Influences on Practice: A Study of Teachers Who Implemented Curriculum-Based Field Trips with Classroom Connections

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Heather K. Harkins, Ph.D.  
University of Connecticut, 2013

ABSTRACT

Field trips are a common strategy used in science education. Researchers have found that student learning on field trips (such as to museums) can occur. Researchers have suggested that a series of curriculum-connected activities (which occur before, during, and after the trip) make learning more likely. This study establishes the influential factors and experiences on four teachers who implemented curriculum-based field trips to a science center with explicit connections to ongoing student learning. Kolb’s Experiential Learning Model and Pugh’s Transformational Experiences construct were used to examine the role of prior experiences in shaping these teachers’ educational field trip practice.

Influential factors on educational field trip practice were found to originate from teacher beliefs, as well as the context of the teacher at the time of the field trip. Teacher valuation of factors (e.g., state standards and grade level curriculum) depended on a dynamic between their previous experiences and core beliefs (e.g., sense of responsibility, sense of purpose, desire to continuously improve one’s craft, and self-preservation). Transformational experiences (Pugh, 2011) punctuated the development of field trip practice over time, yet a cycle of “trial and error” akin to the process of Experiential Learning (Kolb, 1984) sufficiently described the overall way in which teachers had developed educational field trip practice. Familiarity with the science center was instrumental in each teacher’s implementation of a curriculum-based field trip. Therefore, multiple previous visits (both personal and professional) to the science center were considered vital in the development of educational field trip practice. Finally, experiences (e.g., museum open houses, professional development workshops, and previous field trips) were not one-size-fits-all, rather, the impact of these experiences was dependent on personal and contextual factors at work on the individual teacher.
Influences on Practice:

A Study of Teachers Who Implemented

Curriculum-Based Field Trips with Classroom Connections

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B.A., Gordon College, 1997

M.S., Southern Connecticut State University, 2001

A Dissertation Submitted

In Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

at the

University of Connecticut

2013
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2013
Influences on Practice:
A Study of Teachers Who Implemented
Curriculum-Based Field Trips with Classroom Connections

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2013
This work is dedicated
to my daughter Acadia.
Throughout this dissertation journey, I have frequently recalled hiking Mauna Loa as an undergrad. The name translates as “long mountain”—which is fitting for this extant shield volcano which offers little altitude gain after hours of hiking—very unlike the White Mountains to which I was accustomed at the time. I just remember the final leg to the 13,250 ft. summit cabin as a step-by-step slog. The fresh snow was inches deep, the sun glaring in the blue sky, my boots weren’t waterproof, and my red blood cells could barely keep up. So I stayed on the heels of one of the instructors and I focused on stepping into the footprints she created. I probably drove her crazy, but literally following her footfall with my footfall and focusing on that increment allowed me to work successfully toward the overall feat. Similarly, I started up “Dissertation Mountain” two and a half years ago, and it has been a long yet steady climb. I know that I have only made this ascent because of those who have gone ahead, and those who have supported me each step of the way. This is an accomplishment made possible by the support of many individuals.

I would first like to thank my committee for helping this study take shape from beginning to end. I was honored to occupy the role of dissertator in their company and take advantage of their individual and collective wisdom. Even though dissertations are lonely ventures, I never felt alone with the support of my committee members palpable during analysis and writing. Their footfalls in research and service, the impact they had on me in coursework, discussions, and conference presentations, was always available for my tracking and reference; and I knew they were never farther away than an email. To borrow a saying from my daughter, they were “superheroes and they helped me.” In particular, Dr. David Moss challenged me at each turn to be more succinct, authoritative, and to stay focused. Dr. Robin Grenier introduced me to qualitative methods and shared my combined interest in informal environments, adult learning, and teacher development – all of this was constant encouragement for this work. Dr. Jim Kisiel offered a level of scrutiny and expertise from years of research which has
spanned the spectrum of informal science. Dr. Bill Watson was not only an enthusiastic supporter, but his own dissertation’s format served as a footprint for me at a particularly crucial stage. Finally, I thank my advisor and committee chair, Dr. John Settlage. In hindsight, Dr. Settlage’s feedback in the interim between my proposal and dissertation defense was most critical in continuously moving forward towards a successful end. Whenever I looked up and essentially said, “where is the next step?,” Dr. Settlage communicated to me in a way that made me realize the next footfall was right before me and he positioned me to take it. I am grateful to have studied under his mentorship for my time at UConn.

Next I would like to thank the participants in this research. Each and every single one quickened the pace of my study and moved me closer to the end. My interview participants were close companions on this journey, and I am thankful for the stories they shared with me and gave me license to interpret. I found our conversations useful as well as enjoyable! My deepest gratitude goes out to all who were willing to take part in the various phases of the study. Clearly, without you, this work could not have been accomplished.

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doctoral path as a reference and guide. My thanks also go to Dr. Aja LaDuke, Dr. Meg Monaghan, Vanessa Kass, and Beth Werner. Our grassroots cohort was held together by respect, admiration, professionalism, and love. That sisterhood formed part of the fabric underlying my work, and I feel whole here at the end because it was part of this journey.

Finally, I would like to thank family. Periodic holidays and summer picnics with them reliably provided refreshment and rejuvenation. My parents, Bill and Faith Harkins, in particular were a constant wellspring of encouragement. I am thankful for their tenacious support. My daughter Acadia inspired me to wrap this degree up, and reinforced my desire to complete the dissertation with integrity and thoroughness. Although she won’t understand it for many years to come, I expect this accomplishment will serve as an example to her of what a person, a woman, and a mommy can do. My hope is this provides come inspiration to her at some point in her walk on this Earth and, perhaps, the skies above it. At the very least, I look forward to telling her older self how she swiped pads of interview notes, re-sorted piles of literature review papers, and how looking in her eyes made me all at once feel I had to finish and I had to do well. Her role is legend. Finally, I thank my husband, Ted Bliman. No one else has lived this with me, and no one else has done more to ensure my completion. Besides the desk-side food and beverage service, I thank you for the permission to do my best, and your unrelenting acceptance with my doing what I could. You have been my rock. I am so glad to be at the end of this journey with you by my side.
# TABLE OF CONTENTS

LIST OF TABLES ............................................................................................................. XIII

LIST OF FIGURES .......................................................................................................... XIV

LIST OF APPENDICES .................................................................................................. XV

## CHAPTER 1: AN INTRODUCTION TO THE STUDY ........................................................... 16

- **PURPOSE OF THE STUDY** ....................................................................................... 17
- **BACKGROUND OF THE STUDY** ............................................................................. 18
  - Origins of educational practice ............................................................................... 18
  - Field Trip Guidelines ............................................................................................... 19
  - Early research into pre and post visit activities ...................................................... 20
  - Teacher field trip practices ...................................................................................... 22
  - Glimpses of educational practice ............................................................................. 23
- **RESEARCH QUESTIONS** ....................................................................................... 25
- **CONCEPTUAL FRAMEWORK** ................................................................................ 25
  - Constructivism: The importance of prior knowledge and experiences ................... 25
  - The importance of experience in teacher field trip practice and adult learning ....... 27
  - Mental models as representations of experience ..................................................... 28
- **THEORETICAL FRAMEWORK** .............................................................................. 30
  - Kolb’s theory of experiential learning .................................................................... 31
  - Pugh’s transformative experiences ......................................................................... 31
  - Comparing the two theories .................................................................................... 32
- **DEFINITION OF TERMS** ....................................................................................... 33
- **ORGANIZATION OF THE DISSERTATION** ............................................................. 35

## CHAPTER 2: RESEARCH ON SCHOOL FIELD TRIPS TO DESIGNED SPACES (2000-2010) .................................................. 36

- **PREVIOUSLY PUBLISHED LITERATURE REVIEWS OF SCHOOL FIELD TRIPS** .................................................. 36
- **PURPOSE OF THE LITERATURE REVIEW** ............................................................. 38
- **ASSEMBLING THE BODY OF RESEARCH** ............................................................. 39
  - Dates ......................................................................................................................... 41
  - Inclusion Criteria ..................................................................................................... 42
- **THEMES FROM FIELD TRIP RESEARCH 2000-2010** ........................................... 44
  - Worksheets .............................................................................................................. 45
  - Guided Tours ............................................................................................................ 47
  - Museum Educators ................................................................................................. 49
  - Chaperones .............................................................................................................. 51
  - Students ................................................................................................................... 54
    - Effect of trip experiences on student attitudes and career interests ..................... 55
    - Student perspective ............................................................................................. 56
    - Student learning of science content ..................................................................... 58
    - Student conversation and discourse during field trips ....................................... 61
Role of Student Choice .................................................................................................................. 63
How students with special learning needs are affected by science field trip experiences ........ 65
Long Term Impact on Students ...................................................................................................... 66
Teachers ........................................................................................................................................... 68

CHAPTER 3: METHODS ................................................................................................................... 83

RESEARCH QUESTIONS .................................................................................................................. 83
FIELD TRIP SITE DESCRIPTION .................................................................................................... 84
Field Trip Program Options ............................................................................................................ 86
Description of a Typical Field Trip at this Science Center ............................................................ 86

PARTICIPANTS .................................................................................................................................. 87
Number of participants ................................................................................................................... 87
Sampling method ............................................................................................................................ 88
Recruitment ..................................................................................................................................... 88

DATA COLLECTION METHODS ..................................................................................................... 89
Questionnaire .................................................................................................................................... 90
Interviews ......................................................................................................................................... 90
Concept Mapping ............................................................................................................................ 91
Incentive .......................................................................................................................................... 94

ANALYSIS ......................................................................................................................................... 94

POSITION OF THE RESEARCHER .................................................................................................... 98

LIMITATIONS ................................................................................................................................... 101

CHAPTER 4: RESULTS ..................................................................................................................... 104

INTRODUCTION TO PARTICIPANTS .............................................................................................. 104
A MODEL FOR EDUCATIONAL FIELD TRIP PRACTICE ................................................................ 105

NATALIE .......................................................................................................................................... 108
Internal influences ............................................................................................................................ 110
Feeling responsible as a teacher ..................................................................................................... 110
Making the field trip memorable by facilitating connections and capitalizing on the wow factor ........................................................................................................................................ 112
Giving students the kind of opportunities they deserve ................................................................ 113

External influences ......................................................................................................................... 114
Students, and their learning, engagement, excitement, and enthusiasm ........................................ 114
Specific 5th grade science curriculum ............................................................................................ 115
Other external influences ............................................................................................................... 116
Emergent influences ....................................................................................................................... 117

MONICA .......................................................................................................................................... 118
CHAPTER 5: DISCUSSION AND IMPLICATIONS ................................................................. 162

SUMMARY OF RESEARCH ....................................................................................... 162

DISCUSSION OF RESULTS ...................................................................................... 163

Research Question 1: Influential factors and their management .............................. 163

Students .................................................................................................................. 168

Collegial support and the role of other adults ......................................................... 169

Existing resources, science standards and curriculum ............................................ 169

Research Question 2: Experiences which shaped the planning and implementation of field trips 170

Revisiting the Research Questions and Methods ..................................................... 176

CONTRIBUTION OF THIS DISSERTATION TO FIELD TRIP LITERATURE .................. 181

IMPLICATIONS FOR PRACTICE ............................................................................ 184

Suggestions for Museums ....................................................................................... 184

A special consideration of science centers ........................................................... 186

Suggestions for School Districts ............................................................................. 187

Suggestions for Teacher Educators ....................................................................... 189

RECOMMENDATIONS FOR FUTURE RESEARCH .................................................... 192
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Overview of participants</td>
<td>105</td>
</tr>
<tr>
<td>4.2</td>
<td>Summary of Natalie’s results</td>
<td>158</td>
</tr>
<tr>
<td>4.3</td>
<td>Summary of Monica’s results</td>
<td>159</td>
</tr>
<tr>
<td>4.4</td>
<td>Summary of Hannah’s results</td>
<td>160</td>
</tr>
<tr>
<td>4.5</td>
<td>Summary of Steven’s results</td>
<td>161</td>
</tr>
<tr>
<td>5.1</td>
<td>Summary of Internal Influences</td>
<td>166</td>
</tr>
<tr>
<td>5.2</td>
<td>Summary of External Influences</td>
<td>167</td>
</tr>
<tr>
<td>5.3</td>
<td>Summary of previous experiences which operated as influential factors</td>
<td>174</td>
</tr>
<tr>
<td>F.2</td>
<td>Codes developed during open coding process</td>
<td>231</td>
</tr>
<tr>
<td>F.3</td>
<td>Codes related to teacher perspective of students</td>
<td>232</td>
</tr>
<tr>
<td>F.4</td>
<td>Natalie’s list of codes</td>
<td>233</td>
</tr>
<tr>
<td>F.5</td>
<td>Monica’s list of codes</td>
<td>234</td>
</tr>
<tr>
<td>F.6</td>
<td>Hannah’s list of codes</td>
<td>235</td>
</tr>
<tr>
<td>F.7</td>
<td>Steven’s list of codes</td>
<td>237</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

Figure 1.1  Kolb’s Experiential Learning Theory represented as a cycle ........................................ 31
Figure 4.1  A model for the educational field trip practice of study participants .......................... 107
Figure 4.2  Model of Transformative Experiences (Pugh) and the relationship to Experiential Learning Theory (Kolb) ......................................................... 156
Figure 5.1  A model for the educational field trip practice of study participants ...................... 164
Figure 5.2  The interconnectivity established between Natalie’s internal factors, experiences, and external factors ................................................................. 165
Figure 5.3  One association in Monica’s data set between an internal influence, experiences, and external factors ............................................................................. 171
Figure 5.4  One association in Hannah’s data set between internal influences, experiences, and external factors ............................................................................. 172
Figure 5.5  One association in Steven’s data set between internal influences, experiences, and external factors ............................................................................. 173
Figure 5.6  Model of Transformative Experiences (Pugh) and the relationship to Experiential Learning Theory (Kolb) ................................................................. 175
Figure C.1  Lisa’s concept map ..................................................................................................... 215
Figure C.2  Erica’s concept map .................................................................................................. 216
Figure E.1  Natalie’s Word Choices for concept map ................................................................. 223
Figure E.2  Natalie’s Concept Map ............................................................................................ 224
Figure E.3  Steven’s word choices for concept map ................................................................. 225
Figure E.4  Steven’s concept map ............................................................................................. 226
Figure E.5  Helen’s word choices for concept map ................................................................. 227
Figure E.6  Helen’s concept map ............................................................................................. 228
Figure E.7  Monica’s word choices ........................................................................................... 229
Figure E.8  Monica’s Concept Map ........................................................................................... 230
Figure G.1  Natalie’s NVivo Model ........................................................................................... 240
Figure G.2  Monica’s NVivo Model ........................................................................................ 241
Figure G.3  Hannah’s NVivo Model ......................................................................................... 242
Figure G.4  Steven’s NVivo Model ........................................................................................... 243
LIST OF APPENDICES

Appendix A: Recruitment Materials........................................................................................................ 200
Appendix B: Memo regarding a participant who dropped out of the study ........................................ 206
Appendix C: Summary of the pilot study ................................................................................................. 209
Appendix D: Final Interview Structure .................................................................................................. 217
Appendix E: Concept Maps .................................................................................................................... 223
Appendix F: Coding lists and NVivo models .......................................................................................... 231
Appendix G: Models of coded passages ................................................................................................. 239
CHAPTER 1: AN INTRODUCTION TO THE STUDY

“Contrary to the pervasive idea that schools are responsible for addressing the scientific knowledge needs of society, the reality is that schools cannot act alone, and society must better understand and draw on the full range of science learning experiences to improve science education broadly” (National Research Council, 2009, p. 12). Others also argue that out-of-school contexts, such as museums, are imperative (Braund & Reiss, 2006) in science education. The National Science Education Standards (National Research Council, 1996) advocates for incorporation of museums into the ongoing education of Kindergarten through 12th grade students. One way in which museums typically work with schools is by hosting groups of students on field trips. “The field trip is one of the most complex and expensive activities in the educational system” (Orion & Hofstein, 1994, p. 1117).

There are more than 77 million Prekindergarten-College students in the United States (U.S. Census Bureau, 2009). It is estimated that in 2009, over 10.7 million students were taken on field trips to science museums alone (Association of Science-Technology Centers, 2009). School field trips can be memorable, influential and pivotal experiences during the course of a child’s lifetime (Prather, 1989). Field trips in science are necessary because they can enthuse and interest students in a subject matter which has proven problematic for student learning, student achievement, and teacher professional development.

However, the educational potential of field trips has been questioned. Gilbert and Priest (1997) write, “The challenge to teachers and educators alike is how to realize that potential, and how to improve the quality of learning achieved by pupils (taking part in field trips)” (p. 750). Furthermore, “it is important to achieve optimal educational results that will justify the investment” (Orion & Hofstein, 1994, pg. 1117) of time and money that field trips require.

Researchers have identified field trip practices which optimize educational conditions (Melton, Feldman & Mason, 1938; Delaney, 1967; Falk, Martin & Balling, 1978; Finson & Enochs, 1987; Bitgood,
1989; Orion & Hofstein, 1994; Rennie & McClafferty, 1995; Jarvis & Pell, 2002, 2005; DeWitt & Storksdieck, 2007; Stavrova & Urhahne, 2010). However, research has also continuously suggested that these practices are neither apparent (Cox-Peterson & Pfaffinger, 1998), nor assimilated (Storksdieck, 2001), nor widespread (Griffin & Symington, 1997) in teacher field trip practice. In order to better understand these this contradiction, we must begin to understand how teachers do implement educational field trips which demonstrate research-based ideals.

Purpose of the Study

The immediate purpose of this study is threefold. First, it will explore the perspective of teachers whose field trip practices do reflect those which research has shown to optimize educational potential. Second, it will develop an understanding of how these teachers came to implement these educational field trips. Finally, it will explore the role of experience within the development of teacher field trip practice.

The proposed study will investigate how teachers who implement educational field trip best practices became the way they are. This research will aim to make a contribution to the substantial body of literature dealing with school field trips, and specifically, the teacher’s role in and perspective of field trips. This research aims to inform how to design preservice and inservice experiences geared towards teacher development of field trip practice. It is anticipated that the proposed study will also become part of the larger dialogue regarding teacher professional learning, and the role of experience in that learning.

In order to fully realize how museums can be incorporated into the education of K-12 students, we need to understand how teachers choose to use field trips to museums for educational purposes; and how they come to understand how to implement best practice strategies. This data is needed by teacher educators, education researchers, museum practitioners, and science teachers in order to collectively surmount the challenge that science education has become. We must understand this
incremental detail, and others like it, in order to comprehensively transform an educational system which includes museums and schools, as well as other institutions.

Background of the Study

Research in the 20th century converged on a common set of guidelines by which teachers might develop the optimal field trip conditions for student learning to occur (e.g., Rennie and McClafferty, 1995). These guidelines typically include the recommendation that teachers conduct pre and post visit lessons in their own classrooms in order to connect the visit to ongoing classroom learning. Essentially, teachers are encouraged to prepare their students for the field trip, offer some structure for learning while on site at the field trip location (e.g., a well-designed worksheet or museum-based educational program), and follow up with the experience back in the classroom. During the course of this manuscript, the term “educational field trip” will be used to describe this connected curriculum-based series of activities: preparatory classroom lesson(s) for students, visit-based activities for students, and follow up classroom lesson(s). These are practices which researchers have identified as important yet uncommon. Each of these practices is under the control of the teacher, at least to some extent. The following section explores the development of effective practice in relevant literature.

Origins of educational practice

Early literature regarding effective practice originated from firsthand experience and designed investigations. Therefore, the origins of these ideas are fundamentally based in the ongoing, dynamic relationship between educational research and practice. Numerous pamphlets and articles on how to conduct field trips have been published. The following section describes some of the non-empirical sources of information regarding field trip practice which were published in the 20th century. A later section describes empirical works.
Field Trip Guidelines.

Early advocates for educational field trip practice were practitioners who assumed the importance of preparatory and follow up exercises with students. Based on his personal experiences with leading field trips for college students, Marcy (1940) published a paper in the Journal of Higher Education recommending that teachers prepare their students in advance of a field trip so that students are able to ask good questions while on site. Noting that a teacher needs to decide whether or not to have the students do anything after the field trip, he wrote, “If a report is required, care must be taken that the visit (itself) is not spoiled by too much formality of questioning and notetaking” (Marcy, 1940, p. 207). Later, in a brief manuscript titled How to Conduct a Field Trip for the National Council for the Social Studies, Bye (1952) encouraged teachers to identify objectives and develop relevant classroom lessons. In the Teachers College Record, Delaney (1964) summarized guidelines for planning and conducting school field trips.

Over time, published field trip guidelines became more detailed and formulaic. Gemake (1980) published her how-to guide in Education and outlined a step-by-step process for what to do before, during, and after a field trip. Her suggestions encompassed logistical, behavioral, and student-learning concerns that teachers would likely have. She built in suggestions for evaluation and teacher reflection of the field trip experience. Gemake also suggested that teachers exude enthusiasm for learning while on the field trip, noting this would likely have a positive impact on students. Finally, she suggested that teachers begin small, and build on successful field trip experiences: “Each successful field trip will increase the likelihood that the experience will be repeated” (Gemake, 1980; p. 26).

As the final decade of the 20th century neared, Bitgood (1989) presented a list of guidelines for field trips that was similar to those from earlier in the century, however, he substantiated the ideas with relevant research that supported and expanded the original ideas. Similarly, Rennie and McClafferty (1995) forwarded their guidelines, all based on research. However, they noted that research to-date
spoke “least eloquently about the nature of post visit activities” (p. 180) and they relied on common sense to articulate suggestions for classroom-based follow up after the visit.

Numerous how-to field trip guides for science education punctuated the past century. They outlined field trip practice guidelines which had remained fairly stable since the 1930’s. Researchers have consistently used their investigations as avenues to affirm and add on to these educational practice guidelines (e.g., Jarvis and Pell, 2005; Stavrova and Urhahne, 2010). Early research into the effect of pre and post visit activities on students is presented next.

Early research into pre and post visit activities.

In a localized study, Melton, Feldman and Mason (1938) described a series of investigations regarding school children and the Buffalo Museum of Science. The goal was to increase the educational effectiveness of field trip visits. Over the course of several years, the researchers performed numerous comparative investigations which included Buffalo Public School students during the course of field trip experiences. In their conclusions, they wrote, “It is now certain that all children who visit a museum for the purpose of learning . . . profit materially from a specific preparation for the subject of the visit” (p. 72). Consequently, researchers begin to examine pre visit preparation activities.

A high school teacher, Delaney later published in *Science Education* the results of his experiment on preparing 7th grade social studies and science students for a field trip (Delaney, 1967). In his experimental design, one group of students received extensive information to prepare both cognitively and logistically for the field trip. The control group was given an announcement of the field trip and a permission slip. Using a forced response quiz administered to both groups following the field trip, he concluded that most students of “average and less than average academic ability were shown statistically...to have benefitted significantly from pre-field trip introduction” (Delaney, 1967; p. 480). However, he found no difference in the effect of the pre-visit introduction on students of “superior
academic ability.” Confident that his findings supported the idea of implementing pre-visit lessons with students, he encouraged further research on the effectiveness of both pre-visit and post-visit lessons.

Researchers soon began to more closely examine the effect of field trip preparation by examining a phenomenon referred to as “novelty.” Novelty refers to the level of familiarity with a setting, for instance, one’s home environment typically has a very low novelty while a new place (such as a museum) is full of the unfamiliar (e.g., objects, pathways, procedures, sounds). Falk, Martin and Balling (1978) studied two groups of students taking part in field trips: those who were familiar with the field trip setting (an outdoor venue) and those who were not. They concluded that the perceived novelty of the unfamiliar setting had a negative effect on student learning during the course of field trips, the implication being that preorientation of students to the museum environment would help position the students for learning gains.

Later studies suggested that novelty may have a greater impact on younger students (Falk and Balling, 1982) and that both too much and too little novelty can negatively affect student learning (Falk, 1983). Gennaro (1981) compared the learning of two groups of students: those who had received a venue-specific orientation and those who received a general orientation to taking the field trip. Students who had received the venue-specific advance organizer fared slightly better in terms of learning. Kubota and Olstad (1991) found in their study that novelty-reducing measures had a greater effect on boys than on girls. In an experimental mixed methods design, Orion and Hofstein (1994) found that the novelty factor and preparation for the field trip had the greatest influence on learning. Anderson and Lucas (1997) investigated how low levels of perceived novelty might impact student learning. They found that students, who had both visited the science center previously and received the in-class preparation program prior to the trip, outperformed their peers. They concluded that prior visits, with or without orientation programs, help reduce the novelty effect and facilitate student learning. Overall, the idea of novelty brought urgency to the notion of doing pre-visit activities with
students: if students were not adequately prepared for the impressive and new features of the field trip venue, those features could actually deter or delay learning while on-site. As much as pre-visit, preparatory lessons needed to prepare students cognitively, they now also needed to prepare students spatially.

Amidst all of the research into the effect on learning, some researchers began to attend to the affective outcomes associated with field trips. For instance, Finson and Enochs (1987) examined the extent to which field trips, and teacher preparation for field trips, affected students’ attitudes toward science. In their matched experimental design, the researchers compared students who had and who had not gone on a field trip, and students whose teachers had and had not implemented structured pre-visit, visit, and post-visit activities. They found that taking a field trip did not necessarily result in an increased positive attitude toward science. In fact, they found that only a well-planned, structured field trip with a prepared teacher resulted in attitudinal gains. Some students were better off for not visiting the museum at all: “(S)tudents (of teachers) who did not visit the museum performed better on... attitude measures than did students who were subjected to unstructured (field trip) methodologies” (Finson & Enochs, p. 604).

Early research into conducting pre and post visit activities confirmed many of the recommendations for educational field trip practice. Specifically, pre visit activities were found to have a great deal of influence on cognitive and affective student outcomes. However, research was also indicating that teachers were not necessarily employing these ideas in actual field trip practice.

Teacher field trip practices

Since educational practice ideas have been articulated and confirmed through research, it has continuously suggested that, in general, field trips neither incorporate these strategies nor optimize conditions for cognitive or affective student gains. For instance, in their research on 12 school groups and 29 teachers in Australia, Griffin and Symington (1997) found minimal match between observed
practices and what the literature recommended for effective school field trip practice. In addition, their findings suggest that what was being studied in school typically did not match what was studied while on location at the museum. Similar findings have been found in numerous studies, and research has found that teachers, in general, neither prepare their students for field trips (Cox-Petersen & Pfaffinger, 1998) nor connect field trips to classroom learning.

