the PIE single-session outreach lessons, the exploratory interviews that were conducted were transcribed and significant statements selected from these transcripts following a phenomenological method. Themes were categorized based on relevancy to the two research questions. Three major themes emerged for each question regarding perceived impacts on students and motivations of teachers for participating in PIE lessons. These themes are elaborated upon in this chapter. Throughout chapters four and five, feminine pronouns are used when talking about the interview participants because all seven of the teachers were female. Pseudonyms are used for each respondent to maintain anonymity.

Study Population

In this study, seven teachers were interviewed. The teachers were K-5th teachers that were involved in the PIE program from 2010-2013. Each teacher taught in a different school. While the original intent of the study was to interview eight teachers, only one teacher was interviewed from the category that taught at the K-2nd level and had participated in only one lesson. This category had the smallest population to begin with and current contact information was not available for all past PIE participants. Of those contacted, all but one declined to be interviewed. The number of teachers interviewed from each category and their pseudonyms can be found in Table 2.

Table 2

Four major categories of PIE participants

3 rd -5 th grade teachers who have participated in PIE more than 1 time (2 interviewed – Diane, Faye)	3 rd -5 th grade teachers who have participated in PIE only 1 time (2 interviewed – Alison, Emily)
K-2 nd grade teachers who have participated in PIE more than 1 time (2 interviewed – Carly, Gail)	K-2 nd grade teachers who have participated in PIE only 1 time (1 interviewed - Barb)

In this study, two major research questions were asked. The answers that emerged from the interviews were separated into the themes in this chapter. Direct quotes from the teachers have been shortened where appropriate and ellipses are used to make the quotes more readable. Full quotes from the teachers can be found in Appendix D.

Research Question 1: What are Teachers’ Perspectives of the Outreach Lesson’s Impact on their Students?

The most important reason for why the interviewees saw the PIE program as positive was they perceived there were benefits for their students. This view was expressed by all seven teachers and with a greater frequency than any other reason. These benefits can be broken up into three major themes: student enjoyment during the lesson; student learning due to the PIE lesson; and student interest in a topic leading to increased learning.

While these are all things that teachers perceive as benefits for the students, none of the teachers said they did any formal assessment of student gains from the PIE lesson. Only two teachers did any informal assessment. This consisted of either a brief discussion with the students about what they just learned (Faye) or a brief journaling period where students were asked to write down a few facts about what they had just learned (Emily).

Theme 1.A.: Student Enjoyment. All seven of the teachers interviewed mentioned student enjoyment as an important aspect of the PIE lessons. During the lessons, the teachers indicated that this excitement was reflective of the students being attentive to what was being taught. Students showed enjoyment through things such as a remaining quiet when the volunteer educator was talking (Barb, Carly), focusing on the activities (Alison, Faye), willingness to share information with the volunteer educator (Emily), willingness to participate (Barb, Carly, Emily, Gail), physical signs like sitting up on knees to see what was happening (Carly, Emily), and verbal signs of recognition, like “Ah” or “Oh, yeah” (Barb). An example of student enjoyment shown through the students focusing on activities is captured in the following quote by Faye:

You could...see that they were doing what they were supposed to do. They were filling out paperwork they were supposed to, they were talking about the activity, they were playing with the materials, they were doing what they were supposed to do with the materials....it was just a buzz of working noise .(See Appendix D¹ for verbatim quote.)

It was also mentioned by Alison, Carly and Diane that having a new person come into the classroom to present the lesson contributed to student enjoyment. Diane gave an example of this when she said, “Well, I think that there's a high interest because they're very energetic, and new people, and the activities.” A similar view was expressed by Emily, who mentioned that even when the information discussed in a PIE lesson was a recap of what the teacher had already told the students, it was beneficial for the students to hear it from another person.

Another factor contributing to student enjoyment according to Emily and Alison was the method used to teach the content in the lesson. This was described most often by highlighting the hands-on and interactive nature of the lesson. Emily stated:

Kids want to hold something or volunteer for something...and...the young man answered their questions...as they went along...so I think that was also...captivating...it wasn't just a show, but it was really participatory and engaging...(See Appendix D² for verbatim quote.)

Teachers also referenced the use of visuals (Diane) and the flow of the lesson (Faye) as ways the lesson was taught that led to student enjoyment.

Theme 1.B.: Student Learning. All seven of the teachers perceived that their students learned from the lessons. This learning fell into two categories: knowledge gained about the subject and new awareness of the subject.

Teachers mentioned knowledge gained by students mostly in reference to vocabulary (Carly, Barb, Emily). Carly described an emphasis on vocabulary during the lesson:

She had the kids do the skit and would tell them how to do it, and...then...everything that had a "tion" at the end she would say evaporaTION!...And she made it fun for them...they learned these huge words but it was really good cause then they started pointing out all these T...I...O...N words. (See Appendix D³ for verbatim quote.)

Carly also mentioned learning in relation to a diagram of the water cycle that the volunteer had drawn on the board. She said that after the PIE lesson, she saw her students recreate this diagram unprompted.

