CONNECTING FIELD TRIP AND CLASSROOM LEARNING:
EVALUATING THE UTILITY OF A MUSEUM-BASED FRAMEWORK IN AN
ENVIRONMENTAL EDUCATION CONTEXT

By

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Abstract

Field trips have been shown to be more effective when they connect with classroom learning. The Framework for Museum Practice (FMP) proposes that museum educators use four principles when creating pre- and post-field trip activities for teachers to use. This case study, conducted at the Central Wisconsin Environmental Station (CWES), evaluates the usefulness of the FMP in an environmental education context.

First, the FMP was compared to national environmental education guidelines using content analysis. Findings show both documents are concerned with the themes of depth, skills building, instructional soundness, and usability while themes such as fairness, accuracy and action orientation are absent from the FMP. Second, teachers visiting CWES on field trips were surveyed about their opinions of FMP principles and their use of pre- and post-field trip activities. Surveys indicate most teachers theoretically agree with FMP principles 1, 3 and 4. These principles encourage adoption of the teachers' perspective, creating opportunities for teachers and students to work together towards an end product, and allowing students to practice literacy, research or dialogues skills. Only half of the teachers theoretically agree with FMP principle 2 (the need to conduct both pre- and post-field trip activities.) Finally, pre- and post-field trip activities based on FMP principles were pilot-tested. Pilot tests indicate that teachers need pre- and post-field trip materials that are easy for both teachers and students to use and that FMP-based materials mostly met these criteria. Though results indicate the FMP can be useful in an environmental education context, surveys and pilot tests also indicate that barriers such as lack of time can prevent teachers from effectively connecting field trip and classroom learning.

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Chapter I: Introduction

Field trips have great potential to positively affect students' learning (Farmer, Knapp & Benton, 2007; Flexer & Borun, 1984; Lisowski & Disinger, 1991; MacKenzie & White, 1982) and students' attitudes towards their education (Hannon & Randolph, 1999; Michie, 1998; Price & Hein, 1991; Wendling & Wuensch, 1985). Field trips provide real world settings in which students are challenged to apply knowledge learned in the classroom. Many students enjoy the less formal setting in which the learning takes place (Braund & Reiss, 2006; Falk, 1983; Flexer & Borun, 1984). As a result, these students may become more excited about their school subjects (Michie, 1998; Storsdieck, 2001). Though field trips themselves tend to be short-term outings, the effects of these trips on students may continue for many months to years after the field trip (Farmer, Knapp & Benton, 2007; MacKenzie & White, 1982).

This being said, not all field trips equally stimulate changes in student learning and attitudes. In order to reap maximum benefits from their trip, students must be prepared for the experience and must have an opportunity to reflect on it once the trip is over (Bitgood, 1989; EETAP, 1998; Orion, 1993; Storsdieck, 2006). Many field trip venues design pre-trip activities and post-trip activities that are provided to interested teachers. Field trip venues hope that these materials can support a connection between classroom and field trip learning that optimizes the trip's potential to positively affect students. Field trip venues also hope that teachers will use these materials in their classrooms despite barriers related to time, curriculum and standardized-testing pressures. One field trip venue, the Central Wisconsin Environmental Station, chose to explore a

new way of designing field trip pre- and post-activities to help achieve maximum potential for student learning while considering practical realities of teachers.

The Central Wisconsin Environmental Station

The Central Wisconsin Environmental Station (CWES) is a 200-acre environmental station operated by the University of Wisconsin - Stevens Point (UW-SP). CWES is located in Amherst Junction, Wisconsin and offers day-long and overnight environmental field trip programs for school groups. CWES field trips are designed to serve specific grade ranges within elementary, middle and high school populations. On average, over 3,000 students from 50 different schools across the state of Wisconsin visit CWES on field trips each year.

CWES designs preparatory and follow-up materials for field trips and makes them available to visiting teachers in downloadable, printable formats. The activities can be accessed on the "Teachers" webpage of the CWES website (http://www.uwsp.edu/cnr/cwes/Teachers.aspx). Along with providing links to optional pre- and post-trip materials, this website provides links to required field trips forms such as those for lesson and meal selection. Any teacher visiting CWES must use the website to reserve and plan their field trip.

Despite the accessibility of these activities to teachers, CWES found that many teachers may not be using them. CWES reviewed teacher responses on evaluation forms that were sent to each visiting school after their field trip between Fall 2005 and Fall 2009. When asked, "How helpful did you find CWES's pre-visit activities?" over 50% of teachers (n=181) left the question blank or marked "N/A" for "not applicable." When asked "How helpful did you find CWES's post-visit activities?" over 56% of teachers

(n=182) left the question blank or marked "N/A." Though these percentages do not account for the teachers that did not return the evaluation form, nor does it suggest that these findings definitively indicate teacher usage of CWES pre- and post-activities, CWES decided to take a closer look at the design of its materials.

Can Environmental Centers Learn from Museums?

Pre-visit and post-visit field trip materials should be geared towards the educational needs of students. Additionally, these materials should consider the practical needs of teachers. After all, the materials can only be effective if teachers decide to use them. To guide this design practice, researchers DeWitt and Osborne (2007) created the Framework for Museum Practice (FMP). The FMP is based on four principles that may optimize the learning opportunities for students on field trips while simultaneously removing some of the barriers teachers face to using pre- and post-field trip materials. These principles include adopting the perspective of the teacher, providing structure to the field trip, encouraging joint productive activity and providing opportunities to practice research, literacy and dialogue skills.

DeWitt and Osborne piloted the use of the framework in a museum setting with two classes. Pilot teachers confirmed their satisfaction with the FMP-based materials. Though findings were limited because of the small number of teachers, the positive reviews by teachers were encouraging. Two years later, Assaraf & Orion (2009) created an environmental unit that they considered aligned to the FMP. They studied junior high school students to determine if the unit could encourage students to develop components of environmental literacy. They concluded that the unit was successful in this respect based on pre- and post-unit surveys of about 500 7th – 8th grade students participating in

the study. Thus, the principles of the FMP included in the materials helped encourage environmental literacy/learning in this large group of students.

Because the FMP has shown promise in the environmental realm as a way to reap positive impacts on student learning/environmental literacy, this study seeks to further evaluate the utility of the framework in the environmental education context. Rather than focusing on the ability of the framework to optimize student learning on field trips, this study sought to evaluate the ability of the framework to meet the needs of teachers conducting environmental education field trips. The framework was theoretically analyzed for its alignment to nationally-recognized guidelines for the creation of quality environmental education materials. The framework was also evaluated in terms of its utility to teachers visiting the Central Wisconsin Environmental Station (CWES).

Goal of the Study

This study explores the utility of the Framework for Museum Practice (FMP) in designing materials that support environmental education field trips. The study evaluates theoretical alignment of the FMP with the environmental education context. The study also explores whether the FMP can be used to develop pre- and post-trip activities that 5th – 8th grade teachers conducting field trips to the Central Wisconsin Environmental Station (CWES) will utilize in their classrooms.

Study Objectives

1. Assess how well aligned the FMP is to nationally-recognized evaluation criteria for designing quality environmental education materials

2. Evaluate whether or not teachers visiting CWES theoretically agree with FMP principles when choosing pre- and post-field trip activities

3. Evaluate teachers' actual use of FMP principles in conjunction with their field trips to CWES

Assumptions of the Study

1. The population of teachers sampled in spring of 2010 is representative of the overall population of teachers visiting CWES each year.

2. The sampled population of teachers will respond to survey questions honestly.

3. The pilot test teachers will participate without biasing the study results (i.e., not behave differently than they would were they not participating in a study).

Limitations of the Study

1. This study is an evaluative case study and takes place at only one environmental education center: the Central Wisconsin Environmental Station. Because this study is limited to one environmental center, results from teacher surveys and pilot studies cannot be widely generalized. However, study methods are described in detail for other environmental education field trip venues interested in duplicating the study.

2. This study included only those teachers of the $5^{th} – 8^{th}$ grade range (middle school teachers). The researcher limited the study to middle school teachers because of the need to focus the design of educational materials, in a later phase of the research, on grade-range specific academic standards. This grade range provides the largest pool of prospective study participants: middle school teachers conducting field trips to CWES outnumber elementary and high school teachers conducting field trips to CWES. Additionally, it has been found that the potential for student learning during field trips is greatest within this grade range (Falk, 1983).

3. The redesign of pre- and post-visit materials was limited to two CWES lessons. CWES offers over 27 lessons suitable for the $5th – 8^{th}$ grade range. By limiting the redesign to two lessons, the researcher ensured her ability to pilot each of the two newly-designed pre- and post-visit activities in a reasonable timeframe.

4. All middle school teachers visiting CWES during the spring of 2010 were asked to participate in the study rather than selecting teachers at random. This purposive sampling was used to increase the number of teacher responses generated, but may cause data to less accurately reflect the year-round population of teachers visiting CWES.

5. Only two teachers volunteered to participate in pilot tests of activities. Both pilot study teachers were selected based on their willingness to participate. Therefore, their usage of pre- and post-field trip pilot materials cannot be widely generalized to demonstrate how all teachers visiting CWES might use those same materials.

However, their responses to materials were used to shed further light on data gathered from teacher surveys.

Definition of Terms and Abbreviations

Central Wisconsin Environmental Station (CWES) – An environmental education center operated by the University of Wisconsin-Stevens Point that is the focus of this case study. The center offers a variety of day-long and residential environmental field trips for school groups. The center's school programs are designed for specific grade ranges (elementary, middle and high school levels). CWES serves over 50 different schools, reaching over 3,000 students each year with its educational programs (CWES, 2009).

Emic perspective – The way that someone who participates in a phenomenon views that phenomenon (Gall, Gall, & Borg, 2003).

Etic perspective - The way that someone who does not participate in the phenomenon views that phenomenon (Gall, Gall, & Borg, 2003).

Field trip motivations – The reasons that drive teachers to organize and conduct field trips outside of the school setting. These motivations can be broadly placed into three categories:

> *Cognitive motivations* – Reasons related to educational opportunities afforded by the field trip (i.e. an alternative way of teaching content related to the curriculum; providing hands-on experiences; challenging students to apply learning in real-world situations) (Michie, 1998).

Affective motivations – Reasons related to positively shifting student attitudes towards subjects and encouraging positive student behaviors (Michie, 1998).

Social motivations – Reasons related to providing a positive and novel social experience (i.e. offering students with an escape from routine; allowing students and teachers to interact in an informal way; providing a fun experience that students enjoy) (Kisiel, 2005).

Framework for Museum Practice (FMP) – A set of four principles created by researchers DeWitt and Osborne (2007) to serve as a guide for the creation of field-trip materials by museum educators. The four principles upon which the FMP is based address both teacher and student needs in relation to the field trip. The framework was designed to maximize the impacts of the field trip on student learning. The framework was also designed to address practical concerns of teachers. The four main principles include: 1) Adopting the perspective of the teacher, 2) Providing structure, 3) Encouraging joint productive activity, and 4) Supporting dialogue, literacy and/or research skills.

Joint productive activity – Process of learning by which students work with one another and with their teacher towards an end product – the end product providing a clear purpose for each phase of learning (DeWitt & Osborne, 2007).

North American Association for Environmental Education (NAAEE) - A network of professionals, students, and volunteers working in the field of environmental education throughout North America and in over 55 countries around the world. NAAEE created "Environmental Education Materials: Guidelines for Excellence." First published in 1996, the guidelines help direct the creation and evaluation of environmental education

materials such as lesson plans and activity handbooks by providing six clearly-defined indicators of quality (NAAEE, 2004).

Nonformal education – Organized educational activities that take place outside of the established formal school system at venues such as nature centers, environmental stations, museums, aquariums, zoos and other institutions. Nonformal education programs, like formal education programs, are designed to meet specific learning objectives.

Novelty Effect – In the context of field trips, this effect refers to students' natural tendency to explore a new, unfamiliar environment before concentrating on educational concepts being taught in the new environment (Falk, 1983).

Pre-visit materials; pre-field trip materials – Materials designed by museums, environmental stations and other nonformal education venues for use by teachers in their classrooms before their visit.

Post-visit materials; post-field trip materials – Materials designed by museums, environmental stations and other nonformal education venues for use by teachers in their classrooms after their visit.

Importance of the Study

According to Laetsch, Diamond, Gottfried & Rosenfeld, twenty-million students in elementary and junior high grades take field trips to science centers, museums and other informal learning institutions each year (as cited in Kubota & Olstad, 1991, p. 225). These field trips may be able to positively affect students' learning and attitudes if students are prepared for them and allowed to reflect on them. Recognizing that teachers may not have the time to plan their own pre- and post-field trip activities, field trip venues that are interested in optimizing the field trip experience for teachers and students should design these materials and make them accessible to visiting school groups. By using a framework during the design process, educators can ensure they consider the educational needs of students and practical needs of teachers.

This case study seeks to evaluate the success of the Framework for Museum Practice in creating supporting materials for field trips to the Central Wisconsin Environmental Station. Though findings from the study are not generalizable, the study accomplishes two important things. First, the study provides a theoretical analysis of the framework's alignment with nationally-recognized standards for the creation of quality environmental education materials. Second, the study provides a methodology through which other environmental centers can evaluate the success of the framework in designing pre- and post- materials for their own field trips. In this way, findings will serve not only CWES itself, but may also serve other educators in their quest to design materials that support the needs of students and teachers on environmental field trips.

Chapter II: Literature Review

To help the reader understand the relevancy of the Framework for Museum Practice to environmental education field trips, this chapter examines literature related to the following topics:

- Designing Materials for Environmental Education

- Learning in the Context of Field Trips

- Designing Supporting Materials for Field Trips with Student Learning in Mind

- Designing Supporting Materials for Field Trips with Teachers' Needs in Mind

- An Answer from the Museum World: the Framework for Museum Practice (FMP)

Designing Materials for Environmental Education Program

Many resource guides and academic papers have been published on the subject of what considerations need to be made when designing environmental education materials and curriculum (Engleson & Yockers, 1994; Hungerford & Peyton, 1976; Hungerford, Peyton, & Wilke, 1980; Kyung-Ok Kim, 2003; Monroe & Cappaert, 1994; NAAEE, 2004; Ramsey, Hungerford & Volk, 1992). These resources focus on how to best integrate environmental education into existing school curriculum or how to create lesson objectives and activities that will encourage student development of environmental knowledge, awareness, attitudes and skills.

Of these resources, the North American Association for Environmental Education's *Environmental Education Materials: Guidelines for Excellence* (2004) is one of the most widely distributed. First published in 1996 to help standardize the creation of quality environmental education materials, the guidelines contain six criteria. NAAEE

encourages educators to design lesson plans and activities with these six criteria in mind. Additionally, NAAEE encourages teachers to consider the six criteria when deciding which materials to use in their classrooms. The six criteria are summarized in the following table.

Table 2.1 NAAEE's Guidelines for Excellence in Environmental Education Materials

Guideline	Description of Criteria for Good Quality Materials
Fairness and Accuracy	Materials should be fair and accurate in describing environmental problems, issues and conditions, and in reflecting the diversity of perspectives on them.
Depth	Materials should foster awareness of the natural and built environment, an understanding of environmental education concepts, conditions, and issues, and an awareness of the feelings, values, attitudes, and perceptions at the heart of environmental issues, as appropriate for different developmental levels.
Emphasis on Skills Building	Materials should build lifelong skills that enable learners to address environmental issues.
Action Orientation	Materials should promote civic responsibility. They should encourage leaders to use their knowledge, personal skills, and assessment of environmental problems and issues as a basis for environmental problem solving and action.
Instructional soundness	Materials should rely on instructional techniques that create an effective learning environment.
Usability	Materials should be well designed and easy to use.

Though NAAEE's guidelines are comprehensive in their coverage of designing environmental education materials, they do not fully address an important component of learning: context. If one designs an environmental education activity, that activity might be used in the classroom, in the schoolyard, on a field trip, or at a student's home. All of these contexts provide a different setting for learning that will directly affect how, and to

what extent, the learning takes place. Falk (1983) wrote, "The key to ensuring that students will benefit from field trips is to realize that settings do have an effect on learning. Armed with this realization, we can at least begin to think of making the place where learning occurs a functional part of our instructional repertoire," (pg. 141.) Therefore, it is important to understand how one should modify the design criteria for environmental education materials when the materials are to be used for field trip-related learning.

Learning in the Context of Field Trips

Much of the literature related to field trip learning shows that learning on a field trip can, indeed, produce different results than learning in a classroom. Koran, Koran & Ellis (1989) examined field trip literature and found positive outcomes, both cognitive and/or affective, on students in 20 of the 27 studies reviewed. Below are some of the positive effects of field trips that have been noted.

Positive effects on student cognition – Children that go on field trips as part of their educational experience show statistically significant learning about the field trip subject (Lisowski & Disinger, 1991). What's more, based on pre- and post-test measures, children exhibit more knowledge about a subject if they learn about the subject on a field trip instead of learning about the subject in a classroom (Flexer & Borun, 1984; MacKenzie & White, 1982; Wendling & Wuensch, 1985). Not only do students seem to learn more during field trips, but they expect to learn more during field trips. According to pre-field trip surveys with 5th grade students, 98% felt they could learn more about ecology through a field trip than by classroom study alone (Wendling & Wuensch, 1985).

Positive effects on student attitudes towards learning – Serveral studies suggest that students enjoy learning on field trips (Hannon & Randolph, 1999; Michie, 1998; Price & Hein, 1991; Wendling & Wuensch, 1985). In Wendling and Wuensch's study (1985), students even enjoyed learning on their field trip more than socializing. When asked to pick their favorite parts of a field trip taken to a park, the students identified educational activities such as "casting animal tracks" and "studying the food web of the pond", more often than they identified social aspects likes "getting to play a game" or "getting to know their classmates better". Still other studies suggest that students not only find learning fun on their field trips, but they enjoy field trip lessons more than they enjoy lessons taught on the same subject in a classroom (Braund & Reiss, 2006; Falk, 1983; Flexer & Borun, 1984).

Following from these conclusions, it is not surprising that researchers have also found field trips improve student attitudes towards subjects they are learning (Michie, 1998; Storsdieck, 2001). This is consistent with findings in the field of "brain-based" education. Brain-based education examines physiological properties of the brain and how they affect human learning. When students feel positively about their learning environment, endorphins (a hormone associated with increased energy) are released in the brain. When students feel negatively about their learning environment, cortisol (a hormone associated with stress) is released in the brain. Whereas endorphins produce a feeling of euphoria and stimulate the frontal lobes of the brain responsible for learning, cortisol reduces frontal lobe activity to focus on the cause of stress and how to deal with it (Sousa, 2006).

Long-term positive effects on learning – Though few studies have examined the long-term effects of field trips on learning, researchers have found some positive results. In a study of 3rd and 5th graders, both age levels were able to retain significant amounts of content as long as one month after their field trip (Falk & Balling, 1982 as cited in Falk, 1983.) In a study of 8th and 9th graders, MacKenzie and White (1982) found that those students participating in a geography field trip retained information better twelve weeks after the trip than those that did not participate in the trip. Finally, in a phenomenological analysis of 4th graders a year after their field trip to Great Smoky Mountains National Park, in-depth interviews revealed positive long-term retention of information taught on the field trip and a perceived increase in pro-environmental attitudes by the students (Farmer, Knapp & Benton, 2007).

Designing Supporting Materials for Field Trips with Student Learning in Mind

Though positive impacts of field trips on students are well documented, a cautionary note should accompany reports on these impacts. Not all field trips maximize learning potential equally. In fact, if not planned well, a field trip can become little more than a distracting trip away from school for students and their teachers (Athman & Monroe, 2008; Orion, 1993). The question is, "How can one best maximize potential for student learning on field trips?"

Field trips as three-part units

"A field trip should be a learning experience. This criterion may seem trivial, but in reality, most field trips can be summarized as adventure-social events. In order to make the field trip more educational, a teacher should develop learning materials that both prepare students for the trip as well as guide them through it."

- Orion (1993), pg 326

Many researchers agree that the field trip is more educationally beneficial for students when implemented as a three-part learning unit (Bitgood, 1989; EETAP, 1998; Orion, 1993; Storsdieck, 2006). The learning component of field trips should begin with pre-activities to help direct student attention toward the focus of their visit. Pre-activities should be followed by the field trip itself. Finally, the field trip should be followed by post-activities to reinforce and reflect upon concepts learned on the field trip.

Pre-field trip activities – When students go on a field trip, they are not only exposed to new information, but they are also placed in a different environment in which to learn the new information. A field trip venue that is unfamiliar to students can lead to what is termed the "novelty effect". Falk (1983) explained this effect as students' natural tendency to explore a new, unfamiliar environment before concentrating on educational concepts being taught. Falk also noted that, of many variables affecting field trips, novelty of the setting proved to be one of the most interesting and consistently important variables. Children who are unfamiliar with a place may lack pre-existing knowledge upon which they can base and contextualize new learning. As a result, these unfamiliar learners may first need to explore and situate themselves in the environment before they can construct new meanings (Falk, Martin, & Balling, 1978).