To address this situation, researchers began to create partnership experiences in which they themselves plan and/or implement part or whole of the field trip experience, including any pre-visit or post visit classroom based activities (Anderson, Lucas, Ginns, & Dierking, 2000; DeWitt & Osborne, 2007; Luehmann & Markowitz, 2007). This body of participatory research has tested and affirmed the effectiveness of the recommendations for field trip practice, and has helped teachers realize these best practice guidelines. Research has noted that these kinds of partnership experiences might be the most promising way by which to get teachers to employ best practice guidelines (Stavrova & Urhahne, 2010). However, researchers cannot reach many teachers, nor can they always be on hand to plan, design, and implement activities in tandem with a teacher. Clearly, we need to better understand the field trip practice of teachers who employ research-based guidelines. Research has yet to explore how teachers, who do exhibit best practices, became the way they are. Unfortunately, teachers who incorporate best practice guidelines on their own have eluded researchers.

Glimpses of educational practice

Teachers who implement educational field trips, independently from any researcher-directed experiences (e.g., Anderson, Lucas, Ginns, & Dierking, 2000), are relatively unknown in the literature. Researchers have observed glimpses of these teachers during the course of their investigations. For instance, in his exploration of teacher field trip practices, Lucas (2000) described a teacher who planned an evocative series of activities for her students centered on their field trip to a science center. In their evaluation of a science center field trip, Jarvis and Pell (2005) identified a teacher who made exemplary
use of a space center visit for her students. She prepared the students in advance for the personal, social and physical contexts of the field trip. She then integrated the visit experiences into her ongoing curriculum. Researchers noted that her measures, typically associated with cognitive gains, were likely to have contributed to the observed benefits to student attitudes. Finally, Davidson, Passmore and Anderson (2010) investigated the “agendas and practices of students, teachers, and zoo educators” (p. 122) surrounding a field trip to a zoo. They presented one case study of a teacher who rallied both her students and her assistant teachers throughout a 4-week unit on endangered animals, including about 2 weeks of preparatory and follow up activities surrounding the actual field trip.

In each of these cases (Lucas, 2000; Jarvis & Pell, 2005; Davidson et al, 2010) it was noted that the students adopted the learning agenda of their teacher, which was communicated explicitly to them, and understood the connection of the field trip to ongoing classroom learning. Students employed this understanding prior to, during and after the field trip itself. The researchers’ descriptions of the teachers indicated that they were constructivists in terms of their orientation toward student learning. The students’ experience during the field trip itself was central to the ongoing construction of intended learning outcomes in the classroom. Teachers relied on the cognitive prominence of the field trip experience once they returned to the classroom, and were disappointed when things at the venue did not go as planned or realized they could have done something differently to have brought potential learning experiences there into greater relief (Lucas, 2000).

Overall, educational field trip practice behaviors are understood to be inconsistent, sporadic and limited. With such an immense number of students taken out of the school for science-related visits to museums each year, research must pause to consider how teachers, like those found in Jarvis & Pell (2005), Davidson, Passmore and Anderson (2010), and Lucas (2000), choose and implement an educational field trip according to best practice guidelines.
Research Questions

The two research questions guiding this study are:

1. What factors influence teacher implementation of educational field trip practices and how do teachers manage or address such factors in their practice?

2. What experiences have shaped how teachers learn to plan and implement educational field trips?

The proposed study will seek to establish the role of prior experiences in teacher development of field trip practice. In order to construct an understanding of the role of experience, this study will employ a two part conceptual framework based on adult experiential learning and the concept of Mental Models. The following section describes the conceptual framework that has shaped the proposed study.

Conceptual Framework

The purpose of this study is to understand the development of educational field trip practice in those teachers who have implemented them. The development of the study was guided by a three part conceptual framework: constructivism, experiential learning, and mental models. The following sections discuss each part of this framework, identify precedence for its use in field trip research, and describe how it will apply to the proposed study.

*Constructivism: The importance of prior knowledge and experiences*

The proposed study is based on a constructivist framework. Constructivist theory posits that new knowledge is constructed based on prior knowledge (Bransford, Brown, & Cocking, 2000). In their position paper on theoretical basis’ in informal learning, Anderson, Lucas and Ginns (2003) suggest that constructivism might be the most appropriate theoretical base for research on learning in informal settings.
Constructivism has heavily influenced research in informal settings, where it frequently has sociocultural overtones. An idea inherent in sociocultural constructivism is that experiences are fundamental to learning, and that experiences are subjective to social and cultural contexts (Cobb, 1994). For instance, Rahm (2006) focused on “how science is co-constructed among the participants” (p. 48) and based her study on the idea that science is *talked* into being among participants at a science museum. Falk and Dierking (2000) included constructivism in their Contextual Model of Learning, a widely used framework for research in informal settings.

Just as constructivism is appropriate toward understanding learning in informal settings, constructivism also has applications for understanding teachers who conduct school field trips to museums. Kisiel (2007) applied constructivist thought by suggesting that in order to build a “teacher’s ‘museum efficacy,’ or confidence in success in teaching in a museum setting, (we) must first address teachers’ real concerns about control and coverage and then gradually lead them to what research says about the unique nature of science learning in informal settings” (p. 41). As Bamberger and Tal (2009) write, “According to the social constructivist epistemology, teachers are reconstructing their roles as mediators of students’ experiences with their social and physical worlds and as facilitators of students’ interpretation and reconceptualization” (p. 117). From a constructivist perspective of education, what teachers do is create a context in which students can learn through experiences which build upon prior knowledge. The remainder of this section will describe how constructivism has framed the perspective of the researcher during the course of the proposal.

From a constructivist perspective, researchers must first gain a better understanding of where teachers are starting from conceptually, so that we can cooperatively work toward where we would like to be in terms of field trip practice. Likewise, we need this information to position ourselves to continuously gauge the feasibility, workability, and validity of research-based ideas from the perspective
of the teacher’s prior experience. Finally, we must update research-based ideas to include and reflect a teachers’ voice and increase the likelihood of their reception.

This proposed study has developed from a constructivist viewpoint. Consequently, it will explore the role of prior knowledge and experience for teachers who employ best practice guidelines in field trip practice. This information has potential use for teacher educators as they plan how to incorporate ideas regarding field trips into their teacher preparation coursework.

**The importance of experience in teacher field trip practice and adult learning**

Teachers have limited options for learning about field trip practice. Perhaps the most prominent of these is a teacher’s own prior experiences, if any, while taking field trips as a student. Griffin (2004) notes that teachers use their own experiences to inform field trip practice. Michie (1998) suggests that “teachers who experienced good field trips as part of their teaching will continue to organize and take them” (p. 49, approximately) while experiencing poor field trips will diminish their value and decrease their use. Approaching the situation from a constructivist perspective suggests that teachers don’t conceive of field trips beyond what they themselves have experienced. The consequent lack of formal address during a teacher’s inservice career creates an ongoing cycle of status quo in terms of teacher field trip practice. Therefore, a teacher’s prior experience with field trips is one starting point for understanding field trip practice.

A teacher’s readiness-to-learn after experience has also been documented. Jarvis and Pell (2002) share the comment from a teacher participating in their study that “only after having taken a class to Challenger did she understand what preparation was really needed” (p. 997). This teacher noted that her learning could not be packaged in a teacher in-service training and that the experience of the trip itself was integral to understanding field trip planning.

Learning is a process “of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience in order to guide future action” (Mezirow, 1996, p. 162). Therefore,
experience is integral, and intrinsic, to adult learning. “Experience flows across arbitrary denominations of formal and informal education, private and public sites of learning, and compliant and resistant meaning making” (Fenwick, 2000, p.245). Fenwick (2000) recognizes that *experiential learning*, even though absurd in its redundancy, has become a central tenet of adult education. Kolb (Kolb, 1984; Kolb & Kolb, 2005) describes the experiential learning process as starting with a concrete experience, proceeding through reflection observation and abstract hypothesizing, toward active testing. Thomas and Ryan (2008) described Mezirow’s Theory of Transformative Learning as a four phase process: experiences which are disorienting to adults from their current frame of reference can generate critical reflection, which then paves the way for the construction of new meaning and understanding, ultimately culminating in a changed perspective. Disorientation might be brought about by discrete or cumulative experiences that occur over time. Taylor (2008) claims that a change in perspective is necessary as we age and desire a more rigorous understanding of ideas previously accepted with childlike naiveté. Not only is experience important for learning to occur, but the importance of experience in learning increases with age.

Fenwick’s appraisal of adult education perspectives of cognition suggests that what constitutes an experience has been broadly construed. Brookfield (1998) supports the notion that an experience can be a thought or feeling as well as a lived phenomenon. Grenier (2009) identified a variety of experiences in the development of museum docent expertise, including formal training, observing others, shadowing, self-directed access to media, and practicing. Kolb’s Experiential Learning Theory defines experience as a “public event” which is perceptible by the senses. This is the definition of experience which will be used during the course of this study.

*Mental models as representations of experience*

In order to fully appreciate how experience has led to learning, one must rely upon mental models. Seel (2001) defines mental models as “cognitive artifacts, i.e. inventions of the mind that
represent, organize and restructure the subject’s domain specific knowledge in such a way that even complex phenomena of the (observable or imagined) world become plausible” (p. 408). They are constructed as needed (and persist at varying lengths of time) to give structure to the external world. In essence, mental models are the mind’s way of ordering incoming information in relationship to previous experience. These “former experiences represented in mental models ‘tell’ the individuals what they may perceive” (Seel, p. 408). Therefore, the process of constructing mental models is limited by those currently in operation (Hofstader, 2001) as well as one’s immediate context. Mental models have a dual purpose in that “they represent human knowledge and they generate subjective plausibility with regard to the external world and its situations” (Seel, p. 407). In generating plausibility, mental models meet the psychological need for competence in relation to external information. In representing knowledge, mental models meet the need for relatedness. In allowing individuals to command a situation with a mental explanation which was self-formulated, mental models meet the need for autonomy. Therefore, the creation of mental models is one way in which individuals are able to meet these three basic psychological needs: competence, relatedness, and autonomy (Deci & Ryan, 2000).

Endsley (1997) suggests that an extensive set of mental models may “circumvent” other limitations and “also allow for decision making on the basis of incomplete information and ... uncertainty.” Essentially, experienced learners can fill in the blanks when it comes to situations they have not previously had direct experience with based on their set of mental models. This ability to adapt to a new situation given the mental models in existence is not only limited to those with a wealth of similar mental models from the past, it has also been documented in newcomers who are not constrained by previous experiences in the same exact field (Stark, Gruber, Rankl & Mandl, 1998). In essence, individuals may employ a mental model from a dissimilar experience in order to understand a situation (e.g., they may create a metaphor). This may help understand teachers’ educational field trip
practice. Some teachers may actually be transferring their mental models from routine classroom lesson planning, which typically includes an introduction and conclusion, to field trip practice.

Mental models theory helps explain why experience is so vital a consideration in adult learning. Taylor (2008) refers to mental models as “frames of reference” that structure “an individual’s tacit points of view and influence their thinking, beliefs, and actions” (Taylor, 2008, p. 5). As we age, mental models become somewhat fixed, reinforced, and resistant to change. They may be so ingrained that we are not even aware of them. New experiences in which we are actively, physically, and mentally engaged have the greatest potential to stimulate the construction of new mental models, and consequently, new learning and a change in perspective. Therefore, examining the experiences of teachers who have implemented educational field trips can reveal how these experiences have shaped their mental models and, quite possibly, transformed them from an “apprentice by observation” to a critically reflective practitioner. The implication of mental models theory in the proposed research is that when teachers are in the midst of describing how they have learned (from experience), their mental models play a crucial role in representing their ideas. Mental models are considered to be representations of experience. Therefore, the interview protocol will include an exercise which will allow for exploration of the participants’ mental models of field trip practice. They will be explored and probed during the interviews with participants in order to understand their underlying experiences and rationales.

Theoretical framework

The analysis will consider the suitability of two different theories for explaining the role of experience in teachers’ planning and implementing educational field trips. Kolb’s theory of experiential learning and Pugh’s construct of transformative experiences were used as contrasting theoretical lenses through which data collected relevant to the second research question were interpreted. Both theories emphasize the importance of experience in learning, and both emphasize that learning is a process
rather than an outcome. The distinguishing features of the theories are that Pugh deals with experience as a destination, and Kolb treats experience as a means to an end.

*Kolb’s theory of experiential learning*

Kolb’s theory of learning consists of four stages: concrete experience, reflection, abstract conceptualization, and experimentation. These stages are represented by Kolb as a cycle and as sequential with experience often referred to as the starting point. Once a concrete experience occurs, the individual reflects on it, and reconceives of the situation as a result, those new ideas are then actively applied to practice, thus helping to create new concrete experience from which to continue on in the cycle. Kolb’s Theory of Experiential Learning is represented in Figure 1.1.

*Figure 1.1  Kolb’s Experiential Learning Theory represented as a cycle*

Actual, physical experimentation is not necessary, and visualization is sometimes considered to suffice as a form of experimentation.

*Pugh’s transformative experiences*

Pugh has inquired into students’ use of science concepts in their everyday lives and how active application creates an experience whereby students’ understandings are transformed and they see the
world anew. Pugh positions experience as an outcome rather than a means to an end (Pugh, 2011). With less emphasis on learning as an end goal, Pugh’s theory blurs delineation between educational concepts introduced in classroom environments and the lifewide, every day contexts of students. Pugh has developed the construct of transformative experience, which he defines as “an expansion of perception and value resulting from active use of a concept” (Pugh, 2002). The emphasis is squarely on motivated use, experiential value, and expanded perception, as outlined in the following description:

The construct of transformative experience fills a gap by defining a form of engagement that extends beyond the classroom. . . Motivated use is a type of transfer that refers to the application of learning in a context (including out-of-school contexts) in which such use is not required. Expansion of perception refers to seeing and understanding aspects of the world (objects, events, issues, others, or the self) in new ways. It is the cognitive aspect of the motivated use. Experiential value refers to the valuing of content for its usefulness in immediate, everyday experience. . . [I]n line with prior conceptions of engagement, transformative experience is a holistic construct defined by behavior (motivated use), cognition (expansion of perception), and affect (experiential value).” (Pugh et al, 2010, page 4).

Pugh’s transformative experience relies on a crossover of knowledge from one realm to another (e.g., the science classroom to the student’s life) in a situation which is all at once meaningful to the learner. Transformative experiences can be subtle, fast and instantaneous, and the effect may persist to varying degrees (Pugh et al, 2010). For instance, a student may revel in noticing changes in the position of the sun in the sky relative to her home after learning about the Earth’s rotation in science class. Or, a student might develop into a lifelong plant enthusiast after studying Mendel’s work on dominant and recessive (traits) in peas. Pugh’s stance toward transformative experiences is that they occur infrequently unless students are guided toward them.

Comparing the two theories

Like Pugh, Kolb’s theory of experiential learning emphasizes the role of a mediator, a facilitator positioned to help trigger the learner to reflect and connect ideas, and plan how to apply those ideas in new situations. Unlike Pugh, Kolb’s theory emphasizes the cognitive aspects of learning. In short, Kolb’s
positions experience as a means toward learning, learning which can then be factored into future experiences. In contrast, Pugh positions experience (rather than knowledge) as having the ability to transform an individual’s perspective, and perhaps, his or her trajectory in this world.

Both Pugh and Kolb rebuke the idea of “learning as a transmission of knowledge” and treat learning as a process rather than an outcome. To Kolb, learning occurs via the transformation of experience whereas for Pugh, the transformative experience is a culmination of learning. Outward, physical and observed encounters in the world are fundamental to both theories. Where they diverge is that Kolb’s theory situates concrete experience as a means to an end, whereas Pugh situates transformative experience as an end in and of itself. Kolb’s theory underemphasizes the role of motivation and value while they are central within Pugh’s theory.

Definition of Terms

Educational field trips

This phrase describes a series of lessons and/or activities illustrative of research-based ideals (i.e., includes pre-visit, visit, and post-visit lessons that are curriculum related). The word “educational” indicates that research has shown similar activities to be effective toward student learning goals associated with existing school-based curriculum. Educational does not mean that the proposed study has ascertained the effectiveness in terms of the cognitive or affective student outcomes for teachers participating in this research.

Designed space

Some researchers (Glick & Samarapungavan, 2008) indicate that there are school and non-school (informal) contexts. Kisiel (2003) describes a kind of hybridized space that develops in the context of a school field trip, which tends to include both formal and informal elements. In order to avoid ambiguity, I use the term designed space to refer to an informal location which has been constructed to
fulfill some level of an educational role in society, such as a museum. The design may be based on free choice learning principles, which allow learners to select their own course through the space.

Experience

The word “experience” refers to an event occurring in a participant’s life that was perceptible to the senses, meaning that it was an outward, public event that others may have witnessed or physically participated in as well. Such an experience may be either participated in or observed. The physicality in this definition allows the research to focus in on what participants experienced firsthand which influenced their practice.

Influences, Factors, Influential factors

These terms appear in the first research question and, used interchangeably in chapters 3-5, refer to anything which the participants identified as having had an influence on their field trip to the science center.

Informal

This term simply means non-school.

Museum

Following the tradition in the literature (Falk and Dierking, 2000), a variety of institutions, such as science centers and museums, zoos, botanical gardens and planetaria, are included in the collection of institutions referred to as “museums.”

Museum educator

This is an individual who is employed by or volunteers with a museum in an educational role, such as a tour guide or staff scientist. In using the term educator, I am referring to those who work directly with teachers and students to introduce and interpret exhibits and actively construct meaning. When authors themselves use the terms “guide” or “docent”, I adopt their language while discussing
their particular research. Collectively, however, I refer to all of these staff persons as museum educators.

Recent research

I use this phrase throughout this manuscript to refer to the literature both published between 2000-2010, and included in the literature review for this study.

Organization of the Dissertation

This chapter has introduced the proposed study and identified the research questions. It has also provided background information regarding the study and described the conceptual and theoretical frameworks. The second chapter provides a systematic literature review of recently published studies investigating various aspects of school field trips. The third chapter will describe the methods which will be used to conduct the study. The fourth chapter will present the research results. Finally, the fifth chapter will discuss results and identify their implications for research and practice.
CHAPTER 2: RESEARCH ON SCHOOL FIELD TRIPS TO DESIGNED SPACES (2000-2010)

The previous chapter introduced the proposed study and its aims to explore how teachers, whose field trip practices reflect research based ideas, came to understand how to enact those practices. The chapter that follows this one will describe the methods for the proposed study.

This chapter presents the literature review which was conducted in order to conceive of the proposed study, therefore, it was written prior to chapters one or three. At the outset, the combination of systematic reading, writing, and analysis of literature was viewed as a useful endeavor. The initial goal of the exercise was to delve into the field trip literature and identify a course for further research. Eventually, the goal became the identification of themes from the existing literature on school field trips. The ideas from the literature review coalesced with the interests and ambitions of the author, which are described in more detail in chapter three, and the proposed research was conceived.

The original literature review, which helped precipitate the proposed study, is included below in its entirety. As such, it revisits some ideas from the previous chapter.

Previously published literature reviews of school field trips

In a literature review of field trip research, Griffin (2004) identified three dominant field trip research initiatives up until the 1990’s: “the overall educational value of the trips; the impact of preparing for field trips; and early studies into the complexity of elements that influenced student learning” (p. S59). She went on to identify three emerging research approaches at the turn of the century: “listening to adults and students in museums; understanding how students and teachers value and define learning; and crossing boundaries between schools and museums” (p. S61). This predominant research signaled the shift toward the study of the processes that affect individual learning during field trip experiences (Griffin, 2004). Research has continued to examine the multifaceted nature
of student learning within the context of field trips. The evolution of research on field trips signals the complexity of student learning in informal spaces.

By the end of the 20th century, research on school field trips had established a list of recommendations to increase the potential for student learning on field trips (Rennie and McClafferty, 1995; Griffin, 1998; Rudman, 1994). An excellent summary of these recommendations, and others generated from research since, can be found in Jarvis and Pell (2005), DeWitt and Storksdieck (2007), or Stavrova and Urhahne (2010). Invariably, these collections of recommendations highlight the significance of the on-site experience in relationship to students’ ongoing classroom learning. In general, it is recommended that teachers plan and align pre-visit, visit and post-visit activities to complement each other and to support student learning within their existing curriculum (DeWitt & Osborne, 2007). Teachers are also encouraged to include opportunities for socially-based learning (Davidson, Passmore & Anderson, 2010), to moderate the effect of novelty through pre-orientation of their students to the field trip location (Orion & Hofstein, 1994; Anderson & Lucas, 1997), and to moderate the level of student choice (Bamberger & Tal, 2006; Mortensen & Smart, 2007; Stavrova & Urhahne, 2010). While cognitive gains by students are clearly emphasized in these recommendations, the affective consequences of student experiences during field trips have also been integrated as an important consideration in the optimization of school field trip experiences.

A number of literature reviews have been published regarding field trips. Price and Hein (1991) surveyed evaluations of field trip programs and highlighted the importance of small group, social interactions during field trips. Rudman (1994) considered the history of field trips, and provided recommendations based on the earliest research into field trip structure. Rennie and McClafferty (1995) summarized research findings to date and presented guidelines for science teachers as they sought to identify and communicate research-based recommendations for conducting school field trips. Griffin (2004) claimed that the literature revealed the volatile, and “context specific,” nature of field trip
learning. She noted that recent research on families’ in museum settings might be useful in the considerations of how to prepare and guide students for learning while on field trips. She also argued for increased attention to the role of the teacher, writing, “These earlier studies did not fully address... the teachers’ perceptions and expectations of learning in informal settings” (p. S60). Most recently, DeWitt and Storksdieck (2008) synthesized ideas from the field trip literature and articulated a research agenda for the future. Over time, these reviews have punctuated our understanding of school field trips and made future research efforts more expeditious.

Purpose of the literature review

This literature review will establish the recent research basis of field trips which emphasize science content. Specifically, this review establishes the research base on the roles and perspectives of teachers in regard to field trip experiences. This literature review of school field trips will break with the traditions of earlier literature reviews on the topic which tended to include empirical, conceptual, theoretical, and practice-focused works, as well as books, unpublished evaluation reports and dissertations. Unlike other reviews on this topic, this one excluded non-empirical sources. Therefore, this literature review will only include peer-reviewed, published research from journals which attend (in whole or part) to science education. This measure will bring recent empirical research on field trips into relief. Furthermore, this review will focus on published works dealing with field trips to designed spaces, such as museums, rather than to parks or other natural outdoor settings. An additional contribution of this review is that it includes empirical works from both the academic and museum communities.

The purpose of this literature review is to examine how research on field trips has examined the teacher’s role and perspective of school field trips, as well as other field trip ideas, in the early 21st century. It is not the purpose of this literature review to summarize recommendations for field trip practice forwarded by the authors of the manuscripts included in this review. This literature review will suggest the central importance of the teacher in school field trips, and create an argument for more
research into the teacher’s perspectives. In considering this body of field trip research, it is also the intent of this literature review to consider how future research into teacher perspectives might be useful for further investigations, influential for theory, and pivotal for practice regarding field trips. The methods used during the course of the literature review are described in more detail below.

Assembling the Body of Research

Much has been written about informal science learning, use of informal spaces and museums for science learning. These include dissertations and both research and practice articles written for a myriad of audiences and purposes over the course of more than fifty years. Surveying three research journals from 1997-2007, Phipps (2010) found no fewer than 85 papers on informal science.

This literature review will concentrate on school science field trips. There is a substantial knowledge base for field trips in the literature. The amount of published research on science field trips alone may be surprising to those whose research centers on education in formal settings. Due to the size of this literature base, a process was necessary to identify, gather, and systemically review this body of research.

Prior to initiating a formal review process, a few key papers had been identified and assembled. Therefore, the initial review of this literature focused on recent research and publications of particular interest to the author, as well as the aforementioned published literature reviews. At this point, I made the decision to focus on empirical studies published in peer reviewed journals. This decision was as useful to the purpose of the literature review as it was practical.

Peer reviewed journals known to include research papers regarding school field trips were identified from the reference lists of several relevant literature reviews on informal science education (Phipps, 2010; DeWitt & Storksdieck, 2008; Griffin, 2004). I then searched the websites of the individual journals and other journals known to publish science education research. Some of these individual journals were only accessible through their publisher’s website, and sometimes access was granted to
me based on my personal membership or subscription (i.e., Museum Educators Roundtable and Visitor Studies).

An Endnote library had previously been created to assemble and manage the manuscripts for the literature review. The University of Connecticut Library’s available online search engines (including Web of Science, Scopus and EbscoHost) were used to build out the Endnote library. Search terms included combinations and variations of the following: schools, science, field trips, excursion, student, pupils, museums, science center, science centre, and teachers. At about this point in the process, for reasons discussed later, I narrowed the timeframe of the literature to 2000-2010.

The steps taken to identify papers to include in the literature review ensured that multiple search engines, pathways and databases were used. In the end, a phenomenon similar to saturation occurred in which papers of interest, both from online searches and reference lists of papers, became redundant.

The functionality of Endnote (version X4) was used for the literature review. First, abstracts were scanned and papers perused to identify empirical studies. Empirical studies could be isolated together within the larger Endnote library using the Group function. Finally, in later stages of the review, these papers could be sorted into subgroups based on their subject matter (i.e., teacher perspective, long term impact).

After online search engines and publishers websites had been tapped, any further identification of papers to include in the review continued by using reference lists from the previously identified papers. At this stage, reading and writing was simultaneously taking place. Papers were read to identify characteristics of the research (i.e., setting, location, participants), as well as key findings and research focus. Notes were taken on each paper, and these notes were written up in a word processing program. Eventually, papers with a similar focus were grouped together within the word processing program prior to the final stages of editing. Therefore, each paper went through three levels of review: an initial
individualized read-through, a typed, individualized summary and final editing within the group set of papers. This method proved conducive to scaffolding me through the writing such that papers read later in the process moved through these levels more expeditiously. This writing process allowed me to capture ideas relevant to all aspects of the proposed research, and retain them for my records even though a literature review was the primary focus and product at the time.

Dates

Over the past century, research in informal science education has increased and now represents a substantial body of literature. It became apparent early on that establishing a time frame would isolate the recent past in which teachers were more consistently considered as part of field trip research. It would also result in a more feasible number of papers to review. The question became what dates could be justified based on the research problem. Several factors informed this decision:

1. **The National Science Education Standards (1996).** The publication of the National Science Education Standards in 1996 which called for partnerships between formal and informal institutions for science education reform.
2. **Griffin and Symington (1997).** In perusing the literature as a whole, Griffin and Symington (1997) was positioned as a watershed paper regarding teachers and school science field trips. The literature review wanted to consider how the teachers’ role in field trips was developed within research literature since Griffin and Symington.
3. **Phipps (2010) conclusions regarding informal science literature.** Phipps (2010) identified that the informal science literature based prior to 1994 had been criticized for its lack of attention to conceptual framework and theoretical underpinnings. She indicated that literature from 1997 to 2007 had attended to conceptual frameworks, and specifically, conceptual frameworks of constructivism, situated cognition, and socioculturalism (Phipps, 2010). Based on struggles to pair earlier, sometimes more positivist or behaviorist, research with more current works, I was attracted to considering literature which had common theoretical momentum. Therefore, I decided to focus on more recent literature.
4. **Falk and Dierking’s Contextual Model of Learning (2000).** Reviewing studies likely influenced by sociocultural theory, even as represented in the Contextual Model of Learning (CML). In 2000, Falk and Dierking solidified those ideas and presented the CML. Researchers quickly embraced this tool and there is evidence that this framework has had a lasting effect on the literature.