When asked questions regarding the impacts that the PIE lesson had on their students, increased awareness was mentioned frequently by the two teachers who commented on it (Diane, Emily). Diane who spoke most about awareness sums this up by saying, "But I have to say maybe the information isn't as important as just that exposure to...other instructors and other subjects that your own teacher doesn't have." (See Appendix D⁴ for verbatim quote.)

When teachers were asked if they could describe ways that their students were able to use the information gained during a PIE lesson and transfer that knowledge to another topic, they were less certain. Diane stated that she was hopeful that there was some sort of transfer, though she doubted that there was much, if any at all. Barb and Carly simply mentioned that it was transferrable to a similar Lake Superior unit that they were doing in the future, though they offered no examples for how student transferred it to a separate topic. One example of being transferrable to a similar unit is when Barb mentioned that the PIE water cycle lesson came during the middle of her weather unit and it was therefore directly related. The most direct reference to transfer was offered by Gail who shared that after the lesson on simple machines, the students in her class used their free play time to create new machines out of materials that were in the classroom.

After that...they would take the Legos and...make a...simple machine out of it...and create something new out of it. Or I have some things called "clever sticks" where they would...hook them together and...they're trying to make a...different simple machine out of it. A couple did that and I thought that was neat because they...took it from that... (See Appendix D⁵ for verbatim quote.) (Gail)

Lastly, Carly suggested that the novelty of the experience of having a visitor come to the classroom helped the students remember the subject taught. "...because we don't get a lot of visitors into our classroom, I mean, you...hand pick...we just don't have a lot of time for a lot of outside [presentations]...so they remember it." (See Appendix D⁶ for verbatim quote.)

Another important aspect of the student learning theme was that the PIE lessons were used to prepare students for an upcoming unit. Emily and Alison both mentioned using the PIE lessons in this way. Emily signed her class up for a second time because she felt it had a direct connection to what she would be teaching. Alison signed up because she thought any knowledge

gained about Lake Superior would be valuable before they do their Water Watch unit, which has a strong Lake Superior connection.

A final aspect of the student learning theme, which three teachers mentioned, was that the lesson's impact on students was enhanced because content was grade-level appropriate (Alison, Barb, Carly). Barb gave an example of this: "I think it was really age-appropriate...just in the fact that she had...manipulatives, the pictures that went with it, and she would write the words on the white board." (See Appendix D⁷ for verbatim quote.) These types of comments came from both grade level categories of teachers. Carly made the comment that though she was aware that the lesson was originally created for grades 3 and up, that the volunteer taught the lesson in a way that was appropriate for her first graders.

Theme 1.C.: Student Interested/Becomes Interested in the Topic. A final theme related to the impact of the PIE program on students was student interest in a specific lesson topic, e.g. geology, Lake Superior fish, etc. The teachers mentioned student interest as an emotional response to the lesson.

There were two ways that this theme was referred to by teachers. The first was when Diane referred to a student having a previous interest in a specific topic and that having an in-depth lesson on the topic would increase that interest and the student would gain knowledge on the topic. Diane mentioned this when talking about awareness. The second was that the lesson created a direct interest in the topic. Gail mentioned this in the context of having presenters come and speak to her class on specific topics. She said that having presentations on different topics was one way to get individual students emotionally invested in a subject. As an example of this, Gail said, "...we just always like to have guest speakers, like presenters, I just think makes school interesting, and you never know what tangent's gonna spark some kid's joy."

While student interest overlaps with the other two themes of student enjoyment and student knowledge gains, this theme was separated from the other two because it was mentioned as being a leading factor to both of these. It was also stated by both of these teachers that this emotional response was not expected from a majority of their students, but from only one or two.

Research Question Two: What Motivates a Teacher to Choose to Have the Outreach Lesson Taught in their Classroom?

During the interviews, teachers were asked about their experiences with the PIE program and for what reason(s) they signed up for the PIE lessons. The motivating reasons for teachers to choose PIE outreach lessons came from their answers to these questions. Statements made by the teachers fell into three major themes related to why they invited the PIE lessons into their classroom. The themes include expectations of the PIE program, the PIE program as a source of resources, and teacher learning.

Theme 2.A.: Expectations of the PIE Program. One theme that emerged from the interviews is that teachers are willing to have the lesson again because of their past experience with the PIE program. This can be broken up into their experience with the volunteers, the interactivity expected of the lessons, and the relevancy of the information taught. All of these three subthemes were perceived as benefiting students. Volunteer ability was mentioned by teachers as volunteers being prepared to properly teach their students. Interactivity of lessons was mentioned as a way to keep students enjoyment of the lesson high. Relevancy of information was directly related to student learning.

Subtheme A: Volunteer Ability. The most popular response regarding volunteer ability was that volunteers were prepared to teach the lesson. This subtheme had three categories to it—volunteer educators were prepared to deal with students, volunteer educators were physically

ready for the lesson including showing up on time and getting props ready, and volunteer educators were knowledgeable about the subject.