Numerous studies attest to the fact that preparation of students for field trips is positive (Cox-Peterson & Pfaffinger, 1998; de White and Jacobson, 1994; Falk, Martin, & Balling, 1978; Flexer & Borun, 1984; Gennaro, 1981; Kubota & Olstad, 1991). Preparation can include pre-field trip activities that introduce field trip concepts and vocabulary in the classroom. Preparation can also include sharing logistical information with students such as their schedules, a map of the site, what they should bring, and what

they can expect the day of the field trip. Both forms of preparation can reduce the novelty of the new environment in which the field trip takes place (Orion & Hofstein, 1994).

By orienting students prior to their field trip, learning associated with the field trip is positively affected. When students are more familiar with an environment, it results in increased on-task behavior (Kubota & Olstad, 1991) and in increased student learning as measured by pre- and post-tests (Falk, Martin, & Balling, 1978; Flexer & Borun, 1984; Gennaro, 1981). As one researcher argued, pre-visit activities ensure the field trip is worth the money paid for the experience, "Since the pre-visit experiences may represent little cost to a school district, the value of going on such a field trip can more easily be made if students are prepared beforehand," (Gennaro, 1981, pg 278).

In addition to reducing the novelty effect, teachers can use their pre-visit activities to clarify what students will be expected to do as follow-up (Athman and Monroe 2008; EETAP, 1998; Rennie & McClafferty, 1996). By providing the expectation for further classroom learning related to the field trip in advance, students are aware of their responsibilities and how the trip connects to what they will be discussing in school.

Post-field trip activities – Whereas pre-field trip activities are generally recommended to help reduce the novelty effect, post-field trip activities also play an important role in student learning related to field trips. Researchers argue that post-visit activities provide crucial opportunities for students to reflect on what they learned (Anderson, Lucas, Ginns & Dierking, 2000; Assraf & Orion, 2009; Athman & Monroe, 2008; deWhite & Jacobson, 1994; Farmer & Wott, 1995; Rennie & McCafferty, 1996). Though many researchers argue for the importance of post-visit activities, the literature specifically studying effects of post-visit activities is much more limited than that

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examining effects related to pre-visit activities. Those studies that have been published support the idea that post-field trip activities positively affect student learning.

For example, in a study of how eleven and twelve year olds construct knowledge in the context of a field trip, researchers found that students who were able to reflect on their learning exhibited complex learning related to their trip. This result was interpreted by comparing concept maps drawn by students before their trip and after post-trip activities. Students that participated in post-trip activities in their classroom were able to draw many connections between components on concept maps describing the ideas of electricity and magnetism studied during their trip to a science center, whereas they had not been able to draw these associations before the trip (Anderson, Lucas, Ginns & Dierking, 2000).

In addition to encouraging complex learning, post-field trip activities might also contribute to increased retention of field trip learning. In a study conducted by Farmer and Wott (1995), the researchers found a statistically significant increase in post-test scores of 4th graders that participated in relevant post-field trip activities as compared to 4th graders that participated in non-relevant post-field trip activities.

Though more research should be conducted to look at effects of post-visit activities on field trip learning, the studies mentioned above agree with learning theories of brain-based education. The field of brain-based education advocates for the necessity of giving students time to reflect on their learning in order to improve retention of what was learned. According to Sousa (2006), retention is the process whereby long-term memory preserves learning in such a way that it can locate, identify and retrieve it accurately in the future. Sousa argues that retention relies on rehearsal (the repetition and

processing of information). He states, "If the learner cannot attach sense or meaning [to what was learned], and if there is no time for further processing, then the new information is likely to be lost. Providing sufficient time to go beyond the initial processing to secondary rehearsal allows the learner to review the information, to make sense of it, to elaborate on the details, and to assign values and relevance, thus increasing significantly the chance of long-term storage," (pg 87.) According to this view, field trips that are followed by post-field trip activities may be more successful than field trips with no follow-up in encouraging long-term student learning related to the trip.

Field trip activities – Since the focus of this study is on better connecting the field trip to the classroom, the field trip as a phenomenon itself will not be discussed in great detail. There is a fair amount of literature revolving around best practices for field trip experiences (meaning just those experiences that occur away from school on the day of the field trip). A portion of this literature was written by researchers investigating "best practices" for field trips to museum, aquarium, science center and planetarium settings (*see* Bitgood, 1989; Griffin, 1994; Koran, Koran & Ellis, 1989; Price & Hein, 1991; Robertson, 2006). Another portion of literature also exists for best practices in environmental field days and outdoor learning in general (*see* Assaraf & Orion, 2009; Braund & Resiss, 2006; Carlson, 2008; Orion,1993; Storksdieck, 2006). Though these studies touch upon the necessity of connecting field trips to the curriculum, concrete frameworks for how to prepare for a field trip and how to follow up with a field trip are not provided. Hence, the gap in field trip research is not so much a lack of suggestions, but a lack of structured principles that one should consider when designing resources to help connect field trip learning and classroom learning.

One recent study by DeWitt and Osborne (2007) does provide a framework through which design of activities may best be approached. The research in this study is, in part, based upon DeWitt and Osborne's framework, and it will be discussed in detail at the end of this literature review.

Designing Supporting Materials for Field with Teachers' Needs in Mind

Teachers make the ultimate decision of whether or not to use pre- and post-field trip materials in their classrooms. If these materials do not meet their needs, teachers will not use the materials, and students will not reap the benefits that these materials could provide. Therefore, it is important to understand the needs of teachers and to ensure that pre- and post-field trip activities meet those needs.

Teacher Motivations for Taking Field Trips – Teachers recognize various motivations for taking their students on field trips. These motivations can broadly be categorized as cognitive, affective, and social. Teachers who view the field trip as a learning opportunity express cognitive motivations. Teachers who view the field trip as a way to excite their students about learning express affective motivations. Finally, teachers that view the field trip as an enjoyable outing or a way to increase personal connections between students express social motivations. There is also a very small percentage of teachers who feel obligated to take field trips by their school rather than having any motivation to do so themselves (Kisiel, 2005). Usually, teachers express more than one motivation for taking their field trip. And, usually, their motivations fall under more than just one category (Anderson & Zhang, 2003; Cox-Peterson & Pfaffinger, 1998; Kisiel, 2005; Michie, 1998; Rebar, 2009; Storsdieck, 2006). Table 2.2 summarizes findings from these studies.

Table 2.2 Teachers' motivations for taking field trips

Researcher(s) and Year	Cognitive Motivations	Affective Motivations	Social Motivations
Anderson & Zhang (2003)	- Curriculum fit		- Amount of enjoyment
Cox-Peterson &Pfaffinger (1998)	- Provide hands-on experiences for students		- Allow students to enjoy the experience
Gregg (1993)	- Classroom correlation - hands-on experience	- unique setting can "turn students around"	
Kisiel (2005)	- Connect with the classroom curriculum - Provide a general learning experience - Encourage lifelong learning	- Enhance interest and motivation - Provide exposure to new experiences	- Provide a change in setting and routine - For enjoyment
Michie (1998)	- Hands-on experiences to augment classroom learning	- Improve students' attitudes toward subject matter	
Rebar (2009)	- Provide a memorable learning experience - Promote lifelong learning - Go to a place where the subject(s) relate to the curriculum	- Expose students to new experiences - Foster student interest and motivation for the subject	
Storsdieck (2006)	- Increase teaching effectiveness - Relate to classroom curriculum - Provide better visualization of concepts	- Unusual perspective/new experience for students - Motivate students for the topic	- For entertainment only - For "edutainment" (entertainment with an educational component)

Each of the studies in Table 2.2 found at least a portion of teachers within the sample population that expressed cognitive motivations. These studies suggest that many

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teachers think of field trips as learning opportunities, and most teachers agree upon the importance of connecting field trip learning to the curriculum. Despite these educational motivations, a review of the literature shows that teachers often do not have a plan for how to connect field trip learning to classroom learning, or are unable to carry out connecting activities due to various barriers (*see* Anderson & Zhang, 2003; Cox-Peterson & Pfaffinger, 1998; Griffin, 1994; Hannon & Randolph, 1999; Kisiel, 2005; Michie, 1998; Orion, 1993; Storsdieck, 2006; Roberston, 2006; Xanthoudaki, 1998).

Disconnect Between Field Trip and Classroom Learning – When studying the connection between field trip and classroom learning, Griffin (1994) conducted interviews with 114 teachers and students from 13 different schools visiting two different science museums. She found that the vast majority of teachers did not provide the type of preparation or follow-up that would allow students to link learning on the field trip to learning in the classroom. In terms of pre-field trip activities, both teachers and students acknowledged that little to no preparation had occurred before the trip. According to Griffin, "Very few students could see the purpose of their visit other than a day out, or at best 'to learn things', but with no clear idea of what these 'things' were," (Griffin, 1994, pg123). Prior to their field trips, most teachers acknowledged that they had little plans to follow up on field trip learning. At the same time, students acknowledged that they had little expectations for follow-up to be conducted. After conducting their field trips, more than 75% of teachers admitted that little or no actual follow up occurred; and 90% of the students stated that little or no follow-up actually occurred.

Similarly, Storsdieck (2001) found little preparation and follow-up related to school field trips to a planetarium. In terms of preparation, only 14 of 35 teachers (40%)

remembered covering relevant topics related to the field trip prior to their visit to a planetarium. In terms of follow-up, only 85 of 246 students (35%) remembered any follow-up to their planetarium visit occurring in their classroom. Although 76% of teachers said they conducted follow-up to the field trip, when asked to describe what the follow-up consisted of, answers from teacher to teacher varied greatly. Only 30% of teachers actually discussed content learned on the field trip while 23% of teachers just asked students for their impressions. The other 46% of teachers considered their follow up to the field trip as making reference to the field trip at some point later in the curriculum. From these responses, Storsdieck concluded that the attitude of teachers, in general, was to focus on organizing the trip rather than providing curricular links.

In contrast to Griffin's findings and Storsdieck's findings, Rebar (2009) found that most visiting teachers to an aquarium did follow up their field trip experiences. What's more, Rebar found that teachers followed-up on the trip with activities (such as student research projects or writing assignments) that would encourage students to reflect on field trip learning and make connections to their classroom learning. Rebar noted that follow-up activities may occur much later in the year as teachers refer back to the trip each time a unit arises in which trip experiences become relevant. However, he interpreted evidence from observations of teachers at the aquarium to show that connections drawn during the trip by teachers were opportunistic and not planned. His evidence also supported that fact that teachers viewed the field trip as a way to provide background information to relevant units rather than integrating field-trip learning strategically with classroom learning.

Barriers to connecting field trip and classroom learning – Why is it that teachers expressing cognitive motivations for taking their field trip aren't often using pre- and post-field trip activities to help their students achieve optimal learning in relation to their field trip? Could it be that teachers' biggest motivations are actually not cognitive, but instead are affective or social? Or, is it because of multiple types of barriers that prevent teachers from fully realizing ideal practices related to field trip learning?

Some research suggests that teachers may place more importance on affective and social field trip outcomes though they profess that their motivations are mostly cognitive. Kisiel (2005) found that though 90% of teachers in his study chose curricular connections as their biggest motivation behind taking field trips, when asked to define what makes a field trip "successful" only 23% suggested that seeing students make curricular connections was a sign that the field trip was successful. Mayger (2007) similarly writes that though post-visit activities are crucial for students to make sense of what they have learned cognitively, most common follow-up activities are affective in nature and revolve around discussions about what students enjoyed. In a similar vein, Cox-Peterson & Pfaffinger (1998) noted that only one of eleven teachers interviewed during their study planned to delve deeper into the subject matter encountered during their field trip when students returned to school.

Though alternative field trip motives may play a small part in why pre- and post-field trip activities are not used by teachers, it seems a much larger part is due to various barriers that inhibit the use of such activities by teachers despite their best intentions. In a study by Storsdieck (2001), the majority of teachers admitted to not preparing for or following up on their visit to a planetarium. However, when the same teachers were

asked what they would recommend other visiting teachers do before taking the planetarium field trip, almost all agreed that teachers should provide some form of content preparation. Additionally, these teachers recommended that other teachers should use follow-up activities. Most teachers admitted the field trip could have been better with more preparation and follow up, but that they felt their curriculum did not allow them to spend more time on field trip preparation and follow up. Many of them suggested they might have done more if provided with better teaching materials from the planetarium. These two findings: that teachers feel they do not have enough time and that they feel the field trip venue should provide teaching materials are significant because they reoccur in similar studies addressing field trip preparation and follow-up.

Lack of time is a significant barrier – The most common barrier to using pre- and post-field trip activities that has been noted in the literature is lack of time (Cox-Peterson & Pfaffinger, 1998; Hannon & Randolph, 1999; Kisiel, 2005; Michie, 1998; Roberston, 2006; Storsdieck, 2001; Xanthoudaki, 1998). This is not surprising, considering that lack of time is also a barrier mentioned in the literature for teachers carrying out field trips in general (Michie, 1998; Meichtry & Harrell, 2002; Orion, 1993) and a barrier for carrying out any form of environmental education (Assaraf & Orion, 2009; Ernst, 2007; Sewing as cited in Ham, Rellergert-Taylor, and Krumpe, 1988). Field trips entail an enormous amount of logistical planning on the part of the teacher and require that students leave the school setting (requiring additional time for travel to and from the field trip venue). Time must be devoted to logistical aspects of the field trip, as it must also be devoted to planning activities that link classroom and field trip learning. Many teachers simply do not have enough time to concentrate on both. Furthermore,

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because of the pressures placed on teachers to cover materials that will be appear on standardized tests (almost exclusively math and English) environmental education becomes a peripheral consideration in many classrooms, and planning field trips around environmental education becomes something that most teachers cannot devote their attention to without feeling they are abandoning areas in their curriculum that students will be tested on (Kisiel, 2005; Robertson, 2006).

Recommendation that field trip venues provide teachers with materials – Recognizing that the most common barrier to integrating classroom and field trip learning is the lack of teacher's time, some researchers suggest that field trip venues provide pre- and post- field trip materials (Anderson, Kisiel, and Storsdieck, 2006; Cox-Peterson & Pfaffinger, 1998; Kisiel, 2005; Michie, 1998). By doing so, venues can remove a portion of the time burden teachers experience when planning for field trips. Simultaneously, by giving teachers pre-planned ways to introduce and follow-up on field trip lessons, field trip venues can encourage strategies that will maximize opportunities for learning during the field trip. Finally, by providing these resources, field trip venues are meeting the expectations by some teachers that they will be provided with pre-designed activities that help link museum and classroom learning (Anderson & Zhang, 2003).

An Answer from the Museum World: the Framework for Museum Practice (FMP)

Understanding that teachers have many other pedagogical responsibilities, it is logical that field trip venues should make every effort to assist teachers by providing them with activities they can use in their classrooms to connect school and field trip learning. These materials should respond to both students' educational needs and teacher's practical needs. Though the field of environmental education has looked at best

practices for field trips, the literature lacks a formal framework that field trip venue staff can use to design materials with both the needs of teachers and students in mind. However, though environmental education venues have no formal frameworks to this end, the museum world does. In 2007, two researchers created the Framework for Museum practice or "FMP" to help museum educators design field trips materials from the teacher's perspective that creates optimal learning conditions for students (DeWitt & Osborne, 2007).

The FMP was derived from perspectives of Cultural Historical Activity Theory, theories of intrinsic motivation, and research into conceptual learning. Cultural Historical Activity Theory recognizes that teachers and museum educators teach in different contexts and that any material designed by museum educators should address the context and needs of the teacher if it is to be utile to teachers (DeWitt & Osborne, 2007). The FMP is based on four principles: 1) Adopting the perspective of the teacher, 2) Providing structure, 3) Encouraging joint productive activity, and 4) Supporting dialogue, literacy and/or research skills. According to DeWitt and Osborne's research, if these principles are addressed during the creation of field trip materials, teachers will find the materials useful and the materials will help maximize the impacts of the field trip on student learning.

Principle 1: Adopting the perspective of the teacher

"…the teacher's perceived needs for resources, his or her agenda or goals for the school trip, and the context in which he or she operates should be a primary consideration in the development of resources for school trips."

- DeWitt & Osborne (2007), pg 689

In Principle 1 of the FMP, DeWitt and Osborne stress that museum educators should take into account the needs of teachers when designing field trip support materials. As noted in this literature review, two of those major needs are minimizing amount of time teachers need to spend on field trip preparation and maximizing the links between field trip learning and the classroom curriculum.

Principle 2: Providing structure – In Principle 2 of the FMP, DeWitt and Osborne advocate that designers of field trip materials provide pre-visit activities to help reduce the "novelty effect" of the field trip. They also encourage designers to provide post-visit activities that build upon content encountered during the field trip. This manner of looking at the field trip as a three-part unit was detailed in the literature review above, and has much support from other researchers (Athman & Monroe , 2008; Bitgood, 1989; Falk, 1983; Orion, 1993; Orion & Hofstein, 1994; Rebar, 2009; Storksdieck, 2006; Xanthoudaki,1998). By providing a unit-like structure to the field trip, the trip has a focus and teachers may be more likely to treat pre- and post-visit activities as part of the whole unit rather than separate activities that require additional time.

Principle 3: Encouraging joint productive activity – In Principle 3 of the FMP, DeWitt & Osborne argue for the need of students to understand a clear purpose for the field trip and for them to work together with each other and the teacher towards some end product. They term this principle, "encouraging joint productive activity." More specifically, DeWitt and Osborne provide the following sub-guidelines for encouraging joint productive activity. Materials should:

- o Encourage discussion between students, their peers, and their teacher to build knowledge related to the field trip
- o Allow students to pursue their own interests and curiosity to the extent possible
- o Provide students with choices and control over their participation in activities
- o Challenge students to extend their thinking beyond rote activities
- o Draw students in by making experiences personally relevant and meaningful

Other field trip studies in contexts outside of museums support these techniques for engaging students. For example, Griffin (1994) supports the need to let students ask questions about that which they are curious for learning at informal science centers, while Assraf & Orion (2009) and Storsdieck (2006) argue that environmental lessons occurring on field trips and outings need to pertain to something familiar in students' lives. Research has found increases in critical thinking skills, positive attitudes towards learning (Ernst & Monroe, 2004) as well as increased retention of learning (Mackenzie & White, 1982) for students whose field trips allowed them to have control and be challenged.

In addition to research that supports DeWitt & Osborne's sub-principles for optimizing student learning on field trips, these sub-principles seem to be supported by students themselves. In a study by Spector & Gibson (1991), students were asked how they felt they learned best. Several themes emerged from student answers including: doing hands-on activities; being active learners; using inductive reasoning to generate new knowledge; interacting with peers and adults; creating networks; and experiencing a

sense of self-reliance. These themes seem to support the desire of students for "joint productive activity" as defined by DeWitt & Osborne.

Principle 4: Supporting dialogue, literacy and/or research skills – The final principle of the FMP asks that designers of field trip materials consider skills beyond those directly related to field trip content. Transferable skills such as oral and written literacy, public speaking, and methods of inquiry are just as valuable for students. The new national Common Core Standards – adopted by 42 states in the U.S. at the time of this writing – include standards related to each of these skills (CCSSI, 2010). By including these skills, field trip learning has an even better chance of relating back to what is going on in the classroom.

Summary

Field trips provide numerous positive impacts on student learning and attitudes in both short- and longer-term time frames. However, not all field trips provide these benefits equally. Researchers argue that, without proper links to school curriculum, a field trip serves as little more than a distracting day away from school.

In terms of environmental education, though many resources are available to guide the development of quality materials and curriculum, most of these resources are not specific to the learning contexts of field trips. Because of the unique environment of the field trip, students may be distracted by the "novelty" of the trip and may be less able to concentrate on learning until they develop a degree of familiarity with their new learning context. Additionally, without follow-up in the classroom, students may have a lower chance of experiencing complex learning related to their trip and less of a

probability of retaining information learned on their trip. Any materials developed to help support student learning on field trips should take these factors into account.

In addition to considering how best to design materials that support student learning related to field trips, those who develop such materials should also be concerned with supporting the needs of teachers. Ultimately, teachers will decide whether or not to use materials that prepare for and follow-up on their field trip. If those materials do not meet their needs, teachers are not likely to use them. Field trip venues should be particularly aware of the pressures of time and curriculum on teachers when developing materials.

By creating the Framework for Museum Practice (FMP), researchers DeWitt and Osborne (2007) provided museum educators with a clear set of guidelines to follow when designing materials that support field trips to their sites. These guidelines address both the educational needs of students and the practical needs of teachers. Environmental educators at nature centers and other nonformal learning institutions lack a similar framework to guide their design of field trips materials. However, environmental educators may not have to start from scratch: the FMP shows promise as a tool not only for museum educators, but also for educators from other institutions (nature centers, zoos, and aquariums) as well.

Chapter III: Methodology

The researcher integrated methods within an evaluative, case study approach. During the research, methods evolved and changed to ensure collection of the richest data possible – a process recommended in the naturalistic inquiry methods framework (Lincoln & Guba, 1985). Surveys, observations, and interviews were used to collect both quantitative and qualitative data. Additionally, document analysis was used. The use of multiple methods provided an opportunity to triangulate data and focused on correlational validity, or the degree to which findings obtained by one method correlate with findings obtained by another method, and thus, justify their suitability (Krippendorf, 1980, p. 157). The following chapter details the research design.