5. **Teacher perspectives research.** In addition, a cursory review of the literature on field trips indicated that research on teacher perspectives of these kinds of experiences began in earnest in the early 2000’s, precipitated by earlier studies from Griffin and Symington (1997), Cox-Peterson and Pfaffinger (1998), and Michie (1998).

6. **The influence of the internet.** The onset of the internet in the late 20th century and increasing number of organizational websites for field trip venues. This development increased access to informal institutions, and provided teachers with readily available, free access to field trip information.

7. **The first decade of the 21st Century.** 2010 was selected as an end date because, upon this writing, it was the most recent completed calendar year. In addition, it allowed the review to cover the first full decade of field trip research in the 21st century

Therefore, it was decided that this literature review would include empirical studies published in peer-reviewed journals from 2000 through 2010. This literature review focused on recent published research on school science field trips. I use the term “recent research” throughout this chapter to refer to published works included in the literature review.

**Inclusion Criteria**

The goal was to be as inclusive as possible; however, it became apparent that a more selective approach would yield ideas more precise in relationship to the research question and purpose of the literature review. Therefore, a list of criteria was developed to identify which papers to include in the review. Included papers were:

1. Published in a peer-reviewed journal.
2. Empirical rather than theoretical or conceptual.
3. Reporting original research.
4. Available in English. Papers published primarily for audiences outside the United States
were included, however, when referenced during the course of the literature review, their
international origins are acknowledged.
5. In regard to school field trips which included science as subject matter.
6. Based on a research question or problem which was aimed at understanding some aspect of
school field trips. In addition, the findings had to report on some facet of field trip practice.

In addition, the field trips examined in the papers had to be:
1. Non-school excursions (in whole or part) to locations away from school grounds. They were
   not simply “out of doors” or elsewhere on the school campus.
2. Not simply a “field experience” wherein classroom ideas or skills were applied.
3. To a space designed and maintained for informal science learning, rather than a naturally
   maintained setting. These designed spaces could be referred to as museums.¹
4. Non-residential, one day outings or multiple visits over a period of time.
5. Inclusive of some combination of preK-12th grade students, and/or, preK-12 grade teachers
   or chaperones.
6. During school, rather than after-school, programs.

Finally, in light of the decision to include only empirical studies, it is worth noting that this
author does not believe empiricism to be the only method of knowledge generation or
research. Rather, the decision to include only empirical studies was because this researcher intends this
proposed study to be situated within the research literature. Therefore, the proposed study uses
empiricism to establish part of what is known about school field trips. I acknowledge the wealth of non-
empirical and published, or empirical and non-published, works over the past decades which deal
directly with school field trips (and for an exceptional and inclusive review of some of these, see DeWitt
and Storksdieck, 2008). It is left to question whether or not the empirical literature from 2000 to 2010 is
in any way representative of the complete body of published works regarding field trips during this same
time frame.

¹ The one exception might be Lebak (2007), depending on how one categorizes The Outdoor Classroom
venue. I include it because it was described as having designed components maintained for the
purposes of learning.
It is also noteworthy that there is a significant body of literature (not included in this review) dedicated to studying environmental field trips to urban, suburban and rural outdoor spaces. Typically, these excursions focus on developing environmentalism or understanding of ecological concepts with students. From one perspective, the research on science and environmental field trips has been divergent, with each field tending to build on its own literature base, with minimal overlap or cross-referencing. However, the phenomenon is representative of two distinguishable movements from the latter half of the 20th century: the post-Sputnik era of science education, and environmentalism. Consequently, the natural and physical sciences are distinguished by their own set of national (and usually, state) standards and environmental science also has its own standards; the former usually part of K-12 achievement testing. Including literature on environmental field trips was determined to be extraneous to the research problem at hand.

Based on the methods described above, 56 papers were included in the literature review. The following section presents the themes identified in the literature review. A discussion of these ideas can be found later on in this chapter.

Themes from field trip research 2000-2010

Broadly considered, field trip research from 2000-2010 focused on the main stakeholders in field trip practice: students, teachers, chaperones, and museum educators. In addition, research documented two instructional methods frequently used during school science field trips: worksheets and guided tours. Much of the literature attended to students and teachers, with only smaller subsets investigating chaperones and museum educators. Methods for student learning (guided tours, classroom or simulated programs, and worksheets) were the subjects of only a few studies. Several themes were developed from the literature reviewed, each of which is discussed in more detail in the sections that follow:
• The design of a worksheet was shown to affect its use and utility. Worksheet design was also shown to possibly increase the potential for student learning. In addition, worksheet design was used to reveal teacher perspectives regarding field trips to informal settings.

• Guided tours may limit student learning opportunities. However, they can be modified to bring about more student learning opportunities.

• Museum educators’ interactions with students and teachers are only beginning to be understood in the context of the field trip. However, the work of museum educators was shown to be more complex and adaptive than indicated by earlier research.

• Chaperones’ roles and behaviors did not necessarily represent their desired role within the school field trip group. Chaperones were infrequently considered in the research literature and their full potential as part of school field trip groups has yet to be realized.

• Researchers established that students can benefit from field trip experiences. They provided evidence for cognitive and affective benefits of field trip experiences, and noted that students were able to learn about science in general, or about specific science content. Social interactions were important to students, and they appeared to play a key role in learning.

• Teachers vary in their involvement with and preparation for field trip experiences. Researchers have partnered with teachers to apply research-based ideas regarding field trips, such as implementing pre-visit classroom activities. Recent research suggests that the teacher’s objectives, behaviors, strategies, and communication affect the field trip experience for students.

Worksheets

Worksheets are a desirable component of field trips for some teachers. Research suggests that both teachers and students associate worksheets with learning in informal settings (Griffin, 2004; Kisiel, 2003). Teachers also associate worksheets with behavior management and control (Kisiel, 2003). They
believe worksheets will keep students on task (Kisiel, 2003). However, student abandonment of worksheets suggests this device might have limited appeal for students (Mortensen & Smart, 2007). Research over the past 11 years has not directly tested any of these assumptions. Instead, focus in the empirical literature has been on the structure and design of worksheets, and how they reflect teachers’ perspectives. Problems appear to be in the design as well as implementation of worksheets, so researchers have attempted to increase an understanding of how teachers think about worksheets as well as their preparation for using them (Mortensen & Smart, 2007).

Kisiel (2003) identified eight characteristics of teacher-generated worksheets for museum field trips: task density, orientation cues, site specificity, information source, level of choice, cognitive level, response length, and response format. He also identified two overarching agendas when teachers generated worksheets: a survey agenda and a concept agenda (Kisiel, 2003). The worksheet generated by a survey agenda was meant to give the student broad experience throughout the museum setting. A concept agenda was aimed at a specific concept or scientific idea, and typically involves students with exploring less of the museum overall. In a later study, Kisiel (2007) found that a majority of teachers would have used a survey-oriented worksheet if they were to lead a field trip experience.

Mortensen and Smart (2007) examined museum-generated worksheets in use by teachers with their students at a natural history museum. They found that worksheet tasks which had a medium level of site-specificity while allowing opportunity for choice while offering some options, were most frequently completed. They also found that the smaller the group of students, “the higher the occurrence of learning events measured as curriculum-related conversations” (Mortensen & Smart, 2007, p. 1407). Therefore, they advocate for a small group approach to worksheet completion.

Other research has focused on the functionality of worksheets for student learning of specific concepts. Krombaß and Harms (2008) found that worksheets were an effective way for students to
learn about biodiversity in a natural history museum. Notably, the worksheet experience was integrated into a field trip design by researchers that also included free time for exploration.

Krombaß and Harms (2008) and Mortensen and Smart (2007) suggest that worksheets can be useful, and are better than nothing at all. However, there more or less effective ways to design them based on the learning goals of the teacher. Worksheets are an attempt by teachers to bring structure to a setting which is foreign to them as an instructional environment, such as a science center based on interactive exhibit experiences.

Recommendations for worksheet design include: incorporate student choice and control, and include post visit components which embed follow up into field trip practice. In addition, as Mortensen and Smart (2007) noted, making resources available to teachers does not ensure their use, and, in general, there may be a reluctance of teachers to use museum educational materials. Therefore, revelations about teacher field trip practice will likely come about as researchers continue to examine worksheets, their design, and their use.

**Guided Tours**

Very few studies focus on the programmatic elements of a field trip run by museum educators; such as guided tours or classroom programs. Venues which maintain collections on display, such as natural history museums, tend to use tours to engage students in field trip groups. Three recent studies at natural history museums have investigated how guided tours operate within the school field trip. Interestingly, the three studies took place in three different countries.

Cox-Peterson, Marsh, Kisiel & Melber (2003) found that students were not generally engaged in dialogue with each other or the docent while on docent-led school field trip tours. Rather, the tour “focused on facts or stories” (p. 206) and included scientific vocabulary surpassing the developmental level of students. Similarly, Tal and Morag (2007) examined terminology use and questioning in docent-
led museum tours in Israel. In their observational study, they suggested that questions were used to forward the docent’s agenda rather than probe and develop student understanding.

Similar to Cox-Peterson et al. (2003), Tal and Morag (2007) noted an overwhelming amount of scientific terms used in a relatively short amount of time in the majority of the tours they studied. These findings indicate that the breadth and depth of scientific vocabulary introduced during guided tours might surpass what is reasonable for students to absorb and understand. Students were observed to take on passive roles during tours, sometimes exhibiting restlessness, and high levels of learning were evident in only about 9% of students (Cox-Peterson et al, 2003).

In a later study, Stavrova and Urhahne (2010) tested two types of guided tours: one modified to include more active participation by students, the other was a standard tour with less participation. They found that each type of tour led to similar increase in student understanding of energy concepts. However, the tour with more active participation resulted in higher student interest. Their research also explored the affective realm of the student experience. Therefore, their research tested several recommendations from the literature and confirmed that they support student learning, as well as student motivations and emotional states. They suggested that field trip students are susceptible to negative emotions, such as boredom or anger, and that these can affect learning. Consequently, the researchers argue that improving guided tours was worth it because of the positive impacts on student learning.

Cox-Peterson et al. (2003) found teacher recommendations for improvement of the tours to be consistent with research-based ideas to optimize the impact of field trip experiences. Namely, teachers recommended that the tour experience include hands-on activities, more student interaction, and more time for students to explore the gallery on their own (Cox-Peterson et al., 2003). The authors acknowledged that altering docent practice at the institution (a natural history museum) would not
necessarily be easy, partly because “apparent teacher and student satisfaction with the tours makes instituting change even more difficult” (Cox-Peterson et al., 2003, p. 215).

Guided tours may be an attractive feature to teachers, but research on guided tours suggests they might not create optimal conditions in which student learning can occur. The small collection of research on guided tours in the 21st century identified few student interactions and overly structured visits (Talk and Morag, 2007; Cox-Peterson et al., 2003). However, research also suggests that guided tours have the potential to integrate best practice principles for field trips, and model effective pedagogies for an informal setting at the same time (Cox-Peterson et al., 2003). This is a tall order, and it is unclear whether or not the educational knowledge base of museums can support it (Hein, 2002). Guided tours might more effectively serve as a bridge, for both students and teachers, between their experiences learning in the classroom to learning in the museum. If guided tour practice begins to establish itself on learning pedagogy rather than knowledge-transmission, venues which are based on interactive exhibit experiences, such as science-centers, might also benefit from incorporating these tour programs within their free-choice design space.

Museum Educators

Researchers have examined the role of museum educators because of their presumed influence on student learning during field trips. Tran (2006) claimed that museum educators have a “significant role in shaping the nature of educational experiences afforded by their museums” (p. 279). Tran (2006) noted that museum educators were creative, flexible and adaptive with the content and delivery of their school field trip programs taking place in a classroom-style setting at a science museum. Overall, she noted that museum educators were thoughtful, reflective, and responsive to the needs of their participants. However, she also noted that museum educators’ communication with teachers and chaperones (as to what their roles were during the classroom programs) was implicit and not commonly understood. Tran (2006) also identified a similarity between teaching in schools and teaching in
She found this “borrowing of school practices” (Tran, 2006, p. 293) somewhat troubling because museums need to capitalize on their uniqueness and not mimic school environments. In a later study, Tran (2008) suggested that museum educators shared a common conception of their work, laying the foundation for professional learning programs for educators. In a description of one such program, Martell (2008) considered field trip-based-talk and described the benefits of a method for museum educators to reflect on their craft.

Research has examined what teachers and museum educators think of each other’s roles during school field trips. Tal, Bamberger and Morag (2005) found that museum professionals themselves are too accepting of the disconnected teacher. Tal and Steiner (2006) found that museum educators varied in their preference for teacher involvement, as did teachers in their own expectation for how involved they would be during the visit. Museum educators want teachers more active prior to and during the field trip (Tal & Steiner, 2006). However, educators may underutilize teachers (Tal & Steiner, 2006), perhaps only looking to them to handle discipline and student behavior issues (Tran, 2006). Moreover, Tran (2006) found that museum educators’ goals were to interest and excite students toward lifelong learning and return museum visits, rather than have them learn science content knowledge. These goals may or may not have been different from the teachers who organized the field trip.

Museum educators and teachers are from two different communities of practice (Kisiel, 2010) who must work in close proximity during the course of a school field trip. Research in this area has revealed the complexity of working in this hybridized space. Based on their comparison of three studies which examined teacher perspectives of field trips, Anderson, Kisiel, and Storksdieck (2006) suggested that “some tensions are likely to exist concerning who ought to bear the responsibility for creating learning experiences” (p. 377). In order to avoid these tensions, communication between museum educators and teachers is imperative. Museum educators and teachers need clearly defined roles during classroom programs at museums (Tran, 2006). Too many assumptions are made otherwise that
inadvertently may result in hiccups during the course of the program. Tal and Steiner (2006) suggest that teacher professional development has the potential to increase interactions between museum educators and teachers. Such interactions will likely lead to an increased understanding of roles and increased communication between museum educators and teachers.

**Chaperones**

Chaperones are adults who accompany a teacher and his or her students on a field trip. It is likely that chaperones account for the supervision of students during field trips in the United States more often than their own teachers. This seems especially likely at science centers which house interactive exhibits set up for small groups. However, the role of chaperones in field trips has not received much attention in the field trip research literature (Parsons & Breise, 2000). Furthermore, chaperones have been infrequent participants in published research and few studies mention chaperones at all. Fewer still have been designed, in whole or part, to understand the role of chaperones and their behaviors, and how chaperones might influence student learning.

Several studies have described the role of chaperones during field trips. Sedzielarz (2003) interviewed chaperones in her ethnographic research of school group chaperones. Her work identified nine identities which chaperones fulfill: guide, group facilitator, timekeeper, learning leader, teacher, role model, security guard, learner, and strategizer (Sedzielarz, 2003). Wood (2010) later identified three potential roles that a chaperone can fulfill as three points on a continuum: Escort, Parent, or Educator. She describes the Escort chaperone as one who focuses on logistics, while the Educator chaperone directs experiences, and the Parent Chaperone focuses on enhancing and participating (Wood, 2010). Neither Wood (2010) nor Sedzielarz (2003) suggest that the chaperone roles are mutually exclusive. Therefore, even though their overall role might be typified by a certain description, a chaperone may fulfill various roles over the course of the field trip, and to varying degrees. For instance, Wood (2010) found that chaperones most frequently portrayed escort behaviors. Sedzielarz (2003)
summarizes the multifaceted nature of chaperoning as follows: “Assigning a single role to chaperones is misunderstanding the complexity of this phenomenon. Assuming that all chaperones will fulfill the same role expectation (e.g. teacher) can be frustrating, since support attempts will not lead to desired results and other support opportunities will be neglected” (p.24).

Research has also described the role of the chaperone from the perspective of the teacher. Interestingly, this research has found that teacher-defined roles for chaperones are divergent to chaperone-defined roles for themselves (Burtnyk & Combs, 2005). In their study, Burtnyk and Combs (2005) found that 50% of chaperones felt that facilitating learning was part of their role while only 14% of teachers felt the same way. However, the researchers suggested that chaperones were less comfortable in their role than reported, because researchers noted a low occurrence of discussions with students. The key finding of their research was that teachers and chaperones had “divergent expectations for chaperones on field trips” (p. 14). Burtnyk and Combs (2005) claim that this difference indicates that communication barriers exist between teachers and chaperones, and that this barrier might influence the successfulness of museum educators developing materials to include chaperones as learning facilitators. So there might be a difference in how teachers view chaperones and how chaperones view themselves. Chaperones might also consider themselves more ready and able to facilitate learning than teachers do. Burtnyk and Combs (2005) pose a new question: “How do we encourage teachers to use chaperones as facilitators on field trips?” (p. 15).

Several ideas have been advanced in the literature reviewed regarding chaperones. Sedzielarz (2003) suggests that chaperones’ expectations need to be addressed and that venues need to communicate with teachers regarding their chaperones. In his study of teacher perceptions, Kisiel (2007) noted, “Unfortunately, the logistics of the museum setting often requires teachers to break students into smaller groups with chaperones who are unable to foster the same kinds of learning experiences” (p. 31). Similarly, Tunnicliffe (2000) stressed the educational importance of chaperones: “If
chaperones are not effectively prepared, the pupils in their charge are deprived of the educational experience to which they are entitled” (p. 753). Parsons and Breise (2000) found that parents opted to chaperone in order to spend time with their children or in order to visit the venue and its attractions. Finally, “the importance of social interaction as a basis for learning in museums further demonstrates the need for a more developed understanding of the role of chaperones in a field trip experience” (Wood, 2010, p. 162).

Other researchers have suggested that chaperones have great potential to support children’s science learning during field trips. In their study about teachers’ utilized of chaperone, Mortensen and Smart (2007) noted the potential of parent chaperones as facilitators of learning. As a result of their research, Burtnyk and Combs (2005) suggest that “using chaperones as facilitators is of particular interest to museum educators” (p. 13). Tran (2006) found that museum educators were likely to incorporate chaperones into their professional repertoire, utilizing them to compensate and extend their own individual capacities in leading groups of students. Museum staff expect chaperones to behave like parents: maintaining personal and social relationships constructed around exploration while learning (Wood, 2010). Burtnyk and Combs (2005) found that the guides being examined, when used by chaperones, correlated to a dwell time more than two times when without. These findings contrast with earlier assumptions that chaperones should behave like a surrogate teacher (Sedzielarz, 2003).

The full potential of chaperones, however, is yet to be realized by researchers. Wood (2010) found that chaperones were not actively participating with students, and exhibited fewer interactional behaviors with students (escort-like, parent-like, or educator-like) than expected. Some research seems to suggest that chaperones should behave like surrogate parents. However, other research suggests that chaperoned school groups need to have more of an educative focus and flair to their conversations than family groups (Tunnicliffe, 1997; 2000). Even though parents are a useful reference and comparison group for chaperone studies, the assumption should not be that chaperones should be like
parents. Tran (2006) suggests that museums need to realize their uniqueness rather than be like schools. The same idea might be extrapolated to this situation, specifically, chaperoned school field trip groups need to realize their uniqueness rather than behave like families. In a comparison study of school group chaperone and family behaviors, Wood (2010) concluded that “chaperones do interact with children in ways similar to parents, but to a lesser degree overall” (p. 173).

Field trip research from 2000-2010 which has attended to chaperones expanded upon an initial study from the 1990s (Parsons & Muhs, 1994). Furthermore, research into the roles and behaviors of chaperones has offered insight into the full complexity of field trip practice.

Finally, it is worth noting that not every field trip has chaperones. Some museums may not require any chaperones in addition to teachers in field trip groups. Including chaperones also might drive up the costs of a field trip, an expense which teachers might want to minimize. Chaperones are usually required at science centers, where exhibits are designed for small group experiences; however, at other museums which emphasize docent-led tours, a larger group of students might be accommodated without additional adult chaperones.

Based on their absence from the research literature, one might assume that researchers also tend to think of chaperones as fulfilling some roles (i.e., escort) rather than those which have a learning function. However, there are also significant obstacles to including chaperones as participants in research studies. It is possible that these factors have affected the inclusion and consideration of chaperones during the course of recent research on field trips.

Students

The majority of recent research on field trips has investigated their influence on students. Recent research either focuses squarely on the effect of trip experiences on student learning, or it considers student learning peripherally, or in concert with other factors such as student attitudes (i.e., Jarvis and Pell, 2002). The body of literature which examines the impact of field trips on students was
categorized according to eight focus areas: student attitudes and career interests, the students’
perspective of field trips, student learning of science content, student conversations and discourse
during school trips, the importance of social interactions during field trips, and the role of student
choice, as well as how students with special learning needs are affected by field trip experiences, and
the long term impact of school field trips on students. Each of these topics from recently published
literature is described in the sections that follow.

Effect of trip experiences on student attitudes and career interests.

Salmi (2003) presented a compilation of case studies aimed at establishing how students’
science center experiences affect motivation and career choices. He found that students who were
already interested in the content in science center visits got more out of it than those who were not. He
also found that the motivating effect of science center was greatest on primary students. Gifted
students and those with learning difficulties were motivated by science center visits, but the latter’s
motivational gains seemed dependent upon the connection between the center’s exhibits and the
school’s curriculum. By including university students as participants, he established that visits to science
centers did affect career choice. He notes that learning should be meaningfully planned for students,
and that prior knowledge be taken into account.

Interest and attitude are important factors in a student’s career selection. Bozdogan and Yalçin
(2009) contend that science centers are the most important informal settings for teachers and students
because of their “combination of science, technology, and training” (p. 28). Bozdogan and Yalçin (2009)
found that a visit to a science center increased student interest and academic achievement, but that
academic achievement on its own was not a predictor of interest. They suggest that variations in
student motivation might help explain this disconnect. Bozdogan and Yalçin (2009) advocate for the
importance of the teacher’s role in school field trips, and they emphasize the need for teachers to
understand the importance of taking students on field trips. They argue for teacher preparation at
various stages of a teacher's career, and the role of museums and universities and families in communicating with teachers.

Jarvis and Pell (2002) examined attitudes and knowledge of 10-11 year old students before and after a field trip to a space mission simulator at the Challenger Learning Centre in the United Kingdom. While they noted that 24% of the students felt inspired by the trip to become scientists, they also noted that the trip had less of an impact on students with a previous disposition towards science careers. That a “sizeable number of pupils were relatively unaffected by the experience” was explained by the forced roles that some students had during the space mission simulation (Jarvis & Pell, 2002). This research identified attitudinal variations between girls and boys. For instance, boys’ attitudes were more stable than girls, and mostly girls became more interested in becoming scientists. Jarvis and Pell (2002) noted that pre-visit preparation of students by their teachers might be commensurate with attitudinal gains associated with the field trip. This suggestion is supported by earlier research (Finson & Enochs, 1987) which examined the “pre-visit effect” and found that students who had not even gone on the field trip experienced more gains than those whose teachers did not integrate field trip experiences with ongoing classroom learning.

Student perspective.

Researchers have noted that the student perspective has been largely absent from the literature (Bamberger & Tal, 2009; DeWitt, 2008; Davidson et al., 2009; Anderson et al., 2008; Lelliott & Pendlebury, 2009). Researchers have now begun to understand student perspectives of field trip experiences.

Bamberger and Tal (2008b), examined the range of outcomes resulting from field trips to natural history museums. They categorized outcomes in three ways: content oriented; social oriented, and interest oriented. Similarly, DeWitt (2008) examined field trip learning from the student’s perspective, and demonstrated that most students (80%) were able to draw on prior knowledge to make meaning
from their school field trips to a science center. Her research establishes the potential role that museum exhibits can play in student learning during the course of a field trip.

When Bamberger and Tal (2009) modified a survey methodology to assess student field trip experiences at four different institutions, they found that factors affecting student learning (i.e., level of choice) were not perceived equally across institutions. They concluded that different types of institutions, or different institutions of the same type (e.g., natural history museums), may be an entity all its own in terms of student experience and student perceptions.

DeWitt and Osborne (2010) examined the social context of the museum field trip experience utilizing data collected through group interviews with students. Teachers “reported undertaking minimal preparation and no specific follow up to these visits” (p. 1370). The researchers found that students thought exhibit experiences were “fun” or “interesting” because they were hands-on, and that student interest peaked immediately following the visit, and dropped off within weeks (DeWitt & Osborne, 2010).

Davidson et al. (2010) examined the agendas of teachers, students and zoo educators for field trip experiences. Similar to Jarvis and Pell (2005), Davidson et al. found that teacher practices and agendas had an influence on students, whereas those of zoo educators did not. In general, Davidson, et al. (2010) found that when expectations, planning and preparation were minimal, ultimately, learning was minimal students perceived the benefits from field trips to be primarily social. Alternatively, when a trip was purposefully planned as part of classroom unit, the expectation levels of students and teachers matched (Davidson, et al., 2010). In addition, the social need that students have on field trips, that perhaps gets created by the context of the field trip itself, “can be harnessed for learning, by getting students to work together, share, and discuss what they are learning with each other” (Davidson, et al., 2010, p. 137).
As researchers explore student perspectives, they have utilized methods atypical of the majority of field trip research. Lelliott and Pendlebury (2009) used narrative analysis to tell the story of Tlotlo, a composite character representing the experiences of 34 students from four schools who visited an astronomical science center in South Africa. Their narrative illustrates six themes from the students’ experiences: socio-economic constrains on museum visits, misconceptions, visit preparation and follow-up, memories and imaginings, enjoyment, and discussing the visit afterwards. Their research suggest that school visits to museums, even those for which students are minimally prepared, might offer continuous learning implications (Lelliott & Pendlebury, 2009). Their methods and findings offer fresh vantage points from which to consider field trips and their effects on students.

Student learning of science content.

A number of recent studies have examined how field trips, and any pre-visit and post visit classroom experiences, affected student learning of science content. Some of this research identifies the specific science content of interest (e.g., Anderson et al., 2000), while other research tries to understand how students learned about topics in general (e.g., Miglietta et al., 2008). Researchers appear more personally involved in this area of field trip research than in others. For instance, researchers often design and implement the pre, post or visit experiences themselves, or in concert with the students’ teacher, as they investigate students’ science content learning.

Miglietta, et al. (2008) examined student learning during the course of a lecture and guided tour of a marine biology museum in Italy. In regard to science content learning, the researchers noted some differences between the genders in the short term, but this difference did not persist over time. Specifically, female field trip members learned more than males when tested right after the experience, but the delayed-post test showed that this difference faded.