The teachers were very impressed with the volunteer educators' ability to keep their students' attention. Four of the teachers commented on the classroom management skills of the volunteers (Carly, Diane, Faye). They felt comfortable about letting the PIE volunteers run the classroom. While Faye remarked that she liked to be in the room while the presentation was happening in case of management issues, she said she didn't need to act very often to correct a student's behavior and, instead, said that she was actually impressed with the classroom management skills of the volunteers. Diane mentioned specifically that the volunteer educators were good at engaging with the students so they didn't lose interest. Carly commented on the ability for the volunteer to keep the attention of her first grade students through the whole program—longer than she had expected. "It kept their attention, which is half of it, because it was a longer session, and in here maybe fifteen minutes is their attention span, but they would go farther, so, it was really good" (Carly)

Carly also mentioned the ability of the volunteer to teach to her students' grade level. This was attributed partially to the patience that the volunteer had with her students and partially to the concepts taught in the lesson. Gail commented similarly about the concepts being a good choice for her kindergarteners. Faye commented that all of the volunteers that came to her classroom seemed to have had experience in front of students before. Diane and Gail commented that when they had more than one volunteer come into the classroom for a PIE lesson, the two were ready to work as a team and everything flowed well.

All of the teachers who had multiple lessons commented on there being only minor differences between presenters (Carly, Diane, Faye, Gail). Their experiences with the different

presenters were all positive. Emily, who had one lesson, said that she had seen the introduction to another presentation and spoke with the other teachers in her school after the presentations. Some of her colleagues did not have as good of an experience as she did with the program. She attributed this to there being a different presenter.

Three of the teachers mentioned some way in which the volunteers were physically prepared for the lesson. This included the volunteer educator showing up on time (Faye), and the volunteer ready to go with the props that they bring (Barb, Diane, Faye).

Finally, Carly, Diane, Emily and Gail all commented that the volunteer educators had a good amount of knowledge in relation to the subject they were teaching.

Faye combined many of the ideas of volunteer preparation into one of her statements:

...they must be trained well. I mean, you must go over this is how you do it and this is the classroom and this is how it works...it's obvious that they're...they're not just thrown into this...it looks like the people who come in have had some training and they know what they're doing...classroom management-wise and lesson-wise and managing their materials and...it's really a pretty together...I just have come to expect a pretty together program coming into the classroom as far as the presenter and materials and the lesson. It's all done pretty well. (See Appendix D⁸ for verbatim quote.)

Subtheme B: Interactive Lessons. Another subtheme was the interactive nature of the lessons. All but one of the teachers who had participated in the lesson before commented at some point that they were expecting the volunteer educator coming in to do more than just lecture on the material (Carly, Diane, Faye).

I'm expecting they'll have some kind of hands-on experience with those activities...that they'll get a different, unique look at that topic and be involved and more engaged. It's not gonna be someone coming in and lecturing. It's always been an engaging, hands-on kind of something. (See Appendix D⁹ for verbatim quote.) (Faye)

Carly, again, referenced this in relation to materials. She stated that for her grade level at her school, they don't have a lot of materials for doing hands on lessons. These two teachers saw this as increasing student enjoyment of the material.

Subtheme C: Relevant Information. The third subtheme for expectations of the PIE program was that the information was relevant to the students in some way. There were two ways in which teachers said the information could be relevant—information ties into the curriculum and information relates to the geographic area in which the students live.

The first category in this subtheme was that the information was topically relevant to the curriculum that the teacher is teaching. Examples of topical relevancy were the water cycle or geology as topics the teacher was going to/did cover with her students (Barb, Carly).

Out of the seven teachers, Emily was the only one who said she had known about the program before participating and had passed on having the PIE program come to her classroom because she thought the topic wasn't very relevant to her curriculum. When she did sign up for a lesson, it was because she thought it would relate directly to an upcoming water unit they were doing. After the first time, however, she said she would take a chance on having the program again even without a direct connection because of its local relevancy.

Local relevancy was commented on by all teachers. A majority of the teachers said that local relevancy of the topic was a factor in them choosing to have a PIE lesson. Diane and Emily both mentioned the Lake Superior connection as having a strong influence on why they chose to have the lesson. Diane said she wants to give her students as many opportunities to learn about Lake Superior as she can throughout the year. Emily expressed this when talking about the American eel lesson that was the only lesson she has had from PIE. "Well, definitely...it's Lake Superior....everything that goes down a child's drain or what gets washed out of their street ends up in Lake Superior. It affects their daily life and this American eel creature." (See Appendix D¹⁰ for verbatim quote.) Faye said that even when the topic didn't align with her curriculum, she knew it always was at least a science lesson that had a local connection and that was good

enough of a reason to continuing signing up for PIE. Alison expressed the opposite sentiment that Faye did. She felt that the local relevancy was a factor, but admitted that the curriculum connection was more important and she would have signed up for any water-related lesson that was offered to her.