Research Design - Evaluative Case Study

A case study is an in-depth study of instances of phenomenon in their natural context and from the perspectives of the participants involved in the phenomenon (Gall, Gall & Borg, 2003). According to this definition, a case study has four properties.

First, in a case study, the researcher focuses on a specific instance, otherwise known as a "case" of the phenomenon she has chosen to research. In this study, the researcher was concerned with whether a framework designed for museums could be used by environmental education centers to design pre- and post-field trip materials that teachers are likely to use in their classrooms. A single case – the Central Wisconsin Environmental Center (CWES) – was chosen for study. The researcher chose not to pursue a multi-case design because of time-constraints and difficulty in gaining entry to other sites similar to, but geographically far, from CWES. Additionally, it has been

argued that the study of multiple cases reduces the attention that can be given to any one of them, and thus serves to weaken rather than strengthen the study (Wolcott, 1992). Wolcott, who argued this point of view, expresses a strong preference for studying just one case in depth, especially when the researcher has less experience with case study research.

The second property of case studies is that each case must be studied in-depth. Because the phenomenon being studied has many aspects, the researcher needs to select a focus for investigation that can be examined thoroughly. In this study, the focus is on determining whether characteristics of pre- and post- materials designed using the Framework for Museum Practice are aligned with what teachers are currently doing or are interested in doing in their classrooms to prepare for and follow up with environmental education field trips.

A third property of case studies is that the research phenomenon should be studied in its natural context. To do so, the researcher interacts with study participants in their own natural settings. In this study, the researcher engaged visiting teachers through surveys administered during their field trips, observations in their classrooms prior to and following their field trips, and in-depth interviews following post-field trip activities in their schools.

Finally, case studies are based on emic perspectives. An emic perspective is the way that someone who participates in a phenomenon views that phenomenon (in this case, how teachers visiting CWES view the usefulness of pre- and post-field trip materials designed using the FMP). This is opposed to the etic perspective, which is the way that someone who does not participate in the phenomenon views that phenomenon (i.e. how

the researcher views the usefulness of pre- and post-field trip materials designed using the FMP). It should be noted that although the case study seeks to develop an understanding of phenomenon from the emic perspective, the etic perspective can also be included in case study reports. The etic perspective helps to make conceptual and theoretical sense of the case, and to report the findings in a way that clarifies the research's contribution to a wider body of research (Gall, Gall & Borg, 2003).

Methods

The researcher collected data on three subproblems to evaluate the utility of the Framework for Museum Practice (FMP) in the theoretical context of environmental education and to evaluate its utility for designing materials that teachers feel best support their field trips to CWES. The three subproblems were:

1) How well aligned is the Framework for Museum Practice (FMP) to nationally-recognized evaluation criteria for designing quality environmental education materials?

2) How theoretically important is it to teachers visiting CWES that FMP principles be included in pre- and post-field trip activities?

3) How do teachers use FMP principles in conjunction with their field trips to CWES?

Subproblem 1: *How well aligned is the Framework for Museum Practice (FMP) to nationally-recognized evaluation criteria for designing quality environmental education materials?*

Subproblem 1 Data Sources – The researcher chose the <u>NAAEE Guidelines for Excellence</u> to represent the environmental education context under which the FMP was examined. The guidelines themselves are nationally-recognized and are grounded in a common understanding of effective environmental education that was defined by two of the field's founding documents: the *Belgrade Charter* (UNESCO-UNEP, 1976) and the *Tbilisi Declaration* (UNESCO, 1978). Additionally, extensive collaboration occurred between diverse players in the environmental education field during the process of creating and refining the guidelines. Over 1,000 practitioners and scholars in the field (including curriculum developers, educational administrators, environmental education specialists and environmental scientists) reviewed the document (NAAEE, 2004).

Subproblem 1 Data Collection and Analysis – To determine if the Framework for Museum practice fits theoretically into the environmental education context, the researcher conducted conceptual content analysis of the two documents using the coding steps defined by Carley (1993).

Creating a coding scheme: The researcher created a coding scheme using the guidelines within the <u>NAAEE Environmental Education Materials: Guidelines for Excellence</u> (2004). Each of the guidelines became a category or "indicator of quality" for EE materials. That category was defined by *in vivo* coding - a process in which words

and phrases from the text itself are used to articulate codes and categories. This pre-defined coding scheme was then used to code the FMP.

Defining the level of analysis: The researcher discarded "irrelevant information" prior to coding. Carley (1993) defines irrelevant information as anything that does not deal with the research concern. In this study, only the text that defined each of the four FMP principles (found on pages 689 – 691 of the document) was coded. Text that was included in other sections of the document (the abstract, the methods of the study, etc.) was not coded. Once irrelevant information was discarded, the researcher coded each of the remaining sentences of the FMP separately.

Defining the level of implications: During the coding process, the researcher coded based on similar ideas rather than similar wording. If the researcher found a sentence that met the criteria of a particular category's definition but did not contain identical wording to the category's definition, it was still coded under that category. For example, if a category's definition included "materials are centered on learners' interests and concerns" and a sentence from the FMP mentioned "allowing students to pursue their own interests" then the sentence met the criteria for the category despite not being identically worded. Though this level of implication makes automated coding unusable, it allows the researcher to compare texts to one another based on shared meaning (Carley, 1993).

Existence or frequency: The researcher's main concern was the existence of categories, rather than the frequency at which they appeared. Coding that uses frequency-based comparisons is typically concerned with the emphasis placed on certain categories over others (Carley, 1993). However, this researcher's primary purpose in coding was

simply to determine theoretical alignment of one document (and the ideas behind it) to another.

Validity and reliability: Krippendorff (1980) addresses the validity and reliability of content analysis. He states that a content analyst must make his results validatable, by defining, "…in unambiguous terms the kind of evidence that would demonstrate the validity or invalidity of the inferences he [the researcher] wishes to make." (pg 171). In this case, the researcher posits that the alignment of the Framework for Museum Practice with the environmental education context can be determined by comparing the FMP's contents to those of the NAAEE's nationally-recognized standards for environmental education materials. If the FMP demonstrates instances of the guidelines found in the NAAEE's Guidelines for Excellence, the researcher will infer that the FMP fits well theoretically into the environmental education context.

Reliability of content analysis must also be determined. Replicability of a study can help determine reliability (Weber, 1990.) Replicability refers to the ability of other researchers to apply the same technique to the same data, and achieve the same results. To ensure replicability of this content analysis, a second researcher was given the coding scheme with categories and their definitions. The second researcher, Dr. Dennis Yockers, Professor of Human Dimensions of Natural Resource Management at the University of Wisconsin – Stevens Point, was trained in the protocol and reviewed the coding scheme with the researcher. Afterwards, each researcher independently analyzed the Framework for Museum Practice for instances of the NAAEE's six guidelines and compared results.

Subproblem 2: *How theoretically important is it to teachers visiting CWES that FMP principles are included in pre- and post-field trip activities?*

Subproblem 2 Initial Data Sources – The planned sources of data for this subproblem included teachers that visited CWES on field trips during the 2009 – 2010 school year. The teachers either came to CWES for a day trip, or they stayed overnight during a one, two, or three-day residential program. As mentioned in the limitations of the study, the population of teachers included only those teachers that taught either the 5th, 6th, 7th or 8th grade levels, or some combination of these grades. Due to low participation, the sample population changed after the initial survey attempt in fall 2009 (see *Revised Data Sources* on the following page).

Subproblem 2 Planned Data Collection Procedures – The researcher developed a short online form to survey visiting teachers about their usage of pre- and post-field trip activities; motivations for and barriers to using the activities; and their opinions about ways to improve the activities. An online survey was used because of teachers' familiarity with other CWES online forms by which they specify meal and lesson preferences for their field trips.

As suggested by Gall, Gall & Borg (2003), the survey included closed- and open-question types to yield both quantitative and qualitative data – the former for the purpose of providing an overview of teacher responses, the latter for providing the emic perspective. The online survey was pilot-tested by eight professionals ranging in age from 25 – 63. None of the teachers visiting CWES (a clear limitation to accuracy of survey responses involved) were used in the pilot test because of the desire to ensure a

larger number of survey participants that would provide a well-rounded picture of the case in this study.

The initial survey invitation was sent to each of the teachers listed as points of contact for organizing their school's field trip to CWES during that semester (n = 17) on November 18, 2009. The researcher coordinated with the CWES Program Manager – the main liaison between school groups and CWES – to send the invitation to teachers via an email from his email address because of their pre-existing relationship with him. The invitation provided a link to the survey form on the CWES website. The email encouraged teachers to fill out the form and also forward the email to other teachers whose classes had participated in the CWES field trip. Additionally, the survey contained one question that did not ask about pre- and post-field trip activities, but instead attempted to recruit teachers for phone interviews (to provide more in-depth responses to the online survey's questions).

The researcher planned to repeat this email invitation at the end of Spring 2010 to collect data from teachers visiting CWES during that semester. However, this method was also changed after the initial survey attempt due to low participation (see *Revised Data Collection Procedures).* Lincoln & Guba (1985) argue that, when conducting naturalistic inquiry, methods can and should evolve as the study is conducted. They state, "…what emerges as a function of the interaction between inquirer and phenomenon is largely unpredictable in advance" (pg 41). They warn that "steps" to carrying out naturalistic inquiry must be adaptable. "Review, recycling, and change must be central postures. The design, in the final analysis, does truly emerge," (pg 249).

Subproblem 2 Revised Data Sources – The final population of teachers used for data collection related to subproblem 2 included teachers of the 5th – 8th grade range that visited CWES on field trips during Spring 2010. As suggested by Lincoln & Guba (1985), when conducting naturalistic inquiry, sample populations are not random. Populations are purposive and strive to increase the scope or range of data exposed. To ensure that the full array of multiple realities is uncovered, methods must be devised to ensure a hearty amount of data from the broadest spectrum of participants. Therefore, all teachers, rather than a random selection, were asked to participate.

Subproblem 2 Revised Data Collection Procedures – The researcher redesigned the survey – changing it from its online format into a paper format and rewriting some of the questions based on responses to the initial survey that indicated misunderstanding of the questions. The second version of the survey also included both open- and closed-ended questions, as well as questions using a Likert scale. This survey was reviewed and revised by Janice Easton, instructor of the "Applied Evaluation of Environmental Education Programs" course (NRES 751) for the University of Wisconsin-Stevens Point. The survey was also reviewed for readability and usability by members of the researcher's graduate committee, and peer-reviewed by members of the Applied Evaluation of Environmental Education Programs' class. Finally, the survey was pilot-tested with two teachers, one a 7th grade teacher who had never been on a field trip to CWES, and the other a teacher visiting CWES on her field trip with 7th and 8th graders. The researcher held conversations with both teachers to discuss any questions that they had trouble understanding or interpreting. The final survey and consent form can be found in Appendix A.

The second survey was distributed beginning on February 4th, 2010 and ending May 14th, 2010. During this time, paper surveys were distributed to each teacher and student teacher in the 5th – 8th grade range visiting CWES on a field trip (n = 59). Substitute teachers were not included in the study. First, the researcher greeted teachers as they arrived to CWES. The researcher gave teachers the typical arrival presentation in which they are welcomed and asked to fill out paperwork concerning billing for their visit. Upon concluding the paperwork, the researcher informed the teachers of an additional opportunity to participate in her research project with the incentive of a free CWES water bottle for participation. On days when the researcher was absent, the CWES Program Manager, a member of the researcher's graduate committee, performed this function. Groves et. al. (2009) argues that interaction between the survey administrator and participants can lead to higher cooperation rates. This face-to-face method of survey delivery was used to diminish the number of non-respondents to surveys.

Teachers that expressed interest were handed a clipboard with a pencil, an informed consent form, a copy of the survey and an envelope. Teachers were informed that they could fill out the questionnaire at any point during the day (or during any day of their trip for those staying overnight). Further, teachers were asked to read and sign the informed consent form if they were interested in participating. Teachers were instructed to place their completed questionnaire in the envelope provided when finished. They were informed that they should seal the envelope and hand the clipboard, sealed envelope, and signed consent form back to a CWES staff member at any point prior to their departure from CWES.

Though surveys were delivered using a face-to-face method, participants were asked to fill out the surveys at their own convenience. Paper-based, self-administered questionnaires (SAQ's) have long been used as part of face-to-face surveys to elicit information of a sensitive nature (Groves et. al, 2009). The nature of questions in this study is not sensitive, per se. However, the researcher wanted to provide an opportunity for those teachers who might be hesitant to answer any questions to feel that they could respond honestly. Teachers were allowed to take the surveys with them throughout the duration of their field trip and fill them out at a time when the researcher was not present. As groups of teachers typically split off to chaperone different field groups during the field trip, most teachers had an opportunity to fill out the questionnaire while not in the presence of other teachers and while a CWES staff member otherwise engaged their students.

Subproblem 2 Data Analysis Procedures – Because case studies are involved with understanding the context in which the research concern is embedded, the researcher used the survey to collect information on the visiting teachers including age, years of teaching experience, years visiting CWES, etc. This allows the researcher to describe the demographics of the population of teachers involved in this case study. Demographics data are reported using descriptive statistics.

A second goal of the survey was to determine which principles of the FMP, if any, are theoretically important to teachers when they are deciding whether or not to use pre- and post-field trip materials. Question types included "A or B" preference questions, Likert-scale type questions, and a question that asked teachers to rank their answers from the group of Likert scale questions.

For the "A or B" preference questions, teachers were given a choice between an item that represented an FMP principle, and one that did not. For the Likert scale questions, teachers were asked to rate how important each item was to them when choosing whether or not to use a pre- or post-field trip material in their classroom. Every item was tied to a principle in the FMP. For example, item g, "They connect field-trip learning to student's personal experiences" is representative of a subcomponent of the FMP's 3rd principle – encouraging joint productive activity. Appendix B contains a copy of the survey where questions are labeled according to the Principle in the FMP to which they apply. Finally, for the ranking question, teachers were asked to assess, out of all the items they listed as being important, which three items were the most important to them when choosing whether or not to use a given set of pre- and post-field trip materials. Data from these questions were analyzed quantitatively and reported in terms of frequencies.

Subproblem 3: How do teachers use FMP principles in conjunction with their environmental education field trips to CWES?

Subproblem 3 Data Sources – The teacher survey was also a source of data for subproblem three. Though the close-ended questions in the survey asked teachers to make theoretical choices about the importance of FMP-based principles, the open-ended questions asked teachers to describe what they currently do in practice to prepare for and follow-up with field trips.

A second source of data for subproblem three were observations of teachers pilot-testing FMP-based pre- and post-field trip materials. All visiting teachers from field trips conducted during the 2009 – 2010 school year were solicited for their participation in pilot studies of new CWES pre- and post- field trip materials. For those teachers that

expressed interest in the pilot studies, the researcher sent an email explaining that the pilot-test would involve two classroom observations by the researcher. The first observation would take place prior to the field trip, and the teacher would implement the pre-visit activities designed by the researcher. The second observation would take place after the field trip, and the teacher would implement the post-visit activities designed by the researcher. The researcher would interview the teacher following the last observation. In appreciation of the time the teachers would need to spend (both reviewing and becoming comfortable with the lesson materials as well as taking part in the interview), the researcher offered a small stipend or gift certificate to a scientific supply catalogue as a participation incentive. The researcher also hoped that the incentive would entice participation by teachers who did not currently use pre- and post-field trip materials in their classrooms.

The last sources of data for subproblem three were the teacher interviews. These interviews allowed the researcher to further explore the emic perspective of teachers.

Subproblem 3 Data Collection – In order to conduct pilot-testing, the researcher needed to design materials using the FMP. The researcher coordinated with the two teachers to determine for which CWES field trip lessons they were interested in conducting pilot tests. The researcher then designed FMP-based pre- and post-field trip activities to connect the field trip lessons selected with classroom learning.

Designing quality educational materials requires that the designer sensitize his or herself to the setting in which the materials will be used. Therefore, the researcher conducted classroom observations of a 7th grade science class both during regular session, and during weeks when the class was preparing for and had been on a field trip to a

different nature center. The researcher also conducted observations in a 9th grade

environmental science classroom prior to and following its field trip to CWES. Three

observations of the 7th grade classroom, and two observations of the 9th grade classroom

were conducted.

The researcher created the pre- and post-field trip materials in a lesson plan

format, and created webpages within the CWES website from which the materials could

be downloaded. The webpages served the additional purpose of providing support

materials for lessons including quotes, pictures and ideas for projects to use as a way of

assessing student learning after their field trip. Appendices C and D contain summary

tables that depict how supporting materials for the two chosen field trip lessons – "Pond

Power" and "Laws of Nature" – were designed to include principles of the FMP. The full

set of supporting materials can be accessed and downloaded from the following sites:

http://www.uwsp.edu/cnr/cwes/PreandPosts/Pond_Power/Pond_power_home_page.aspx and

http://www.uwsp.edu/cnr/cwes/PreandPosts/Laws_of_Nature/Laws_of_nature_home_page.aspx .

Athman and Monroe (2001) recommend that curriculum materials, when being

developed, should be reviewed by content and pedagogical experts. The lesson materials

in this study were reviewed and revised by input from an expert in environmental

education curriculum design, an expert in secondary science pedagogy, and an expert in

CWES curriculum. The materials were emailed to teachers prior to the beginning of the

school year. Two weeks prior to their field trips, teachers were emailed a link to the

website containing the lesson materials and support materials.

Observations – The researcher conducted all observations of classrooms and field

trip lessons using an observation form to note descriptive observational variables of

students and teachers relevant to the research concern. Gall, Gall & Borg (2003) define a descriptive observational variable as being a variable that requires little inference on the part of the observer (i.e. an observable behavior like sharing the field trip schedule with students.) They note that this form of variable generally has the major advantage of yielding reliable data (as opposed to variables that rely on inferences and evaluation, such as how self-confident the teacher appears.)

The observation form is included in Appendix E. The form received an identical review to that of the survey used by the researcher (see above under *Data Collection Procedures for Subproblem 2*). Additionally, the researcher contacted and consulted with Jennifer DeWitt, one of the authors of the FMP, for her suggestions. The revised form was pilot-tested in the two classrooms.

According to recommendations by Gall, Gall & Borg (2003) a researcher must think about ways to reduce "observer effect" or any action by the observer that has a negative effect on validity or reliability of the data they collect. The researcher in this study reduced some observer effects (as classified by Evertson & Green, 1986) such as the effect of the observer on the observed, observer drift, and reliability decay.

To reduce the effects of observer on the observed, the researcher informed teachers she would be observing their implementation of pre- and post-field trip activities, but did not describe her research concern of observing behaviors specifically related to the FMP. On classroom observation days, the researcher arrived to the teacher's classroom prior to the students' arrival and sat in a back corner to present as little of a distracting presence as possible. The researcher was not able to conduct prior observations to help desensitize students to her presence and, thus, further decrease

observer effect. However, the researcher had both teachers introduce her to the class at the beginning of the lesson. She did this to limit student curiosity and distraction caused by the presence of the researcher. During subsequent observations, the researcher did not need to be reintroduced.

On field trip observation days, the researcher greeted the teacher and her students prior to field trip lessons. When students were divided into groups to start their field trip lessons, the researcher randomly selected one group to follow during their lesson. She introduced herself, and let the students know she would be observing the lesson. The researcher maintained a 5 foot distance from the group when outside, and sat in the back of the classroom when inside.

To reduce the effects of observer drift (the loss of observation skill during later observations) and reliability decay (unreliable observation data submitted by third-party observers when they observe unsupervised), the researcher conducted all observations herself. Before each observation, she reviewed the observation sheet and instructions.

Interviews – The researcher created an interview guide to help guide the flow of semi-structured interviews. The interview guide received an identical review to that of the observation form used by the researcher (see above under *Observations*). The final interview guide is included in Appendix F.

Teachers were interviewed using a semi-structured format immediately following the class period in which the researcher observed the implementation of post-field trip activities. In each case, the teacher consented to audio recording of the interview, and the dialogue was recorded using a digital voice recorder. Additionally, the researcher took written notes. As suggested by Kvale (2007), the interviewer began the interview with a

briefing about the purpose of the interview and ended the interview with a debriefing of what she heard said during the interview. This created the opportunity for the interviewee to challenge or agree with the interviewer's perceptions of what was said.

Subproblem 3 Data Analysis – The researcher examined open-ended responses to survey questions about pre- and post-visit activities that teachers carried out in conjunction with their visit to CWES. She coded these responses using constant comparative method (Glaser, 1992) and discusses the findings in light of FMP principles.

Additionally, though the observation sheet was originally designed to help evaluate the validity of the materials created using the FMP, it became a source of data for this subproblem. Both pilot-test teachers modified the activities designed by the researcher to meet their needs. As a result, the data collected during the observations became a way for the researcher to observe whether the teachers' lessons, as modified, still included principles of the FMP. For observations, the presence/absence of descriptive observational variables were recorded and tabulated to determine whether FMP principles were exhibited during the pilot tests.