Glick and Samarapungavan (2008) explored the impact of researcher-designed pre and post visit field trip experiences on learning by comparing two groups of students: one which received the pre and
post visit lessons, and one which did not. The intervention group learned more than the control group. They concluded that students learned more effectively in the structured field trip experience that incorporated pre and post visit activities (Glick & Samarapungavan, 2008).

Research has examined how students learn specific science content as part of a field trip experience. These studies have investigated the utility of the museum environment to student learning. Collectively, these studies have used a variety of methods: pre-post tests, observations, individual student interviews and small group interviews. Researchers have intervened in a variety of capacities, including a university-museum-school partnership (Tenenbaum, Rappolt-Schlichtmann, & Zanger, 2004), a researcher-teacher program (Henriksen & Jorde, 2001), and a study of students whose teachers had already planned the field trips (Bowker, 2004).

Tenenbaum, et al. (2004) examined an integrated learning experience spanning from the classroom to the museum. Their study included low income, inner city kindergarten students with diverse ethnic backgrounds in the United States. Researchers interviewed the students prior to and after the overall field trip experience. They examined the students’ content knowledge and their attitudes towards science. Teachers, who were interviewed as part of the study, indicated that the museum program was fun and it offered a quality educational experience. As a result of participating in both the teacher-led classroom and educator-led museum programs, students increased their understanding of bubbles and currents, and they grasped more complexity in regard to buoyancy.

Caleon and Subramaniam (2005, 2007) conducted a series of studies on student learning as a result from cryogenics activities at a science center in Singapore. In their initial study, they concluded that students (10-12 years old) learned cryogenics-related concepts, and made attitudinal gains regarding enjoyment of science and science careers (Caleon & Subramaniam, 2005). In their later study, they found that cognitive gains were more stable two weeks after the program than were attitudinal
gains (Caleon & Subramaniam, 2007). These two studies provide evidence for student learning during field trips.

Henriksen and Jorde (2001), in cooperation with classroom teachers, administered pre and post visit activities with 16 year old Norwegian students regarding radiation. The lesson also included a visit to a museum. Consequently, they examined student learning as a package deal which included the pre-visit, visit, and post-visit activities. They found that the frequency of alternative conceptions of radiation decreased in student explanations after the program, while the frequency of scientific statements stayed about the same. While the visit experience “clearly led to improvements in [students] conceptual understanding of the science issues” (Henriksen & Jorde, 2001, p. 203), the researchers did raise some concerns with how science ideas were conveyed to school visitors.

Bowker (2004) found that children, 7-11 years old, from eight different schools in the U.K. enjoyed their field trip visit in which they learned about plants and nature. Their teachers had general, broad goals for the visit rather than specific content goals. Bowker noted the influence of prior experiences, specifically those from home, in learning about less popular plants (herbs). He also noted the importance of the affective and social processes of learning to students on the field trips.

Anderson, Lucas, Ginns, and Dierking, (2000) investigated how post-visit activities back in the school classroom affected student learning after a field trip to a science museum in Australia. Noting the consequential effect of research on their participants, the researchers used concept maps to establish student understanding of electricity and magnetism prior to and after a post visit classroom activity. They then used data from student interviews to characterize the learning process. They describe four case studies, including Roger, of whom they write, “It is evident that Roger’s overall understandings were constructed through a series of overlapping, reinforcing experiences that were encountered in home, school, and informal contexts” (Anderson, et al., 2000, p. 670). By focusing on how students learned instead of what they learned, this study offers a unique vantage point on the
process of student learning in informal settings. First, they found that student understanding changed in “many ways not specifically intended by those who planned the exhibits and/or post-visit activity experiences” (Anderson, et al., 2000, p. 677). Some of these changed understandings were more scientifically valid than others. Second, similarly to Bowker (2004), they identified the influence of prior knowledge and experience in the learning process in the various stages of activities. Finally, as Henriksen and Jorde (2001) also noted, the science center exhibits and post visit activities inadvertently led to alternative understandings of science concepts. Despite their design quality, components of a field trip, such as a post visit activity or exhibits in a science center, are ultimately only as effective as the students’ interpretation. Field trips do not operate, in whole or part, in isolation from the students’ previous experiences and prior knowledge. Therefore, Anderson et al. (2000) and Henriksen and Jorde (2001) suggest that field trips must be carefully planned, such that educators and teachers can respond to student learning needs that arise in regard to specific science content.

Morrell (2003) found that, following a facilitated outdoor experience, students increased their knowledge regarding forestry concepts and retained that knowledge for at least three months. The lesson plan materials given to teachers were extensive, and teachers self-reported doing both the pre-visit and post-visit activities, factors which might have affected student learning.

**Student conversation and discourse during field trips.**

Lebak (2007) examined the role of cultural responsiveness during a field trip experience. As an outdoor educator, she reported on her guidance, of a group of students whose socioeconomic and ethnic backgrounds were very different than her own. In reflection, Lebak noted numerous instances during the trip when her lack of cultural and individual capital with students had an effect on the experience of students. At times, Lebak found the teacher to be an integral mediator in transactions which involved the educator and the students. This research suggests that teachers might serve as cultural brokers during field trips. She writes,
The cultural boundaries that are evident between the students and me are impossible to mediate during the 1-day field trip. ... Although an informal science teacher may have symbolic capital in terms of science knowledge, cultural barriers may prevent informal science teachers from making sense of the students’ culture, seeing their own culture in terms of capital, and aligning their enactment to benefit their learning. . . . (T)hrough creating culturally adaptive ways of transacting, teachers can provide opportunities for their students to generate positive emotional energy and group solidarity in the learning of science at informal learning centers” (Lebak, 2007, p. 862).

Tunnicliffe, Lucas and Osborne (1997) suggested that a school visit to a museum can be a missed learning opportunity if students are not given structured forums to discuss their experience. Tunnicliffe (2000) sought to determine the extent to which visitors discussed the intended exhibit content in a natural history museum, and if school group conversations were more educationally focused than family groups. In her research, she found similar content in both family and school group conversations (Tunnicliffe, 1997, 2000), and only a small amount of talk which referenced science content or process skills (i.e., predicting, gathering data, observing). The realization that school groups were more focused on being social than learning surprised her (Tunnicliffe, 2000). However, other research has noted that the social interactions on school field trips are a “potential means by which student learning may be facilitated” (DeWitt & Hohenstein, 2010a, p. 454).

In a later study of conversations between visitors, Tunnicliffe (2001) discovered that the presence of an adult, and especially teachers, had an effect on student conversations at a botanical garden. Cuing by adults prompted students to discuss less obvious features, make interpretations, and read labels to find out information. Her research (Tunnicliffe et al., 1997; Tunnicliffe, 2000; Tunnicliffe, 2001) also suggests that conversations are affected by context: animals on display at a zoo, plants in a botanical garden, animatronic exhibits in a museum. She suggests that affective comments are important in the development of long term ideas based in the visit’s content.

Whereas Tunnicliffe’s research focused on content-related-talk as the singular indicator of student learning, DeWitt and Hohenstein (2010a, 2010b) focused on characteristics of discourse which
have the potential to support student learning. DeWitt and Hohenstein (2010a) compared teacher-student conversations between field trips and in the school classroom in their exploration of how field trip settings and demands potentially affect teacher behaviors. They found that “closed-ended, often task-related or procedural, questions as well as those seeking brief factual responses, tended to predominate in both the museum and classroom settings” (DeWitt and Hohenstein 2010a, p. 466). They also found that the museum setting had an effect on teacher behavior. For instance, teachers asked more questions that prompted student action, and made fewer evaluative statements in the museum setting. DeWitt and Hohenstein (2010a) conclude that teacher-student conversations in museums have the potential to create important learning opportunities, rather than missed learning opportunities.

DeWitt and Hohenstein (2010b) examined student-student conversations in both the museum and classroom settings. They found that students were more likely to vocalize content-related ideas in the museum than in the classroom, and more task-related ideas in the classroom as opposed to in the museum (DeWitt & Hohenstein, 2010b). The data suggest that students conduct content-related talk amongst themselves with ease during their museum visits, yet to varying levels of frequency.

Role of Student Choice.

In order to examine how the format of a field trip might affect student learning, Wilde and Urhahne (2008) designed trip experiences with various levels of self-regulation. They developed one with a more open-ended, constructivist approach, another with closed tasks (multiple choice questions) which minimized student choice, and a third version which gave students the choice as to which they preferred: closed or open ended. All three took place at a natural history museum in Germany with fifth grade students. Similar learning gains occurred regardless of visit type. However, students were more interested and motivated with closed tasks than they were with more open-ended tasks, the reverse of what was expected. Wilde and Urhahne (2008) suggest that students might have perceived more choice in closed tasks. They also questioned whether their intervention truly embodied self-regulation in the
context of the study, and if students simply preferred the closed-ended tasks because there was less writing involved.

Using observational methods, Anderson, Piscitelli, and Everett (2008) studied young children’s agendas over the course of multiple visits to the same venue, including a science museum. They identified that children’s agendas compete with the agendas of museum educators in three ways: content as determined by who leads the conversation, mission as determined by who leads the path, and time.

Anderson et al. (2008) noted that when constructivist strategies were effectively employed and agendas negotiated, competing agendas had the potential to positively influence student learning. Agendas also vary among members within a group, and agendas have been found to influence learning in museum settings (Falk, Moussouri, & Coulson, 1998). Anderson et al. suggested strategies for negotiating agendas prior to and during the field trip, including adding flexibility into the schedule to allow time for children to pursue their motivations and interests.

Bamberger and Tal (2006) examined how choice and control affected student learning. They identified three levels of choice present in observational studies students on field trips in Israel: No choice, Limited choice or Free choice. These choice levels were determined by the amount of control children had over six field trip features: topic of focus, space for exploration, objects for exploration, time allocations, interactions between students and facilitators and order of the exploration and assignments. These variations in choice level operated on a continuum, with many variations offering limited choice as possibilities. Field trips with limited choice offered learning supports to students and some level of control. No choice or free choice contexts were not as ideal for students in field trip groups. Consequently, limited choice visits engaged students in the learning process to a greater extent than no choice or free choice visits.
Everett and Piscitelli (2006) found that mobile activity stations near the exhibit galleries and aimed at engaging young children (with puppets, role play, puzzles, and other activities) encouraged interactions with others. They concluded that “child-centered” resources provided children “with opportunities for choice, play, and social interaction” (Everett & Piscitelli, 2006, p. 10). Such child-centered activities engaged children in discovering the discourse and purpose of museums at a very young age.

How students with special learning needs are affected by science field trip experiences.

A few studies included students who were identified as having special learning needs. These studies were comparable to the majority of the literature in their findings regarding student learning. By attending to a specialized facet of science field trips, these studies have yielded insights into these experiences for researchers and practitioners interested in field trips for the general, as well as the special needs, population.

Tam and Nassivera (2000) identified a dearth in the literature regarding special needs and science learning. They presented an effective model for collaboration between university instructors and teachers to leverage museum resources to help teachers meet the needs of students with learning difficulties in the secondary school science classroom.

Brooke and Solomon (1998, 2001) investigated how students with moderate and severe learning difficulties engaged in activities at a small science center. They proposed (1998) and then applied (2001) a model of how play might ultimately serve as the foundation for the development of investigation skills, via curiosity and an interest in cause and effect. Their study (Brooke & Solomon, 2001) also compared teacher reactions to behaviors of students with severe learning difficulties in both the science center and classroom settings. They concluded that students with severe learning disabilities did show curiosity in the science center, and that student learning at the science center complemented classroom learning. Teachers were included in this study and during their interviews, they were shown video of
their students in both settings: in school and at the science center (Brooke & Solomon, 2001). Teachers
were impressed by how motivated their students were at the science center, and recognized behaviors
atypical of the classroom setting.

Rapp (2005) investigated how a children’s science museum was a learning environment for
students with special learning needs, and the extent to which this environment was able to host the
“complex heterogeneity” of students. By way of presenting four students’ cases, Rapp (2005)
recognized benefits of participation in science field trips for a cross section of students spanning a range
of learning abilities (challenged to gifted) in one elementary school classroom. Noteworthy in each of
these cases was how learning was situated as a socially mediated component of the field trip, rather
than a predetermined goal of either the teacher or museum educators. In one of her cases (Fiona) Rapp
noted the possible cognitive and social effects of praise on a student while that student interacted with
an exhibit. Rapp (2005) also noted, “[T]eachers may have had very different goals for the project than
did the researcher. The teachers and the researcher did not share the same perceptions of what was
important in order for learning to occur” (p. 305). Unlike Brooke and Solomon (2001), who as
researchers, noted the complementary nature of the museum and classroom, the general classroom
teacher included in Rapp’s (2005) investigation did not believe that connections readily existed.
Furthermore, in Rapp’s study the general education and special education teachers differed in their
opinion that there was “carryover” from the museum to the classroom.

Long Term Impact on Students.

Whereas most research focuses on the short term and immediate effect of participating in a
science field trip, a few studies have attempted to establish the long term impact on student learning.
In a paper preceding the bounds of this literature review, Falk and Dierking (1997) examined long term
memories related to school field trips. Their study concluded that memories from field trips persist over
time, and that school field trips have the potential to have a lasting impact on students. None of the
studies on long term impact, however, have taken the teacher perspective into consideration, or established the original intent (learning or otherwise) of the field trip from the teacher’s perspective.

Bamberger and Tal (2008a) compared immediate and long term (16 months) outcomes for 8th grade students who had visited a science museum. They concluded that the visit made a significant educational impact on students in the short and long term. Most importantly, students recognized the “contribution of the visit to their knowledge; and emphasized peer interactions during their visit” (Bamberger and Tal, 2008a, p. 198). However, they highlight that in Israel, where their study took place, few interactions take place between teachers and students on the field trip, and “neither the museum staff, no the school teachers connect the knowledge gained at the museum to the science learned in school” (Bamberger and Tal, 2008a, p. 208). Nevertheless, 7 out of 21 students connected what they learned in the museum with what they were learning in school. Peer interactions were identified as important to student learning.

Pace and Tesi (2004) interviewed eight adults (ages 25-31) on their perceptions of school field trips taken when younger. Retrospectively, participants identified hands-on experiences and social interactions as the most important components of field trips. In essence, the more active they were on the field trip, the more information they felt had been retained. Only three of the eight participants perceived that their field trips had educational value, yet most valued the “break in routine” that school field trips offered.

Knapp (2007) researched the long term (one year) impact of a field trip to a national park, which included a visit to an environmental center, which constituted the designed space in this study. Research on the long term impacts of environmental field trips (Knapp, 2007, and 2000) identified, as did Pace and Tesi (2004), that what students did made for more memorable experiences. If hands-on aspects of field trips are such important factors in the long term impact on students (Pace & Tesi, 2004), then this would support the assertion made by Bozdogan and Yalçin (2009) that science centers are the
most important informal settings for teachers and students because of their integration of science, technology, and training through hands-on, interactive exhibits.

Overall, the research into the long term impact of student learning on field trips suggests that field trips can make a lasting impression on students, perhaps more so than any other school day (Falk and Dierking, 1997). Pace and Tesi (2004) and Knapp (2007) found variation in the number of students who retain subject matter information. By focusing on memories as an indicator of learning, Falk and Dierking (1997) show greater promise for the long term impact of field trips than do other studies which emphasize educational value and connections perceived by students (Pace and Tesi, 2004; Bamberger and Tal, 2008a).

*Teachers*

The following section reviews the recent research regarding teachers and field trips. Common areas of inquiry have included teacher strategies, behaviors, objectives, agendas, and motivations for taking part in school field trip experiences.

Tal (2001) considered “the field trip as a complex method for enriching the learning environment in science classrooms” (p. 26). She investigated how two different groups of students (preservice/novice teachers, and inservice/experienced teachers) experienced field trips which had been planned for them as educative experiences. The goal was to generate teacher reflection on how field trips are conducted. Interviews and open-ended survey questions were methods of data collection. Tal (2001) concluded that field trips are less complex for preservice/novice teachers, and they are more motivated to implement them as part of their teaching. She also noted that comfort with field trips increases with professional development; however, there are variations in how the professional development might be best suited to teachers in various stages of their careers. Tal suggests offering “teachers a variety of experiences, which will increase their self-confidence and ability to facilitate field trips as an ongoing and enriching science learning environment” (p. 46). Tal presented three generalized
teacher approaches to field trips: the involved teacher, the teacher who follows the program, and the passive teacher.

In an exploration of motivations, Kisiel (2005) identified eight different motivations that teachers have for taking a field trip (including exposure to new experiences and connecting with the curriculum). He acknowledged that these motivations were not exclusive of each other because a teacher can have multiple motivations (Kisiel, 2005). It might also be reasonable to assume, that motivations can change and emerge during the course of the field trip itself. In addition, Kisiel (2005) suggests that “teacher agendas may be weak or somewhat unrefined” (p. 949).

A school field trip presents an intersection between an environment the teacher has control over and an environmental over which the teacher has little control. Therefore, research into field trips is research into teacher’s perspective on teaching and learning science. Kisiel (2007) highlights the situatedness of instructional practice, and suggests that strategies from classroom environments may not be as effective in informal settings. Therefore, teachers may not be aware of how to most effectively use museum settings to support student learning (Kisiel, 2007).

In their research, Tal and Steiner (2006) found that most of the teachers were engaged in the visit, but 15% were passive and detached, and only 21.5% were actively (pedagogically) involved. Kisiel (2006) offers an intricate picture of teacher strategies during field trips. He investigated the types of strategies, both reported and actual, used by teachers during field trips to a natural history museum. He identified five types of strategies (including structured and unstructured student engagement and supervision), any number of which may be utilized by teachers during the course of the field trip. However, he noted that “(L)ess than 70% of survey respondents were able to describe during-visit strategies” (p. 447), indicating that it was very unlikely that the visit had robust connection to the ongoing learning of students in their classroom. Therefore, even though teachers may acknowledge curriculum connection as a reason for their vision, they may not be executing this purpose in practice.
In addition, this inability of teachers to identify strategies may reflect their unfamiliarity with the setting, or with learning pedagogy within that setting.

Kisiel (2006) found that worksheet use was desirable for teachers, however, about a third of those who reported using worksheets indicated some hesitation with using them, an idea which might shed light on Mortensen and Smart’s (2007) finding that few teachers adopted use of a museum-generated worksheet to which they were introduced. Teachers have varying ideas regarding what type of worksheet (if any) will help constitute a successful field trip. However, Kisiel (2007) determined that teachers were more inclined toward a survey-oriented worksheet that offered a general experience of the museum as opposed to a concept-oriented worksheet which offered a visit experience focused on specific content.

In one study which reverses the typical trend in teacher involvement, Lucas (2000) examined the experience of one teacher and her students throughout the course of the field trip experience (pre-visit, visit and post) to a science museum. This teacher is an anomaly in the literature because she meaningfully planned both pre and post visit activities, and demonstrably integrated the field trip into her curriculum plan. Her efforts during the visit itself were somehow thwarted, or at least in conflict with, those of museum educators. For instance, she wanted her students to explore exhibits and manipulate variables on their own, and she posed open-ended questions to them in order to provoke thought. However, museum educators wanted to direct the students on how to do the exhibit the right way, and they asked questions which prompted students to recall facts or information. Overall, there was an inconsistency between the teacher’s agenda and the agendas of the museum educators that she encountered (Lucas, 2000).

Yu (2005) investigated how teachers perceived factors associated with large group visits (>100 students) to a science museum in Taiwan, where a travel agent typically designs field trips for groups this size. He noted that Curriculum fit “was not the first consideration in planning trips” (p. 13) and
described the situation in the museum as “hundreds of students are left unsupervised in the exhibition halls and have no idea what to look for, or how to use the exhibitions” (Yu, 2005, p. 12). Yu found little teacher involvement in planning and implementing the field trip, and little connection made between the museum and classroom learning (Yu, 2005). Teachers felt that they were not responsible for student learning while in the museum (Yu, 2005). “It is clear that teachers are aware of the problems caused by taking a large number of students on a field trip. However, other factors such as administrative details, responsibility and discipline, lead teachers to choose to travel with a large group, regardless of its inefficiency” (Yu, 2005, p. 14).

Tal and Steiner (2006) identified three levels of communication between teachers and museums: administrative, content, and pedagogical-content and examined whether more experience with a museum field trip affected the level of communication enacted by the teacher. They found that the length of experience with visiting the museum did not matter or make a difference in how they communicated with the museum. They did, however, note differences between how elementary and secondary school teachers utilized museum resources, with the former appearing almost totally reliant on museum staff, and the latter less so and “more active” during both the planning and visit stages of the field trip. They also noted that more secondary teachers were planning pre/post activities. They suggest that the science teacher’s presence during the field trip is crucial, as only a person in this role can effectively “bridge” in class learning with field trip experiences.

Jarvis and Pell (2005) identified a variation in teacher effectiveness during the field trip. Their research suggests that teacher enthusiasm, attitude toward science, and teacher preparedness might be predictors of cognitive and affective gains for students on field trips. Essentially, they discovered that teacher behavior influences student experiences. Other adults accompanying the students were influential as well; however, Teachers and classroom assistants “were more able to control the behavior of their groups than many parent helpers (Jarvis and Pell, 2005, p. 60). Jarvis and Pell (2005) also found
that some adults, “who did not encourage the children’s interest” (p. 60) during the field trip, did not like science themselves. This research also found that the simulation experience in which the students were involved, rather than the visit to the exhibit halls, emerged as the basis for increased student interest in science.

Using interviews and surveys, Storksdieck (2001) examined how teachers and students prepared for and reacted to their field trip to a planetarium, and how their ideas correlated with each other. Storksdieck (2001) found that teachers and students agendas differed, and that little communication took place between them, and between either of them and staff members from the venue itself. He also found that when teachers were preparing for field trips, content preparation was deemed more important than gauging students’ expectations, prior knowledge and attitudes. In addition, he found that follow up was seen more as a way to clarify questions rather than explore and develop affective or cognitive gains. Furthermore, few students (35%) reported doing follow up activities. This finding suggests that most students did not perceive that follow up activities had been conducted. Storksdieck found that even when teachers understood best practices for field trips, they did not necessarily enact them, citing time in their curriculum schedule as a major deterrent. Surprisingly, Storksdieck found that the field trip (to a planetarium) had a greater overall impact on the teachers than the students.

Tal, Bamberger and Morag (2005) suggest that “the key to successful field trips is the teacher’s capability in organizing, sequencing, focusing, and evaluating the event for the needs of each student, and in providing an experience consistent with the outcomes desired” (p. 932). Their research investigated the role of relevant content knowledge and previous experience of teachers with field trip sites. Similarly to previous research on preservice students, they found that after experience in planning and participating in a structured field trip, teachers were more likely to develop them themselves.
Discussion

Characteristics of field trip research 2000-2010

Research on school field trips can be characterized in a number of ways. Based on this review, several factors emerged as relevant in describing this unique body of literature. Each of these characteristics of recent field trip research is discussed in the paragraphs that follow.

Based on earlier reports (Phipps, 2009; Griffin, 2004; Rennie & McClafferty, 1995), the published literature on field trips from 2000 to 2010 has shifted. This recent research has still focused on student learning as a result of field trip experiences, but it lacks the anxiousness described by Phipps (2010): “There is an underlying desperation present in articles from the later 1990s, a need to prove the worth of this understudied form of learning” (p. 18). The literature also became more focused on outcomes resulting from the accumulation of field trip experiences (pre visit-visit-post) rather than simply as the result of a visit to the venue itself.

Empirical studies of field trips can be characterized in terms of the conceptual framework employed. Recent research on school field trips is typically based on a constructivist or sociocultural framework, however, there are variations of the extent to which these frameworks manifest or are applied. For instance, conceptual frameworks are predominant in papers from academic research literature. The Contextual Model of Learning (CML) is a theoretical framework of learning in informal settings posited by Falk and Dierking (2000). The CML was referenced in about 12 of the 56 papers in the literature review.

Field trip research has typically been quasi-experimental. Research methods typically included observations, interviews, and surveys. Few studies employed untraditional methods or variations of traditional methods. For instance, Lelliott and Pendlebury used narrative analysis to present a composite student’s experience at a South African Planetarium. DeWitt (2008) interviewed paired students rather than individuals in order to reflect the social nature of their museum visit. She also used video as an aid
in provoking recall of student experiences. Lebak (2007) examined herself as a cultural factor within a school field trip group. These methods allowed researchers to explore school field trips in new ways.

When researchers have studied student learning, they typically incorporate a pre-post survey design. If they were investigating the extent to which learning persisted, they employed a pre, post, delayed post design. None of the studies reported tracking student learning for more than 16 months after the field trip. Only some of the studies which examined student learning included additional methods of data collection aside from surveys.

Field trip research is an international endeavor. Research included in this review took place in the United States, the United Kingdom, Australia, Israel, Germany, Italy, Turkey, New Zealand, Taiwan, and Norway. Within the United States, research typically was conducted in West or East coast states and associated with museums in urban areas. Research from different regions of the world tends to indicate agreement on several ideas, including: overall low involvement of teachers, and low incidence of field trip visits accompanied by pre and post visit classroom activities. There were a few unique factors associated with field trip practice and research from different regions. For instance, research from Israel (i.e., Bamberger & Tal, 2006) and Taiwan (Yu, 2005) describes field trips, especially large sized groups, as being arranged by travel agents rather than teachers themselves.

Field trip research has taken place in a variety of venues, including, planetariums, botanical gardens, environmental centers associated with parks, science centers, and natural history museums. There were also variations of venues, such as a science center which focused on cryogenics and a natural history museum which focused on marine biology. Potentially unique effects on students from varied venue experiences (differences between planetariums and science centers) or different venues of the same sort (differences between science center A and science center B) have not been reported in the literature. Furthermore, venues widely vary in their application of sociocultural theory. Not all embody principles forwarded by the CML (Falk & Dierking, 2000). Any venue-contributed uniqueness to
the experience of students, chaperones, teachers or educators has not been considered. To some extent, it is assumed that findings from a study in one venue might apply to field trip practice to any venue considered a museum. There is nothing in the literature to suggest otherwise. However, differences between venues of the same type which are perceived by students have just begun to be considered (Bamberger & Tal, 2009). Future research might explore these ideas in order to establish the transferability of findings regarding field trips from venue to venue.

A wide variety of students have participated in field trip research. Students with a wide age range are included in each identified focus area for field trip research. For instance, research which examined student participants most frequently focused on 5th grade students, and typically focused on fifth, sixth, seventh and/or eighth grade. Fewer studies looked at younger ages and fewer still considered older students. Studies varied in the number of student participants, from 31 to 655 (Bozdogan & Yalçın, 2009; Jarvis & Pell, 2002).