Three of the teachers said that the local relevancy was not a factor in decision to have the lesson (Carly, Barb, Gail). For Carly, this was because she was unaware that there was a strong local relevancy to the information that was going to be presented in her class. Barb stated that her decision to have the lesson was more due to a block student teaching in her classroom that suggested and taught the lesson to her students. Carly and Barb both stated that after they saw the lesson taught, they appreciated the local relevancy of it. Gail knew that the lesson was locally relevant, but stated that this was not a major factor in her decision.

Theme 2.B.: Resources. Three important categories emerged under the resources theme. The first was the teachers using the volunteer's knowledge as a resource. Along with teachers gaining knowledge, interviewees stated that the PIE lesson filled in content areas for the students that the teachers didn't feel prepared to address (Alison, Diane, Carly, Emily). When talking about learning from the PIE lessons herself, Diane elaborated further saying that science was not a subject she felt knowledgeable about and that it was usually taught to the students in her school by another teacher. Carly also talked about the PIE program bringing in information that the students would otherwise not get in the following quote:

I really loved them coming in, because it was fun for the kids and it wasn't, you know, there's a magician coming, it was we're gonna learn something about our area and...about science, and I really felt strongly that that was something we were missing in school. (See Appendix D¹¹ for verbatim quote)

The second category related to resources was that the PIE lessons provided all of their own material resources for the lesson. The teachers said that bringing in the PIE lesson allows

the students to be exposed to many more ideas and activities than if the teachers had to put the lesson together themselves. Also, in one case, funding was a barrier to getting more resources in the classroom (Carly).

Carly provided an example where she asked for a copy of the papers the volunteer had so that she could use it later. She also commented that as a private school she felt they didn't have as much access to resources as the public school teachers. This was particularly true when it comes to Lake Superior resources. Relating to using resources from the PIE program were comments made by Diane about a suggested improvement for the PIE program. When asked if she used any information from the PIE lesson at a later time, she said that she hadn't as much as she would like to because the topic simply slipped her mind after some time had passed. She recommended that a poster or other visual could be put up in the classroom that would help remind her and her students about the lesson so it could be reconnected into what they were studying.

The last category of the resource theme that emerged was time. Teachers reported that they don't have time to create environmental lessons, but they are willing to have these sorts of lessons taught in their classroom when given the opportunity (Carly, Diane). Diane gave the best example of this when she said, "...I've got books...gone to all the workshops on...Project Wild, Project Aquatic Wild. I have all that stuff, but when do I have time to actually pull it out and do it? That's the problem. (See Appendix D¹² for verbatim quote.)

She also mentioned that she doesn't want to create a lesson if one on the topic already existed, so having PIE willing to come to her classroom and teach on water topics was beneficial for that reason also. Carly explained there aren't many resources available for the younger grades in her school in regards to science, so having someone come in with these resources was great.

Theme 2.C.: Teacher Learning. Five of the teachers mentioned that they themselves learned from the lesson (Barb, Carly, Diane, Emily, Gail). Barb and Diane mentioned learning from a past lesson as at least partially fueling their interest in bringing PIE lessons back to their classrooms. The other two teachers mentioned that they gained knowledge specifically from a PIE lesson they had had. Examples of teacher learning include Carly's example about a geology lesson and how she hadn't known all of the rocks the volunteer was talking about. Gail described her learning from a watershed lesson:

[The lesson] just gave me a...eye opener....I knew about watersheds, but...I had...relearned it and it has been awhile and...I've taken environmental classes and probably have learned about it too, but...the more you see it and the more you hear about it, then the [more] knowledgeable I am about it. (See Appendix D¹³ for verbatim quote.)

Gail also mentioned that she remembered having environmental classes during college and learning much of this same material, but that it didn't all stick with her. Therefore, she stated, the more she hears and sees it, the better.

Summary

Teachers saw three major impacts on their students due to the PIE lessons. These are enjoyment of the lesson, student learning due to the lesson, and student interest in the lesson. Student enjoyment and student learning were mentioned by all seven of the teachers and were seen as positive outcomes of the PIE lessons. Student learning had two distinct categories mentioned by teachers. These are knowledge gains about the topic and a general awareness of the topic. Student interest was seen as another positive outcome by two of the teachers and could lead to added enjoyment or knowledge gains about the topic. However, they both only expected one or two of their students to experience this interest about the lesson.

Teachers were motivated to participate in the PIE program mainly because of the expected student benefits. Five of the teachers expressed some lack of knowledge, time, or

physical resources to do environmental/science lessons. PIE assisted them in those areas. The teachers also thought that just having someone else come into the classroom to get the student excited about anything was a good enough reason for signing up for an outreach lesson. However, the four teachers who have had multiple lessons also expressed that they were impressed with the volunteer educators' abilities. While the teachers clearly stated that the reason they signed up was for their students' benefit, there was also the secondary benefit of the personal knowledge they gained from watching the PIE lesson.