Finally, to help understand what Principle 1 (adopting the perspective of the teacher) means in this case study, open-ended responses from surveys and interviews were examined. Survey responses related to teacher motivations for/barriers to using pre- and post-visit activities were coded using constant comparative method (Glaser, 1992). Additionally, responses to interview questions about "what worked" and "what didn't work" were coded using the same method. Results were compared to create a working definition for the "needs" of teachers visiting CWES. These needs must be defined in order to ensure that CWES can better meet the needs of visiting teachers in the future.

Summary of Methods – Case studies combine many methods for the purpose of triangulating data and providing a richer description of the case being studied (Gall, Gall & Borg, 2003). In this study, methods such as document analysis, surveys, observations and interviews were used. Table 3.1 summarizes each data source, the research sub-problem it was used to study, and how the data was analyzed.

Table 3.1 - Summary of methods

Data source	Research subproblem to be addressed	Form of data analysis
Framework for Museum Practice	**Subproblem 1** (alignment of FMP with EE context)	**Document/content analysis** – the researcher created *in vivo* codes and categories based on the NAAEE's guidelines for excellence in EE Materials. Two coders then examined the FMP for presence or absence of these codes and categories using conceptual content analysis.
Teacher surveys (Appendix B)	**Subproblem 2** (theoretical importance of FMP principles to teachers) & **Subproblem 3** (how teachers use principles of the FMP in conjunction with their field trips to CWES)	**Quantitative analysis** –Likert scale questions and a ranking question on the surveys were used to determine teachers' opinions of FMP principles. Results are reported as frequencies of teachers agreeing/disagreeing (for Likert) with each principle, as well as which principles were chosen as most important. For "A or B" preference questions, frequencies are reported for how often teachers chose the FMP-based designs vs. the non-FMP-based designs. **Qualitative analysis** – Responses to open-ended questions of what teachers currently do in practice to prepare and follow-up with field trips were coded using constant comparative method (Glaser, 1992). These activities are discussed in light of their alignment/non-alignment with FMP principles. Additionally, open-ended questions of teacher motivations for/barriers to conducting pre- and post-visit activities were coded using the same method. Categories are used to help define the needs of teachers visiting CWES and to better inform the successful implementation of FMP Principle 1 (adopting the teachers' perspective.)
Observations (Appendix E)	**Subproblem 3** (how teachers use principles of the FMP in conjunction with their field trips to CWES)	**Quantitative analysis** – presence/absence of descriptive observational variables were recorded during classroom observations to determine utilization of FMP-principles during pre- and post-field trip activities.
Interviews (Appendix F)	**Subproblem 3** (how teachers use principles of the FMP conjunction with their field trips to CWES)	**Qualitative coding** - Responses to interview questions were coded using the constant comparison method (Glaser, 1992). Results were compared to and combined with those from the survey to create a working definition for the "needs" of teachers visiting CWES and to better inform the successful implementation of FMP Principle 1 (adopting the teachers' perspective.)

Chapter IV: Results

Subproblem 1: How well aligned is the Framework for Museum Practice to nationally-recognized evaluation criteria for designing quality environmental education materials?

Results for Subproblem 1 – The researcher based the categories for the coding scheme on *in vivo* language of the NAAEE's criteria for quality environmental education materials (NAAEE, 2004). The categories established under this coding scheme included: *fairness, accuracy, depth, skills building, action orientation, instructional soundness* and *usability*.

The themes of fairness and accuracy, as described by NAAEE, focus on the need for environmental education materials to present both accurate information, and information from many different perspectives. Information should not include personal biases or opinions, but should allow students to interpret the facts for themselves.

The NAAEE guidelines also refer to a theme of "depth". Under this theme, the guidelines describe how materials should not only foster awareness of both the natural and built environment, but should also go one step further. Materials should promote understanding of environmental concepts and issues in context as well as how these issues are connected to human feelings, values and attitudes.

The theme of skills building, as presented in the NAAEE guidelines, encourages environmental educators to design materials in a way that allows students

to study environmental concepts while building lifelong, transferable skills like critical thinking.

Action orientation, another theme in the NAAEE guidelines, describes how environmental education materials should promote civic responsibility and allow students to use their knowledge and skills to both devise solutions for environmental problems and take actions towards solving these problems.

The theme of "instructional soundness" is also included in the NAAEE guidelines. Under this theme, effective modes of teaching are addressed. Environmental education materials should focus on learner-centered instruction and making the learning relevant to students' lives. At the same time, the materials should create opportunities for different learning styles (visual, audio, kinesthetic, etc.), focus on interdisciplinary connections, and allow students to learn outside of the classroom. The materials should also clearly lay out goals and objectives and provide some manner of assessing whether these goals and objectives were obtained.

The final theme in the NAAEE guidelines is "usability." This theme is concerned with the need for environmental education materials to be easy to use, long-lived, adaptable, and clear. Additionally, the materials should be accompanied by instructional support and should fit with national, state or local requirements.

The coding scheme created from the NAAEE guidelines can be found in Appendix G. Two researchers independently analyzed the FMP document using the coding scheme.

The content analyses of both researchers indicate the presence of the categories of depth, skills building, instructional soundness and usability within the

FMP document. Neither of the researchers found indication of the categories of fairness and accuracy or action orientation in the FMP document.

The FMP does not stress the need to provide fair and accurate environmental information, nor does it stress the need for materials to create opportunities for students to take action. Being a museum-based framework, it is understandable that the museum context does not call for these needs as does the environmental education context. When being used as a framework to design environmental education materials, educators should keep these additional factors in mind.

Subproblem 2: *How theoretically important is it to teachers visiting CWES that FMP principles are included in pre- and post-field trip activities?*

Results from initial teacher surveys – Only four responses were received as a result of the initial online survey. A reminder email was sent after the Thanksgiving holiday, but no additional responses were received. As a result, the protocol was changed.

Results from the redesigned teacher surveys and protocol – Out of the fifty-nine teachers that visited CWES during the spring of 2010, fifty teachers and three student teachers consented to participate in the study and returned the form for a return rate of approximately 90%. The demographics of teachers responding to the survey are reported in Appendix H.

Teachers' opinions related to FMP Principle 1

The first principle of the FMP states that educators must keep in mind the needs of teachers when designing pre- and post-field trip materials. According to the

literature, three of the most frequently mentioned needs of teachers include specifying curricular tie-ins, minimizing the amount of classroom time needed, and offering training to support teachers' understanding of materials. In this survey, based on Likert-type scales, most teachers "Strongly Agreed" or "Agreed" with the desire to have these needs met.

Curricular tie-ins – Teachers were asked to rate their level of agreement with the statement: *Pre- and post-trip activities prepared for teachers are useful if they list the curricular standards to which they are aligned*. The majority of teachers either agreed (61%, n = 31) or strongly agreed with statement (16%, n = 8). Some teachers (17%, n = 9) had no opinion. Only 6% (n = 3) disagreed with the statement, and no teachers strongly disagreed.

Minimizing classroom time – Teachers were asked to rate their level of agreement with the statement: *Pre- and post-trip activities prepared for teachers are useful if they do not take more than one class period a piece to complete*. Most teachers either agreed (47%, n = 25) or strongly agreed (21%, n = 11) with the statement. Again, there were some teachers that had no opinion (11%, n = 6). Other teachers (21%, n = 11) disagreed with the statement. No teachers strongly disagreed with the statement.

Offering training – Teachers were asked to rate their level of agreement with the statement: *Pre- and post-trip activities prepared for teachers are useful if they include a short online video tutorial of how to do the activities*. Many teachers agreed with the statement (42%, n=21) or strongly agreed with the statement (14%, n

= 7). Over a third of teachers expressed no opinion (32%, n = 16). 12% (n = 6)

disagreed with the statement. No teachers strongly disagreed with the statement.

Teachers' opinions related to FMP Principle 2

The second principle of the FMP states that educators should provide

structure for field trip learning by creating pre- and post-field trip materials for use in

classrooms. In this way, the field trip becomes part of a larger learning unit that

connects back to the school environment. Pre-visit activities should orient students to

the site and trip so they can reduce the "novelty effect" that has been shown to

impair learning. Post-visit activities should reinforce learning by building upon

knowledge learned during the field trip. The survey included four questions to

determine teachers' opinion of Principle 2 of the FMP.

Use of pre-visit activities to orient – Teachers were asked to rank their

agreement with the statement: *Pre and post-field trip activities prepared for teachers*

are useful if pre-field trip activities include a video for students/teachers that orients

them to the CWES site. Most teachers either agreed (33%, n = 17) or strongly agreed

(25%, n = 13). Many teachers did not express an opinion (29%, n = 15). 13.5% of

teachers (n = 7) disagreed with the statement. No teachers strongly disagreed with

the statement.

Use of post-visit activities to reinforce learning – Teachers were asked to

rank their agreement with the statement: *Pre and post-field trip activities prepared*

for teachers are useful if they provide ideas for student projects that can be assigned

to assess what was learned. No teachers disagreed or strongly disagreed with this

statement. 62% (n = 33) of teachers agreed and 23% (n = 12) strongly agreed. 15% of teacher (n = 8) expressed no opinion.

Field trip as a three-part unit or as a stand-alone event – Teachers were asked to choose their reaction to the following statement: *I would be most likely to use pre- and post-field trip activities if they were designed to act as a complete unit (the post- activity would build off the pre-activity) OR they were designed to stand alone (the post- activity could be done without the pre-activity).* They could circle the first choice, the second choice, or both. Teachers were close to evenly split on their opinions. 50% of teachers (n = 26) preferred that the pre- and post-field trip activities be designed to act as a complete unit. 44% of teachers (n = 23) preferred that pre- and post-activities could be used individually. 6% of teachers (n = 3) thought that either design would be useful.

Teachers' opinions related to FMP Principle 3

The third principle of the FMP states that supporting materials for field trips should encourage joint productive activity in which students work together with each other and their teacher towards an end product. Activities should be challenging, personally relevant and interesting to them. The survey included four questions to determine teachers' opinion of Principle 3 of the FMP.

Satisfying student curiosity – Teachers were asked to rate their level of agreement to the following statement: *Pre- and post- field trip activities prepared for teachers are useful if they allow students to explore information from field-trip lessons about which they are still curious.* No teachers disagreed or strongly

disagreed with this statement. 61% (n = 32) agreed with the statement and 26% (n = 14) strongly agreed with the statement. Seven teachers (13%) expressed no opinion.

Relevancy to students' personal experiences – Teachers were asked to rate their level of agreement to the following statement: *Pre- and post- field trip activities prepared for teachers are useful if they connect field trip learning to students' personal experiences*. Again, no teachers disagreed or strongly disagreed with this statement. 49% (n = 26) agreed and 40% (n = 21) strongly agreed. Again, there were some teachers (11%, n = 6) that expressed no opinion.

Working together with peers and teacher – Teachers were asked to choose their reaction to the following statement: *I would be most likely to use pre- and post- field trip activities if they were designed to be conducted in class OR they were designed to be conducted as homework*. The vast majority (92%, n = 48) preferred that the activities be designed to be conducted in class. A few teachers (8%, n = 4) responded that they would be likely to use either format. No teachers preferred that the activities only be conducted as homework.

Teachers were also asked to choose their reaction to the statement: *I would be most likely to use pre- and post- field trip activities if they generate discussion among students OR they allow students to work individually*. The majority of teachers agreed that activities should be designed to generate discussion among students (77%, n = 40). Only 4% of teachers (n = 2) preferred that activities only be designed to allow students to work individually. Ten teachers (19%) responded that they would be likely to use either format.

Teachers' opinions related to FMP Principle 4

The fourth principle of the FMP states that activities designed by educators for teachers should provide opportunities for learning more than just the content of the lesson. Students should also build broader skills in communication, research, and literacy through the activities. The survey included two questions to determine teachers' opinion of Principle 4 of the FMP.

Research and literacy skills – Teachers were asked to rate their level of agreement with the statement: *Pre- and post-trip activities prepared for teachers are useful if they assess students' research skills and/or literacy in addition to assessing student recall of information*. 49% of teachers (n = 26) agreed with the statement and 19% of teachers (n = 10) strongly agreed with the statement. Around 24% of teachers (n = 13) had no opinion, while 6% (n = 3) disagreed and 2% (n = 1) strongly disagreed.

Beyond content – Teachers were asked to choose their reaction to the following statement, "I would be most likely to use pre- and post- field trip activities if they include tasks for students that go beyond recalling information learned during the field trip OR they focus on assessing student recall of information learned during the field trip." The vast majority of teachers (78%, n = 41) agreed that they would be more likely to use post-field trip activities if they included tasks that went beyond recalling information. 11% of teachers (n = 6) preferred that the post-field trip activities only assess what was learned on the field trip. The final 11% of teachers (n = 6) expressed they would be likely to use either format of activities.

Teachers' top concerns for pre- and post-activities

One question in the survey asked teachers to rank the top three features that would make pre- and post-field trip activities useful for teachers. When answers for all three choices were taken together, the choice most selected by teachers had to do with creating activities that were relevant to their students' lives and experiences. This answer was chosen by thirty-two of fifty-four teachers, and accounted for 21% of all the choices selected. Similarly, teachers often selected the option for activities allowing students to explore information from field-trip lessons about which they were still curious. Twenty-seven teachers chose this, and it accounted for a little over 17% of all choices. The third most popular choice had to do with providing teachers with a way to assess their students' learning from the field trip. Twenty-six teachers chose this option, accounting for 17% of all choices. See Appendix I for a full summary of how teachers ranked the importance of pre- and post-visit activity features.

Summary of Results for Subproblem 2

Responses to closed-ended questions on the teacher survey indicate that the majority of teachers responding to the survey theoretically agree with principles of the FMP.

The majority of teachers visiting CWES are concerned with FMP Principle 1: that pre- and post-field trip materials meet their own needs. Some of these needs include providing curricular tie-ins, minimizing classroom time needed to complete the activities, and offering training for the activities.

In terms of FMP Principle 2, most teachers visiting CWES believe in the value of pre-activities that are used to orient students to the site and post-activities that allow students to reflect on learning. However, teachers visiting CWES are almost evenly split in their perception for the need of the field trip to be a three-part unit. Half agreed, while the other half preferred that pre- and post-activities be designed to stand alone (eg. the pre-activities could be used without needing to use the post, or vice versa.)

Most teachers indicated a preference for the types of activities that would encourage joint productive activity as FMP Principle 3 recommends. Most teachers agreed that pre- and post-activities should be designed to be relevant to students' lives and allow them to explore information in which they had an interest. Additionally, the vast majority of teachers responding to the survey preferred that pre- and post-visit activities be designed to be conducted in class (not for homework) and stimulate discussion among students (rather than being activities in which students work individually).

Finally, most teachers agreed theoretically with Principle 4 of the FMP by indicating that they believed pre- and post-activities should allow them to assess the research and literacy skills of their students in addition to assessing the content learned on the field trip. They also agreed that pre- and post- visit activities go beyond content-based information to allow for skills practice.

Subproblem 3: *How do teachers use FMP principles in conjunction with*

their environmental education field trips to CWES?

In addition to looking at teachers' theoretical agreement with principles of the

FMP, the researcher sought to understand teachers' actual use of FMP principles.

Teachers' survey responses indicated that the majority of teachers visiting CWES

adhere to Principle 2 by preparing their students in some way and planning to

follow-up with their students in some way. Unfortunately, teachers' responses were

not descriptive enough to confirm their use of FMP Principle 3 in pre- and post-field

trip activities. As suggested by FMP Principle 4, teachers' post-field trip activities

generally involved components that allowed students to practice literacy or dialogue

skills in addition to reviewing information from the field trip.

In addition to survey responses, data from pilot test interviews and

observations shed light on teachers' use and opinions of FMP-based materials.

Because FMP Principle 1 is concerned with identifying and satisfying teachers'

needs, open-ended responses from surveys and teacher interviews were also used to

define the needs of teachers visiting CWES.

Teachers' definition of FMP Principle 1

Principle 1 of the FMP states that the teachers' perceived needs for resources,

his or her goals for the trip, and the context in which he/she operates (e.g. available

classroom time, curriculum demands) must be considered to create resources that

teachers will find useful. DeWitt and Osborne (2007) suggest that those designing

pre- and post- activities for field trips engage with teachers to understand their

perspective more fully. Open-ended questions provided opportunity for teachers who

did conduct pre-activities and who did plan on doing post-visit activities to describe what motivated them to do so. For those teachers who did not use pre-visit activities, or who did not plan on using post-visit activities, open-ended survey questions allowed them to provide information on what kinds of barriers they faced to using pre- and post-visit activities. Information from pilot-test interviews shed additional light on the needs of teachers.

Motivations for using pre-activities – Teachers' motivations for using pre-visit activities were both cognitive and affective. Cognitive motivations included wanting to improve their students' understanding of trip activities and vocabulary, as well as wanting students to connect classroom and field trip learning. Affective motivations included wanting students to be on their best behavior, feel comfortable, and get excited about the trip. Out of the thirty-two teachers that conducted pre-visit activities, twenty-three teachers specified some sort of cognitive motivation and fifteen teachers mentioned some sort of affective motivation. Some teachers mentioned both in their answer. See Appendix J for sample responses. Figure 4.1 summarizes the reasons teachers chose to conduct pre-visit activities.

Figure 4.1 Teachers' motivations for conducting pre-visit activities (n=32*)
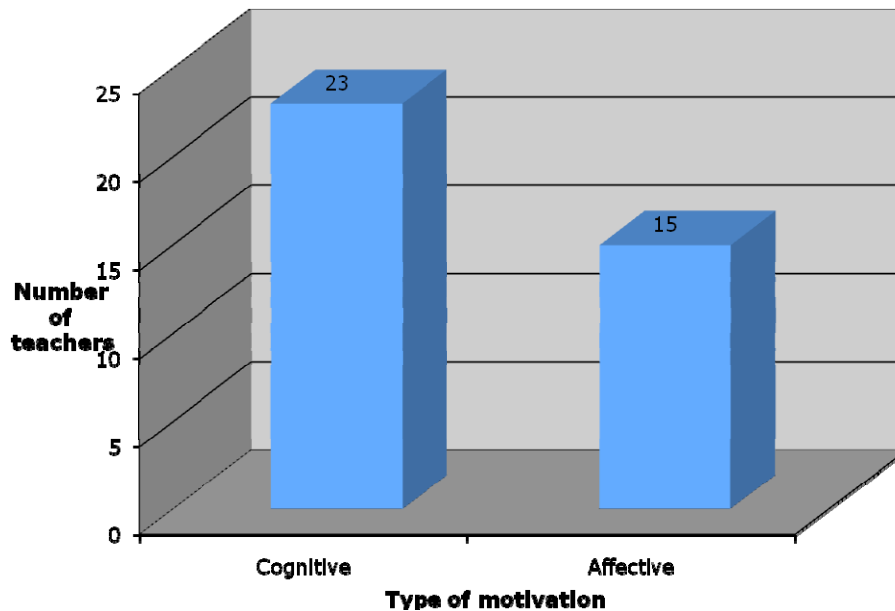
* Some teachers' responses included both types of motivation

Motivations for planning post-field trip activities – As with the motivations for using pre-field trip activities, teachers' motivations for planning post-field trip activities could be categorized into cognitive motivations or affective motivations. Cognitive motivations centered around providing time for students to reflect on learning or encouraging students to make connections between field trip and classroom learning. Affective motivations were concerned with the emotional impacts the visit had on students. There were also numerous responses that were not specific enough to determine whether the motivation was cognitive or affective-based. See Appendix J for sample responses. Figure 4.2 summarizes the reasons teachers planned to conduct post-visit activities.