There are various audiences for field trip research, operating in very different communities of practice. This literature review included empirical research published for audiences in academia (i.e., Journal of Research in Science Teaching and Science Education), teacher preparation (Journal of Science Teacher Education), and museum practice (Journal of Museum Education, Curator, Visitor Studies). Field trip research has been spread out across the literature, a reality which raises the question of access of the different communities to each other’s work. Museum practitioners may not have access to the academic and teacher preparation journals, and vice versa. Researchers conducting studies in field trips should strive to continuously monitor how their findings are reaching both communities of practice: museum-based researchers and academy-based researchers.

Some studies examined field trips in situ, with some researchers making first contact with participants upon their arrival to the museum. Other studies fabricated field trips, and sometimes subsidized them, for the purpose of conducting the research. Between these two extremes of
researcher involved were variations of the extent to which the role of research altered the conditions of the field trip experience.

Research has not yet considered the impact that the time of the school year in which the field trip took place. It is possible that field trips which occur early on in the academic year have a different purpose than field trips which occur late in the year, and perhaps after any standardized testing period. Future research which examines field trip practice in situ should identify the timing of the experience in the school calendar.

Recent research on field trips converges on a common idea: During field trips, there is potential for student learning, as well as other outcomes. There is also potential for these outcomes to persist or have consequence over time. Factors which influence these student outcomes include the adults (teachers, chaperones, or museum educators) accompanying them prior to, during, and after field trip experiences. The products these adults generate (in classroom lessons, museum-based-classroom programs, guided tours, worksheets) can also influence students. However, none of these individuals may be more important to the student field trip experience than the teacher. The next section develops this idea in more detail and argues for increased attention to teachers in field trip research.

*Pivotal importance of the teacher throughout the field trip experience*

Research in the early 21st century has continued to examine student learning resulting from field trip experiences and the influences on student learning. Non-traditional methods of study and data representation have been introduced (i.e., Anderson et al., 2000; Lebak, 2007; Lelliott & Pendlebury, 2009). Researchers also began to understand the student’s perspective on field trip experiences (e.g., DeWitt, 2008). In addition, the literature regarding field trips has diversified by building off earlier studies. Research has begun to look more closely at the role of museum educators (Tran, 2006, 2008) and chaperones (e.g., Sedzielarz, 2003; Wood, 2010). Research has also developed ideas regarding worksheet design and utility (Kisiel, 2003, 2007; Mortensen & Smart, 2007). The most prominent
contribution to the field trip literature, including those using more and less traditional methods, may be the discovery of the importance of social experiences for students to learn most effectively on field trips. In addition, field trip research has demonstrated a positive effect on students and teachers (Jarvis & Pell, 2005; Rapp, 2005). This recent research has only made our understanding of the school field trip more complex.

Amidst this diversification of methods and complexity, it might also be argued that research is converging on an idea of central importance and practicality: The role of the teacher is integral to the field trip experiences of students and any related cognitive or affective outcomes. This idea that teachers have pivotal and central importance acts in concert with another relatively new idea: Students themselves are a primary factor in their own learning, as well as the learning of other students around them. The social interactions of students on field trips are known to be a primary component of student learning (DeWitt and Osborne, 2010). By making organizational and logistical decisions on behalf of students (Kisiel, 2006), and by deciding how to structure the visit (Bamberger & Tal, 2006), teachers set the stage for the effectiveness of these social interactions, and create the context in which socially-based learning may occur.

*Integrated ideas from recent research regarding teachers.*

There is wide variation in how teachers are involved with student learning on field trips (Griffin, 2004). Early research on field trips reported a general sense of teacher involvement, and sometimes described teachers as being somewhat detached from the learning process of students. Recent research on field trips illustrates how the quality, amount and type of adult support and teacher planning varies (Jarvis & Pell, 2005; Tal, Bamberger & Morag, 2005).

Teachers acknowledge that field trip experiences for students could be improved if they implemented pre-visit and post-visit components (Storksdieck, 2001; Kisiel, 2005; Yu, 2005). For instance, Kisiel (2005) found that teachers were “unaware of their role in shaping their students’
experiences during the field trip” (p. 937), however, “they admitted that the experience would have been better if they had completed some sort of preparation, follow-up, or both” (p. 937).

Research in informal settings has demonstrated that the visitors’ agenda (their motivation and the strategies they use to conduct their visit) can affect their learning (Falk, et al., 1998). Teachers and students are a specialized type of visitor. Therefore, it has become important to understand teacher and student agendas for field trips, and whether or not these agendas are communicated and commensurate. Research has reported an incongruity between teachers and students field trip agendas (Griffin & Symington, 1997; Storksdieck, 2001).

Teachers have different and varying objectives for field trips (Storksdieck, 2001; Anderson and Zhang, 2003; Kisiel, 2005). Some research has assumed that teachers conduct field trips for specific educational purposes (Tunnicliffe, et al., 1997), yet connecting to the curriculum is one reason teachers have cited for participating in field trips (Kisiel, 2005; Anderson & Zhang, 2003), more reasons do exist. Some of these other, non-educational, purposes may actually be more frequently enacted by teachers. Other research indicates that the field trips engage teachers in a balancing act between a “desire to teach, and want(ing) the students to see the museum as a fun, informal place where” they can learn (Kisiel, 2006, p. 446). When teachers are able to make choices about when the field trip is conducted, there is some indication that they may be more like to be motivated to connect the field trip to their curriculum (Kisiel, 2005).

Understanding the role and perspective of teachers.

In general, field trips have great potential for student learning. Yet teachers may be unaware of, or inexperienced with, how to maximize their role, and the role of other adults, during the field trip. Or, teachers might be aware of best practice ideas (Cox-Peterson et al., 2003), yet this awareness may not transfer to actual practice (Storksdieck, 2001). There are also tensions and potential conflicts, between museum educators’ agendas and teachers’ agendas (Kisiel, 2005), such that borrowing the idea of
bridging (Tal & Morag, 2007) these communities of practice offers a useful illustration. We have yet to fully understand the pathways by which museum educators and teachers communicate. Research into teacher perspectives can also help museum educators and teachers more clearly define their roles and interactions with each other. In general museum educators and teachers need to stop working like “ships in the night” moving past each other on their separate courses toward student learning.

From the perspective of research, a high level of involvement on the part of the teacher and implementation of research-based best practice guidelines is the exception rather than the norm. Even though research has yet to define what it means by “involvement,” or adopt common principles for what involvement might be, the sentiment that teachers are underutilizing these ideas is likely to be the same. The more the teacher is involved, the more likely it seems to that the whole field trip experience together and into alignment. However, it is possible to be too involved, for instance, when teachers misuse informal settings or impose school-like restrictions that do not take advantage of the capital of informal spaces.

Teachers may overestimate the positive effects of field trips for which students have not been prepared. In addition, the mere involvement in an “educational” pre visit, visit, and/or post visit experiences in association with the field trip does not guarantee that any learning, intended or otherwise, will have occurred. Jarvis and Pell (2002) write, “research has confirmed ... that, without careful preparation, management, and follow-up activities, the experience can be disadvantageous for a few children” (p. 997). Alternatively, when a field trip is carefully planned and pre and post visit activities are incorporated, it can be unclear whether specific learning occurred before, during or after the trip itself (e.g., Anderson et al., 2000). However, such distinction may not be necessary if one bases a conceptualization of learning on the CML (Falk & Dierking, 2000).

Furthermore, we know that professional development work with teachers has the potential to impact their current students as well as all students over the future course of their professional tenure.
Research into school field trips affirms this in a commonly identified implication: That field trip preparation and learning theory be included in teacher preparation coursework (J. K. Olson, et al., 2001 2001) and ongoing teacher professional development (Tal & Steiner, 2006).

The insights from research suggest there is much more to understand about the teacher’s role and perspective in terms of other direct stakeholders in the field trip process: museum educators, students, and chaperones. For instance, Kisiel (2005), the introduced the idea that “negotiation” occurs among museum educators, teachers, and students, while on field trips. In another instance, Students may believe that fun and learning are incompatible actions (Griffin, 2004; Bamberger & Tal, 2006). The concept of negotiating with children before and during a field trip (Anderson et al., 2008) is not included in the list of “best strategies” for field trips. But it informs the “choice and control” part. The suggestion that praise during the course of a field trip experience can affect a student’s behavior, both at the museum and in the classroom, thus lending toward improved social experiences which facilitate student learning (Rapp, 2005). Davidson et al. (2010): “In both formal and nonformal situations, students and teachers sometimes have different ideas about what happened during an educational experience” (p. 126). Likewise, it seems possible that chaperones could have conflicting agendas and practices with teachers. Kisiel’s (2006) observations suggest that a teacher who had fewer adults to “negotiate with” during the course of the field trip, was able to more smoothly transition his students between areas of the museum.

Kisiel’s and others (Rebar, 2010) suggest that teachers are negotiators, and prone to conflict with others when they juxtapose formal practices into informal settings. Amidst these negotiations with adults, tensions, and conflict, it is likely that a teacher’s own identity becomes a significant factor in their field trip practice. Further consideration of teacher identity should help understand their role in this overlapping area of formal and informal settings.
While classroom learning may connect with learning that occurs on a field trip, Teachers may have differing opinions of whether or not connections exist between museum and classroom learning experience, even when they are present with the same group of students (i.e., Rapp, 2005). Teachers might not necessarily feel responsible for making connections. Rather, they may believe that connections should manifest on their own (i.e., between exhibits and curriculum), or by someone else’s design (i.e., museum educators and exhibit designers).

**Understanding the importance of teachers.**

Griffin and Symington (1997) proffered a call-to-action for the research community to attend to the importance of the teacher’s role in school field trips. Their seminal research explored the fidelity of field trip practice to research-based principles. The outcomes of the study suggest that the majority of the teachers had no clear idea of how to use the museum as an informal learning resource or how to facilitate learning in the museum environment. “Any possible learning objectives are therefore overtaken by structural, task-oriented objectives as these are more concrete and immediate” (Griffin & Symington, 1997, p. 775). Consequently, Griffin (2004) suggests that museum educators should view teachers as “well-intentioned novices” who are drawing from their experiences (as both teachers and students themselves) to inform field trip practice.

Griffin (2004) suggests that we view teachers as “well-intentioned novices” who are drawing from their experiences (as both teachers and students themselves) to inform field trip practice. Field trip research over the past 11 years has helped us develop an initial understanding of the teachers’ perspective of field trip experiences. Griffin and Symington (1997) signaled the importance of the teacher’s role in school field trips. Subsequent research focused on developing an understanding of the teacher’s role (Cox-Peterson et al. 2003, Griffin & Symington, 1997; Olson, Cox-Peterson & McComas, 2001), and the teacher’s perspective (Tal, Bamberger, Morag, 2005; others) of field trips. In recent research, the teacher has emerged as a central, pivotal and crucial component of student field trip
experiences. Understanding “what teachers actually do” on a field trip is necessary in order to support teachers use of these settings for student learning (Kisiel, 2006), and in order to facilitate their ongoing professional development.

*Future field trip research as a whole.*

In the 20th century, research did an exceptional job of identifying factors which influence student learning while on field trips. This research culminated in lists of best practices aimed for a mixed audience of researchers and practitioners. Research in the early 21st century continued to develop and understand these best practice ideas. In addition, researchers have tested best practice models (DeWitt & Osborne, 2007). However, we lack a framework for teacher behaviors which support one primary purpose for school field trips: Student learning of curriculum-related science content.

There are a number of intriguing ideas which have emerged from field trip research. In the twentieth century, researchers found that novelty on the greater scale (e.g., the newness of the museum building layout to students), can be somewhat of an obstacle to learning. However, DeWitt and Osborne (2010) have shown that novelty on a smaller scale, at the exhibit level, can increase the memorability of an experience. Researchers have also suggested that repeated visits to venues (Bozdogan & Yalçın, 2009) may compensate for the absence of teacher follow up and post visit activities in the classroom. Griffin and Symington (1997) found a correlation between field trips that had a learning orientation (rather than task-orientation) and connection between topics at the museum and at school. Other research found that even when the teachers are aware of best practice guidelines for field trips, they do not necessarily use them (Storksdieck, 2001). Kisiel’s research suggests that field trips can be optimized for a variety of teacher purposes, not only for cognitive purposes. Therefore, research in all areas of field trip practice could potentially benefit by further research into teacher perspectives.
CHAPTER 3: METHODS

In the first chapter, the proposed study was introduced and the rationale for it was established. The second chapter then reviewed the research literature on field trips from 2000-2010 in order to develop an understanding of the teacher’s role and perspective of field trips. The purpose of this chapter is to review the research questions and explain the methods used to collect and analyze data in order to develop an understanding of how teachers implement educational field trips which include both preparatory (pre-visit) and follow-up (post-visit) lessons. This chapter also describes the research location, potential participants, and methods of recruitment.

Research Questions

Researchers have identified three practices that contribute to student learning during field trips: preparation in the classroom beforehand, a focused and facilitated visit, and follow-up in the classroom afterward. Together, these practices increase the likelihood that students will reap educational benefits from their field trip. Unfortunately, such practices are not typically reflected in how most teachers conduct and manage field trips. Therefore, a substantial gap exists between teachers knowing that there are particular practices versus teachers knowing how to implement such practices.

To guide teachers toward research-based field trip practices, we must understand and leverage contexts in which teachers have learned how to implement those three practices as exemplars to guide teacher preparation and professional development. Adult learning theory posits that experience plays a fundamental role in learning, and that the importance of experience increases with age. Therefore, exploring the role of experience in developing effective field trip practices through an adult learning lens could yield insights into recommendations for museums and cultural sites, as well as others involved in advancing teachers’ professional knowledge. For the purpose of this study, what constitutes an experience will be broadly construed. Lifewide experiences will count, not just those from a teacher’s
formal training or field trip experience. It is anticipated that the proposed study will contribute to the larger dialogue regarding teacher professional learning, and the role of experience in that learning.

The two research questions guiding this study were:

1. What factors influence teacher implementation of educational field trip practices and how do teachers manage or address such factors in their practice?
2. What experiences have shaped how teachers learn to plan and implement educational field trips?

Field trip site description

The study examined how teachers implemented educational field trips to one museum in particular. All participants had visited this museum on a field trip with their students. The museum is a Science Center in the northeastern United States. Concentrating on one field trip site, versus several locations, minimized the effects of differences in types of science museums, differences in science center venues, or regional variations that have been noted or suggested by past research (Bamberger & Tal, 2008, 2009; Tal & Morag, 2007). This strategy also raises, yet leaves unanswered, questions regarding how the findings apply to teachers engaged in field trips to other venues, and how the findings correspond with educational field trip practice in general.

The field trip site for this study consisted of approximately 32,000 square feet of exhibit space with approximately 300,000 people visiting this Science Center each year. The institution is located in an urban area of the state’s capital city. It is frequently described as both a tourist and educational destination.

Like other institutions of its kind, most experiences in the Science Center are based on exhibits that have hands-on features rather than on displays and collections that are hands-off. The Science Center claims to have over 150 exhibits, spread throughout 11 themed galleries (themes include: Forces, Sight and Sound, Health, Sports, Space, Inventions, Planet Earth and Energy Management). Most of the
exhibits are interactive, meaning that there is a variable which visitors can change in order to affect the outcome of the exhibit experience. For instance, one exhibit allows visitors to place different kinds of helmets on a mannequin’s head and then perform a “crash test” by raising a hammer a certain distance and then dropping it against the helmet. Alongside the exhibits are a greenhouse, containing butterflies, and a rooftop garden with walking paths. The Science Center also has four classroom laboratories in which educational staff, known as Staff Scientists, lead 45 and 90 minute hands-on programs dealing with specific science content. Finally, the Center has a 3D movie theater which shows educational science movies about various topics.

This site was selected as a matter of convenience, as it is where the researcher was employed and had six years of experience in teacher professional development and program evaluation. Practitioners at the Science Center will likely be able to use the findings of the research as they would like more teachers to purposefully use the facility and its resources as they guide student learning of science concepts. In addition, there are several contextual factors which make this location appropriate for the study. First, the Science Center supports and promotes the implementation of pre and post visit activities by providing these resources, based on specific state science standards, free of charge from their website. Second, the Science Center offers professional development opportunities which introduce teachers to a field trip model in which pre, visit, and post-visit activities play an integral role. It was likely that these factors were representative of a context in which the study is both viable and feasible.

It is important to emphasize that the study does not constitute an evaluation of the extent to which the Science Center’s specific activities and resources are used. Rather, this is a study about how teachers develop an understanding of doing preparatory, visit, and follow up field trip activities, while using resources from the Science Center or otherwise, in their field trip practice.
Field Trip Program Options

The Science Center has been open for a little more than two years and annually hosts about 60,000 students on school field trips. In the 2010-2011 academic year, 365 different schools sent groups to the Center. Most field trip groups have been students in grades 3-7. There is a charge for students to enter the museum (about $9 each), and additional charges for additional programs (e.g., a 3D movie ticket costs about $5, and a classroom-based laboratory program costs about $6-$12). School groups vary in size and no minimum number of students is required, however, a charge for a chaperone for every 8 students is automatically included to help enforce the recommended chaperone-student ratio. Sometimes, the museum receives funding to provide field trips free of charge to students from certain school districts, or for specific programs. Schools are responsible for expenses related to transporting the students to and from the museum. School groups are permitted from 9am to 5pm, except on days when the Science Center is closed. The Science Center is typically closed on Mondays from September through April and on several holidays.

Description of a Typical Field Trip at this Science Center

During field trips, school field trip groups are greeted at a special entrance and provided with a brief orientation which focuses on behavior management. During the course of their stay, the group will tour the exhibit galleries in small, chaperone-led groups. They interact with each other and the exhibits. Staff, whose specialize in visitor services and/or various areas of science, are usually available to interact with students as well. Typically, these interactions are based around specific exhibit areas, such as one in which the students can plan, build and test paper models of helicopters, or practice first aid on a medical mannequin, or handle sea creatures in a touch tank. The field trip may also include viewing a 3D movie or participating in a laboratory-style classroom program. In addition, field trip groups tend to visit the gift shop and have lunch while onsite.
Participants

Participants were 4th-6th grade teachers who had participated in a field trip at the science center and reported conducting pre and post visit activities with their students. This grade range reflected the majority of teachers who took part in field trips at the Science Center. Teachers of these grades are representative of the majority of recent research which has taken place regarding field trips. The researcher recruited teachers addressing a variety of curricular units (e.g., in physical and life science). This measure helped to enrich the sample.

Understanding how elementary teachers do implement field trip activities may be particularly useful. Orion and Hofstein (1994) suggest that students can “learn” how to take field trips which are oriented towards learning, so it is especially important to begin educational field trips early on in elementary school. However, Tal and Steiner (2006) found that no elementary teachers participating in their research either led preparatory or follow up activities, as opposed to some of their secondary school counterparts. Cox-Peterson and Pfaffinger (1998) also found that none of the elementary teachers in their study did any kind of preparation with their students. Science learning and the construction of a science identity may be particularly important during the elementary school years, making science field trips taken during this time even more important and influential.

Number of participants

The study aimed to include between eight and twelve teachers, however, as in other qualitative research, recruitment and data collection were planned to continue until a desired sample had been reached. In the end, the study included eight participants, two of whom were part of a pilot study. Aside from the inclusion criteria described below, the study recruited participants regardless of their race, gender, or socioeconomic status. These ethnographic factors had not been made conditional by the research questions or purpose of the study.
Sampling method

The study used a purposeful sampling method (Patton, 2002). Purposeful sampling meant that participants who were information-rich were identified and recruited to participate in the study. Some screening took place to identify those individuals most likely to provide substantial information regarding the research questions. Information-rich participants were those who exemplified the interests inherent in the research questions by having implemented field trips which were aligned with research-based recommendations for field trip practice. The study was bound by the scope and qualities of participants and only included teachers who implemented preparatory, visit, and follow up activities surrounding a field trip to one specific venue between September, 2010 and March, 2012.

Recruitment

After their field trip, teachers completed a survey as part of the Science Center’s ongoing evaluation of its field trip program. That data available for the proposed study included: details regarding the participant’s history with the Science Center (whether they had visited prior to the field trip, whether it was their first field trip there, if they participated in professional development workshop, or used an educational resource from the Center to prepare for the trip), whether or not they did pre and post visit activities, the purpose of their field trip, whether or not their objective was fulfilled, the effect of the trip on student learning.

From this database, I was able to identify teachers who booked field trips, and claimed to implement pre and post visit activities, between August 2010 and April 2012. During these times, the Science Center had conducted an online survey as part of its ongoing evaluation of the field trip program. In the 2010-2011 school year, a total of 194 teachers had completed the survey, and about 25% of them were 4th-6th grade teachers who reported that they completed both pre and post visit lessons. These individuals were among those contacted by email to participate in the study.
In qualitative research, the precise number of participants is secondary to the ability of the collected data to substantially inform the research questions. Such a phenomenon is referred to as saturation. When the data has reached the point of saturation, data collection is no longer necessary and the research can proceed through the remaining analysis and reporting (Olson, 2011). In this particular study, it was suspected that no fewer than four and no more than twelve participants would be included. In the end, results from only four participants are reported on in Chapter 4. These four were the most information-rich participants relative to the research question.

Recruitment tools and instruments are included in Appendix A. I was successful in recruiting twelve participants for the study: three for inclusion in the pilot phase, and nine for the post-pilot phase. There was some attrition, see Appendix B for details on that participant, and only two participants were eventually included in the pilot study, and six in the post-pilot.

Data from two post-pilot participants was eventually excluded from the full analysis. Their field trips to the Science Center had likely been their first or second attempt at leading an educational field trip. These two participants were just not in the same category as the other four, each of whom had several years of experience with implementing educational field trips. Data from these two reinforced the storylines already present, and more robust, in the other four participants. These two participants were less information-rich because their post-visit activities with students could not be traced to a concrete lesson plan, or a tangible product, that had been based on the curriculum and purposefully planned to occur in concert with other activities before and during the trip.

Data Collection Methods

The research questions warranted a qualitative approach to the study. Qualitative methods emphasize the role of the researcher in data collection and analysis. Therefore, a section later in this chapter attends to the position of the researcher in relationship to the proposed study.
Several methods were used to collect data during the course of the study. Existing data from the Science Center was used to identify and recruit participants for the study. Recruitment was done with an online questionnaire. The questionnaire provided demographic information regarding the participant. That data also provided details regarding each participant’s field trip and history with the Center. Questionnaire data was screened to identify teachers who would be most informative to the research questions. That participant was then contacted to participate in the study and a copy of the IRB form was mailed and/or emailed to them. After a participant acknowledged interest in being part of the research, the first of two 75 minute interviews were scheduled. Finally, each participant engaged in two interviews. Each method is described in more detail below, and the complete details of the pilot study and interview protocol are presented in Appendices C and D, respectively.

**Questionnaire**

The online questionnaire collected demographic information from participants (including number of years teaching, highest degree, school, district, current grade level(s) taught). Brief descriptions of each participant were generated using information from the questionnaire and interviews and presented in Table 4.1. The questionnaire also included questions that were part of the screening protocol used to identify participants who are most suitable for the study.

**Interviews**

Each participant in the study was interviewed twice. The first interview used a semi-structured interview following a written protocol yet allowed for more in-depth discussion when needed. This was an exploratory study and teachers were given latitude in the second interview to discuss what came to mind. The second interview was essentially comprised of a concept map exercise.

The first interview took place at a location of the participant’s preference. Most participants (except one) opted to have the first interview done over the phone. Phone interviews were recorded
using internet-based software (Google Voice). The transcript from the first interview was reviewed and coded prior to the second interview. I coded in the interim between interviews specifically to identify influences on practice and relevant experiences. These codes were transferred onto Post-it notes for the participant to use in the second interview. The second interview took place in person as it included the concept mapping exercise. A pilot study phase was implemented to finalize the interview protocol in relationship to the research questions. That pilot study is reported on in Appendix C, while the final interview protocol is included in Appendix D. All interview recordings were transcribed by a third party and checked by the researcher.

Interview questions and protocols from other research similar to scope and/or purpose were consulted in the development of the interview protocol in the current study. These included DeGraw, 2011; McIntosh, 2011; Olson, Cox-Petersen, & McComas, 2001; and Rebar, 2009. In addition, the protocol incorporated the suggestion to start an interview with discussion of an idea that opens up the topic (Michie, 1998). Olson’s (2011) recommendation to carefully listen to participants’ responses to discern between description and reflection or self-analysis was especially useful in the interviews as it helped push past mental models, and it was a measure also made possible by holding two interviews. Finally, the interview protocol included a debriefing step at the end of each session, meant to help “reground” the participant and transition out of the interview (Olson, 2011).

**Concept Mapping**

Concept mapping is a way to graphically represent and communicate how one conceptualizes an idea. “The concepts are words or ideas that represent events, objects, or even emotions and feelings” (Freeman & Jessup, 2004, p. 151). These ideas are then connected to each other via lines. Descriptions may be attached to the lines in order to make explicit how one concept is related to another. Concept maps allow researchers to explore the mental models of their participants regarding the topic at hand (e. g., Dudzinski, 2011). Once the concept mapping method is introduced to participants, they are given
the opportunity to construct their map on their own (Freeman & Jessup, 2004), sometimes asking questions of the researcher or talking out loud about their map construction as they go (Dudzinski, 2011).

In this study, participants were engaged in a concept map exercise at the beginning of the second interview. The full protocol is included in Appendix D. Teachers were presented with the list of concepts (on Post-its) coded from the first interview transcript. Beginning at that point, the participant was able to check that I had identified influences from the first interview accurately. They were then given an 18 x 24 inch whiteboard, dry erase pens of three different colors, and extra Post-its, and asked to draw a concept map about their field trip to the science center. They were invited to talk out loud and ask questions as they proceeded through the exercise. Each concept map served as an external and tangible representation of ideas relevant to the research questions. Had the study simply included an interview, without any visual establishment of influences in relation to practice, the participant may have felt the need to further clarify their ideas. The concept map helped bound the interview in relationship to the research questions at hand. The concept map allowed us to approach the ideas discussed in the first interview from a different vantage point (having influences written down with the purpose of creating a concept map about their educational field trip). Therefore, the concept map was instrumental in addressing the research questions.

As the participant spoke and placed concepts, I asked questions to have them explain how they connected concepts to each other, and I asked clarifying questions about words they were using. However, I was also able to listen in and prepare questions for further clarification and explanation once the exercise was finished. At that time, I also asked them to discuss concepts they did and did not include in their map. Overall, the exercise was be a way of reviewing ideas from the first interview and going into greater depth with them to reveal underpinnings for expressed mental models relevant to their field trip practice. Furthermore, having mental models out and “in the open” written down on
paper (e.g., Sense of responsibility, cost, childhood) allowed the conversation during the concept mapping exercise to focus on the interconnections between influences and practice. The concept maps generated by all post-pilot phase participants are included in Appendix E.