Chapter 5 discusses how the information gathered from these seven teachers compares and contrasts to the literature about outreach programs and the PIE teacher feedback surveys. It also provides recommendations to the PIE program specifically and to outreach educators in general.

Chapter 5

Discussion

The Partners in Education program has been designed to provide single-session outreach programs to schools. While there have been teacher feedback surveys sent to teachers after each lesson to help PIE stay focused on teacher wants and needs, there was a need seen by the partner organizations to get a better idea of what the program has achieved. This study posed two research questions to better understand teachers' perceptions of the PIE program, including:

- 1) What are teachers' perceptions of the outreach lesson's impact on their students?
- 2) What motivates a teacher to choose to have the outreach lesson taught in their classroom?

Through interviews with teachers participating in the PIE program, it was determined that perceived student impacts include student enjoyment, student learning, and student interest. The teachers' main motivating factor when participating/deciding to participate in an outreach lesson was the potential impacts it would have on their students. Other things that motivated teachers to choose PIE lessons were teacher learning, access to new resources for the classroom, time savings, filling in gaps in teachers' knowledge, and historically positive experiences with the program.

This chapter discusses how these ideas interact, how they compare to the literature, and how they compare to the data gathered from the PIE teacher feedback surveys. Suggestions are provided for the PIE program specifically and other outreach educators in general.

Interpretation of Data

Research Question One: What are teachers' perceptions of the outreach lesson's impact on their students?

The importance of student enjoyment that was found in this research was not surprising, as this came up in much of the literature on outreach lessons (Lahm & Fortner, 1987; Nelson & Philippe, 2009; Rammapudi, 2006; Shanahan, Pedretti, DeCoito, & Baker, n.d.). The teachers stated that a combination of having a new face in the classroom to present and the method of the presentation contributed to student enjoyment.

The teachers stated that students were learning from the PIE lessons, although none of the teachers did any formal assessment. The teachers perceived student learning through a combination of the students' enjoyment, students' interest in the topic, and instances when they observed the students using the information learned through a PIE lesson at a later time. Student learning through outreach lessons was similarly found in Bogner (2010) and Thomas (2012).

A unique concept that emerged from these interviews while teachers discussed student learning was that teachers saw benefit in their students increasing their awareness of a subject, even when this didn't lead to achievements in defined learning objectives. Awareness as mentioned by the teachers was simply student exposure to a topic, helping students make future connections to that information. The fact that awareness is seen as a positive outcome of the PIE lessons by the teachers might also have to do with the timing of the PIE lessons. Several teachers mentioned that they liked having PIE come to their classrooms as preparation for an upcoming water unit. In a neighboring Wisconsin town, each May all grades K-5th do a locally-focused water unit called Water Watch, after most PIE lessons have finished. Because of this, they found PIE useful regardless of what the specific topic the PIE lesson covered. This could also be a

reason that teachers sign up for PIE lessons even when the specific topic doesn't overlap directly with their curricula, because the PIE lesson is still going to have a local water focus.

Other student impacts highlighted by the teachers and also cited in the literature included students bringing knowledge/interest in a topic back into classroom learning (Koehler, Park, & Kaplan, 1999) and the positive experience of an outreach program causing students to stay engaged longer with the topic (Shanahan, Pedretti, DeCoito, & Baker, 2011). These were both secondary reasons each mentioned by only one teacher.

There were a few relevant questions in the PIE survey including the topics of volunteer educator preparation, volunteer educator interaction with students, grade appropriate subject matter, and materials and prop use. For each questions the teachers responded very positively. All of these topics came out as themes during the teacher interviews and the results of the interviews very similar to what was expressed by the teachers in the surveys.

Research Question Two: What motivates a teacher to choose to have the outreach lesson taught in their classroom?

Although the main reason that teachers chose to have PIE come to their classroom was student impacts as expressed in the first research question, there were other reasons that emerged when teachers were asked specifically why they signed up for the PIE lessons. In the literature, a reason cited for teachers liking a specific outreach program was their personal enjoyment of the lesson (Nelson & Van Cleave, 2009; Rammapudi, 2006). While three of the teachers in this study mentioned that they personally enjoyed the lesson, they did not cite this as a reason for choosing to have an outreach lesson. However, even though they didn't cite this as a reason, those who chose to have the lesson more than once did mention that their past positive experiences with the program were part of the reason for choosing to have the lesson again.

Their own personal enjoyment could be a factor in this, although the study did not track this relationship directly.

Teachers were also asked in the PIE surveys what influenced their decision to have the PIE lesson. The inclusion of hands-on activities in PIE lessons was the number one reason chosen by teachers in these surveys. Relevancy of the topic to the school curriculum was ranked second highest. This was consistent with the interviews in this research study, in which teachers stated that the number one reason for participating in the lessons was the positive learning impact that the lesson had on their students. Linking to Minnesota standards, convenient scheduling, reputation of PIE, and past experience with presenters were also included in the individual PIE surveys as options and all these choices had the majority of teachers responding positively to them. Teachers could also choose “other” and provide a comment. Many did choose “other,” and the most written in reason was because of the cost of the program, which is free. This was written in by one-third of the respondents to the question. During the interviews, only one teacher really spent time talking about the lack of cost of the PIE program, but this indicates that cost could be an influence on why some teachers choose PIE lessons versus other outreach opportunities.