Figure 4.2 Teachers' motivations for planning post-visit activities (n=39)
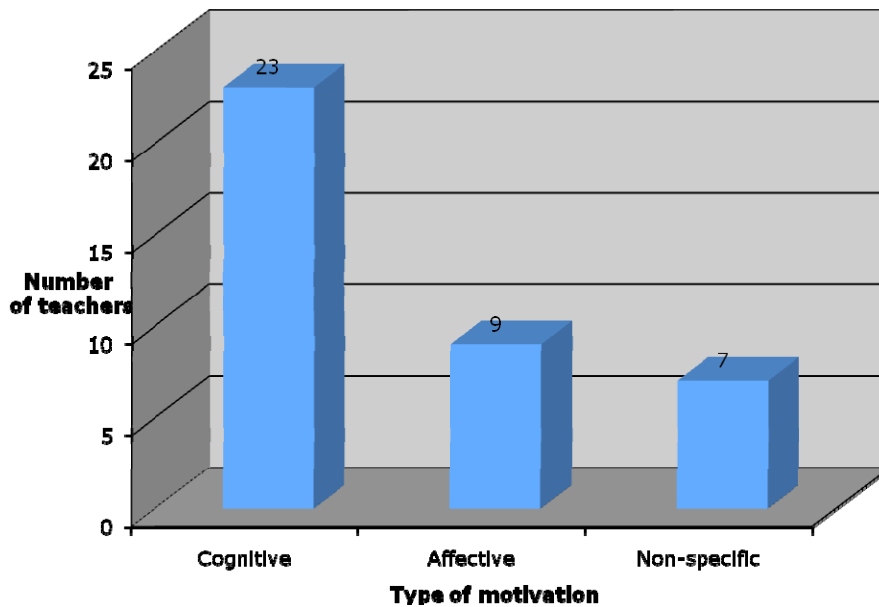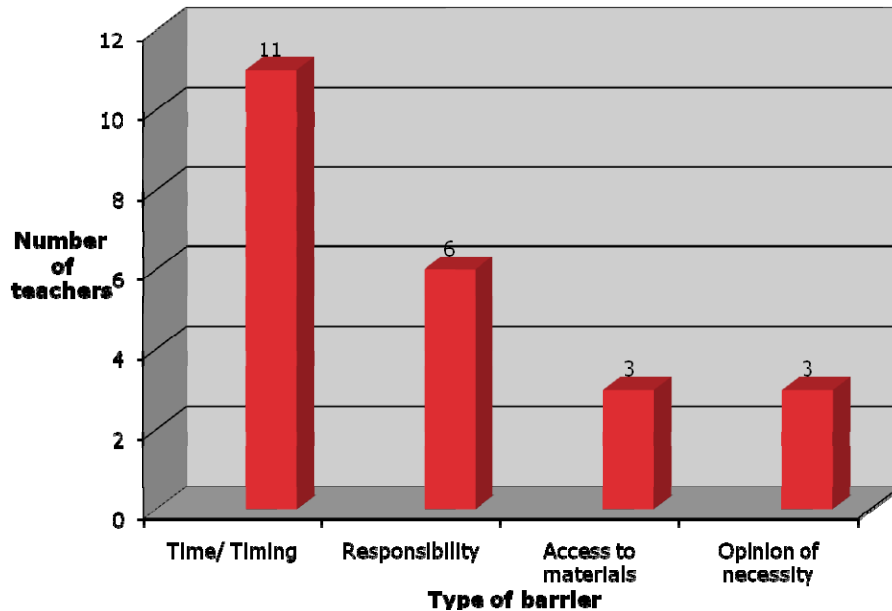

Barriers to conducting pre-field trip activities – Twenty-one teachers did not conduct pre-visit activities. Barriers to conducting these activities included issues with time and timing, issues of responsibility, issues of accessing materials, and opinions on the necessity of the activities.

Time issues revolved around lack of time to carry out activities in the classroom and poor timing of their trip with the portions of the curriculum aligned to it. More than half of the teachers that did not conduct pre-visit activities (eleven out of twenty-one) cited time/timing as their reason for not doing so. Another reason for not conducting the activities had to do with issues of responsibility. These responses indicated that some teachers felt it was the job of another teacher at their school (usually the science teacher) to prepare students for the trip. Access to material was another reason and relates to not knowing where to find pre- and post- activities or being unable to find them. Finally, some teachers did not feel the pre-visit activities

were necessary. See Appendix J for sample responses. Figure 4.3 summarizes

categories into which these teachers' responses fell.

Figure 4.3 Teachers' reasons for not conducting pre-visit activities (n=21*)

*Two teachers' responses included more than one type of barrier

Barriers to conducting post-field trip activities – Fifteen teachers responded

that they did not plan on conducting post-visit activities. Barriers to conducting post-

field trip activities were similar to pre-visit activity barriers and included issues with

time and timing, issues of responsibility, issues of accessibility and opinions on the

necessity of the activities. Figure 4.4 summarizes categories into which these

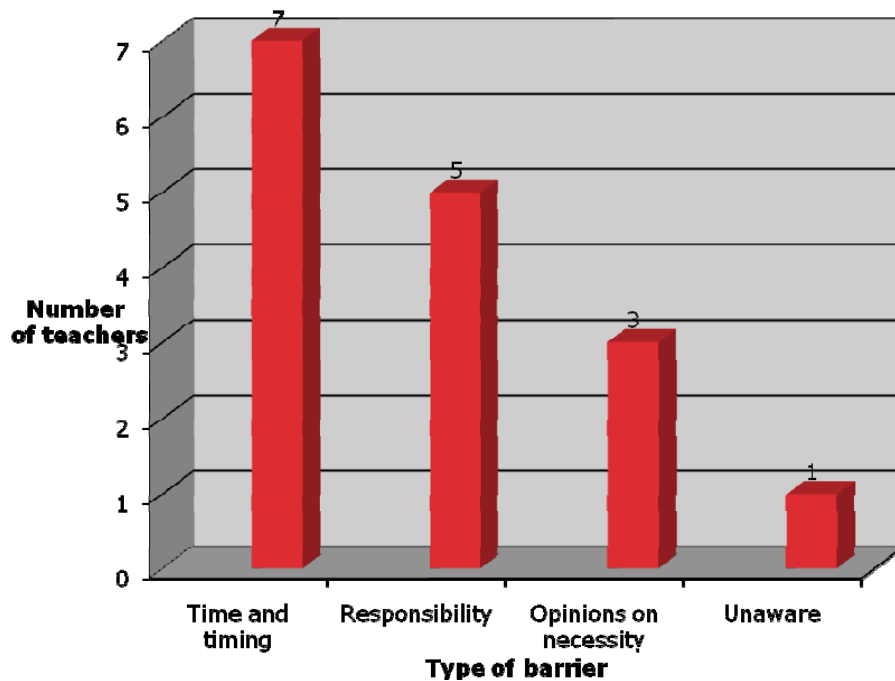teachers' responses fell. See Appendix J for sample responses under these categories.

Figure 4.4 Teachers' reasons for not planning post-visit activities (n=15*)

*One teacher's response included more than one type of barrier

Additional insights from pilot-test interviews

Feedback from pilot test teachers related to what worked well during the FMP-based pre- and post-activities and what did not work well shed further light on the needs of teachers in relation to pre- and post-visit activities. The main needs emerging from their answers were ease of use (for both teachers and students) as well as sufficient timing.

Ease of use for teachers – For pilot test teachers, many comments centered around the ease of use for teachers being an essential component to having pre- and post-visit activities work well in the classroom. Teachers indicated that FMP-based materials had many qualities that made them easy to use. They were pre-made but could be adapted; they were well-organized and, in some cases, the teacher was

already familiar with some of the recommended activities. Qualities that teachers felt could be improved were cutting down on the amount of information that the teacher had to read through and keep track of, as well as not relying on resources (like the computer lab) that may not be available at all times of the year. For sample responses, see Appendix K.

Ease of use for students – Not only did interviews reveal teachers' desire to have materials that were easy for their own use, but they also revealed teachers' desire that any handouts or visuals should be easy for students to use. In this case, the FMP-based activities designed by the researcher met some of the teachers' needs, but did not meet others. On the positive side, the FMP-based activities had handouts with very clear, simple directions for students to follow. On the negative side, the student handouts for FMP-based activities had terms with which students were not familiar that needed to be defined and the layout of some of the handouts did not provide space for the students to organize their thoughts. See Appendix K for example responses.

Timing is sufficient – Finally, both teachers mentioned issues related to timing when asked if there was anything that would prevent them from using pre- and post-visit activities in the future. "…it goes back to, again, having that time in your classroom to do it," one teacher said. The other responded, "The time factor. You know, if we were behind already, and then we went, you know. I might spend a lot less time tying it all together. But, with time not being a factor, definitely…use these activities."
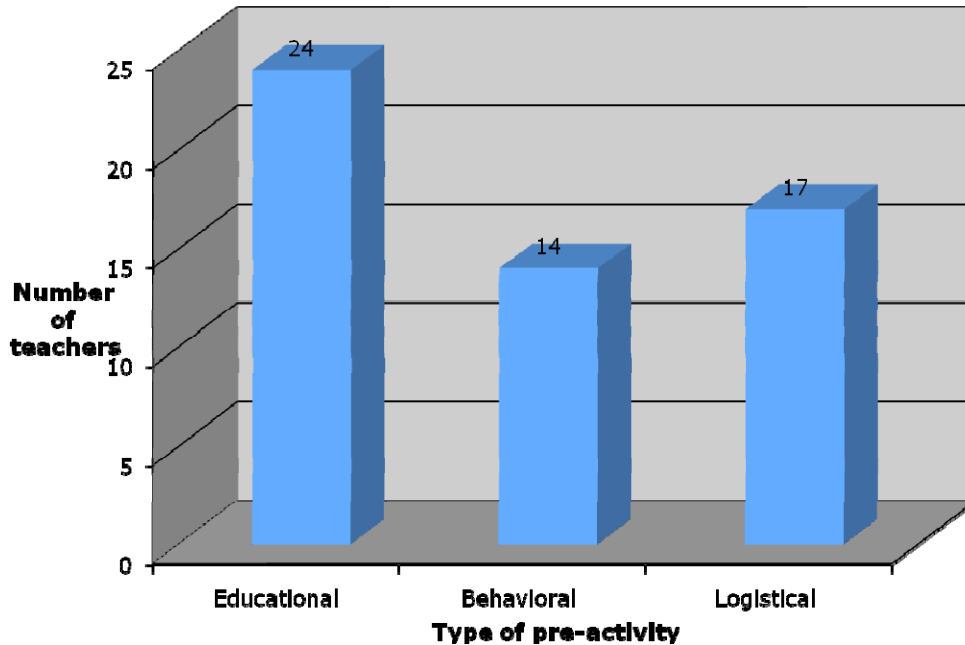
Teachers' use of FMP Principle 2

        Surveys – Surveys indicated that the majority of teachers conducted pre-visit

activities prior to the field trip (60%, n = 32 out of 53). They also indicated that the

majority of teachers planned to conduct post-field trip activities (74%, n = 39 out of

53). Because the survey was administered during the field trip it must be emphasized

that, though the number of teachers reporting their implementation of pre-visit

activities is accurate, the number of teachers reporting post-visit activities only

represents those who planned post-visit activities. It does not reflect those who

actually did conduct post-visit activities.

        Pre-visit activities – FMP Principle 2 recommends that pre- and post-visit

activities should provide structure or focus to the visit and encourage connections

between classroom and field trip learning. It also recommends that the pre-visit

activities be used specifically to orient students to the field trip site and trip itself in

order to reduce the novelty of the setting. Open-ended survey responses were coded

and indicated that the majority of teachers who conducted pre-visit activities did

conduct educational preparation, while only slightly more than half shared logistical

information. Educational preparation included introducing vocabulary and concepts

or working on projects related to field-trip subject matter. Logistical preparation

included sharing the field trip schedule and packing list, as well as well as showing

pictures from the previous year's trip and discussing what to expect. Additionally,

teachers conducted behavioral preparation including going over expectations for

participation and good behavior. See Appendix L for example responses.

Some teachers conducted more than one type of preparation. Figure 4.5

summarizes the number of teachers that used each type of preparation.

Figure 4.5 Types of pre-visit activities conducted by teachers (n = 32*)

*Almost every teacher's response indicated more than one type of preparation

Post-visit activities – FMP Principle 2 recommends that post-visit activities

should reinforce the learning experience and build upon content encountered during

the visit. Open-ended survey responses indicated that teachers who planned on

conducting post-visit activities (n = 39) planned quick review or reflection activities.

Some activities mentioned were crosswords to review vocabulary and discussions of

the field trip. Whereas some teachers mentioned they would use the discussion to

review what was learned on the trip, others intended to use the discussion to

understand students' feelings about the trip. Other popular activities included having

students write journal entries or thank you notes. Less than a third of teachers

described student projects as part of their planned follow-up activities. See Appendix

L for example responses.

Figure 4.6 depicts the type of follow-up activity planned by teachers. Some

teachers planned to use more than one type of follow-up.

Figure 4.6 Types of post-visit activities planned by teachers (n=39*)
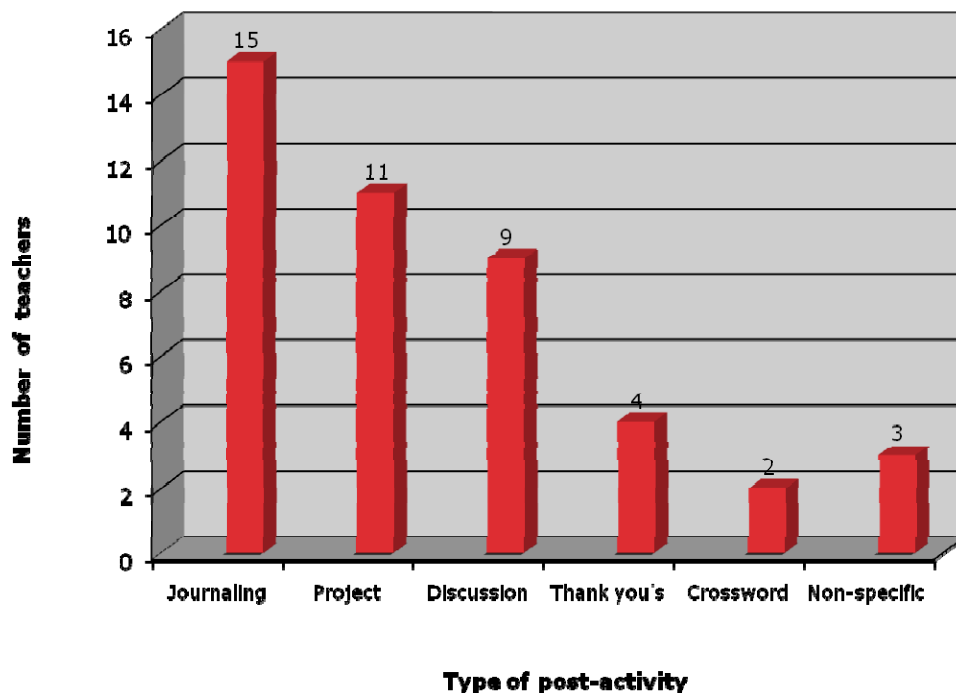
* Several teachers' responses indicated more than one type of follow-up

Observations – Both pilot-test teachers were observed performing some

indicator of FMP principle 2 in their pre- and post-visit activities. Table 4.3

summarizes observational variables observed during the pilot tests.

Table 4.3 FMP Principle 2 observed during pilot tests

	Indicators of FMP Principle 2	Teacher 1	Teacher 2
Pre-visit	Teacher shared the field trip schedule with students	No*	No
	Teacher showed the CWES introductory DVD to students	No*	Yes
	Teacher introduced vocabulary related to the field trip lesson	Yes	Yes
	Teacher introduced concepts related to the trip lesson	Yes	Yes
Post-visit	Teacher asked students to recall vocabulary used during field trip	No	Yes
	Teacher asked students to recall concepts taught during field trip	Yes	Yes
	Teacher assigned in-class project further exploring concepts taught during the field trip	Yes	Yes

* Though not observed doing so, the teacher planned to use the video the day immediately prior to the field trip so the info would be fresher in students' minds.

Teachers' use of FMP Principle 3

       Surveys – Though teachers described their pre- and post-activities, their descriptions did not include enough detail to confirm or disconfirm their use of the third principle of the FMP.

       Observations – Both pilot-test teachers were observed performing indicators of FMP principle 3 in their pre- and post-visit activities. Table 4.4 summarizes observational variables observed during the pilot tests.

Table 4.4 FMP Principle 3 observed during pilot tests

		Teacher 1		Teacher 2	
		Pre-	Post-	Pre-	Pre-
Indicators of FMP Principle 3	Teacher encouraged students to discuss among themselves and/or with the teacher	Yes	Yes	No	Yes
	Teacher provided students the opportunity to explore their individual interests	No	Yes	Yes	No
	Teacher provided students the opportunity to make choices and control, to some extent, the course of the activity	Yes	Yes	Yes	Yes
	Teacher engaged students in cognitive stages of Bloom's taxonomy beyond just that of knowledge acquisition	Yes	Yes	Yes	Yes
	Activity was carried out in local setting or teacher asked students to reflect on the personal relevancy	Yes	Yes	No	Yes

Teachers' use of FMP Principle 4

Surveys – FMP Principle 4 recommends that pre- and post-activities consider building students' skills rather than just focusing on lesson content. Activities should allow students to practice oral and written literacy, dialogue and research. Because of the broad applicability of these skills, most activities include them. Responses from teachers related to pre-visit activities indicate that most teachers either held some form of group discussion or engaged students in literacy-based activities like word searches, reading and journaling prior to the trip. A few teachers conducted experiments with students or assigned-research-based projects related to the field trip. Results were similar for post-visit activities. Literacy and dialogue-based activities dominated the types of post-visit activities planned by teachers (journaling, discussion, crosswords, thank you notes). A few mentioned research-based activities

(researching a Wisconsin animal and creating a poster or tracking an online journey using GPS.) Refer to Appendix L for sample responses.

Observations – Both pilot-test teachers were observed performing indicators of FMP principle 4 in their pre- and post-visit activities. Table 4.5 summarizes observational variables observed during the pilot tests.

Table 4.5 FMP Principle 4 observed during pilot tests

		Teacher 1		Teacher 2	
		Pre-	Post-	Pre-	Post-
Indicators of FMP Principle 4	Students used literacy skills (reading, writing, putting information into their own words) during the activity	Yes	Yes	Yes	Yes
	Students used research skills (collecting, analyzing, and interpreting data) during the activity	Yes	No	Yes	Yes
	Students used dialogue (communication, discussion and/or debate) during the activity	Yes	Yes	Yes	Yes

Summary of Results for Subproblem 3

Surveys shed light on the needs of teachers in relation to their CWES field trips. Pilot test observations and interviews revealed the FMP-based activities designed by the researcher were mostly successful at meeting the needs of teachers determined in the teacher surveys. However, pilot-tests confirmed time-barriers faced by teachers.

Surveys indicated that teachers visiting CWES were concerned with both cognitive (learning) and affective (emotional) field trip goals. These types of goals motivated thirty-two teachers to conduct pre-visit activities. Thirty-nine teachers were motivated to plan post-visit activities with thirty-two being motivated by

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cognitive or affective goals and seven not providing specific enough responses to classify their motivation. This mixture of motivations indicates the teachers are interested in pre- and post-field trip activities that can support both cognitive and affective field trip goals.

Open-ended responses on surveys indicated that some teachers visiting CWES faced barriers to conducting pre- and post-field trip activities. The barrier most cited to conducting both pre- and post-activities was time or timing. Other reasons included the placement of responsibility for preparation/follow-up on another teacher from their school, no awareness of or access to materials, and opinions that the activities were not necessary for their students.

The piloting of FMP-based activities designed by the researcher found that the activities were able to accomplish most of the goals of the FMP and that both pilot-test teachers found it necessary to alter the activities to meet their needs. Both teachers were unable to use the whole set of activities as designed because of time constraints and, instead, chose from among the activities for preparation and follow up. When providing feedback, their responses indicated three priorities for the types of activities they would use again. The activities should be easy for teachers to use (pre-made but easily adaptable, well organized and familiar if possible). The activities should also be easy for students to use (provide clear directions and definitions, as well as a layout on worksheets that allows students to organize their thoughts). Finally, despite availability of high-quality, easy-to-use resources, teachers need enough time to look over and teach the activities.

Chapter V: Discussion

Summary of Findings

This study focused on evaluating the usefulness of the Framework for Museum Practice (FMP) to an environmental education context in three ways: determining the theoretical alignment of the FMP to national standards for environmental education materials; studying the theoretical agreement of teachers visiting CWES with principles of the FMP; and examining the actual use of FMP principles by teachers in conjunction with their CWES field trips.

> ***Subproblem 1:*** *How well aligned is the Framework for Museum Practice to nationally-recognized evaluation criteria for designing quality environmental education materials?*

First, the FMP was compared to national environmental education guidelines using content analysis. The FMP is a framework primarily concerned with the creation of quality field trip experiences. The national environmental education guidelines, created by NAAEE, are guidelines primarily concerned with the creation of quality environmental education activities, lesson plans and curriculum units. Recognizing their different purposes, it is not surprising that some elements of the NAAEE guidelines were absent from the FMP principles. These elements included fairness, accuracy and action orientation. However, other elements of the NAAEE guidelines were present in the FMP principles. Elements that were present included depth, skills building, instructional soundness and usability.

Subproblem 2: *How theoretically important is it to teachers visiting CWES that FMP principles are included in pre- and post-field trip activities?*

Second, teachers visiting CWES completed written surveys during their field trip that indicated their level of agreement with specific principles in the FMP. The survey used purposive sampling; all 5th – 8th grade teachers visiting CWES during the spring of 2010 were asked to participate (n = 59). The survey had a 90% return rate.

The majority of teachers visiting CWES indicated theoretical support of FMP Principle 1 by agreeing that pre- and post-field trip materials should consider teachers' needs such as curricular tie-ins (77% agreed), minimizing classroom time needed to carry out activities (68% agreed), and offering training (56% agreed). The emphasis many teachers visiting CWES placed on the importance of curricular tie-ins mirrors results from other studies showing "curricular-fit" as a primary motivation for why teachers organize field trips (Anderson & Zhang, 2003; Kisiel, 2005; Storksdieck, 2005). Similarly, the desire of many teachers that visit CWES to minimize classroom preparation and follow-up time in relation to their field trip is found throughout the literature. Studies suggest that lack of time is one of the biggest barriers to connecting classroom and field trip learning (Anderson, Kisiel & Storksdieck, 2006; Michie, 1998; Orion, 1993; Price & Hein, 1991). Finally, though literature suggests many teachers feel uncomfortable teaching environmental education activities because they think they lack the appropriate training (Ham, Rellergert-Taylor, & Krumpe, 1988; Meichtry & Harrell, 2002), only slightly more than half of teachers visiting CWES felt that providing additional training along with

EE field trip materials was helpful. Offering training was perhaps not as important to this population of teachers because 65% had over ten years of teaching experience, and 40% had been coming to CWES annually for six years or more.