Concept mapping was used in this study, however, it is noteworthy that Personal Meaning Mapping (Falk, Moussouri & Coulson, 1998) is a method more frequently used in contemporary research dealing with informal science. The Personal Meaning Mapping (PMM) method is a written exploration of ideas related to a central topic, however, the ideas are not predetermined (unlike concept mapping) and are developed by the participant in the context of creating the personal meaning map. The method is commonly used to establish ideas before and after an intervention or activity (e.g., Brown, 2011) and it is frequently accompanied by an interview in order to establish changes over time (Falk & Storksdieck, 2005). While PMM methods were explored during development of this study, it was determined that concept mapping was a more viable method because the first role of the mapping exercise, in part, was to member check the researcher’s interpretations from the first interview and to help bring to light any additional influences. In addition, using predetermined terms (the influences established from the first interview transcript) afforded by concept mapping allowed the participant to establish interconnections between influences and educational field trip practice (e.g., in the school classroom before and after). Therefore, concept mapping was the method determined to be most useful in relationship to the research questions.

The following list summarizes the affordances of the concept mapping method used in this study:

1. It member-checked interpretations (on the pink Post-its) from the first interview.
2. It allowed the researcher and participant to interact with ideas from the first interview in an external and tangible way.
3. It focused the conversation in the second interview on interconnections and relationships between influences and practice.
Incentive

Careful consideration was given to whether or not to offer an incentive to participants in this study. Ultimately, the goal was to thank teachers for their participation without inadvertently influencing what they say. Therefore, it was decided that each participant would receive one free ticket to the science center (a $17 maximum value) as a way to thank them for their time and effort on the questionnaire (Olson, 2011). The incentive was provided as a way to generate interest in the proposed study by those teachers who would be most informative for the research at hand. No incentive was offered for participation in the interviews. However, I did present participants with a thank you note and gift card at the end of the second interview to express personal gratitude for taking part in my dissertation research.

Analysis

There were two stages in analysis. The first stage occurred in between the interviews. The second stage occurred after all interviews had been completed.

Once the first interview data was transcribed for each participant, it was coded prior to the second interview. This coding was done by hand with highlighters and handwritten notes in the margins. Only influences on and experiences relevant to field trip practice were coded from the first interview, and the goal was to generate a manageable list (on Post-its) which the participant could manipulate during the concept map exercise in the second interview. Once all interview transcripts were completed, they were imported into NVivo 9 software.

Careful consideration was given to several theoretical frameworks and the literature reviewed in chapter two in order to make coding decisions. It was noted that most of the recent research used open coding during analysis. Open coding is a method of data reduction that allows the researcher to identify codes, themes and patterns based on the development of codes from the data itself (Strauss & Corbin, 1990). This study followed the tradition in the literature and used open coding. The open coding
method was appropriate because the work was exploratory, rather than investigatory. From one perspective, open coding emphasizes what participants have to say rather than what the researcher is inclined to find. Therefore, the participants’ transcripts were a primary basis from which coding decisions were made.

Transcription files were imported into NVivo where the mechanics of coding operated similarly to a procedure described in Basit (2003). Lumper coding (Saldana, 2012) was used to holistically retain passages describing with influences and experiences. Lumper coding, as opposed to split coding or line-by-line coding, is used to retain a complete idea in relationship to itself, rather than mince it up into smaller pieces. For instance, here is one passage from Monica’s second interview which was coded as “Background in science”:

/A:  Okay. Well, here’s the thing. I think if I look at all of these little stickies... You know, one thing I think that actually might not be here but it really is a big influence, and I honestly think I’ve noticed it with colleagues, is their background in science.

You know, their educational background. If they have a solid background in science or they tend to... Somehow organizing field trips is easy if they understand how to make those connections with the curriculum as opposed to... I don’t know, there’s something about it, having that background in science, I really do. So anyway...

Q:   Is that true for you as well? Do you think that’s an influence?

A:   I think so. I think that is a very... It’s been very beneficial having a science background. Things have been very clear to me, even when I first got to the school and I was given a book and was told, “Okay, go ahead and teach science.” And I looked at that book one night and wanted to throw it out the window because it was really a bad book. And I knew that I was given/ told, “These are the four things you needed to teach this year,” and I could sort through, I weeded through that book and I was able to really at least have a beginning.

So over the course of the last nine years, granted our Science Committee and everything has gotten much better and we’ve gotten textbooks and stuff. Having that science background is really important, it really is, because if you’re a teacher that doesn’t have a strong foundation in science you tend to feel intimidated, not confident, you know? I’ve noticed that. But anyway, I do happen to think that’s a big... maybe that is an int... somehow an internal factor in how I move and the direction I go, really, yeah. But other than that... And then...

Q:   Can I add that on?
A: Yes, I would add that/

Lumper coding allowed this whole idea related to Monica’s background in science to be captured and represented in a single code which captured the essence of its meaning in relationship to the research questions. It kept the interviewer’s questions associated with responses, as appropriate. For instance, in the above passage, I ask Monica a question meant to shift the focus back to herself and her own practice (“Is that true for yourself?”). Eventually, by the end of the coded passage, we have established that her background in science was an influence to the point where she would like to incorporate it into the concept map exercise. I felt that such collaborative determinations were important to retain, verses those which were established on their own from the participant. Therefore, lumper coding allowed the data point (e.g., background in science) to remain in some context in the data set even while facilitating data reduction. The method of coding was useful since I was probing mental models, and pushing past conceptualizations, and asking participants to identify influences and probing regarding what experiences from their past might have generated those influences. Sometimes, as in the example above, this included a substory that had a beginning, middle, and end.

Once the transcripts for the two interviews had been coded, they were re-read and coding was checked. Then, each set of coded passages, on a code-by-code basis, was checked for consistency. Code lists for each participant were eventually generated and maintained. The final code lists are presented in Appendix F. First cut codes (from the first interview transcript) were consulted in the complete coding of both interviews. The codebook for each participant was resolved in relationship to the full data set for that individual, and between participants’ data sets, via the constant comparative analysis method (Glaser & Strauss, 1967). This step essentially calibrated the codebook for each participant in terms of the data collected. Not all passages were coded and some passages were coded
more than once. Additional codes were developed as needed to include data that had the potential to inform the research questions.

Modeling was used to move toward axial coding and to categorize codes together as appropriate. The model option in NVivo was used toward this end. NVivo automatically created a shape (the default is a rectangle) for each code on the model. The codes were then arranged in relation to each other. A model, shown in Figure 4.1, with concentric circles had begun to take form after the first post-pilot phase interviews. Axial coding was a way to test whether that model could be used to represent each participant. First, the codes were arranged in relationship to each other. Coded passages could be consulted immediately in NVivo as needed to compare ideas to each other. Then, once clusters of codes had formed in NVivo’s modeling platform, the clusters could be moved in relationship to each other to test how the participant’s data set could be represented in a way similarly to Figure 4.1. The determination was that each participant’s axial codes could be arranged in terms of this model: with internal influence clusters on the left, experiences in the middle, external influence clusters on the right, and additional codes (e.g., descriptions of the field trip) along the bottom and right hand edge.

The actual assignment of axial codes was done using print outs of the NVivo models on 11 x 17 inch paper and it was used to explain the relationship between the coded passages as much as possible given the data set for each participant. Once this step was complete, and the models were generated, the participant’s data set was written up for chapter four. Each participant’s data set was addressed in turn, and earlier interpretations were revisited and revised as necessary given decisions made in later coding. Similarly, previously coded and interpreted cases could be used to inform decisions about coding in latter data sets. The final NVivo code models are in Appendix G, and these have been more clearly represented in Tables 4.2 through 4.5.
The end results of the analysis were data displays (Miles & Huberman, 1994) which graphically depict the findings of the study. Many of these data displays began as jotted diagrams with pen and paper. Data displays are included in Chapter Five along with discussion of results.

The analysis addressed the credibility, transferability, dependability, and confirmability of this qualitative study (Lincoln & Guba, 1985). Clear descriptions of the analytical process, coupled with the constant comparative analysis method should help build this study’s credibility and confirmability. Rich descriptions of the study site location and the participants has been included toward transferability. As Rapp (2005) writes, “transferability is more likely if the original setting is described carefully, so that similarities among settings can be noted” (p. 300). Extreme care with the data set, and detailed reporting of the analysis worked toward dependability. The final list of codes (in Appendix F), code models (in Appendix G) and presentation of results in Chapters 4 and 5 will lend toward confirmability.

Position of the researcher

My experiences on school field trips during my education were positive and memorable. Allan Friedman (Falk & Friedman, 2011) has suggested that visits to museums can enthuse students who then see school as a tool to get where they want to go. This idea resonates with my own experiences. Prior to high school, field trips gave me the chance to talk with scientists and fueled my interest in marine biology on my way toward a college concentration in that area. In high school, I participated in a statewide high school chemistry competition, went on my first whale watch, visited the Bronx Zoo, and an aquarium. My interest in the life sciences had great momentum through most of high school and college, during which time I frequently visited the aquarium and science center in Boston. While some coursework and encounters made the journey a little bumpy, the majority of my experiences both in school and non-school environments supported and strengthened the development of my science identity, which resulted in an aptitude for the life sciences in particular.
If my K-12 self used formal education mainly as a tool to get what and where I wanted, in contrast, my college self was immersed in science and learning as a way of becoming who I thought I was. Here again, informal contexts played a role. After my freshman year, I worked as a data collector and assistant naturalist aboard a whale watching vessel. During my junior year, I studied biogeography, volcanology and native history by hiking the Hawaiian Islands, from newest to oldest, in a field course. As part of coursework and for personal interest throughout college, I frequented marshes, tide pools, beaches, trails, and museums in the Boston area. In hindsight, college was one big “field trip” for me, complete with various stops around the globe and a myriad of loosely connected pre and post visit experiences (both contrived and serendipitous), and a combination of formal and informal learning experiences. The whole thing added up to one big wad of continuous learning. After college, I served as a seasonal interpreter at an aquarium in Maine. In the years that followed, I made my trajectory toward educational work.

While I taught high school science, I led one off-campus field excursion for students. We visited a local river bed and met up with an educator from a local non-profit who I had enlisted to take the students on a geological tour. As a teacher, I did very little to integrate the content of the tour with the ongoing classroom content. In retrospect, I believe it was because I felt the curriculum itself was classroom-bound and finite, almost canonical, whereas the field experience was simply a way to bring the ideas to life in the students’ own backyard. I also saw the excursion as a way to build rapport with the students, to be placed in the position of learner myself, and to literally take a walk in the woods and let someone else be the scientific authority with my students for an hour.

In hindsight, I doubt that my inability and disinterest in integrating the field experience into the ongoing classroom curriculum was noticed by the students. However, knowing what I do now from the research literature, I also wonder if I could have capitalized on the field experience and made it more central and prominent in the overall geology unit, rather than a casual, inconsequential endeavor. I also
wonder if the cognitive abilities of the students (it was an advanced placement course) somehow played a role in my decision making. For instance, it is possible that I believed that learning would “just happen” because these were accomplished students.

After teaching high school, I secured a position teaching science experiments on a mobile laboratory which was located on a renovated bus. I was now leading two-hour-long experiments for 3rd-12th grade students as they visited the lab, which parked at their school for one or two days at a time. I also led the professional development workshops for their teachers. These workshops introduced the pre and post visit activities for the classroom. During the course of this position, I quickly realized that teachers tended not to do the pre-visit activity. However, I also came to realize that the visit itself was designed to be self-contained and all-inclusive, without any prior knowledge necessary from the recommended pre-visit lesson.

When I started my doctoral program, I began working with the State Science Center\(^2\), a nonprofit that was dubbed a tourist attraction for an urban revitalization plan. The State Science Center was also charged with being a science education destination and resource for schools, students and teachers. The State Science Center opened in June, 2009 and my work shifted from teacher professional development to visitor research and program evaluation. The 2011-2012 academic year was the third year in which the State Science Center hosted school field trip groups. Over the past two academic years, I have frequently observed school groups on field trips to the science center, evaluated the field trip program, and been part of behind-the-scenes discussions and decision making regarding the field trip program.

During my evaluation work, I have both casually observed and formally followed school groups through the Science Center. My observations fueled my interest in understanding how teachers use school field trips, and how they choose to integrate these experiences in their ongoing classroom

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\(^2\) A pseudonym
learning. My earlier experiences and more recent observations support what the literature suggests: that teachers rarely implement field trips which have pre and post visit classroom experiences which combine with visit experiences to bring about student learning of specific science content. My own disinterest in doing this when I was a teacher also drives my curiosity.

In addition, I fear that there is something at stake if we do not understand how teachers make the decision to do pre and post visit lessons, and how they coordinate the field trip as part of their students’ ongoing classroom learning. I fear that we will miss the chance to fully realize the role of museums in our educational system. I also fear that if field trips to science museums remain status quo, we will communicate that science is a “drive-by” subject area. Enthusing students and opening their eyes to science, and then returning to school-as-normal without any regard for the students’ generated ideas, or the excitement they felt, will communicate a disregard for science. As millions of students go on science field trips each year, I worry that uncoordinated, disenfranchised experiences might, at an incremental level, thwart science education reform efforts and perpetuate a scientifically illiterate society. I feel that we must begin to capitalize on these experiences to enthuse students in learning science, and to affirm their excitement. We must make strides to integrate informal, cultural institutions (such as science centers) with formal science education. A small part of this is understanding how to increase teachers’ effective use of field trips in the ongoing learning of students. From a constructivist perspective, an initial step in that process is to understand what prior experiences have led teachers to plan educational field trips, meaning those which are connected to the curriculum and have preparatory, visit, and follow up components.

Limitations

The purpose of this research is to develop an understanding of the experiences of teachers and how those experiences have played a role in developing field trip practices, especially the practice of implementing pre and post-visit lessons. There are limitations as to how this research will be conducted
in relation to the proposed research questions. In this section, I consider limitations of the conceptual framework and methods.

In an appraisal of criticisms regarding constructivism from the field of adult education, Fenwick (2000) noted that a constructivist view institutes the role of reflection in learning. Citing the feminist perspective of Michelson (1996), Fenwick writes, “The learning process of reflection presumes that knowledge is extracted and abstracted from experience by the processing mind. This ignores the possibility that all knowledge is constructed within power-laden social processes, that experience and knowledge are mutually determined, and that experience itself is knowledge driven and cannot be known outside socially available meanings” (Fenwick, 2000, p. 250). Besides ignoring the issue of power, Fenwick also noted that constructivism minimizes the roles of internal resistance, desire, and participation (e.g., Lave & Wenger, 1991), perhaps to the point of indicating that these are secondary or inconsequential to the autonomous, cognitive self. There is an overemphasis on the individual’s role in learning, an issue which may not be as acute in this proposed research because the structure of our educational system means that teachers typically conduct their work in isolation from each other. Finally, constructivism has been criticized for being excessively rational. These limitations of the constructivist perspective make the first research question important as that question will allow the proposed research to explore factors affecting teachers that are independent from experience (e.g., the perception of power relationships between principals and teachers). Ultimately, this research will speak about how to design experiences for teachers in which they can learn. The constructivist perspective is practical toward this end, but it does have limitations.

Research has shown teachers’ interests, agendas, and perceptions of field trips do not necessarily match those of their students or the conclusions of researchers. This is the case even when teachers have the most educational intentions in mind. In addition, teachers may say that they do pre
and post activities in the classroom without actually doing so, or doing so in a way which does not purposefully relate them to each other.

The study does not intend to establish the trustworthiness of its participants by comparing their account of the field trip situation to anyone else’s. Rather, there is the assumption that, given the parameters and scope of the research context, the participants who will be most informative for the research questions were recruited for this study. Therefore, the extent to which they are informative will speak to their credibility.

The effectiveness of these teachers, or the methods they claim to have used prior to, during, and after the field trip experience, were subjected to scrutiny. Previous research has examined the effectiveness of methods within a controlled, researcher-directed context. Future research may seek to examine the effectiveness of teachers who implement pre, visit, and post lessons independently from a researcher-directed situation. How student learning results from educational field trips is important. Such information will be vital for a more complete understanding of educational field trip practice, and to substantiate or confound current field trip logic.

A final limitation is that the interpretation of “pre-visit lesson” and “post-visit lesson” was left to the teacher and that no determination of effectiveness was made. The extent to which these lessons were aimed at specific science content verses general science understanding may vary widely. For instance, a teacher may engage in pre, visit, and post lessons in order to have her students learn that light is a form of energy that can be reflected, refracted or absorbed. Another teacher may engage in pre, visit, and post lessons in order to have her students review grade level concepts to date, and prepare for the ones left in the school year. While the study comments on these variations in relation to the findings, future research might improve upon the methods and findings in order to focus on teachers engaged in using science museums for either concept-focused or survey-oriented means of learning (Kisiel, 2006).
CHAPTER 4: RESULTS

The previous chapters have outlined the research questions and methods, as well as the basis of the study in the research literature on field trips. This chapter contains the results of the investigations in terms of the research questions. First, an overview of participants is given. Then, a model generated during analysis will be introduced and used to frame the results. Third, in response to the first research question, I report the influences on participant’s field trip practice and how each managed or addressed such factors. A brief description of the field trip can be found at the beginning of each participant’s section. Fourth, in response to the second research question, the experiences from all participants will be considered in light of Kolb’s theory of experiential learning and Pugh’s concept of transformational experiences. Finally, patterns among participants are presented. Chapter five will discuss the results, and describe implications of this research.

Introduction to participants

Four participants were identified during the recruitment, screening, and interview process as those who were most information-rich in relation to the research questions. Table 4.1 serves as a brief introduction to these participants.
Table 4.1  
Overview of participants

<table>
<thead>
<tr>
<th></th>
<th>Natalie</th>
<th>Monica</th>
<th>Hannah</th>
<th>Steven</th>
</tr>
</thead>
<tbody>
<tr>
<td>District</td>
<td>Suburban/Urban</td>
<td>Suburban/Urban</td>
<td>Suburban</td>
<td>Suburban</td>
</tr>
<tr>
<td>Number of years teaching</td>
<td>31</td>
<td>8</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Teaching was</td>
<td>First career</td>
<td>Second career</td>
<td>Second career</td>
<td>First career</td>
</tr>
<tr>
<td>School</td>
<td>Public School (K-6th grades)</td>
<td>Magnet School (K-8th grades)</td>
<td>Public School (PreK-8th grades)</td>
<td>Middle School (5th-8th grades)</td>
</tr>
<tr>
<td>Grade level</td>
<td>5th</td>
<td>6th</td>
<td>5th</td>
<td>5th</td>
</tr>
<tr>
<td>Visited SC prior to field trip</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Attended SC PD prior to field trip</td>
<td>No(^3)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Content</td>
<td>Reaction time</td>
<td>Weather; 6th grade science in general</td>
<td>Review of 3rd-4th/Preview of 5th grade science</td>
<td>Review of 5th grade science</td>
</tr>
<tr>
<td>Pre visit</td>
<td>Reaction time activity</td>
<td>Weather activities (e.g., Air pressure)</td>
<td>3rd-4th grade review/Orientation</td>
<td>5th gr. Curriculum; Orientation</td>
</tr>
<tr>
<td>Visit</td>
<td>Reaction lab and exhibits relevant to 5th grade; all exhibits</td>
<td>Meteorology lab, Weather exhibits; all exhibits</td>
<td>3rd-5th grade Trail Guides; all exhibits</td>
<td>3D movie, Senses lab, 5th grade Trail Guides</td>
</tr>
<tr>
<td>Post visit</td>
<td>State embedded task on reaction time</td>
<td>Weather activities (e.g., water cycle)</td>
<td>Discussion, subsequent 5th grade units</td>
<td>Discussion, 2nd-4th grade science review, and CMT</td>
</tr>
<tr>
<td>Used Trail Guides</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

A model for educational field trip practice

The findings from participants, individually and as a group, can be represented by the model in Figure 4.1. This model is presented now as a frame of reference as the reader proceeds through the results and it is revisited in chapter 5 for discussion. The model represents what the analysis concluded:

\(^3\) It is noteworthy that, based on my familiarity with her independent of this research, Natalie had extensive knowledge of how the Science Center’s PDs worked and how a series of their activities spanning pre visit, visit, and post visit could create a continuous opportunity for student learning of a grade level science standard.
that influences on participants had *internal and/or external origins*, relative to the participant’s perception at the time of planning and implementing the educational field trip. I chose this nomenclature for my categories based on participants’ treatment of them, specifically, during the second interviews. Admittedly, I did not collect data on gesticulations or movements. However, I believe that notes taken after interviews, the concept map artifacts (included in Appendix E), and transcript passages support the use of this nomenclature. This nomenclature and the distinctions I provide below offer one way to frame and consider the results.

Internal influences were uniquely those which participants referred to as “about them” or “part of who they were” prior to, or in spite of, other influences and field trip-related activities. During the second interviews, participants sometimes gestured to themselves as they discussed these kinds of influences. Internal influences took the form of mental models represented in belief statements, values, and motivations. Internal influences occupied central territory in Steven’s concept map, whereas Natalie specifically chose not to incorporate them into the concept map because they were about her. Monica placed influences which I identified as internal as culminating themes in her concept map, while Hannah placed her internal influence at the end of a list of key factors. I considered internal factors to be at the operational “core” of the individual, and particularly resistant to change. Participants sometimes contrasted the influences I later specified as internal as being about “who they were,” as opposed to external factors which reflected “what was acting on them.”

All previous experiences were situated as internal influences because they originated from within the individual teacher at the time the educational field trip was implemented. At the time of the field trip, these were memories which the participant had of previous events and occurrences. Therefore, I incorporate them into the internal realm of the model. Experiences were a mediating force between internal and external influences, which were sometimes aligned and sometimes at odds. Experiences had resulted in the development of the internal and/or external factors, and had sometimes
triggered a factor (internal or external) to have greater influence on the field trip activities. Therefore, I have represented experiences in the form of an arrow pressing on both (other) internal and external influences.

**External influences** originated from outside the individual, from others or from environmental context, at the time of the field trip. Essentially, these were factors which participants did not refer to as “about them” or “who they were.” Participants did not point to themselves when they spoke of these, rather, they may have pointed away from themselves, or at the concept written on the Post-it itself. External motivators, such as the influence of principals, and environmental contexts have been referred to in other research as having effect on adult learning (Sheckley, Kehrhahn, Bell, & Grenier, 2007; Spear & Mocker, 1984).

The final piece of the model is a block which represents the educational field trip to the Science Center. I have included the three activities requisite in my definition of educational field trip practice, and I have also included the idea of continuity across all activities.

*Figure 4.1* A model for the educational field trip practice of study participants.
This model now necessitates the presentation of my descriptions of the participants’ field trips, and an examination of influences on participants’ field trip practice. Accordingly, the influences for each participant will be discussed in terms of whether I categorized them as internal or external.

Analysis was comprehensive in relation to the data set at hand. Ideas which had greater strength in the data set, and demonstrable influence on the teacher’s *educational* field trip practice, became the categorical headings within each participant’s section. Even though the influences are identified and presented distinctly for the sake of analysis, they did not exist independently of each other. Influences intertwined to reinforce educational field trip practice. This complexity further necessitates the presentation of data on a case-by-case basis, so that the rich ecology of each participant’s practice can be preserved.

Natalie

Natalie was a fifth grade teacher at a public elementary school in an urban district. A 31 year veteran teacher, she had taught in the district for 18 years. Natalie had been to the Science Center several times before the field trip and was very familiar with how the center tied into her fifth grade curriculum. She planned and booked the trip for her class to attend with another teacher’s fifth grade class. Natalie and the other teacher split their teaching responsibilities when it came to science and social studies. Natalie taught science to the two classes and took care of planning and arranging the actual trip. Costs for admission and the lab program were covered by a grant administered by the center. However, her students held a fundraiser in order to pay for bus expenses. Each of the two fifth grade classes had about 20 students, and each class was accompanied on the field trip by three chaperones as well as their teacher.

Before the trip to the Science Center, Natalie had her students visit another museum’s website to do an activity to become familiar with and excited about the concept of “reaction time.” At the
science center, students participated in a 45 minute lab program\(^4\) led by a museum educator. The lab program focused on the concept of reaction time. Natalie reported being thrilled with the activity because the educator used instructional practices parallel to her own (e.g., having students record notices and wonders) and because the materials were exciting and her students were engaged with learning the intended science content. Along with the lab program, students spent time in the exhibit galleries. They spent the most time in the Sight and Sound and Space Science galleries which tied in with other fifth grade content. Natalie gave students copies of the Science Center’s Trail Guides to use while they visited the exhibits in these galleries. Natalie said, “We did spend time specifically in those two areas, and then, of course, they wanted to see everything else, so we did quick visits through the other galleries.” Students had their science notebooks and were prompted at various times during the visit to write down things they noticed and wondered. Back at school after the trip, students went through a state fifth grade embedded task (used as preparation for the fifth grade science mastery exam) called *Catch it!* and further experimented with reaction time. They referred to the lab program at the science center during the course of *Catch It!* back at school.

Students used science notebooks throughout all activities associated with the field trip, before, during, and after the visit. Natalie guided students in talk circles (Worth, Winokur, Crissman, Heller-Winokur, & Davis, 2009) using their notebooks. Natalie used the notebooks to formatively assess student learning, and she reviewed them in preparation for our second interview. Natalie emphasized the central purpose of the field trip really was for the reaction time lab program, which she felt was unique and memorable for students. In hindsight, the exhibits were “a nice, worthwhile benefit,” yet they were not a priority and were not central to her overall purpose for the trip.

Students were a strong influence on Natalie and she placed that term immediately in the center of her concept map. During the course of the mapping exercise, she debated how to situate the

\(^4\) Recall that lab programs take place in classroom-like space at the Science Center, separate and away from the exhibits.
influences originating from herself that we had identified in the first interview together. Since she wanted the map to be about her students, she perceived the field trip as all about them and wanted the map to reflect that. Ultimately, she decided not to incorporate herself into the map at all. In referring to these internal factors during the mapping exercise, Natalie said:

They are part of it, they’re the major part of why the plan worked out the way it did… So all of these did influence the overall plan, yes, but I don’t want them in here because they were already part of who I was when I planned this trip. (N2)

Therefore, while Natalie situated students as the primary influence on her educational field trip, the internal influences were central to how she enacted the field trip and, in fact, were what allowed students to be so influential on why she did what she did. The following sections present the internal and external influences on Natalie’s educational field trip practice.

*Internal influences*

*Feeling responsible as a teacher*

Natalie felt responsible to plan and implement a field trip like a “good lesson plan” where the pre-visit, visit and post visit components were connected to each other and focused on common learning goals (e.g., reaction time). She felt responsible for preparing her students so the field trip would be worthwhile and integrative throughout the various activities. Natalie said:

I think over my years of teaching, there have been field trips that were true learning experiences and field trips that I wish had been more of an educational experience. And I feel that I’m the one that has to make sure that that happens and I just feel that I’m invested in field trips in the sense of making the most out of them for the students. And I feel that if I fall short in preparing them, I’ve seen over the years that if I don’t do my part well then what they bring back after the experience is not as great as it should be. So, I feel very responsible for their learning, very responsible prior to, during and after the field trip that the field trip can’t just be over, it has to be ongoing. I think that’s where I come from with field trips. (N1)

Natalie contended that the cumulative effect of implementing and reflecting on field trips over time affected her trip to the science center. She kept notes to herself to remind her what to do differently next time. She has been on at least two field trips to the science center, and was able to
compare the first time to the second time in preparation for the trip of interest in this research. Natalie felt part of her responsibility as a teacher was to go through this process of reflection, toward improving her practice and giving her students the best overall field trip possible.