Teachers also talked about choosing the PIE lessons because they were looking for accessible, quality outreach programs. This was similar to Rammapudi (2006) who found that teachers liked programming that was positive and memorable, highly educational, supportive of the curriculum, and that left a lasting impression on the students. Teachers looked for this because of their perceived lack of time/knowledge, which was also supported by Rammapudi’s study and others (Moskal & Skokan, 2011; Stamp & O’Brien, 2005).

Recommendations

Recommendations for PIE. The teacher interviews show that the PIE lessons did a lot of things correctly that the teachers really appreciated. The partners should ensure that programming continues to be interactive for the students and be locally relevant. The majority of teachers' expectations of the PIE program focused on the volunteer educators' abilities. This suggests that PIE's most important asset is its volunteer educators. Because of this, it is important that they continue to get the highest level of training possible through the program and have up-to-date knowledge about the topic they are teaching. The PIE partner organizations have also discussed whether learning outcomes are the most important aspect of the program. This suggests that while teachers perceive that learning outcomes are being met, there are other reasons that motivate teachers to have single-session outreach lessons as well.

There are three recommendations that arose from the teacher interviews and literature. First, if possible, allow teachers to choose the programs that they would like. According to the teachers, grade-level appropriateness was very important. The lessons had added value according to the teachers when topic was closely tied to the curriculum of that grade level. PIE currently spans six different grade levels, and the curriculum for these grade levels has different needs. Therefore, there would need to be enough lesson options to cover a range of learning goals across these six grades. There would also need to still be a new lesson for each grade level each semester to satisfy the teachers who participate in PIE twice a year. Second, creating some sort of visual reminder to give to teachers for follow-up in their classroom could be beneficial. This was suggested by Diane, who stated that the connections she made back to the PIE lesson were less than she would have liked because she didn't always remember the lesson and therefore couldn't connect back to it when teaching about other topics. She said that if there was a visual

in the classroom, she and her students would likely find more connections to the topic covered during the PIE lesson. Third, having a follow-up option available to teachers could improve student learning. This was suggested in much of the literature. However, this should be optional because time was cited as a barrier by some of the teachers to having more outreach in the classroom. In Rammapudi's (2006), teachers suggested follow-up as something they would like to see and Thomas (2012) emphasized that a longer exposure to material can increase student learning.

Recommendations for Outreach Educators. Interactive lessons continue to be a motivating factor for teachers to choose outreach. Therefore, all outreach should strive to be more than just a lecture on the material. The more amount of time a student is actively doing something, the better. In this study, teachers clearly saw students interacting during the lesson as having a positive student impact.

Lesson evaluations should go beyond measuring enjoyment of a lesson in order to assess learning outcomes. While enjoyment is an important motivating factor for teachers to choose outreach lessons, if the organizations creating single-session outreach lessons expect to achieve a goal of increasing students' knowledge of a subject, enjoyment of a lesson does not correlate to knowledge gains (Nelson & Van Cleave, 2009). However, in these interviews, there were teachers who found awareness of a topic to be a valuable reason for having single-session outreach programs present in their classrooms. Therefore, outreach lessons should consider their audience to find out if achievement of learning outcomes is what teachers are expecting of the program, or if there are other motivating factors.

Further Study

While this study informs the PIE program about why teachers choose to participate in the program, it would be of value to reach out to teachers who did not choose to continue to participate in the outreach lessons and find out the reasons for this. This would be interesting to pursue from the standpoint of what PIE can do differently to keep more teachers' interest as well as to find out what barriers exist that prevent teachers from choosing/pursuing more outreach programs.

This study suggests that teachers perceive that their students are learning from the lesson, but in the literature, there is debate about just how impactful single-session outreach programs are for achieving learning goals beyond enjoyment of the lesson. Therefore, it would be helpful—if the PIE program hopes to achieve any goals beyond enjoyment—to do a formal assessment of student learning to see if this program is succeeding in achieving those goals.

Like this study, the outreach literature often looks into a single outreach program that an organization is doing. Because teachers are participating in multiple outreach programs across various organizations, it would be interesting to find out if there are subjects that are more often sought out by teachers. It would also be interesting to find out which topics teachers in different grade levels would like to see offered as outreach lessons.

Finally, to further this research, a survey could be done of teachers in outreach programs to see what percentage of teachers agree with conclusions of this study concerning the reactions and reasons for participating in outreach programs.