The majority of teachers also indicated theoretical agreement with FMP Principles 3 and 4. These principles are concerned with providing opportunities for students to participate in joint productive activity and to build literacy, dialogue and research skills.

In the case of FMP Principle 3, most teachers agreed that post-field trip activities should allow students to further explore information about the field trip in which they were curious (86% agreed). Most teachers also supported pre- and post-field trip activities that connect learning to students' personal experiences (89% agreed). Finally, most teachers exhibited a preference for pre- and post-field trip activities to be carried out in the classroom rather than for homework (92% exhibited this preference) and that the activities should be designed so that students discuss and work with each other and the teacher rather than working individually (77% exhibited this preference). In the case of FMP Principle 4, most teachers theoretically saw the value in having pre- and post-field trip activities that allowed them to assess both content learned as well as literacy and research skills (68% agreed). Additionally, 78% agreed that they would be more likely to use post-visit activities if the activities provided opportunities for students to carry out tasks beyond that of just recalling information learned.

In terms of FMP Principle 2, teachers' opinions were mixed. While 58% saw the value in using the pre-field trip activity to orient students to the site by using a

video, 29% had no opinion and 13% disagreed. However, most teachers saw the value in having post-visit activities that provided ways of assessing and reviewing what was learned on the trip (85% agreed with 15% expressing no opinion.)

Some studies in the literature have found even less support by teachers for the planning of pre-field trip activities than was found in this case. These studies cite reasons such as time constraints, not wanting to "spoil" the visit, and assumptions that students would make connections on their own (Cox-Peterson & Pfaffinger, 1998; Kisiel 2005). Unfortunately, if teachers visiting CWES or other field trip venues hold these beliefs, research suggests that their students – due to lack of preparation for the field trip – are likely to experience a novelty effect while on the trip. This effect reduces the chance that students will cognitively benefit from the field trip (Falk, Martin, & Balling, 1978; Flexer & Borun, 1984; Gennaro, 1981).

In relation to what happens after the field trip, though some studies find that a majority of teachers express interest in following up the field trip with a post-visit activity (Cox-Peterson & Pfaffinger, 1998; Griffin, 1994), other studies suggest teachers' intended follow-up either doesn't get carried out or that it consists of making informal, opportunistic connections rather than committing to a structured, reflective activity (Anderson & Zhang, 2003; Griffin, 1994; Storsdieck, 2006). Because teachers visiting CWES were asked to report on their post-field trip activity prior to returning to school, there is no way of knowing if the activity they reported planning was actually carried out. Without proper follow-up, research suggests that there is a decrease in the amount of students that will retain information learned on the field trip (Anderson, Lucas, Ginns & Dierking, 2000; Farmer & Wott, 1995).

Finally, teachers visiting CWES were close to evenly split on their opinions of whether pre- and post-field trip activities should be used as a "three-part field trip unit". 50% of teachers preferred that the pre- and post-field trip activities be designed to act as a complete unit, while 44% of teachers preferred that pre- and post-activities could be used individually. 6% of teachers thought that either design would be useful. This split may reflect the time pressures faced by teachers and the time they have available in their curriculum to carry out both pre- and post-field trip activities.

Subproblem 3: How do teachers use FMP principles in conjunction with their environmental education field trips to CWES?

Finally, the third evaluation technique evaluated open-ended answers from teachers' surveys about their current preparation and follow-up to field trips. Additionally, for the evaluation, the researcher created materials based on the principles of the FMP and had teachers visiting CWES pilot test the materials in conjunction with their trip. Two teachers volunteered to pilot test activities. They were observed during the pilot tests and interviewed immediately following the post-field trip activities.

Open-ended responses revealed that a majority of teachers surveyed (a little over 60%) were conducting some sort of pre-visit activity with their students that could orient the students to the field trip site or lesson content. Survey responses also revealed that about 74% of teachers had planned or were going to plan some sort of follow-up to the field trip related to what had been learned. This information shows

that a slight majority of teachers visiting CWES already exercise FMP principle 2 with their field trip, while a lesser amount of teachers visiting CWES do not.

Though open-ended responses about pre-visit activities and post-visit activities were not specific enough to determine if FMP Principle 3 was being used, teachers' descriptions did indicate an adherence to Principle 4 in the post-visit activities that they were planning. The most popular post-visit activities were journaling/writing about the field trip experience (38%), conducting a project related to the field trip (28%) and discussing the field trip experience (23%). These types of activities allow for literacy, research and dialogue skills development.

In addition to open-ended survey responses, pilot teachers were observed carrying out indicators of FMP principles 2, 3 and 4 during pre- and post-activities even though they both modified the FMP-based activities designed by the researcher. In their interviews, they exhibited a positive reaction to these principles, being very supportive of the activities ability to promote research skills, allow for group work and higher-level thinking, and engage students in something relevant to their lives or of personal interest to them.

In reference to FMP Principle 1, open-ended survey responses showed that teachers had two types of motivations for why they carried out pre- and post-visit activities: cognitive and affective. Around two-thirds of teachers carrying out these activities were concerned with cognitive/learning-based outcomes of the field trip. Some teachers carrying out these activities were concerned with affective/emotional-based outcomes. This mixture of motivations indicates that pre- and post-visit activities should ideally address both cognitive and affective goals. This

recommendation can be found in the literature for museum studies as well

(Anderson, Kisiel, & Storksdieck, 2006; Kisiel, 2005).

Additionally, open-ended survey responses indicated the barriers teachers face to carrying out pre- and post-activities. By far, time and timing are the biggest barriers and were cited by over half of the teachers that were unable to carry out pre-activities and over half of those not planning on carrying out post-activities. Either teachers did not have enough time to do the activities, or their field trips were scheduled during a point in their curriculum not related to the field trip (ie. they did cover the topic of the field trip, but either much earlier or later in the year). A second reason teachers did not carry out pre- and post-activities is that they placed that responsibility on another teacher from their school (usually the science teacher). This reason exposes the ongoing barrier of integrating environmental education in a cross-disciplinary fashion because of the habit of using science alone as the subject under which to teach it (Ham, Rellergert-Taylor, & Krumpe, 1988; Simmons, 1989). Other reasons included teachers' opinions that the activities were not necessary and teachers being unaware of, or unable to access the pre- and post-activities offered by CWES.

Finally, during pilot test interviews, the needs of teachers visiting CWES were further defined. By clarifying these needs, CWES will have additional information to help in the implementation of FMP Principle 1 (adopting the perspectives of the teacher.) CWES pilot teachers expressed what worked well about the FMP-based materials and what didn't work well about the materials. From their responses emerged three main themes: materials need to be easy for teachers to use,

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easy for students to use, and the teacher must have enough time to both review the material and teach it in the classroom. Teachers' responses indicated that materials were easy for them to use when they were well-organized, concise in their synopsis of activities, familiar to the teacher, pre-made but could be adapted, and did not rely on resources (like a computer lab) that may not be available at all times of the year. Teachers' responses indicated that materials were easy for their students to use when handouts provided clear directions, familiar vocabulary and space for students to organize their thoughts. Finally, teachers indicated that despite the quality of the pre- and post-field trip resources provided, they still might not be able to use them if there was not sufficient time.

Conclusions

This case study found that the FMP is a useful tool in the environmental education context of the Central Wisconsin Environmental Station with a few caveats. After analyzing the alignment of the FMP to national environmental education guidelines, the FMP was found to be a straightforward set of principles that are similar in scope to many of the guidelines set by NAAEE to ensure the creation of quality environmental education materials. The FMP already encompasses the NAAEE themes of depth, skills building, instructional soundness and usability. However, when using the FMP as a guide, environmental educators still need to be aware of the elements of fairness, accuracy and action orientation in the materials they create to support field trips.

In addition to its theoretical alignment with national environmental education guidelines, the FMP was found to be a useful tool for creating the types of pre- and

post-field trip materials that teachers visiting CWES are theoretically interested in, and the types of activities that are similar to those already being used by some teachers in conjunction with their field trips. Nevertheless, there are still barriers that even FMP-based materials might not be able to address. The biggest of those barriers is time. Though FMP-based materials can be designed to minimize the time needed to review and implement activities, some teachers face significant barriers that make even minimal time commitments devoted to connecting field trip and classroom learning impossible.

Recommendations for CWES

The FMP has the power to guide the development of pre- and post-field trip materials that can address both the practical needs of teachers and the educational needs of students. It is recommended that CWES review the pre- and post-visit activities that it offers in light of recommendations made in the FMP. CWES should revise these activities if needed and as time allows. By doing so, CWES can offer resources that help to better connect classroom and field trip learning and improve the effectiveness of field trip experiences. Having these activities premade and available for teachers may also meet the desires or expectations by some teachers that the field trip venue provide pre- and post-field trip activities (Anderson & Zhang, 2003; Michie, 1998).

CWES will face challenges if it decides to undergo this process. The biggest challenge will be to create activities that will not only meet the curricular needs of teachers from multiple school districts and a wide range of grade levels, but activities that will also meet the learning needs of a large, diverse population of students.

When designing or re-designing pre- and post-field trip activities, the most important thing to keep in mind is how much time the teacher will need to review the activities and how much classroom time will be required to implement the activities. Though one option to cut down on the amount of class time needed to carry out these activities is to assign the activities for homework, this is not recommended as a solution at CWES. Based on survey responses in which 92% of teachers preferred that pre- and post-activities be designed to be carried out in class rather than assigned as homework, it is advised that these activities be teacher-led.

Further, because many teachers visiting CWES did not recognize the need to use pre-visit activities to orient their students to the field trip site, it is suggested that the Program Manager include information about the novelty effect and importance of letting students watch the CWES orientation video prior to their visit in materials for teachers or in conversations with teachers prior to their field trip.

Though CWES should share the above information with teachers, it is advised that CWES continue to use field trip lessons that can stand alone. Though this is contradictory to FMP principle 2, it recognizes the barriers teachers face to carrying out pre- and post-activities. Again, these teachers should be encouraged to use pre- and post-visit activities because of the increased learning and affective outcomes that result when field trips are connected to classroom learning. However, because 40% of teachers visiting CWES reported not using pre-visit activities and 26% reported not planning post-visit activities, it is important that CWES field trips still be comprehensible for their students.

Recommendations for other environmental education centers

If interested in further improving the effectiveness of field trips, environmental education centers should undertake their own studies. If choosing to use the FMP as a tool to help design pre- and post-visit activities, environmental educators should understand the limitation related to teachers' time. Environmental education centers should also undertake a needs assessment of their teachers to help better determine the perspectives of teachers visiting their center and the types of materials these teachers are interested in using in conjunction with their field trips.

Recommendations for teachers and school districts

Research suggests that field trips can be most effective when students are prepared for the trip and are given time to reflect on what they learned when they are back at school (Bitgood, 1989; EETAP, 1998; Orion, 1993; Storsdieck, 2006). In order to make the expense of the trip and the time taken away from class worthwhile, teachers should prepare their students by orienting them to the site, sharing the schedule for the day and helping students develop a basic understanding of the vocabulary and concepts they will be learning about. Teachers should also set aside some time on the day following the field trip to conduct a post-visit activity. This activity allows students to reflect on their experiences and connect them back to what is being learned in the classroom.

Research also suggests that, if carried out effectively, field trips have the power to positively benefit student learning (Farmer, Knapp & Benton, 2007; Flexer & Borun, 1984; Lisowski & Disinger, 1991; MacKenzie & White, 1982) and attitudes towards learning (Hannon & Randolph, 1999; Michie, 1998; Price & Hein,

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1991; Wendling & Wuensch, 1985). School districts should recognize the potential of field trips to engage students and should support teachers' efforts in carrying out effective field trips. School districts can do this by paying for substitutes to cover classes while teachers are on field trips, and by creating policies that encourage teachers to take the time necessary to prepare for and follow up on their field trips. Particularly, school districts should be aware that the pressures of standardized testing can weigh heavily on teachers (Anderson, Kisiel & Storksdieck, 2006). School districts should consider balancing their insistence on high standardized test scores with an allowance for teachers and students to apply their learning outside of the classroom during field trip opportunities. When conducted effectively, field trips (and their accompanying preparation and follow-up in the classroom) connect to the school curriculum, goals and objectives and address the academic core standards.

Implications for Further Research

If more time could be devoted to this study, the researcher would recommend a revision of pilot-test activities in light of the comments made by the first two pilot-test teachers. She would also recommend that additional pilot-testing be conducted with the revised activities to further improve their usability for teachers.

Another interesting topic for research would be the examination of what drove the apparent contradiction between the time barriers reported by teachers not using pre- and post-visit activities and the preference of 92% of teachers that post-activities be designed for use in the classroom rather than assigned as homework. Assigning these activities as homework seems a plausible way to relieve pressures on teachers'

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class time. However, the vast majority of teachers expressed a preference that these materials be designed to be used in class.

Additionally, though the researcher's study was concerned with how useful FMP-based activities would be to teachers visiting CWES, she would recommend another study to determine if students' learning and attitudes improved based on preparation and follow-up with FMP-based activities. This could be carried out through a pre-test/post-test design using several treatment groups of students who experience FMP-based activities, several treatment groups of students who experience non-FMP-based activities, and several control groups that do not experience any pre- or post- activities.

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APPENDIX A

In-Person Teacher Survey Instrument

Teacher Survey on Pre- and Post- Field Trip Activities

The purpose of this questionnaire is to determine the extent to which you use pre- and post-field trip activities in your classroom before and/or after your visit to CWES. Additionally, the questionnaire asks that you provide your perceptions of the usefulness of these activities. There are no right or wrong answers. We will keep your answers confidential and use your responses to improve our program. Thank you, in advance, for your participation!

PRE – FIELD TRIP ACTIVITIES

Pre- field trip activities *- activities you used in your classroom to prepare your students for their field trip to CWES. These activities can include, but are not limited to, sharing the field trip schedule with your students, introducing vocabulary and/or concepts related to the field trip lessons, or setting out behavioral expectations for the field trip.*

Did you use pre- field trip activities in your classroom prior to your visit to CWES? *(Please circle yes or no and answer the question(s) indicated.)*

Yes   No

Please provide a brief, specific description of any pre- field trip activities that you used. IF you used the pre- field trip activities available on the CWES website, please specify so in your answer.

There are many possible reasons for why teachers choose not to use pre- field trip activities. Please provide at least one reason why you did not use pre- field trip activities.

There are many possible reasons for why teachers choose to use pre- field trip activities. Please provide at least one reason for why you used pre- field trip activities.

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POST – FIELD TRIP ACTIVITIES

Post- field trip activities - *activities you plan to use in your classroom to follow up on the field-trip to CWES.* These activities can include, but are not limited to, asking students their impressions, discussing the content of the lessons that were covered during the field-trip, or assigning projects/homework related to field trip lesson content.

Are you planning on using post- field trip activities in your classroom after your visit to CWES? *(Please circle yes or no and answer the question(s) indicated.)*

Yes   No

Please provide a brief, specific description of any post-visit activities that you are planning to use. IF you are planning to use post- field-trip activities available on the CWES website, please specify so in your answer.

There are many possible reasons for why teachers choose not to use post- field trip activities. Please provide at least one reason for why you are not planning to use post- field trip activities.

There are many possible reasons for why teachers choose to use post- field trip activities. Please provide at least one reason for why you are planning to use post- field trip activities.

TIMING OF FIELD TRIP

If the CWES field trip lessons were relevant for your curriculum, when as part of the curriculum did you visit CWES? *(Please check the answer that applies.)*

☐ several weeks before you started the unit   ☐ a couple of days before you started the unit

☐ while you were teaching the unit   ☐ several weeks after you finished the unit

☐ several days after you finished the unit   ☐ the field trip lessons were not relevant to my curriculum

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OPINIONS ON FIELD TRIP SUPPORT MATERIALS

Whether or not you used pre- and or post- field trip activities, please provide your opinion of the following statements by circling your choice along the scale.

Pre- and post- field trip activities prepared for teachers are useful if:

a) They list the curricular standards to which they are aligned	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
b) They do not take more than one class period apiece to complete	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
c) They include a short online video tutorial of how to do the activities	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
d) Pre-field trip activities include a video for students/teachers that orients them to the CWES site	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
e) They provide ideas for student projects that can be assigned to assess what was learned	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
f) They allow students to explore information from field-trip lessons about which they are still curious	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
g) They connect field trip learning to students' personal experiences	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
h) They assess students' research skills and/or literacy in addition to assessing student recall of information	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree

Out of items "a" through "h" above, please list the three items that you believe would make pre- and post- field trip activities most useful. *Indicate your choices by providing the letter of the item or specifying your own answer.*

1) _____   2) _____   3) _____

Other *(please specify)* _____

Please continue survey on the back of this page.

Whether or not you used pre- and or post- field trip activities, for the questions below, please circle the choice that best describes your opinion. IF you feel positively about both statements, Circle both.

I would be most likely to use pre- and post- field trip activities if:

They were designed to be conducted in class	OR	They were designed to be conducted as homework
They generate discussion among students individually	OR	They allow students to work
They include tasks for students that go beyond recalling information learned during the field trip	OR	They focus on assessing student recall of information learned during the field trip
They were designed to act as a complete unit (the post- activity would build off the pre-activity)	OR	They were designed to stand alone (the post- activity could be done without the pre-activity)

DEMOGRAPHICS

What grade level(s) do you teach?

□ 5th   □ 6th   □ 7th   □ 8th   □ Other (*specify*) _____

How long have you been teaching?

□ Less than a year   □ 1 – 2 years   □ 3 – 5 years   □ 6 – 10 years   □ 10 or more years

How many years have you been bringing your class to CWES?

□ 1 year (this year)   □ 2 – 5 years   □ 6 - 10 years □ more than 10 years

Is your CURRENT field trip to CWES a day-long program or an overnight program?

□Day-long program
□ Overnight program (2 days, 1 night)
□ Overnight program (3 days, 2 nights)

Please use the schedule included to determine the names of the lessons that your class participated in during their field trip. Please list the names of the lessons in the space provided below.

THANK YOU for your participation! Please place your survey in the envelope provided, seal the envelope, and return to a CWES staff member before you depart.

APPENDIX B

In-Person Teacher Survey Instrument
(Annotated to describe relation to research concern)

Teacher Survey on Pre- and Post- Field Trip Activities

The purpose of this questionnaire is to determine the extent to which you use pre- and post-field trip activities in your classroom before and/or after your visit to CWES. Additionally, the questionnaire asks that you provide your perceptions of the usefulness of these activities. There are no right or wrong answers. We will keep your answers confidential and use your responses to improve our program. Thank you, in advance, for your participation!

PRE – FIELD TRIP ACTIVITIES

Pre- field trip activities - *activities you used in your classroom to prepare your students for their field trip to CWES. These activities can include, but are not limited to, sharing the field trip schedule with your students, introducing vocabulary and/or concepts related to the field trip lessons, or setting out behavioral expectations for the field trip.*

Did you use pre- field trip activities in your classroom prior to your visit to CWES? *(Please circle yes or no and answer the question(s) indicated.)*

Yes   No

Please provide a brief, specific description of any pre- field trip activities that you used. IF you used the pre- field trip activities available on the CWES website, please specify so in your answer.

> Answers from this open-ended question are intended to reveal actual use of FMP principles in activities already being carried out by teachers (Principles 1 – 4 of the FMP).

There are many possible reasons for why teachers choose not to use pre- field trip activities. Please provide at least one reason why you did not use pre- field trip activities.

> Answers from this open-ended question are intended to reveal any barriers the teacher faces to implementing pre-visit activities (Principle 1 of the FMP).

There are many possible reasons for why teachers choose to use pre- field trip activities. Please provide at least one reason for why you used pre- field trip activities.

> Answers from this open-ended question are intended to reveal the perspectives of the teacher related to pre-visit materials (Principle 1 of the FMP).

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POST – FIELD TRIP ACTIVITIES

Post- field trip activities - *activities you plan to use in your classroom to follow up on the field-trip to CWES.* These activities can include, but are not limited to, asking students their impressions, discussing the content of the lessons that were covered during the field-trip, or assigning projects/homework related to field trip lesson content.

Are you planning on using post- field trip activities in your classroom after your visit to CWES? *(Please circle yes or no and answer the question(s) indicated.)*

Yes   No

Please provide a brief, specific description of any post-visit activities that you are planning to use. IF you are planning to use post- field-trip activities available on the CWES website, please specify so in your answer.

There are many possible reasons for why teachers choose not to use post- field trip activities. Please provide at least one reason for why you are not planning to use post-field trip activities

> Answers from this open-ended question are intended to reveal actual use of FMP principles in activities already being carried out by teachers (Principles 1 – 4 of the FMP).

> Answers from this open-ended question are intended to reveal any barriers the teacher faces to implementing post-visit activities (Principle 1 of the FMP).

There are many possible reasons for why teachers choose to use post- field trip activities. Please provide at least one reason for why you are planning to use post- field trip activities.