Natalie described how she had first felt this sense of responsibility and took it upon herself to prepare a packet for students prior to a field trip to Ellis Island. While they were at the museum, a student ran up to her excited to have seen a device used to screen immigrants for eye disease. That student’s enthusiasm made an impression on her which was based on forming a connection with something discussed in class beforehand. That experience heightened her sense of responsibility to prepare students for what they would see and do, and ensure there were connections between the classroom and museum that would make learning meaningful.

She also felt a sense of responsibility because her students were in an urban part of a suburban school district, and were not affluent or privileged. She felt their visit to the science center might be the only time they would go, and that made her responsible for implementing a worthwhile trip. In communicating her sense of responsibility, Natalie said,

I think as a teacher we always feel responsible, but I think when we’re going outside of our normal daily routine, it’s a unique experience for the students ... I’m not responsible if I’m not taking [on] my role [of] preparing [students] for the trip... I think it’s the same as just writing an effective lesson plan, that if I haven’t done my prior reflecting of all the ‘what ifs’ that could happen during the lesson, it’s the same thing, I think, that if I want a field trip to be effective it’s the same thing as designing an effective lesson or a unit. That I have to put enough thought into it and enough reflection prior to what would happen if or how could I make this better? I think ... it’s the role of the teacher, I guess, to plan effective lessons for your students. (N1)

Because see, I see that my responsibility for learning shows up, not as a separate thing but it’s [the] title, I am responsible so therefore these are the things [on the map] I did so I don’t think I need to include that [about me] because I accepted the responsibility. (N2)

But this seems to be right because it might be the only time they ever do it. I mean and if they’re not ever going to make it to do it again, it has to be a happy, wonderful memory so that even if they don’t get to do it again maybe they’ll remember to do it with their own child or a brother or a sister... I think that whole responsibility thing is big, and I think it is for everybody, but I think more so for people who work with the type of students that I do. (N2)
Underlying Natalie’s sense of responsibility as a teacher were her previous experiences leading field trips. Specifically, she identified an experience with a student at Ellis Island, and her very first field trip as a teacher. The experiences leading field trips over time, and the two specific episodes she described, supported her assertion that a sense of responsibility was at the foundation of her trip to the science center. In communicating her responsibility as a teacher, Natalie said:

If we thought it was valuable enough to do, then it should be valuable enough for us to prepare the students well, and then come back and refer back to that so that they have that as part of them, as part of what they [have] accumulated... (N1)

Making the field trip memorable by facilitating connections and capitalizing on the wow factor

Natalie’s sense of responsibility was closely related to a drive to make the trip memorable for students. This relied on the field trip being unique enough that it could not be replicated in her classroom. Natalie said:

Well, I’m a big believer in field trips for students but I want it to be something that we can’t do in the classroom. So things just like taking the elevator, that was a real wow for the students and seeing the river and there were just so many, I think, ideas that kind of would pop into your head as you were experiencing them and as you’d see the kids excited about it, that you kind of had to go with because it was the moment where if we didn’t expand upon their wows, we would kind of lose sight of where they were at that moment. (N1)

Natalie was looking for a certain amount of the wow factor at the science center to make a lasting impression on her students. In order for the impressions to have the greatest staying power, she felt that student preparation and guidance were necessary. For instance, she had students dwell in the plaza level and spend time writing down their notices and wonders about the mobiles overhead. Natalie described this factor as follows:

I think that it needs to be a long remembered experience, that’s what I would like it to be for the students, something that is long remembered. Very often students who come back to visit with you start reminiscing. I think, usually there’ll be something, an experience in the classroom that’s mentioned and then as you start talking about that, I think they also like to talk about other things that they did as far as field trips. And I think that if a student is remembering it five years later or seven years later, then there had to be some value to it, and I think that’s what I would like the students to come away with after a field trip. (N1)
The memorable factor was very important to Natalie and she placed the concept in the center of her concept map alongside students. Natalie incorporated this long term perspective into how she ran the field trip to the science center.

In explaining the importance of memorability in her field trip practice, Natalie said:

An experience that can be remembered, whether it be seeing an eye hook or knowing something about reaction time, [it’s important that it] all connects to their life in general. You know, how does this connect, not just to what they’re learning in school, but to life, and why are they remembering those things [in particular]? … if they’re remembering that, [how] can I provide that [kind of] experience [to students again]? (N1)

_Giving students the kind of opportunities they deserve_

Natalie reported that field trips were educational opportunities that her students deserved. In regard to her very first field trip led as a teacher, she said:

You wanted the kids to go on a field trip, and you didn’t have any money, so you asked if you could walk them. I don’t even [think we did] permission slips, I don’t even remember any of that. But you’ve got to give kids more than classroom, you know? They have to have more than that, and those kids didn’t … So I think my driving force is the child. (N1)

Besides ensuring memorable moments, Natalie felt that making connections between field trip and school ideas helped to create positive moments for students, as she described:

I think that’s why I’m so passionate maybe about the trips, that they have to be very, very positive experiences for the kids-- that they just come away with loving what happened and being enthusiastic, and bringing that back to the classroom... [I ask myself,] what triggered them there to have a good time? And then, [I] can kind of try to duplicate that experience or refer back to it ... Sometimes they’ll be flipping through their science notebooks and say, ‘I remember when we...’ You know? … That’s the best. (N2)

So I think we have a responsibility to give those kids those moments that maybe their parents could but can’t, not because they don’t want to ... They all work very hard. I think that we have a responsibility to give them what they might not have otherwise. (N2)

Making the various activities connect was important to her because it prepared students to become excited and enthusiastic when they saw parallels between what they were doing in class and what they did at the science center. Therefore, Natalie’s drive to plan connected learning activities for students is subsumed under the umbrella of her desire to give students the positive exposure they deserve.
Natalie’s experiences as a child and parent helped influence her belief that children should have these kinds of opportunities. She said:

I think probably from my childhood... We didn’t have money and we would save up for our vacation every year... They used to have vacation clips at banks and you could put money in it and that’s what we did. And every year—I was an only child—but every year on the way back from our vacation we talked about the next vacation and that’s all we talked about all year, was our next vacation. So I think that’s probably where it comes from, all those wonderful experiences that I had with my parents. Yeah, I probably, I think that has to be it. And that, we didn’t have money but we did wonderful trips.

[Then] being a parent, but I taught before I was ever a parent, so that field trip that we walked to [~30 years ago], that was all before [being a parent]. And then with our kids, we did all the camping and those kinds of things rather than the big [and] glamorous. ... we did more of the simple things, you know, of the camping trips and the hiking and all that kind of thing ... I guess it’s my personal value that came from spending time with my parents and appreciating the simple things of life. (N2)

External influences

Students, and their learning, engagement, excitement, and enthusiasm

The students were the primary external influence on Natalie’s field trip practice. To polish off her concept map, she noted that she would have made it more web-like and interconnected, and would have written the students’ names on the connectors and in a circle around all the ideas.

Natalie most frequently talked about students in terms of their learning, engagement, excitement and enthusiasm. For instance, she said, “I think when students are engaged and having fun then it’s more of a long lasting learning experience for them” (N1). The science notebooks were part of her vision for student learning and assessment. Natalie did the pre-visit and consequent activities in order to ensure that students got the learning content she intended.

Natalie understood student behavior to be subsumed under student engagement. Consequently, she addressed any latent concerns with student behavior by making sure that students were focused and engaged in what they were doing. She said:

I think sometimes behavior can be a problem on a field trip if students don’t really know why they’re there or aren’t invested in why they’re there. I think we’ve all seen students at various places just wandering kind of aimlessly ... I see how important it is to make sure that where we
are a place that the kids want to be at that moment, and they really want to know what’s going on there, and why they’re there. So I think I constantly have that in my mind of how to best have the students focus when they’re there and become engaged.

Natalie felt that her familiarity with the venue played a role in making the trip successful toward the learning goals she had for students. Natalie knew where to send students in to see the exhibits she wanted them to see. She knew where the Trail Guides were taking students, and she knew where the lab program was located.

Natalie’s educational field trip practice was primarily influenced by internal factors, with one exception: students. The remaining influences on Natalie’s educational field trip are all considered external. These influences operated like given parameters in place, which simply needed to be incorporated, addressed, or planned around in order to implement the field trip as Natalie intended.

Specific 5th grade science curriculum.

Natalie was focused on specific content specified in her curriculum and this influenced what was planned for the classroom and the science center. This decision was partly based on the timing of the field trip in the school year, and partly based on what the grant funding provided. Natalie also provided a preview and review of other 5th grade curriculum by visiting certain exhibit areas.

Anyone scrutinizing Natalie’s pre visit, visit, and post visit plans for students might be impressed by how she dutifully attended to student learning aligned with curricular goals. However, she seldom spoke about the influence of curriculum during our conversations. My assessment of this phenomenon was twofold. First, Natalie was focused on a specific piece of curriculum (related to a 5th grade content standard on reaction time) rather than curriculum in a broad sense. The identification of the intended content, and its position as part of the curriculum was enough for the purposes of our conversations. Second, I believe that the existing curriculum functioned as a reference point as Natalie sought to create memorable events for her students. In making the field trip memorable, Natalie understood that
activities should wrap around each other and relate to each other, and that she should make the most of the “oh, wow moments” that students had. In doing so, she leveraged the wow-factor to play a role in her students’ science notebooks, which themselves tied in to cross-curricular goals in reading and language arts. By connecting to ongoing classroom learning, Natalie worked towards ensuring memorability. Therefore, I assert that Natalie’s focus on creating a memorable trip helped explain her desire to address the curriculum.

Other external influences

There are several external influences which were influential on Natalie’s field trip practice: existing educational resources, the time length permitted for the visit, the cost of the field trip, and the other teacher involved. This section will briefly discuss each of these influences.

Natalie used an online activity based at another museum as part of her students’ preparation, and she used the Trail Guides provided by the science center for her students while they were onsite. The lab program was another existing resource that played a role and influenced how Natalie implemented the field trip (note that the lab was required as part of the grant that funded the trip). Finally, science notebooks were a resource that Natalie both had access to and extensive training in how to use.

The time length of the visit was partially determined by bus schedules. Natalie indicated that they were somewhat rushed through the additional exhibit areas, the ones extraneous to her curriculum, because they had to get back onto the buses and back to the district in time for school dismissal.

The admission cost was waived but students had to raise money for buses. Natalie dismissed the idea that cost was an influence on her practice; however, it is unlikely that her students would have
gone if they had to pay for admission. From Natalie’s perspective, the cost of a field trip, free or not, was a given rather than an influence. In regard to fundraising for bus costs, Natalie noted:

[The students ran] the pancake breakfast, they worked, they served, they cleared the tables so they could go there [to the science center], oh yeah, because they can’t be given things just because they don’t have something. They couldn’t just... You know, they have to earn it. (N2)

Here, Natalie invokes her sense of responsibility and illustrates how she opportunistically aimed to instill a similar value in her students by having them directly involved with fundraising.

In regard to the other teacher on the field trip with her, Natalie said, “She always wanted to know, what [I would] like them to focus on when we went to a new spot [at the science center]... we were trying to be consistent with the experiences that they were having.” Natalie’s account suggested the other teacher supported Natalie’s efforts with science instruction and followed her lead. Nancy appreciated the division of science notebooks from social studies notebooks, which were under the other teacher’s direction.

Emergent influences

Two minor influential factors arose during the course of the field trip itself that affected Natalie’s practice and did not have a larger effect on its trajectory. One was a student behavior issue, which Natalie dealt with deftly as soon as she learned about it. The second emergent influence was the museum educator she encountered as part of the lab program. She said:

I was totally blown away by the activity because it just, it was so right on and it was nice to stand outside of the box and see them and how engaged they were. And I just think, too, a big impact was our facilitator that was there because she carried through the same format that we were using in the classroom and she was just so good at helping them to raise questions and really be engaged in what they were doing... From a practical point of view I really didn’t have to focus on behavior... Sometimes if you go to a field trip you might have to spend time as the teacher just trying to keep the kids on task and I never had to do that. I was always able to focus on where they were and what they were getting out of the experience themselves.” (N1, 16:03)

Therefore, the museum educator’s instructional method allowed her to focus on student learning rather than behavior during the lab component. This alignment fortified the role of the lab program toward
Natalie’s learning and attitudinal goals for her students.

Monica

Monica was a sixth grade science teacher in an urban district at a public magnet school where she had spent her eight years as a teacher. She also taught one section of language arts. Teaching was a second career for Monica as she had previously worked as a medical technician. Monica had been to the Science Center several times before the field trip. She had visited during an open house event, returned with her family, and later participated in multiple professional development workshops at the center. The field trip costs were covered by a federal grant which the school had been awarded. That grant had covered the cost for Monica of the professional development workshops on how to lead field trips to the science center which were embedded within the curriculum. The field trip we discussed tied in with one specific unit, but Monica noted broader utility for the field trip across the sixth grade science content areas, saying,

I just feel overall for sixth grade there’s a lot of connections [with] most of the content that I teach. I don’t limit where the kids go to [on] the field trip, I don’t limit it just to the weather exhibits. ... I might say to the chaperone, “Make sure you take them to ...,” because I teach ecology, I teach chemistry and weather. And so I believe it just really fits well, it fits terrifically into the sixth grade curriculum. Prior to this year, I also taught landforms, volcanoes and earthquakes, and so I would make a point of having kids look at those exhibits also. (M1)

Monica situated her most recent field trip to the science center at a specific time during her unit on weather. The pre-visit activities supplied in the science center’s meteorology teacher manual were important to her. She referred to them as preassessments. She did them with students because they helped her meet curricular goals for the meteorology unit. For instance, prior to the field trip, she had students pick a city and record the weather in that city for a week. She positioned the field trip after certain concepts had been taught (e.g., temperature, air pressure, weather instruments) and before others (e.g., condensation, clouds, wind, and the water cycle). She envisioned that the visit had played a
connecting role—bringing old and new meteorology concepts together. She noted that meteorology topics were difficult for students and it was good for them to hear multiple times.

Monica brought her sixth grade class to the science center, all of her 75 current science students. She planned for students to attend the 45 minute lab program on meteorology and also tour the exhibits relevant to that content area (e.g., the Weather Forecasting exhibit in the Planet Earth gallery). A small group size was important to Monica, so she recruited twelve chaperones to be able to have small groups of students, below the science center’s recommended group size. Monica spoke to her chaperones beforehand, either by phone or in person, about what she wanted them to do with her students, how they should manage them, and where they should go in the science center and when. Monica said:

I’m very careful about how I plan it, so the chaperones know exactly what they need to do. … I remind them that I want them to go to the sixth floor and I kind of preview some of the things they’re going to see, even like the climate, that little 20-minute video, the little animation kind of thing [on] Global Warming, … I tell the chaperones in my packet [that] I hand out … the exhibits that I want them to see. (M1)

Monica did not want students to miss out on exhibits that interested them, so she purposefully planned for students not to do the science center’s Trail Guide activities. In previous visits, Monica felt that students were too focused on finding the answers and completing the worksheets, and so they missed out on some aspects of the visit that were important to her for them.

Monica noted that the lab program included four activity stations for students (e.g., one each on condensation and temperature). Students rotated through the stations in small groups and the museum educator leading the program guided students and made some summarizing points at the end. Monica had covered the scientific concepts of two stations already, and she felt these were a good review of that information. She had not covered the two other concepts from the lab, but she looked forward to covering that content in the weeks ahead. Overall, Monica felt that there was a good balance of concepts present during the field trip that she had covered beforehand, and would cover subsequently.
In the class session following the Science Center, Monica went over the visit with students and asked what their favorite exhibits were and what they learned. In the following weeks, students did a “big lab” on the uneven heating of Earth’s surface, then they learned about condensation, the wind, and the water cycle over the following month. Monica felt the students had exposure to the concepts at the Science Center, so she could refer back to that and ask students to make connections between what that did in the lab during the field trip. Monica noted that the meteorology unit was lengthy (about eleven weeks) and the Science Center field trip (in the middle) helped break up the time in the classroom.

**Internal influences**

*Personal drive to increase effectiveness in teaching the curriculum*

Monica recognized that her educational field trip practice was influenced by an internal drive to steadily improve her abilities to teach effectively, and accordingly, based on what was outlined in state science standards and her curriculum. Monica recognized how this internal drive to improve had spanned both her professional careers. She said,

I’m always trying to improve my teaching and learning and I’m always seeking out workshops so that I can develop as a teacher. Now, being a science teacher, this is my second career. Prior to [this] I was a medical technologist, and even when I worked in the lab, I was always going to workshops, and many times paid for them myself because that’s how you improve. I have the same philosophy as a teacher. ... because I want to make sure that kids have a solid foundation in science and there’s a lot of pressure with state standards and everything. So, you have to be able to be good in the classroom and be effective. I suppose I have a drive that I want to be an effective teacher. I also like hands on exploration, and I'm always looking for ways to do it in a better way. (M1)

Monica’s ongoing improvement, specifically in regard to field trip practice, was marked by several experiences which included gaining familiarity with the venue and via grant-funded professional development workshops. These will be discussed in the remainder of this section.

In seeking out worthwhile professional development opportunities for herself, Monica attended a weeklong workshop on inquiry, similar to the Exploratorium’s Institute for Inquiry, which was run by
the Science Center at a satellite location in the summer of 2009. She paid out of pocket for the
workshop, as she described:

I felt strongly about inquiry-based science, [that it’s] the way to go, and I had been talking to the
woman that was in charge of the science curriculum... she was very familiar with the Science
Center and actually had participated in the inquiry [workshop] and she wanted me to go but
there was no funding. So you know, I went home and wrestled with that idea of paying for the
trip. ... My husband knew I felt very strongly about it and he said, “If this improves your teaching
and if this is something you think is really important, then go ahead and do it,” and I did it. Then
I wrote an e-mail to my principal just explaining that this was important ... That was a great
week and when I went back I recommended it to everyone and I still do. (M2)

Monica’s drive to be effective as a teacher meant that she would visit field trip venues before
taking students. Monica was driven to get familiar with the site, and explore the potential of it to meet
her needs for instruction. Monica noted that she preferred to visit potential sites beforehand in order
to make the decision whether or not to try and go with students, and because she wanted to be
prepared for anything to happen on the trip. Monica visited the Science Center during a free teacher
open house event. She returned with her husband during the Thanksgiving break and concluded that it
would be a worthwhile field trip location. She felt the exhibits, in general, were a good fit for her sixth
grade curriculum. However, her district could not fund the trip.

When a federal grant became available the following year to fund professional development
workshops and field trips to the science center, Monica was excited about the prospect. Encouraged by
her principal, she attended all three workshops at the science center for three different grade level
content areas (i.e., meteorology, landforms, and forces). She reported that the professional
development workshops effectively demonstrated how her own students would proceed through
learning the content before, during, and after the visit. Workshop facilitators modeled effective
strategies for eliciting student questions and exploration. The PD workshop included the Trail Guides
which toured students through the exhibits dealing with grade level science content based on the state
science standards. The teacher manual distributed during the Meteorology field trip program was an
ongoing resource where she could find effective activities for students and ideas for her own
consideration in planning lessons. She would tweak and adjust these existing resources as needed to improve upon them with her students in her school, as she said:

These packets [e.g., the Me in Meteorology teacher guide] that they hand out, I keep them right at home because it seems like prior to my teaching a unit, I always reflect, I always make notations about how I want to improve my unit year to year. And so I still go back to them, you know, they do have a lot of information. (M1)

Similarly, the instructional strategies modeled in the professional development workshop served as a reference to her as she implemented the lessons with students. She felt the workshops were not as much about the science content as they were about how to teach science effectively.

The grant also completely covered the costs of the field trip, including the lab program with a museum educator, and transportation. The grant was scheduled to last three years, and it provided professional development workshops and field trips each year. When I spoke with Monica, it was at the end of year two, and she had been to the science center a total of two times with students.

Monica was reflective about previous field trips in general, including the earlier field trip to the science center. She noted that her current field trip practice was the result of her years of leading field trips with varying levels of success. She said,

[Earlier in my teaching,] I might not have been as savvy on how to take full advantage of all the opportunities that a field trip might offer. I am very good about organizing student groups to avoid all kinds of behaviors. ... It’s really just after a while you get better and better at field trips; but I’ve also learned that it is really beneficial if you can go to the site prior to organizing the field trip. Those are the things that I’ve learned over the course of the years. (M1)

She had been part of trips that weren’t planned well, and had little connection to ongoing classroom learning, and she felt strongly that these should be more effective learning activities for students. That internal drive to improve her teaching had applied to her field trip practice as well.

An understanding of science and teaching science which resulted in confidence

Monica identified her strong background in science, and consequently, her confidence with the subject area, as influential on her capacity to implement the science center field trip. She said:
Somehow organizing field trips is easy if [teachers] understand how to make those connections with the curriculum, ... there’s something about it, having that background in science... It’s been very beneficial having a science background. Things have been very clear to me... Having that science background is really important, it really is, because if you’re a teacher that doesn’t have a strong foundation in science, you tend to feel intimidated, not confident, you know? I’ve noticed that. But anyway, I do happen to think that’s a big [influence] ... somehow an internal factor in how I move and the direction I go... (M2)

Recall that Monica’s previous career experience had been as a Medical Technologist. Her training in science was extensive prior to becoming a teacher. She was comfortable with self-teaching science concepts that she did not fully understand. She appreciated the science standards and referred to them consistently, prior to the unit, and she would check them off as they were addressed during a unit itself.

Having well planned lessons that connected to each other conceptually over time was an outgrowth of Monica’s understanding of science and her confidence with teaching it. Monica talked a lot about facilitating connections for students throughout the school year, from lesson to lesson and from the Science Center to her classroom. Monica was particularly thoughtful about this during the lab exercise at the Science Center. She said,

Even though I noticed when the instructors at the Science Center were trying to elicit conversations ..., in the group that I was with, there were kids that really had no idea about condensation or really had a difficult time. They didn’t raise their hands. But I thought, that that was okay because ... I knew when we went back to the class that I was going to do a lab with the kids and so that this would build a lot of good prior knowledge and just a firm background in these concepts. ... [Before the trip,] I did not give any lessons on condensation or cloud making, but it was good because they heard it first [at the Science Center] and [that it was] a hands on lab to explore those concepts. So, when I went back to the classroom, within those next few weeks they did a big lab on the uneven heating of our surface, so they were able to make a lot of connections and I think it was a little more valuable, they can really kind of understand those abstract concepts. And then, during the course of the next month, they learned about condensation and then, every time I would talk about it, I said, “Well, do you recall anything we did in the lab at the Science Center?” And they did, so it was great. (M1)

After the trip, the Center’s lab program and exhibits served as an ongoing resource for Monica and her students during the course of the Weather unit, and also in subsequent units remaining in the school year. It was important to Monica that students made connections and built on prior ideas in order to effectively learn science.
Monica was very strategic about what she did with students. She steadfastly consulted the state science standards. However, as long as she would meet curricular goals, she was ready to change methods and adjust processes to better suit her students. For instance, Monica decided against using the science center’s Trail Guide activity based on an earlier experience with doing so. She said:

This year, I did a little something different. I did not give them the trail guide, and the reason is that I have used the trail guides in the past, and it occupies them so much—because I tell them that I’m going to collect them—they don’t get the full exposure and really enjoyment of the exhibits. So I did not use the trail guides this year and I kind of liked it because as they went around to all the exhibits they did not have to spend so much time recording their thoughts or answering the questions, they could really take advantage of the exhibits and just enjoy them…

(M1)

Through reflection, Monica realized that greater student enjoyment was more valuable than whatever cognitive benefits were directly associated with the Trail Guides from the previous year. Her reflection here illustrates how she factored in student enjoyment as she weighed one particular instructional decision related to the field trip. It is likely that the Trail Guides activity was less useful to Monica because of how she utilized chaperones to guide and orient students.

Over time with implementing field trips, Monica knew that she wanted a small group size for students to effectively tour the Science Center’s exhibits. She recruited enough chaperones so that about six students were in each group. She was very confident with this decision, and pleased with the outcome. It was important for Monica that her students tour the exhibits in small groups in order for them to optimize learning potential and minimize behavioral issues. Monica was detail-oriented with her chaperones as well, making sure they helped students attend to certain exhibits at the Science Center. Her understanding of the science content at hand and her confidence with teaching it assured Monica that small groups touring specific exhibit areas was simply the best way to utilize the Science Center during the field trip. A large number of informed chaperones made that possible.

In the professional development workshops that she had taken at the Science Center on how to lead a field trip, Monica learned that winter time was less crowded with field trip groups. Participants
were encouraged to book during less busy times if their goals were educational. Therefore, Monica timed her unit on Meteorology to take place during the winter to increase the likelihood that her students would have best access to the exhibits. Then, she positioned the field trip in the middle of the unit to break up the length of it, and to have students hear about Weather from someone other than herself for a little while. As she said:

I just feel that the reason why I link the Science Center with weather is that it’s such a big unit, there is so much content that I have to cover that to be honest, it’s nice to get help, so to speak, ... and get a different viewpoint and that kids have the opportunities to view it in other ways. Because this unit is a long unit, it takes me about 11 weeks. (M1)

The intentional placement of the Science Center excursion during the unit and the school year further exemplify how Monica’s understanding of science and teaching influenced her field trip practice. Monica’s previous experience with the field trip after the end of the unit helped bring about her resolve that the trip was best situated within the unit itself. In comparing the recent visit to the previous one, Monica said:

Unfortunately, last year I had planned this field trip for the same time, but [because of the] weather, we had to cancel. I wasn’t able to bring my students until March, I believe, and we had already finished Weather. So, the impact wasn’t there, you know? It was still a great experience for them, it still helped to refresh their memories about all the concepts, but when they are actually going as they are learning [about Weather] in the classroom, it’s beneficial. (M1)

*External Influences*

Monica identified a number of external influences on her science center field trip practice. The main one was the grant of which Monica was part. This grant funded the field trip and lab program in their entirety. It also arranged for Monica to get (more) professional development from the Science Center, specifically on field trips.