Limitations

There were a few limitations to this study. First, some of the teachers who were initially contacted about the study declined to be interviewed. This could have resulted in a non-response bias to the data. Second, while the teachers contacted were purposefully sampled to give as much variety as possible, unintentionally six out of seven teachers interviewed were main contact teachers for their school—this means that they were teachers who took part in signing up the rest of their grade level for PIE lessons. This group could have different experiences/expectations of the program. Third, this was the researcher's first time doing phenomenological interviews for a study, and the data relied on the interviewer properly interacting with the participants without biasing them, asking proper follow up questions to get at the whole experience of the participant, and properly interpreting the data. Fourth, this method relied on the teachers being able to accurately articulate their experiences. Finally, what the teachers told the researcher could be biased, because the interviews were face-to-face interviews with the current PIE coordinator for the year.

Conclusion

The themes that emerged in this study about what teachers perceived as important student impacts are student enjoyment in the lesson, student learning, and student interest in the topic. Themes that emerged for why teachers were motivated to participate in and continue to participate in the PIE lessons besides student impacts include expectations of what the program will deliver, the resources that the program will bring to the classroom, and the potential for the teacher to learn from the lesson

Since the PIE lessons all have a connection to Lake Superior, this was reason enough for the teachers to sign up for the PIE lessons regardless of the specific topic. However, teachers

perceived a greater benefit when it the lesson had a direct connection to the topic they were teaching their students in their grade level.

These single-session outreach lessons are perceived by the teachers in a very positive light. The expected outcomes of the lesson, however, are different among the teachers. Student knowledge gains were expected by five of the teachers, while the other two saw a simple awareness about an issue or topic to be recalled later by the students to be an important outcome of the lesson. Teachers are looking for single-session outreach opportunities. When these opportunities add to what she has taught/is going to teach in the classroom or that it makes up for a perceived lack of teacher time/knowledge/resources related to that subject, there is an added benefit.

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Appendix A: IRB Determination Form (Approval Page)

UNIVERSITY OF MINNESOTA

DETERMINATION OF HUMAN SUBJECT RESEARCH

Version 1.1

Updated August 2013, go <http://www.irb.umn.edu> for the latest version

This form is used to help researchers determine if a project requires IRB review. If evidence that IRB review is not required, this form may be used to document that the IRB has reviewed the project description and issued a determination. Please allow two (2) business days for review and response.

Route this form to:
Human Research
Protection Program

U Wide Form
Aug 2013

Section 1 Project Title

Provide the project title below

If the project is funded or if funding is pending, the project title must match grant title.

Teachers' Perceptions of the Partners in Education Program

FOR IRB USE ONLY:

Based on the information provided, this project does not meet the regulatory definition of human subjects research. **IRB approval IS NOT required.**

Section 2 Contact Information

Name (Last name, First name MI): Stieler, David J.	Affiliation: <input checked="" type="checkbox"/> U of M <input type="checkbox"/> Fairview <input type="checkbox"/> Gillette <input type="checkbox"/> Other
Email: stie0100@d.umn.edu	U of M x.500 ID (ex. smith001): stie0100
Phone Number: 515-230-6010	U of M Department Environmental Education

Section 3 Project Description

1. Provide a brief description of your project. Include a description of what any participants will be asked to do and a description of the data accessed and/or collected (1,000 character limit).

This research will focus on the Partners in Education (PIE) program sponsored in part by the UMD education department. The PIE program brings 1-hour Great Lakes-focused lessons to the K-5 classrooms around the Duluth area. The project will investigate teachers' experiences with the PIE program including perceived impacts on their classroom environment and reasons for choosing to participate. The researcher is the current coordinator for the program, and therefore has access to teacher names and how many times they have participated.

The project is exploratory in nature and will use phenomenological open-ended interviews of the teachers. These teachers will be contacted initially by email to participate, then sign a consent form to be interviewed and tape-recorded. The teachers will be asked about how they feel the program impacts themselves and their students, as well as what factors led them to sign up for a PIE lesson.

Appendix B: Interview Consent Form

Teacher Perspectives of the Partners in Education (PIE) Single-session Outreach Lessons

I am inviting you to participate in a research study that will explore the experiences of teachers who have participated in Partners in Education (PIE) program. Please read this form and ask any questions you may have before agreeing to be in the study.

Principle Investigator

This study is being conducted by: David Stieler
MEd Graduate Student
College of Education
University of Minnesota Duluth

Procedures and Confidentiality:

If you agree to be in this study, you will be asked to participate in one interview. I will arrange a time and location convenient for you. The interview will last less than an hour. Your interview will be audio recorded and transcribed into a word processor.

All records of this study will be kept private and the interview will be available only to David Stieler, the principle investigator. Quotes from this interview may be made part of the final research report, but under no circumstances will your name or identifying characteristics be included in this report. You will be assigned a random identifier for use in any research report. All audio-tapes and records linking the number to your real name will be destroyed upon approval of the thesis.

Voluntary Nature of the Study:

Your decision whether or not to participate will not affect your current or future relations with the University of Minnesota Duluth or your participation in the Partners in Education program. If you chose to participate:

- 1) Your participation in this interview is entirely voluntary.
- 2) You are free to refuse to answer any question at any time.
- 3) You are free to withdraw from the interview at any time.
- 4) Excerpts of this interview may be made part of the final research report, but under no circumstances will your name or identifying characteristics be included in this report.