> Answers from this open-ended question are intended to reveal the perspectives of the teacher related to post-visit materials (Principle 1 of the FMP).

> Answers from this question examine if the field trip is being used as a three-part unit (Principle 2 of the FMP).

TIMING OF FIELD TRIP

If the CWES field trip lessons were relevant for your curriculum, when as part of the curriculum did you visit CWES? *(Please check the answer that applies.)*

☐ several weeks before you started the unit   ☐ a couple of days before you started the unit

☐ while you were teaching the unit   ☐ several weeks after you finished the unit

☐ several days after you finished the unit   ☐ the field trip lessons were not relevant to my curriculum

OPINIONS ON FIELD TRIP SUPPORT MATERIALS

Whether or not you used pre- and or post- field trip activities, please provide your opinion of the following statements by circling your choice along the scale.

Pre- and post- field trip activities prepared for teachers are useful if:

a) They list the curricular standards to which they are aligned

Strongly Agree   Agree   No Opinion   Disagree   Strongly Disagree

Determining teachers' needs related to curricular ties, time pressures and training (Principle 1 of the FMP)

b) They do not take more than one class period apiece to complete

Strongly Agree   Agree   No Opinion   Disagree   Strongly Disagree

c) They include a short online video tutorial of how to do the activities

Strongly Agree   Agree   No Opinion   Disagree   Strongly Disagree

Determining teachers' agreement with the need to orient students (Principle 2 of the FMP)

d) Pre-field trip activities include a video for students/teachers that orients them to the CWES site

Strongly Agree   Agree   No Opinion   Disagree   Strongly Disagree

Determining teachers' agreement with the need to provide meaningful follow-up for students (Principle 2 of the FMP)

e) They provide ideas for student projects that can be assigned to assess what was learned

Strongly Agree   Agree   No Opinion   Disagree   Strongly Disagree

f) They allow students to explore information from field-trip lessons about which they are still curious

Strongly Agree   Agree   No Opinion   Disagree   Strongly Disagree

Determining teachers' agreement with the philosophy of joint productive activity (Principle 3 of the FMP)

g) They connect field trip learning to students' personal experiences

Strongly Agree   Agree   No Opinion   Disagree   Strongly Disagree

Determining teachers' agreement with the need to encourage skill development (Principle 4 of the FMP)

h) They assess students' research skills and/or literacy in addition to assessing student recall of information

Strongly Agree   Agree   No Opinion   Disagree   Strongly Disagree

Out of items "a" through "h" above, please list the three items that you believe would make pre- and post- field trip activities most useful. *Indicate your choices by providing the letter of the item or specifying your own answer.*

1) _____   2) _____   3) _____

Other *(please specify)* _____

Determining teachers' priorities for FMP principles 1- 4

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Whether or not you used pre- and or post- field trip activities, for the questions below, please circle the choice that best describes your opinion. IF you feel positively about both statements, Circle both.

I would be most likely to use pre- and post- field trip activities if:

They were designed to be conducted in class   OR   They were designed to be conducted as homework

Determining teachers' agreement with the philosophy of joint productive activity (Principle 3 of the FMP)

They generate discussion among students   OR   They allow students to work individually

They include tasks for students that go beyond recalling information learned during the field trip   OR   They focus on assessing student recall of information learned during the field trip

Determining teachers' agreement with the need to encourage skill development (Principle 4 of the FMP)

They were designed to act as a complete unit (the post- activity would build off the pre- activity)   OR   They were designed to stand alone (the post- activity could be done without the pre-activity)

Determining teachers' agreement with the need for the field trip to be conducted as a three-part unit (Principle 2 of the FMP).

DEMOGRAPHICS

This section was used to define the sample population for this case study.

What grade level(s) do you teach?

□ 5th   □ 6th   □ 7th   □ 8th   □ Other (*specify*) _____

How long have you been teaching?

□ Less than a year   □ 1 – 2 years   □ 3 – 5 years   □ 6 – 10 years   □ 10 or more years

How many years have you been bringing your class to CWES?

□ 1 year (this year)   □ 2 – 5 years   □ 6 - 10 years   □ more than 10 years

Is your CURRENT field trip to CWES a day-long program or an overnight program?

□Day-long program
□ Overnight program (2 days, 1 night)
□ Overnight program (3 days, 2 nights)

Please use the schedule to determine the names of the lessons that your class participated in during their field trip. Please list the names of the lessons in the space provided below.

APPENDIX C

Summary Table of FMP Principles Included in "Pond Power" Pre- and Post-Field Trip Materials

FMP Principles Incorporated into Pond Power Field Trip Supporting Activities*

	FMP Principle 1 Teachers' Needs	FMP Principle 2 Field trip Structure	FMP Principle 3 Joint Productive Activity	FMP Principle 4 Research/Literacy Skills
Pre-visit Activities	- Designed to be carried out in only one class period - Includes academic standards - Materials easily accessible at any time of day (online) - Materials in familiar lesson plan format - All handouts/ supporting visuals provided in lesson plan	*Reduction of novelty effect:* - CWES video orients students to site - Field trip discussion informs student expectations - Introduction of concepts/ vocabulary link classroom learning to learning that will take place on the trip	- Food chain activity draws *connection between students' lives and new learning* (food chain present in their own meal) - Online search allows students to *explore interests* they may have about animals as they complete the trophic pyramid activity - Online search *cognitively engages* students in applying trophic level definitions to actual animals	- Students must *practice literacy skills* while reading about animals to determine their trophic levels
Post-visit Activities	- Standard activities designed to be carried out in only one class period - Choice of culminating activities are up to the teacher's discretion based on time and resources available - Includes academic standards - Materials easily accessible at any time of day (online) - Materials in familiar lesson plan format - All handouts and supporting visuals provided in lesson plan	*Reinforcement of the learning experience:* - Follow up lesson requires students to reflect on learning from the field trip (what macroinvertebrates they found) - Culminating activities require students to build upon field trip learning in order to create a final product. This product gives a tangible purpose for the trip /product created as a result of the trip.	- During follow-up lesson, students *discuss with peers* their findings from the trip - Students *are challenged to think* about factors affecting their findings rather than accepting the findings without review - Students have some *control over choosing* what culminating activity to undertake: - *Local Stream Virtual Sample relates to students' lives* by asking *groups of students* to investigate water quality of their local rivers and *challenges* them to compare findings between locations. - *Don't Run Off From My Backyard challenges* students to *redesign their own yards* in light of non-point source pollution from run-off. - *What's Living in Your Lake? relates to students' lives* by asking *groups of students* to study macroinvertebrates in their local lake.	- Students *practice research skills* when they analyze their findings in light of factors affecting macroinvertebrate populations (sampling bias, dissolved oxygen, and chemicals) - *Local Stream Virtual Sample*: students use *scientific inquiry* (navigating a database to find answers) - *Don't Run Off From My Backyard:* students use *literacy skills* to read about run-off solutions. - *What's Living in Your Lake?*: students practice observation and research skills using scientific protocols to sample a lake.

* Full supporting materials can be viewed and downloaded at: http://www.uwsp.edu/cnr/cwes/PreandPosts/Pond_Power/Pond_power_home_page.aspx

APPENDIX D

Summary Table of FMP Principles Included in "Laws of Nature" Pre- and Post-Field Trip Materials

FMP Principles Incorporated into Laws of Nature Field Trip Supporting Activities

	FMP Principle 1 Teachers' Needs	FMP Principle 2 Field trip Structure	FMP Principle 3 Joint Productive Activity	FMP Principle 4 Research/Literacy Skills
Pre-visit Activities	- Designed to be carried out in one class period - Includes academic standards - Materials easily accessible at any time of day (online) - Materials in familiar lesson plan format - All handouts/ supporting visuals are provided	*Reduction of novelty effect:* - CWES video orients students to site - Field trip discussion informs student expectations - Introduction of concepts/ vocabulary link classroom learning to learning that will take place on the trip	- Students *discuss with their peers and with the teacher* how the definition of ecology relates to Aldo Leopold's quote and the "Oh Deer!" simulation - Students *choose* their favorite animals and are *challenged* to analyze the ecological relationships allowing these animals to survive	- Students *practice literacy skills* when reading Aldo Leopold's quote and observation skills when doing the "Oh Deer!" simulation
Post-visit Activities	- Standard activities designed to be carried out in only one class period - Choice of culminating activities are up to the teacher's discretion based on time and resources available - Includes academic standards - Materials easily accessible at any time of day (online) - Materials in familiar lesson plan format - All handouts and supporting visuals provided in lesson plan	*Reinforcement of the learning experience:* - Follow-up lesson requires students to reflect on learning from the field trip (which laws of nature are illustrated by different adaptations and ecological relationships) - Culminating activities require students to build upon their field trip learning in order to create a final product. This product gives a tangible purpose for the trip /product created as a result of the trip.	- In the follow up lesson, students *discuss with their peers and with the teacher* which laws of nature are illustrated by different adaptations and ecological relationships - Students have some *control over choosing* what culminating activity to undertake: - *Laws of Nature in Current Events*: Students *work in groups* to create a presentation about a current *event of their interest* and are *challenged* to analyze how the event illustrates one of the laws of nature - *Laws of Nature in History*: Students *work in groups* to create a presentation. They *choose* a laws of nature as their topic and are *challenged* to find historical events that illustrate the law. - *Laws of Nature Through the Season*: Students *work in pairs* and *explore facts that interest them* about natural phenology . They are *challenged* to articulate how each fact illustrates a law of nature.	Students *practice research skills* when - *Laws of Nature in Current Events*: Students use *literacy skills* to *research* current events in the library and consider the accuracy of research sources. - *Laws of Nature in History*: Students use *literacy skills* to *research* historical events in the library and must provide citations for all of their research sources. - *Laws of Nature Through the Season*: Students use *literacy skills* to read about phenology throughout different seasons. They use analytical skills to determine how phonological events relate to one or more of the laws of nature.

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* Full supporting materials can be viewed and downloaded at: http://www.uwsp.edu/cnr/cwes/PreandPosts/Laws_of_Nature/Laws_of_nature_home_page.aspx

Appendix E

Observation Forms

Pre- Field Trip Activity Observation Form

Observer: _____   Date: _____

School: _____   Grade level: _____ Teacher's name: _____

Class size: _____ Class mix (# female students/# male students): _____

Lesson Topic: _____ Start time: _____ Stop time: _____

Observations on Indoor setting/conditions (approximate time spent inside, temperature, surroundings):
Reflective comments:
Observations on outdoor setting/conditions (approximate time spent outside, temperature, weather, surroundings):
Reflective comments:

Behaviors related to Principle 2	Observed? (Y or N)	Narrative Description (may include comments made by teachers and/or students that were related to the behavior)
Teacher shared the field trip schedule with students		Reflective comments:
Teacher showed the CWES introductory DVD to students		Reflective comments:
Teacher introduced vocabulary related to the field trip lesson		Reflective comments:
Teacher introduced concepts related to the field trip		Reflective comments:

Behaviors related to Principle 3	Observed? (Y or N)	Narrative Description (may include comments made by teachers and/or students that were related to the behavior)
Teacher encouraged students to discuss among themselves and/or with the teacher		Reflective comments:
Teacher provided students the opportunity to explore their individual interests		Reflective comments:
Teacher provided students the opportunity to make choices and control, to some extent, the course of the activity		Reflective comments:
Teacher engaged students in cognitive stages of Bloom's taxonomy beyond just that of knowledge acquisition		Reflective comments:
Activity was carried out in local setting or teacher asked students to reflect on the personal relevancy of the activity		Reflective comments:

Behaviors related to Principle 4	Observed? (Y or N)	Narrative Description (may include comments made by teachers and/or students that were related to the behavior)
Students used literacy skills (reading, writing, putting information into their own words) during the activity		Reflective comments:
Students used research skills (collecting, analyzing, and interpreting data) during the activity		Reflective comments:
Students used dialogue (communication, discussion and/or debate) during the activity		Reflective comments:

Post- Field Trip Activity Observation Form

Observer: _____ Date: _____

School: _____ Grade level: _____ Teacher's name: _____

Class size: _____ Class mix (female/male): _____

Lesson Topic: _____ Start time: _____ Stop time: _____

<table>
<tr><td>

Observations on Indoor setting/conditions (approximate time spent inside, temperature, surroundings):

Reflective comments:

</td></tr>
<tr><td>

Observations on outdoor setting/conditions (approximate time spent outside, temperature, weather, surroundings):

Reflective comments:

</td></tr>
</table>

Behaviors related to Principle 2	Observed? (Y or N)	Narrative Description (may include comments made by teachers and/or students that were related to the behavior)
Teacher asked students to recall vocabulary used during field trip		Reflective comments:
Teacher asked students to recall concepts taught during field trip		Reflective comments:
Teacher assigned in-class project further exploring concepts taught during the field trip		Reflective comments:
Teacher assigned homework project further exploring concepts taught during the field trip		Reflective comments:

Behaviors related to Principle 3	Observed? (Y or N)	Narrative Description (may include comments made by teachers and/or students that were related to the behavior)
Teacher encouraged students to discuss among themselves and/or with the teacher		Reflective comments:
Teacher provided students the opportunity to explore their individual interests		Reflective comments:
Teacher provided students the opportunity to make choices and control, to some extent, the course of the activity		Reflective comments:
Teacher engaged students in cognitive stages of Bloom's taxonomy beyond just that of knowledge acquisition		Reflective comments:
Activity was carried out in local setting or teacher asked students to reflect on the personal relevancy of the activity		Reflective comments:

Behaviors related to Principle 4	Observed? (Y or N)	Narrative Description (may include comments made by teachers and/or students that were related to the behavior)
Students used literacy skills (reading, writing, putting information into their own words) during the activity		Reflective comments:
Students used research skills (collecting, analyzing, and interpreting data) during the activity		Reflective comments:
Students used dialogue (communication, discussion and/or debate) during the activity		Reflective comments:

Appendix F

Interview Guide

CWES Pre- and Post- Field Trip Activity Evaluation
Interview Guide

Interviewer: _____

Interviewee: _____

Date: _____Time: _____Location: _____

Thank you for volunteering your time to help the Central Wisconsin Environmental Station (CWES) evaluate the pre- and post- field trip activities designed to help connect learning in the classroom to learning during your CWES field trip. Your time is very valuable and I appreciate your willingness to spend the next hour with me. Today, I would like to hear your opinion on whether or not the newly-designed pre- and post- field trip activities meet your needs as a teacher. I would like to determine which parts of the activities "worked" in your classroom; and if there where parts that did not work, or could be improved.

As the data collected in this interview will be incorporated into my thesis, I have provided you with a copy of a consent form to participate in the research study. This study has been evaluated and approved by the UWSP Internal Review Board. If you agree to participate, please sign the form indicating your willingness to participate in the study.

In the interview today, there are no "right" or "wrong" answers to the questions I will ask. Your truthful opinion is highly valued, and all answers are important. Please note that, as a participant of the study, you are not required to answer any question you feel uncomfortable answering. Additionally, your identity will be kept confidential. Your demographic information and quotes from the interview may be used in the research report and will be attributed to "interviewee #1".

CWES also asks your permission to record the interview using a voice recorder. After the interview, I will send you a document of your answers (as transcribed from the recording) for your review and approval.

Introduction

I am very happy to have you here today to help me as I pursue my masters, and I want you to feel as comfortable as possible. I will be taking some notes in case my audio recorder fails for any reason, so I hope you can forgive me if I lose eye contact during some of your responses.

I would like to start by asking a few questions about your teaching background:

What grade level(s) do you currently teach?

What subject(s) do you currently teach?

Approximately how long you have been teaching?

For approximately how many years have you brought your class out to CWES on field trips?

Questions

Since you most recently used the post- field trip activities. Let's start out with some questions about those activities. (At this point, I will hand the teacher a copy of the post field-trip activity lesson plan that was provided by CWES.) As designed by CWES, the post field-trip activities may have had parts that either worked or did not work in your classroom. We would like to know your honest feedback so that we can improve the activities.

1. Were there parts of the post-field trip activities that "worked" in your classroom? If so, which parts?

2. Were the parts of the post-field trip activities that did not work so well in your classroom? If so, which parts?

      Probe: How could the activities be changed or improved so that they might work better?

3. What is your opinion of the format of the post- field trip activity lesson plans?

      Probe: Are there things that can be left out? Are there other things that should be included?

      Probe: Was it useful to have the state education standards listed at the end of the activity lesson plan?

4. Which parts of the post- field trip activities do you feel were successful at meeting or reinforcing your curriculum/subject matter needs? Describe how these activities met your needs.

5. Did you use the post- field trip activity video tutorial? If so, was it useful?

      Probe: Can you suggest any ways in which the video tutorial can be changed or improved so that it might be more useful?

6. Would you use the post- field trip activities again on a future field trip to CWES? Why or why not?

      Probe: What might prevent you from using the post- field trip activities on future field trips?

Now that we've talked about the post- field trip activities, I want to ask a few questions about the field trip itself.

7. When you came to CWES, your class participated in the following lessons (read them off to the teacher). Could you briefly discuss what about these lessons appealed to you when you selected them for your field trip?

8. Did the lessons you selected for your field trip naturally fit in with the curriculum you were teaching your class?

      Probe: If so, could you give an example?

9. Were there activities that did not fit in with your curriculum, but that you selected to fill the field trip schedule?

10. Are there other areas in your curriculum that you feel would lend themselves well to lessons with an outdoor component?

Now that we've talked about the field trip, let's talk about the pre- field trip activities that you tried with your class. (At this point, I will hand the teacher a copy of the post field-trip activity lesson plan that was provided by CWES.) As designed by CWES, the pre- field trip activities may have had parts that either worked or did not work in your classroom. We would like to know your honest feedback so that we can improve the activities.

11. Were there parts of the pre-field trip activities that "worked" in your classroom? If so, which parts?

12. Were the parts of the pre-field trip activities that did not work so well in your classroom? If so, which parts?

      Probe: How could the activities be changed or improved so that they might work better?

13. What is your opinion of the format of the pre- field trip activity lesson plans?

      Probe: Are there things that can be left out? Are there other things that should be included?

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Probe: Was it useful to have the state education standards listed at the end of the activity lesson plan?

14. Which parts of the pre- field trip activities do you feel were successful at meeting or reinforcing your curriculum/subject matter needs? Describe how these activities met your needs.

15. Did you use the pre- field trip activity video tutorial? If so, was it useful?

Probe: Can you suggest any ways in which the video tutorial can be changed or improved so that it might be more useful?

16. Would you use the pre- field trip activities again on a future field trip to CWES? Why or why not?

Probe: What might prevent you from using the pre- field trip activities on future field trips?

17. Overall, do you feel that the pre- and post- field trip activities, as designed, did a good, fair, or poor job of connecting classroom learning to concepts learned during the CWES field trip?

Probe: Can you suggest any improvements for the activities?

18. Is there anything else you would like to add?

Reminder:
- *Summarize the interviewee's main points for clarification.*
- *Thank the interviewee for their time and valuable input. Give them the name and contact information of a person they can contact after the session if they have additional questions or concerns.*
- *Distribute stipend and a copy of their signed consent form that has the IRB Chair's contact information.*

APPENDIX G

Coding Scheme based on NAAEE Guidelines

Coding Scheme - Indicators of Quality Environmental Education Materials

Indicator	Attributes	Examples
Fairness	A. Materials present learners with pros *and* cons of issues from different perspectives	A. "reflecting the diversity of perspectives," "examine multiple perspectives on the issues"
	B. Materials reflect different cultures, races, ages, genders, and social groups in a respectful and equitable way	B. "reflect cultural differences," "depict people of various genders in a respectful and equitable manner"
	C. Materials do not tell learners what to think about issues. Instead, they provide learners with opportunities to reflect on both published research and personal findings in order to construct their own understanding	C. "arrive at their own conclusions", "prompt continued inquiry", "presented in language appropriate to education, not propagandizing," "resources for further study included"
	D. Materials offer transparency of their viewpoints	D. "Materials list the people involved in development and review," "Opinions or policies of an agency or organization are clearly identified as such"
	E. Materials provide guidance and opportunity for investigating bias and validity	E. "Acknowledge that…attitudes shape environmental perceptions," "identifying bias"
Accuracy	F. Materials present up-to-date and accurate information that is backed by clearly-cited evidence from primary sources	F. "reflect sound theories," "well-documented facts," "sources of factual information are clearly referenced"
	G. Materials were developed or reviewed by a diverse group of experts from various fields	G. "range of experts in the appropriate fields reviewed the materials or participated in their development"
Depth	H. Materials include comprehensive learner objectives that address cognitive (awareness and knowledge), affective (attitudes and values), and behavioral outcomes (habits)	H. "Foster awareness," "acquire the …attitudes…needed to protect and improve the environment," "Habits of mind"
	I. Materials should be interdisciplinary (include math, science, English, social studies, and other subjects)	I. "synthesizing knowledge and experience across disciplines," "Concepts from social science fields…are presented"
	J. Learners should be challenged: completing projects that require thinking about concepts at a higher level	J. "challenged to use higher-order thinking skills," "focus on concepts"
	K. Materials should recognize interdependence. They should draw connections within and between human systems (economic, cultural and social) and natural systems (ecological and geographical)	K. "viewing the environment within the context of human influences," "ethical…relationships are addressed," "use unifying themes"
	L. Materials should recognize complexity. They should provide various means of examining issues at different time scales (short-term and long-term) and different geographic scales (local, national, international)	L. "attention to different scales, " "gain an understanding of the complexity of issues", "environmental impact analysis"

Skills Building	M. Learners should have the opportunity to practice creative skills (art, singing, dancing)	M. "using music, art, poetry, drama"
	N. Learners should have the opportunity to practice research skills through conducting investigations (formulating hypothesis, collecting and analyzing data)	N. "investigate," "research," "Data collection" "forming hypothesis" "environmental monitoring"
	O. Learners should have the opportunity to practice communication skills (reading, writing, public speaking)	O. "using metaphors and analogies," "oral and written communications"
	P. Learners should have the opportunity to practice interpersonal skills: working cooperatively together in an atmosphere of respect	P. "opportunity for learners to work cooperatively," "conflict resolution"
	Q. Learners should have the opportunity to use technology	Q. "Use of various forms of technology"
Action Orientation	R. Materials should encourage students to ponder the consequences of their actions and feel a sense of civic and personal responsibility for their actions	R. "acquire the commitment needed to protect the environment," "civic responsibility," "understanding their likely consequences"
	S. Materials should inspire a feeling of self-efficacy in learners so that they have confidence that they, as individuals, can make a difference	S. "contain examples of people that have made a difference," "self-efficacy"
	T. After examining their findings or the findings of others, materials should compel students to plan and evaluate various possible solutions	T. "envision alternative scenarios," "formulating possible solutions," "creating an action plan"
	U. Materials should encourage learning through action. Students should examine real-world contexts and conduct projects in partnership with their community	U. "act on environmental issues," "participate in the political regulatory process," "consumer action," "community service," "provides real-world contexts and issues," "applying skills to issues," "experiential learning"
Instructional Soundness	V. Materials are centered on learners' interests and concerns	V. "learner-centered," "use learner questions and concerns as a starting point"
	W. Materials use various teaching methods to engage students' multiple intelligences	W. "different ways of learning"
	X. Materials are relevant to learners' everyday lives: using their local environment and building upon their prior knowledge	X. "within the probable vocabulary and experience of students" "build from previous knowledge," "connection to learners' everyday lives"
	Y. Materials are aligned with local, state and/or national academic standards	Y. "fit with national, state, or local standards or curricula"
	Z. Activities described in materials are sufficient to achieve the learner outcomes listed	Z. "content is appropriate for achieving objectives"
	AA. Materials encourage students to create a learning network that contains their peers, parents, and/or other community members	AA. "develop an active learning community," "share and celebrate the results of their actions with peers"
	BB. Materials include suggestions for effective means of assessing learners	BB. "suggest projects," "assessment techniques"

Usability	CC. Materials are appealingly-designed and engaging	CC. "well designed," "engagingly written," "layout is interesting and appealing"
	DD. Materials are well-organized and thorough: clearly listing concepts to be covered, goals, objectives, time estimates, equipment needed, and all instructions. Materials provide pre- and post-activities.	DD. "presented logically," "goals and objectives for learner outcomes are clearly stated," "include information about equipment needed," "background information for the educator is adequate and accurate"
	EE. Materials either provide indicated resources or those resources are easily accessible for little to no cost	EE. "equipment and materials are accessible," "suggestions for finding low-cost alternatives for materials"
	FF. Materials have been field tested by educators working in the setting for which the materials are intended and evaluated by experts to ensure that instructors find materials easy to use and reliable	FF. "lessons-related activities can be accomplished in the time specified," "experiments and activities are predictable," "easy to use," "materials are field tested under conditions similar to their intended use"
	GG. Instructors are offered additional instructional support options such as training to improve their comfort with materials	GG. "accompanied by instruction and support," "professional development programs are accessible"
	HH. Materials are accessible to all learners (adaptable to populations with special needs, populations in different regions, and populations in different economic circumstances)	HH. "different education levels," "different income levels," "easy for students to use and understand," "includes suggestions for appropriate variations and extensions,"
	II. Materials are accessible to all instructors (available in electronic and print forms, permission to copy is explicit)	II. "available in electronic form"
	JJ. Materials can be reused year after year (adaptable to changing conditions)	JJ. "material is easy for educators to keep and use"

APPENDIX H

Demographics of Teachers Responding to Survey

Demographics of teachers responding to the survey – Teachers were asked to report their gender, the grade level they taught, and the number of years they had been teaching (teaching experience). They were also asked to report how many years they had been bringing their students to CWES (experience with CWES) and the length of their current field trip to CWES (time spent at CWES). Table 4.1 summarizes their responses.

Table 4.1 Demographics of teachers responding to the survey

	Gender (n = 53)	Grade level taught (n = 51)	Teaching experience (n = 52)	Experience with CWES (n = 53)	Time spent at CWES (n = 53)
Male	15 (28%)				
Female	38 (72%)				
5th grade		15 (29%)			
6th grade		10 (19%)			
7th grade		5 (10%)			
combination of grades (5th - 8th)		21 (42%)			
> 1 year			4 (8%)		
1 - 2 years			2 (4%)		
3 - 5 years			7 (14%)		
6 - 10 years			5 (9%)		
10 + years			34 (65%)		
1st year				14 (26%)	
2 - 5 years				18 (34%)	
6 - 10 years				10 (19%)	
10 + years				11 (21%)	
day trip					16 (30%)
2 days, 1 night					32 (60%)
3 days, 2 nights					5 (10%)

APPENDIX I

Most Important Features of Pre- and Post-visit Activities

Table 4.2 summarizes all selections that were made by teachers when they were asked to rank the most important features of pre- and post-visit activities. The total of 159 responses accounts for three choices made by each of fifty-three teachers. The total of 153 *valid* responses excludes blank responses and two alternative responses. The alternative responses are included below.

Table 4.2 Teachers' "Top 3" most useful pre- and post-visit activity qualities

Response	Frequency*	Percent**	Valid Percent***
They list the curricular standards to which they are aligned	11	6.9	7.2
They do not take more than one class period to complete	12	7.5	7.8
They include a short online video tutorial of how to do the activities	15	9.4	9.8
Pre-field trip activities include a video for students/teachers that orients them to the CWES site	18	11.3	11.8
They provide ideas for student projects that can be assigned to assess what was learned	26	16.4	17.0
They allow students to explore information from field-trip lessons about which they are still curious	27	17.0	17.6
They connect field trip learning to students' personal experiences	32	20.1	20.9
They assess students' research and/or literacy skills in addition to assessing student recall of information	12	7.5	7.8
Total (valid responses)	**153**	**96.2**	**100.0**
Alt. response 1 = all paperwork and worksheets needed	1	.6	
Alt response 2 - chose both e and f (projects for assessment and allow students to explore areas of curiosity)	1	.6	
no response	4	2.5	
Total (alternative and missing responses)	**6**	**3.8**	
Total	159	100.0	

* Frequency refers to the number of times the answer was selected

** Percent refers to the percentage that describes how often the answer was selected

*** Valid percent refers to the percentage that describes how often the answer was selected out of all valid answers (this percentage excludes missing and alternative answers)

APPENDIX J

Sample Responses from Open-ended Survey Questions Related to FMP Principle 1

Sample Responses for Pre-Visit Activity Motivations

Cognitive motivations: The majority of teachers conducted pre-visit activities as a way to encourage cognitive gains for their students.

Most teachers mentioned wanting to improve their students' understanding of trip activities and vocabulary. Responses included, "I wanted my students to be aware of some of the new vocab that they may encounter," and, "I do the pre-trip activities because it front loads for the students and prepares them for the curriculum they will be learning about at camp. It gets them thinking." Other responses in this category included, "to provide students with prior knowledge of topics," and, "students (all of us, really) benefit from an introduction to what's coming - allows them to think about vocabulary and concepts in advance."

Some teachers' responses included their desire for students to make connections between classroom and field trip learning experiences. Example responses include, "Students need to have an understanding of the purpose of their trip and how it relates to their curriculum," and, "Many of the activities relate to our science and math curriculum and it was nice to make the connection."

Affective motivations: A large number of teachers were concerned with preparing their students emotionally and behaviorally for the field trip.

Several teachers mentioned their pre-trip activities were conducted to ensure that students participated and demonstrated good behavior during the trip. Responses of these teachers included, "we really try to get students that want to be here and take their role seriously," and, "I feel the students….stay more engaged when they… have great background before the trip."

Many teachers spoke of how they wanted to ensure their students' comfort and safety through preparatory activities. Examples of their responses included, "to calm any fears students may have," and, "this also helps ease some of their anxieties," as well as, "to make students realize the importance of dressing warm."

Teachers also mentioned the desire to generate enthusiasm for the trip. Responses included, "to generate excitement for the experience," and, "wet the appetite for CWES," and, "to spark interest."

Sample Responses for Post-Visit Activity Motivations

Cognitive motivations: Some teachers focused on the need to provide their students with a time to reflect on what was learned. Sample responses included, "I think it's important to do the follow up activities because it reviews what they learned," and, "reinforce important concepts."

Other teachers focused on allowing their students to make educational connections. These teachers responded with statements such as, "… connect lessons to school learning," and, "students can…transfer this knowledge to their specific topic." One teacher even mentioned how the post activities were essential to justify the field trip stating, "My supervisors actually used our post activities as a reason we could continue the program next year. It was pointed out the program isn't just a day off!"

Affective motivations: Teachers that were concerned with the emotional impacts of the visit on their students fell under this category. Their responses included, "the students are so excited about the trip, it is essential to give them opportunities to express their experience," and, "helps kids understand that CWES is a special experience," as

well as, "I want students reactions to the CWES experience to see what made an impression."

Non-specific motivations: Some teachers' answers were too ambiguous to determine if the motive was cognitive of affective. Responses included, "Bring closure to camp," and, "follow-up for future trips to CWES."

Sample Responses for Pre-Visit Activity Barriers

Time or timing related issues - More than half of the teachers that did not conduct pre-visit activities (eleven out of twenty-one) cited either lack of time, poor curriculum-timing or both as their reason(s) for not doing so. Responses under the "lack of time" category included, "because of time constraints," and "I ran out of time. I wanted to finish the units I was working on before going to CWES." Surprisingly, even two teachers that did conduct pre-visit activities commented under this statement saying, "too detailed, not enough time," and "time is a major factor." Responses under the "poor curriculum-timing" category included, "topic matter was not in sink with curriculum @ the time," and "the activities did not fit into the curriculum we were doing."

Issues of responsibility: Six out of the twenty-one teachers that did not conduct pre-visit activities responded that other teachers were conducting the activities and therefore they were not. An example includes, "Our science teacher, [name omitted], uses the pre-field trip activities in his science classrooms. I (math and language arts teacher) do not use the activities in my classroom." Other responses included, "our science teacher completed these activities with the students," and "I am the special ed teacher - the classroom teachers did do pre-field trip activities, but I was not involved."

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Issues of accessing materials: Three teachers made comments that they were either unaware of the pre-activities offered by CWES (ex. "I didn't receive/ didn't know about them") or there were no pre-activities on the website for the field trip lessons they had chosen (ex. …Also, when I looked on the CWES website, there were only activities for one of our programs.)

Opinions on the necessity of the activities: Three teachers chose not to use pre-visit activities because they felt they were redundant or might, in some way, detract from the trip. Responses included, "have done other lessons in our curriculum that are similar to the pre-activities," and, "[Name omitted] is a school that services highly gifted students. I purposely don't go over things before field trips otherwise they know too much. This way, hopefully the trip is still one where they will learn something and not be bored." One teacher who did do some pre-visit activities also answered this question with the following response, "I don't use skullduggery because I like the surprise element to the blindfold activity."

Sample Responses for Post-Visit Activity Barriers

Time and timing-related issues: Four of the fifteen teachers mentioned they lacked time to do follow-up activities (ex. 'time constraints,' 'time,' and 'time restraints'). Three of the fifteen teachers mentioned that the timing of the field trip did not fit in with the curriculum they were planning on teaching when they returned. Example responses included, "Curriculum set and activities already planned. Would plan on implementing orienteering into PE classes in the future," and, "Again, not with current curriculum."

Issues of responsibility: Five of the fifteen teachers mentioned that the follow-up activities for the field trip were the responsibility of another teacher or they assumed the other teacher would conduct them if needed. Example responses from this category included, "Again, I do not plan to use post- field trip activities in my classroom, but I do think [name omitted] (science teacher) will use them," and, "Following mainstream instructor - going on to next unit [response from special ed teacher]," and, "Science teacher will complete this task."

Opinions on the necessity of activities: Three teachers did not believe the activities were necessary for their students because of similarities to things already done in their classes. Their responses included, "No need in the curriculum…" and, "we already do activities that are related."

Unaware of activities: One teacher of the fifteen mentioned that they were unaware of the post-visit activities stating, "I'm not aware of any post-field trip activities, but if there is anything I can incorporate into math I will."

APPENDIX K

Sample Responses from Interviews Related to FMP Principle 1

Sample Responses Related to Ease of Use for Teachers

Pre-made, but adaptable – Because teachers spend a lot of time preparing logistically for field trips, having pre-made activities that help them prepare their students educationally and affectively for field trips is beneficial. Both teachers mentioned the pre-activities were positive because of the time they saved from not having to put them together themselves. "I would definitely use these [again]. It's so nice to have it done already," one teacher said. The other, when asked about the utility of the activities in connecting classroom and school learning said, "There's a wealth of information that you have, and the resources that you have too…that there's enough that it goes back to…having the time to even put it together…"

However, neither teacher used the activities as they were designed. Each teacher made her own modifications. Both teachers stated the importance of their ability to adapt materials. Interestingly, they both used the term "framework" to describe how they used the pilot-test materials. When asked what parts of the materials didn't work well for her, one teacher responded, "But, you know, you just…you work within the framework and…and some things you kind of shorten up and try to stretch some things a little bit more, but no. There really wasn't anything that…that I would say didn't work well." The other teacher, when asked what parts of the materials worked well for her responded, "I think the activities are a very, very good framework that, you know, I can take off of – pieces – and…make it fit, or expand on it, or do a very short activity..."

Familiarity - One teacher mentioned that the newly-designed pre-visit activities were easy to carry out because they included many types of preparations she had already used with her students in years prior, "It was not a daunting…daunting task at

all," she said, "because so many of the things are things that I …started, or already used – that it…it just made it that much easier."

Well-organized and not overwhelming – In order to be easy to use, materials should be organized well so that they are not overwhelming to teachers who are deciding whether or not to use them. One teacher mentioned that she liked the printable format saying, "I like the way it's all laid out. I like the overview…" The other, however, felt the website were a bit overwhelming. She said, "But, it's – there's a lot. There's a wealth of information with the websites that it connects to. And as I was going through, I'm like, "Well gosh, this is really good." Then, I'd forget where it was [laughs]. "Where was that?"

Uses resources that are readily available – Though teachers were in favor of integrating technology into pre- and post-visit activities, one cautioned that it could really throw off the teacher if the computers were not available for some reason. Having had to switch her pre-visit activity from the computer lab to the library at the last minute, she said the computers would be the reason she might not use the pre-visit activity again. "If there's nothing worse than trying to plan an activity," she stated, "and then you're all set to sign out the computer lab, and then they're down for the day or something. It's, 'Oh my goodness'…"

Sample Responses Related to Ease of Use for Students

Clear definitions – Both teachers recognized weak points in the pre- and post-visit activities designed by the researcher related to unclear definitions. In the post-visit activity chosen by one teacher, students were asked to pick four facts, one from each season, off of the CWES Nature Navigator website. The teacher mentioned that, "They

were a little unclear about what exactly the "fact" was, as well as, "a couple of them questioned, 'What months are spring? What months are fall?' And, we clarified that." The second teacher chose to use a post-activity that referred to Water Action Volunteers (WAV) as being people that sampled rivers and streams for water quality. Despite the short definition, the teacher felt the students need more of an explanation. She stated, "I had to do a little bit of review of explaining what "WAV" was…I think they needed that."

Clear directions – Both teachers liked the fact that the pre- and post-visit activities that they chose had directions that were easy enough for their students to follow. "Very simple to follow," one teacher said, "You know they found the…the Nature Navigator very easily, and "What Happened at CWES" [portion of website], so it was set up very well, you know. That made it very easy." The other teacher mentioned a similar sentiment about the activities she piloted. "Well," she said, "what I liked about it was that the site was easy to find for the students. The directions for finding the site were very, very easy to follow along."

Layout to help organize student responses – One teacher mentioned that the worksheet provided for the post-activity should be laid out differently so as to help student better formulate their responses:

> **Teacher:** Also, I think the line that goes horizontal…I think vertically because the website has it vertically.
>
> **Researcher:** Oh, yeah.
>
> **Teacher:** Because what happens when kids write numbers down – they don't put commas in between. So it's all a blur. So in order to interpret it…Where, if they see it the way it's laid out on the website, it might be a

little easier for them.

Later, in the same interview, the teacher mentioned that there were helpful questions on the worksheet to prompt student thinking, but no place for them to write their answers to the questions. The teacher suggested additional space be added saying, "Because, anything that can be done to organize their thinking process is helpful…you know, that they can write the answers in from one step to the next."

APPENDIX L

Sample Responses from Open-ended Survey Questions Related to FMP Principle 2

Sample Responses for Type of Pre-Visit Activities Conducted

Educational – Many teachers used pre-visit activities to introduce vocabulary to their students. Sample responses of participants included, "The students make a list and work on crosswords. We talk about winter severity vocabulary and lake study," and," we used vocabulary from the compass and skullduggery pre-visit activities."

Several more teachers mentioned that they had taught pre-trip lessons that introduced or reviewed concepts relevant to the field trip. For example, one teacher responded, "in my camp class, I taught '20 questions' and the 'habitat lap sit.' 20 questions got students thinking about the many characteristics of nature."

A few teachers mentioned using projects with their students or building skills with their students prior to the field trip. Responses included, "we create posters/projects about an animal from N.E. Wisconsin and present it to class," as well as, "I also used the website as a way to teach note-taking."

Logistical – Slightly more than half of the teachers commented that they shared logistical information of the trip with students. Of the thirty-two teachers that used pre-visit activities, seventeen made some reference to providing logistical information during their pre-field trip activities.

Many teachers spoke with their students about the schedule or what to bring/expect. Example responses included, "I also spent a lot of time discussing… [the] schedule and what to pack," and, "I also briefly describe what the day will be like." Two teachers mentioned they addressed student questions by showing photos from last year's field trip. Responses included, "slide show of photos of previous year's groups camping experience," and "they are shown a cinimoto video of last year's trip."

Behavioral preparation: In addition to preparing students educationally and logistically, many teachers conducted pre-activities that addressed the behavior and attitudes of their students. Of the thirty-two teachers that used pre-visit activities, fourteen made some reference to behavioral preparation in their pre-field trip activities.

Teachers wanted to ensure that their students were clear on behavioral expectations. Responses included: "I also spent a lot of time discussing behavior expectations," and, "Preparation for the field trip included expectation for participation and good behavior." One teacher also wanted to understand how students might behave on the trip. That teacher responded, "[I] had students journal about how they were feeling. A lot of times this is the first time the kids are away from home."

Teachers from one school mentioned how pre-visit activities included a selection process for students based on good grades and desire to attend. "The overnight trip experience is selective as we only take 25 students…they have to have 2 teacher signatures, no missing assignments, in good academic standing and write an essay on why they should be chosen to go, and how they will extend the knowledge the[y] learned to their classmates upon return."

Sample Responses for Type of Post-Visit Activities Conducted

Writing about field trip/journaling – This was, by far, the most frequently mentioned follow-up activity planned by teachers visiting CWES. Sample responses included, "Writing about camp experiences," "I am planning to have my students journal," and, "Written reflections on specific experiences."

Discussion about field trip – Another frequently mentioned follow-up activity planned by teachers revolved around discussion of the trip. Some teachers mentioned discussion as a method to review what was learned on the trip. Sample responses included, "classroom review/discussion in science," and, "we will discuss the lessons covered." Other teachers used the discussion to determine students' feelings about the trip. Sample responses from this category included, "I'll ask their impressions of the trip," and, "We always discuss how the day went. Kids are always eager to share."

Crossword – Two teachers mentioned crosswords as their planned follow up, saying, "maybe a crossword program (website)," and "I have a crossword puzzle I have taken from the website, a long time ago, that I use."

Thank you notes – Four teachers specified that they planned to write thank you notes for a follow-up activity. Their responses included, "We always have students… make a thank you letter for the counselors," and, "thank you notes to the variety of parties involved."

Student Projects – Some teachers mentioned projects that would require building upon information gathered at CWES. Some examples of their responses included, "tracking a dogsled online using GPS," (a teacher whose class had learned about GPS at CWES), as well as, "each student or student group has to prepare a lesson or create a project to share with their classmates," and, "poster activity - students create a poster of an animal in WI, including pictures, information, adaptations and habitats."

Non-specific – Responses from some teachers were not specific enough to understand the nature of the activities they planned to do in their classrooms after the field trip. Responses under this category included, "I will follow up on the lake study, orienteering and leadership building rules and activities," and, "I also create an assignment to assess their learning."

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