Contact and Questions:

You may ask any questions you have now, before the interview begins. If you have questions later, you may contact either the principle investigator or his advisor at:

David Stieler
Principle Investigator
Phone: 515-230-6010
Email: stie0100@gmail.com

Bruce Munson
Adviser
Phone: 218-726-6324
Email: bmunson@d.umn.edu

You will be given a copy of this form to keep for your records.

Statement of Consent:

I have read the above information. I consent to participate in the study.

Signature: _____

Printed Name: _____

Date: _____

Appendix C: Interview Guide Questions

- 1) What have been your experiences with the PIE program?
- 2) For what reason or reasons were you signed up for the PIE outreach lesson?
- 3) What impacts did you expect the lesson to have on your students?
- 4) What were the reactions of your students to the PIE lesson?
- 5) Describe the atmosphere in your classroom during the PIE lesson.
- 6) Some teachers have written in lesson evaluations about their students using the information from the PIE lesson at a different time. Could you describe ways, if any, you have seen or heard your students using the PIE lesson information at a different time?
- 7) If you have done any assessment of the content taught during the PIE lesson, what did the results show?
- 8) What are your thoughts about the PIE lesson being taught by a volunteer student educator?
- 9) Please describe any ways you incorporate the PIE lesson into your classroom learning.
- 10) What, if any, PIE lesson or activities from a lesson have you used in your classroom afterwards?
- 11) How do the PIE lessons impact you personally as a teacher?
- 12) How did the lesson's connection to the local environment, if any, affect your decision to have the lesson?

Appendix D: Full Interview Quotes

¹ ...you could just see that they were doing what they were supposed to do. They were filling out paperwork they were supposed to, they were talking about the activity, they were playing with the materials, they were doing what they were supposed to do with the materials. It was, um, you could just...it was just a buzz of working noise. (Faye)

² ...kids want to hold something or volunteer for something, um, and they were...ah, the young man answered their questions, like as they went along, and so I think that was also, like, captivating, like it wasn't just like a show, but it was really participatory and engaging... (Emily)

³ Yeah, she had the kids do the skit and would tell them how to do it, and umm...yeah, and then she, you know, everything that had a "tion" at the end she would say evaporaTION! You know, she really, yeah. And she made it fun for them. And so then they learned these huge words but it was really good cause then they started pointing out all these T...I...O...N words. (Carly)

⁴ "...but I have to say maybe the information isn't as important as just that exposure to the...to other instructors and other subjects that your own teacher doesn't have" (Diane).

⁵ And some of them after that, you know, they would take the Legos and, you know, and make a...a simple machine out of it, you know, and create something new out of it. Or I have some things called "clever sticks" where they would, you know, they hook them together and, you know, and they're trying to make a, you know, different simple machine out of it. A couple did that and I thought that was neat because they, you know, took it from that so. (Gail)

⁶ "...because we don't get a lot of visitors into our classroom, I mean, you...hand pick, or, you know, we just don't have a lot of time for a lot of outside...and, um...they, so they remember it" (Carly).

⁷ "I think it was really age-appropriate and just in the fact that she had, um, manipulatives, the pictures that went with it, and she would write the words on the white board" (Barb).

⁸ Umhm, and then they must be trained well. I mean, you must go over this is how you do it and this is the classroom and this is how it works. I mean, it's obvious that they're...they're not just thrown into this, they're...it looks like the people who come in have had some training and they know what they're doing, you know, classroom management-wise and lesson-wise and managing their materials and that, I mean, it's really a pretty together...I, I just have come to expect a pretty together program coming into the classroom as far as the presenter and materials and the lesson. It's all done pretty well. (Faye)

⁹ I'm expecting they'll have some kind of hands-on experience with those activities. Um, you know, that they'll get a different, unique look at that topic and be involved and more engaged. It's not gonna be someone coming in and lecturing. It's always been an engaging, hands-on kind of something. (Faye)

¹⁰“Well, definitely, like, it's Lake Superior. Like, these...everything that goes down a child's drain or what gets washed out of their street ends up in Lake Superior. It affects their daily life and this American eel creature” (Emily).

¹¹ I really loved them coming in, because it was fun for the kids and it wasn't, you know, there's a magician coming, it was we're gonna learn something about our area and that...you know, about science, and I really felt strongly that that was something we were missing in school. (Carly)

¹²“I...you know, I've got books of...gone to all the workshops on, um, you know, Project Wild, Project Aquatic Wild. I have all that stuff, but when do I have time to actually pull it out and do it? That's the problem. And so that would be in that pile...” (Diane).

¹³ Just gave me a, you know, eye opener like...well I knew about watersheds, but, you know, kind of, I had, you know, relearned it and it has been awhile and...I mean I've taken environmental classes and probably have learned about it too, but, you know, just the more you see it and the more you hear about it, then the better knowledgeable I am about it. (Gail)