These workshops introduced Monica to existing educational resources from the Science Center: The Me in Meteorology Teacher Manual, for instance. The PD also illustrated how to tie in the exhibits with content, and it allowed Monica to experience the lab program that students would do firsthand for
herself. The final existing resource was the Science Center’s exhibits, which aligned well with the Meteorology unit and the other science units in the sixth grade curriculum. The science center’s exhibits appealed to Monica on a curriculum-wide level, and she found the science center appropriate for sixth grade science in general (including a tech unit, chemistry, ecology, as well as Weather). The open house event at the Science Center was an opportunity for Monica to gauge the venue as a field trip destination. That first visit led to several more before she actually accompanied students there more than a year later.

The final, major external influence was the state science standards, which positioned the Meteorology unit in sixth grade. Monica organized each unit in a binder, and the first thing in the binder was the standards which she would check off as she covered them with students. The length and scope of the Weather Unit, which was based on the standards, was another influence on how Monica embedded the field trip in the school year, and consequently, the Science Center visit. Monica appreciated the field trip as a way to diversify the learning experiences during that unit, and to give students an opportunity to hear about the concepts from someone other than herself.

The students themselves were an influence on Monica. She sought to optimize learning conditions by getting more chaperones than needed. She factored student enjoyment in to how she designed the exhibit gallery schedule. In general, Monica felt pressured to give students a foundation in science. Implementing filed trips the way she did to the Science Center was one small part of her way of giving students this foundation.

Chaperone availability played an important role for Monica as an external influence. Their availability made it possible for her to enact the field trip the way she did, in small groups of students that helped make behavior and learning more manageable. It was also possible for her to communicate with chaperones beforehand and let them know what her expectations were for how they would orient students during the trip.
There were also some external influences on Monica’s field trip to the Science Center which were much more minor. First, the accessibility to and availability of Science Center staff had some influence. Monica knew that she could call if she had any questions, and staff were helpful during the professional development workshop as well. Second, Monica mentioned a previous principal who had helped usher in the grant to the school. That principal had encouraged her to attend all the professional development workshops available from the science center, not just the ones appropriate for her grade level science. Third, the low crowds likely during winter at the Science Center was an influence. Monica purposefully planned her trip to occur during a period of time when fewer visitors were expected. In the year prior, the weather had been an emergent influence on Monica’s field trip practice as a snow storm postponed the trip until after Monica had finished teaching the unit. She was thankful that, this year, the weather had cooperated in letting the field trip occur as planned, at the time when visitors were less frequent, and midway through the Weather Unit.

Hannah

Hannah was a fifth grade teacher in an affluent suburban district’s elementary school. She had taught for 12 years, many of which were at the second grade level. Fifth grade was when students began having science class every day, and Hannah taught two sections of science and math each day. Hannah was partnered with another fifth grade teacher who taught language arts and social studies to the same two classes of students. Hannah noted that she had not been trained extensively in science, and that teaching was her second career.

Hannah had first visited the Science Center with a fellow teacher during a school vacation week in 2010 to consider it as a possible field trip destination for her students. The two of them agreed on the potential of the Science Center, and were impressed by the connections between the state science standards and the exhibits. The goal would be for students to visit and tour through the facility, visiting
the exhibit areas that pertained to science content that would be tested on the fifth grade Connecticut Mastery Test (CMT). The trip also had a reading goal for students, and it would make use of a “scavenger hunt” worksheet activity which would direct students to read and interpret exhibit labels as nonfiction text. Hannah emerged as the lead teacher in organizing and planning, which included oversight of developing the scavenger hunt for students. Hannah based the scavenger hunt on the Science Center’s existing Trail Guides. The Science Center Trail Guides covered grade level science content, whereas Hannah’s scavenger hunt covered science content from grades 3-5. She merged the existing Trail Guides together, then picked the questions she wanted to keep, and added in questions of her own. Hannah revisited the Science Center each year, and revised the Scavenger Hunt to remain current. I interviewed Hannah after her third time leading her school’s fifth grade field trip to the Science Center. The remainder of this section describes that field trip, which happened in the fall of 2011.

Hannah provided orientation to her students a few days prior to the excursion. She used the Science Center website in class to display the floor plans and layout. She explained to students how they would move from one area to the next and what they should focus on. She previewed the scavenger hunt activity with them and identified expectations. “The whole purpose is really just to get them to pay more attention to the exhibits and to think and question while we’re there. So they previewed [the scavenger hunt at school, then] they complete everything they can while they’re there” (M1). On the day of the trip, the scavenger hunt activity was waiting for them at their desk, bound in a folder with a pencil. When prompted for what else she had done to prepare students for the trip, Hannah described her fifth grade curriculum. She said:

We start with the moon and the phases of the moon first thing in the year and then we go in to the brain and nervous system. So, usually by the time we’ve gone on the trip they’ve done some inquiry labs in both of those areas so they’ve got that behind them. I think this year we were just about to go into sound, so anything that they were picking up on sound is really just going to be part of their prior knowledge before we’ve done any of the inquiries in sound. Their forces in
motion, they would have had before in a prior year so we’re kind of coming back on that. But anything in light and sound is really a preview of what’s to come later in the year. (H1)

It was evident that Hannah had envisioned the field trip as a way to “resurrect” science curriculum topics from earlier grades, a way to review 5th grade science curriculum so far, and a preview of things to come. Hannah was thinking of third-fifth grade science as the activities which had been done with students to prepare for the intended learning during the trip itself.

On the day of the trip, Hannah met with chaperones before boarding the busses. She reviewed their assigned list of students and a detailed schedule, for each chaperone, for the day. The whole fifth grade traveled together to the SC. Students then traveled throughout the museum’s exhibit galleries in chaperoned groups of 8-10. Chaperones were instructed to move on from an area if it became too crowded, because the movement of other school groups was unpredictable. Hannah said:

By going over [the plan] with the chaperones and giving them their grouping, and having previewed it with their students it kind of just keeps us all moving throughout the museum. ... Because it’s such an exciting place and so open, we feel like we need that organization ... You’re basically in the same vicinity of your class with your two chaperones, or you’re seeing them. So we’re kind of checking in throughout the day and I think most of the teachers are seeing their students, even though they’re not in their group, they’re running into them and running into their chaperones constantly and touching base. ... We really feel like we have to stay on top of each other and make sure that [groups] understand that they really need to focus to get through everything they want to see. So it does take quite a bit of organization or else we feel like it won’t quite happen. They’ll go and they’ll have a great time but they won’t get to see what they need to see or what we want them to see. (H1)

The six classes of about 25 students each were fanned out across the center. Chaperones were told where and when to take their groups to have lunch and when to return to the busses.

Hannah knew that there were a lot of questions on the scavenger hunt, perhaps too many. Students were held responsible for doing the scavenger hunt activity. Hannah indicated that students were self-motivated to get the worksheets done to varying extents. Sometimes, high achieving students were a little too concerned about completing the scavenger hunt.

Students did follow-up work in science class with Hannah the next day. This included time to answer the scavenger hunt questions, to go over the questions together, if time permitted, and to do a
written reflection about the trip. Hannah used the reflection prompts to get feedback from her students and to find out what had sparked their personal interest. She felt it was good for students to get their thoughts down in order to “finalize everything.” The scavenger hunt folders were collected and students were given a grade on how much they had completed.

The fifth grade curriculum continued from there, now referring back to any relevant SC visit activities at times. For instance, a LEGO lab and robotics unit took place later in the year, in which students built and tested things, which Hannah could tie in to some of the interactive exhibits in the Forces in Motion gallery. Hannah said:

[On the scavenger hunt, in my] Forces in Motion section, I’m asking [at the race car exhibit,] “if you added weight did the car go further?” ... So, those are giving them a first experience up there [at the Science Center], but then actually when they’re building it and manipulating it back here in our lab, we could refer back to that, or think about that. But [the Scavenger Hunt questions] kind of get them thinking along those lines as we’re there. (H1)

Therefore, she had constructed parts of the scavenger hunt activity to provoke initial hands-on experiences with ideas that she would then build upon in later units.

*Internal influences*

Hannah made less extensive reference to internal influences on her field trip practice than any of the other participants in this study. When prompted during the concept map exercise with the internal factors that had been identified from the first interview (e.g., personal science knowledge), Hannah said, “I think that’s about me. I don’t think I’m the reason for the field trip” (H1). Overall, she stressed the importance of external influences, namely, the alignment of the science center’s exhibits with the state science standards for 3rd-5th grades that helped make the trip a “no-brainer.” Other significant external factors included: supportive colleagues and chaperones, existing materials from the Science Center, and a grade level nonfiction reading goal.

While it was evident that the most powerful influences on Hannah’s current field trip practice were external, this had been Hannah’s third field trip to the Science Center, and these external factors
had strengthened over time. What had set her first trip to the Science Center in motion years ago was her sense of purpose and her background in science. I briefly discuss each of these internal influences first before spending the bulk of this section discussing the external influences on Hannah’s practice. 

*Sense of purpose, background in business, lack of a background in science*

She credited a sense of purpose and accomplishment as the reason she did the pre-visit and post-visit activities with students. Hannah had seen the recommendations on the science center’s website to do these kinds of preparation and follow up activities with students, and it resonated with her sense of purpose. Having a purpose meant that she coordinated her field trip based on the state standards, which represented forethought that would make it “easier to justify.” Not that her rationale for the trip had ever been scrutinized, it was just the way she approached planning out the trip, purposefully aligned with state science standards and a nonfiction reading goal. In order to accomplish something as a result of the trip, Hannah had put together the scavenger hunt activity.

Hannah also noted that she did not have a strong background in science, and that this was part of the inspiration to look to the Science Center years ago as a field trip opportunity for her students. Hannah felt the Science Center helped her get kids excited about science, presumably in a way that she or her school could not on their own. Hannah’s previous career was in the business industry in the state capital area. She was very familiar with the area in which the Science Center was located, and she felt comfortable leading the trip there, even though it was quite a distance from the school district. She noted that, “I was in the business world, so as far as organizing a trip and organizing the financing [for it] and all that, that pretty much just kind of fits into my background” (H1). Hannah had also received some training during her teacher preparation program on the logistics of doing a field trip, including permission slips and what to bring. Hannah’s handling of the logistics with ease, based on her background in business and some introduction to these ideas in her teacher preparation program, likely freed her up to focus on developing other aspects of the field trip to the Science Center.
Hannah continued to visit the Science Center each year to prepare for the upcoming trip, sometimes with her spouse and sometimes on her own. She did this to see what temporary exhibit (in the Traveling Exhibit Gallery) was going to be onsite during her field trip, and what changes to the exhibits and Trail Guides relevant to her curriculum had taken place. She updated her materials to reflect these changes and keep the scavenger hunt current. Prior to her most recent field trip, Hannah had visited during the Science Center’s fall open house event and spoken at length with museum educators about options available during field trips.

_External influences_

_State Science Standards for grades 3-5_

Hannah was primarily influenced by a trio of external factors operating in concert with each other: the third through fifth grade state science standards, the hands-on exhibits aligned with those standards, and the Trail Guides at the science center aligned with those standards. Hannah repeatedly emphasized that this alignment “made it easy” for teachers to envision a field trip, and it had made the trip a “no-brainer” for her and her colleagues. As Hannah said:

It was so obvious to me the first time I visited... I guess I’ve never really been to an outside place that really understood the curriculum that we needed, the State Curriculum Standards, and implemented them. I’ve never been anywhere that did it like this. ... It’s really kind of odd, because I haven’t really done this before, but I just think that it was just so obvious to me that there was so much forethought in tying into what we do in the school, that it made it very easy. And that if we were going to go and really accomplish something, which was my goal and the other teachers all bought into it, it was just a great place to do it. ... It was obvious you had worked with teachers in putting together the Trail Guides ... everything was tied right into the curriculum. ... A lot of times we have to hunt, and peck, and search for that kind of stuff, and you guys had it all laid out right according to the state standards. So, it was just, you guys made it easy for us to buy into because of that. (H1)

Hannah was responsible for preparing her students for the fifth grade mastery test in science. Students in the past had performed well on the other subject area tests, but their science scores lagged and it was important to the district that students perform better. She realized was that students hadn’t necessarily had hands on experiences with the third and fourth grade science concepts. When she did
pre-assessments with students to identify gaps in science understanding, it raised the question of how all that science would be addressed in fifth grade alone. The Science Center’s exhibits addressed this need, Hannah said:

I think that one of the things that attracted us to the museum was that there it was—there was the science from prior years that we weren’t necessarily going to be able to set up exhibits and inquiries on, and yet they could see it and experience it there in the museum. ... So it’s a way to bring it to the forefront for them in an exciting way, and yet also fulfill a need of ours to either go back through the details, or really get that concept down. So, I think that that was one of the most attractive things to us, not just the things that we already study. I think we feel like we can do a pretty good job with those ... (H1)

Hannah’s positioning of the field trip early in the school year helped her and the other fifth grade science teachers refresh their students’ memories of earlier grade level content. Scavenger hunt questions tied to her grade level content were either a review or preview of things to come before the state mastery test in March.

Existing resources (hands on exhibits and Trail Guides aligned with state standards)

Existing resources available from the Science Center were influential on how Hannah implemented the trip. The exhibits themselves were aligned with many concepts from third-fifth grades. Hannah specifically noted the importance of several specific exhibits, including one on the rock cycle, which had been third grade content. She said:

Even if you show [students] on a cool Smart board lesson, it’s not the same as going to the museum and being able to take rocks and put them under the scope and have them see, classify it as a kind of rock and talk about why and where it comes from. And I think that kinds of hands on learning so much reinforces the concepts, and maybe they’ll actually remember them, or erosion, which is one that our kids seem to have such difficulty with. (H2)

It was very clear that the Science Center’s Trail Guides, based on the exhibits, were instrumental. She said, “Your trail guides that relate specifically to the Science Standards, that tie in to what they need to learn in each of these grades, are huge keys for me and they really are my starting point for the scavenger hunt” (H2). Hannah used the Trail Guides from third and fourth grades to “resurrect” prior
learning and give students hands-on experiences at the Science Center with concepts (like the rock cycle) that they might not have had in earlier grades, and for which she did not have time to spend teaching in an in depth, hands-on way in her grade level.

*Nonfiction reading goal*

Besides science, the field trip had a secondary goal, as Hannah said, “We’ve had a reading goal the last couple of years, and we were trying to use the trip to not only take a look at science but also to get them to understand the importance of nonfiction reading” (H1). By tying the field trip to reading, the field trip would address areas of the curriculum covered by all six of the fifth grade teachers.

Hannah said:

> We’ve got language arts and science teachers going and one of our big focuses is on digesting nonfiction reading material and making sure that you’re using your headings, using your captions under pictures, using diagrams and charts. So I try to incorporate all those kinds of things as we’re at the museum. (H1) ... The scavenger hunt is really trying to pull out science things they need to know and reinforce this nonfiction reading. (H2)

The nonfiction reading goal as a part of science learning is yearlong in fifth grade. Therefore, Hannah found that all fifth grade teachers became enthusiastic and supportive of the trip. Teachers had even returned to the Science Center with their own families. She had experienced grade-level wide support from teachers who urged her to plan and implement the trip again because they understood the potential benefits for students. Having teachers, who don’t teach science, get so excited about going on the trip and spending a day doing things that are science-based had made an impression on Hannah and it motivated her to lead the field trip each year.

*Support from other teachers and adults*

Initially, it was just Hannah and her grade level partner who understood the potential for the field trip to the Science Center. However, over the two years since, other adult stakeholders had
become supportive. The positive feedback from teachers and chaperones after each field trip set up the expectation that the trip would occur similarly again the following year. Teacher attitudes toward the trip were positive and supportive.

The principal had also been supportive by arranging substitutes so that Hannah could visit the Science Center prior to the trip each year. The principal had recently visited the Science Center as part of a state education initiative, and became more supportive after seeing it for herself.

Parents were supportive, as well. The Parent-Teacher Association funded part of the recent trip, and parents in general were willing chaperones who followed the instructions that Hannah provided. When weather threatened to delay the trip this past year, Hannah received an email from a parent urging them to go because the kids were so excited.

Adults seemed to rally around the field trip, and their positive feedback influenced Hannah’s subsequent practice by reinforcing it to look similar to how it was in the past. As she said, “I truly have not had a negative comment from anyone on this trip, so that certainly helps” (H1). Hannah was particularly impressed by the strong support of the language arts teachers.

Finally, Hannah’s sense of support and like-mindedness with her fellow teachers was evident in the way she spoke during the interview. She frequently responded to questions in terms of we instead of I. More so than any other participant, Hannah invoked her colleagues consistently throughout the course of our interviews. The word “we” appears in Hannah’s transcripts about twice as often as in Natalie’s or Steven’s, and about four times as often as it does in Monica’s. Hannah’s sense of like-mindedness with her fellow teachers permeated how she thought of the field trip itself. This further supports the conclusion that Hannah was primarily influenced by external factors, including her colleagues.
Students and their excitement with science

Student excitement was very important to Hannah. She recognized the important role that enthusiasm played in students’ learning of science throughout the school year. She said:

This [field trip] just gets them so excited about science, in general, they connect this experience with science. ... This just all makes it so real and exciting that they never talk negatively about science. It’s one of the things, top things on their mind still, and some of these are my worst behaved kids. But they are excited, they are still excited about it and still remember it, it’s still fresh in their mind, even though it happened so much earlier in the year. It’s one of their highlights of the year. (H2)

To help generate this excitement, Hannah wanted students to visit exhibits which interested them.

Hannah described the teachers and chaperones as being on the sidelines:

You see them go off, they’re with a chaperone but when they get to a floor they go off and do different things based on what is most interesting to them and they pair up with different people and really explore things, which is nice. ... I think the beauty of it is that [students] all have their choices and they really get to move and do those things with us on the sidelines controlling things, like student behavior. ... So, it’s kind of different than in our classrooms, where we’re more directing, but the students are directing [at the Science Center] and we’re with them to make sure that they’re taking it to the right places. (H2)

Hannah noted that the Science Center exhibits were most age appropriate for fifth graders, and allowed for differentiation to occur as the students went to varying depths with the material.

Therefore, chaperones were instructed to go along with student interest, but to be sure to visit all the exhibit galleries, and specific areas in particular.

Since Hannah first visited the Science Center when school was in session, she got to see how other students moved throughout the space, and realized it was not what she wanted for her students.

Development of the scavenger hunt activity sprang from that firsthand observation of other school groups. Hannah said:

That very first trip when my partner and I went up there, we observed that kids just kind of run around and grab and do things because they’re so excited, number one, and there’s all those hands on opportunities. But they weren’t really taking the time to read and get things out of it. And I found myself even doing the same thing, I was all excited about the robotics exhibit. So that’s why we put together the scavenger hunt ... Not that we are totally serious about them completing [it], but just to get them to spend more time reading and thinking about the exhibits. So that was the whole purpose and in order to put that scavenger hunt together we used your
trail guides, and then also a trip there just to kind of look for things that we knew, that I knew as a science teacher we were going to be asking and we wanted them to see and understand it.

(H1)

In spite of her attitude toward student choice, interest and excitement, Hannah maintained that the students needed the focus provided by the scavenger hunt activity. She was fearful that the “wide open area with all those hands on things [would be] so exciting, that kids [would just] take off.” She was confident that the scavenger hunt along with the level of guidance provided on site by teachers and chaperones, provided the right balance for students.

Distance from the Science Center and weather

Hannah’s school district was an hour and a half drive from the Science Center, each way. This meant that time onsite was limited because district busses were only available during a window of time in the middle of the day. Bus travel was expensive, especially from this distance, and district busses were most economical. However, cost in any form was not identified as an influential factor on Hannah’s field trip practice.

Hannah’s group had participated in a lab program during her second field trip. While they appreciated the lab (which was on specific fifth grade content dealing with senses) and the “inquiry” teaching methods of museum educators, it did limit their time in the galleries and with the general curriculum. During her recent field trip, her third, they had not done the lab program and had maximized the amount of time students could spend in the galleries. Nevertheless, Hannah noted feeling rushed and running out of time, in her words, “to do what we want to do.”

Hannah was clear that the timing of the field trip in the school year was based on the unpredictable winter weather. She said:

I mean my first thing was, this is a great place to have kids review things just before they take the CMT [in March], and have the hands on experiences. If we really didn’t have to worry about weather or distance, I think we would come to the museum in late February. The reason we came in the fall is just so that they would have the experience, but we try not to get into the
time of year when we have to worry about weather. If we could be closer, and wouldn’t have to worry about it as much, I think we’d probably come in February, when we were further into the curriculum. (H1)

While it would be ideal to position the field trip later in the school year and at a particular point in the curriculum, Hannah positioned the trip where weather was unlikely to interfere. Therefore, weather, and not the curriculum, was the determining factor in when the field trip was scheduled to take place.

Steven

Steven was a fifth grade teacher in a suburban district’s middle school. The school housed fifth through eighth grades; however, the fifth grade class had their own separate wing of the building. Steven had about 22 students in his class and he instructed them in all the subject areas. In fifth grade, science alternated with social studies during the school year. Science was taught from the beginning of school until the standardized testing in March. Then, social studies was covered (instead of science) until the end of school in June. Steven had always wanted to be a teacher and he had held his current position for ten years, and had taught for a total of thirteen. His wife was also a fifth grade teacher, however, in another school district.

Steven had been to the Science Center as part of his school’s field trips before, however, this was the first year he had organized a trip. Steven took advantage of a funding opportunity from the Science Center whereby fifth grade classes could come for free if they participated in the lab program on Senses while onsite. Steven also booked a 3D movie program called 3D Sun, the cost of which was not covered by the grant. When Steven was booking the trip, he could not bring the whole fifth grade class (about 150 students) on the same day and be able to have them each see the movie and participate in the lab program, so he scheduled the 150 students to visit over the course of three consecutive days. Steven’s district was close by the Science Center, about a twenty minute ride.
The trip was purposefully scheduled about two weeks before the CMT in March. Prior to the trip, the entire fifth grade science curriculum was covered. This included units on sound and light, the nervous system and the senses, and the sun-moon-Earth. Steven said, “Different [fifth grade] teachers were at different parts of their curriculum in February. But essentially 99% of the curriculum was covered by the time we came to the Science Center” (S1).

Steven visualized the 5th grade science curriculum as the pre-visit activity and, essentially, the CMT as the post visit activity with students. For him, the connection between the curriculum and the Science Center field trip was fluid. As Steven said, “The pre-visit mostly related to the curriculum and then the curriculum related to the programs we used, including the 3D movie” (S2).

Right before the trip, Steven set up academic and social expectations with students for the trip. The fifth grade curriculum was reviewed with students and Steven introduced them to the floor plans and described the exhibits he wanted them to see, and how they tied into the grade level science topics they had covered. He gave students a preview of the fifth grade Trail Guides he had downloaded from the Science Center’s website, which students were expected to use during their visit. The three Trail Guides highlighted senses, light, and sound concepts at particular exhibits in certain galleries in the Science Center. He also prepared students for viewing the 3D Sun movie, for which he had downloaded the teacher guide in advance.

The field trip at the Science Center consisted of students viewing the 3D Sun movie, taking part in the 45 minute lab program on Senses, and touring through the exhibit areas in small groups of about four students with a chaperone. Steven spent a long time with his students in the Picture of Health gallery, which tied in directly with the fifth grade science topics of senses and the nervous system. They also spent time with electromagnetic energy and maglev exhibits, which ties in with curriculum from earlier grade levels. In discussing how he oriented students to the exhibits, Steven said:

[Students’] immediate reaction was to just start touching and playing with [the exhibits]. It’s always difficult as an educator to get them to take a step back and actually read instructions
before they start engaging, but after you’ve done that once or twice they kind of get the idea of your expectations ... By the end of the day, they were reading instructions and actually getting what to do... [When] you direct them to read the instructions, and the explanations behind it ... once you focus their attention to that, they do seem to understand what’s going on with the exhibits. (S1)

After the visit, Steven used the Trail Guides in class to start the discussion after the trip about how it had gone and what students had seen and done. The Trail Guides were not used beyond their role in getting that conversation started once back in the classroom: they were not graded or assessed. Steven found the Trail Guides helped students to remember aspects of the trip once they got back to the classroom. Steven used the trip activities to review and reinforce prior learning from earlier in fifth grade. Over the course of the following week in science class, Steven and the fifth grade teachers each did a review of curriculum from earlier grade levels. They each used a small kit of topics from fourth, third and second grades for a quick review of that science content. The final activity Steven considered aligned with the field trip was the Science CMT itself, as he said, “[The field trip] just fit in perfectly with what we wanted to do, which is just reinforce what we’d already taught in class in preparation for CMTs” (S1).

Internal influences

Self-preservation, pride in work, sense of integrity

Ultimately, Steven traced his field trip practice back to three internal factors: a sense of integrity, a need for self-preservation, and a sense of pride in his work. Steven credited his sense of integrity to three experiences: his upbringing by parents who valued hard work and respect, his training with the Boy Scouts which included doing your best even when no one was looking, and his education in religious schools which had instilled core values which persisted into adulthood even though religion had not. This integrity was closely connected to, and perpetuated, a need for self-preservation. While self-preservation had fiscal connotations, for Steven, it was fundamentally linked to a sense of integrity
with his work, and doing his work with integrity, in turn, gave him a sense of pride. As his life’s work,

Steven had always wanted to be a teacher and he enjoyed teaching. He said:

[T]here’s a set curriculum set by the Board of Ed. As a teacher who’s employed by this district, I need to follow that curriculum. Or I have no choice, I have to follow that curriculum. ... I look at my mortgage statement and my other bills, I think “Can I afford to lose this job? No.” There’s lots to do with self-preservation. Plus, I mean, I don’t know, I feel like I’m not doing my job if I’m not doing what my employer’s asking me to do. ... You know, I can put my own twist on it here and there, but ultimately I have to cover what the school district expects me to cover in terms of science in a given time period. Am I the most loyal teacher to my district? I would guess there are many who are more loyal. But I also want to do the job as my employers see it. You know, I have pride in my position. (S1)

Therefore, the fifth grade level curriculum was paramount to Steven because following it meant that he was doing his job, and doing it well. Since doing his job well gave him pride with his work and fueled his sense of integrity, this reinforced his desire to follow the curriculum. Since he felt good about doing his job, and doing his job meant following the curriculum, this was the way in which the science field trip was implemented. Steven said, “There’s a sense of pride in having a successful field trip and it’s part of my job... A lot is expected of you to do the right thing, honestly, without anyone really looking over your shoulder, and so the integrity fits in there” (S2). Ultimately, Steven explained his field trip practice in terms of how his internal drive for self-preservation manifested in adhering to the curriculum.

Therefore, he situated the school year leading up to the field trip as the pre visit. He went onto the Science Center’s website and downloaded the Trail Guides specific to his grade level for students to use. He downloaded the 3D movie Teacher Guide and shared it with his colleagues. He organized the trip so that students could each see the movie, participate in a lab experience with a Staff Scientist, and tour the exhibits. Finally, he oriented students to the venue and set the expectations that he had for them as a result of the trip. After the trip, he directed his energy in science class toward final preparations for the CMT exam. Then, once the exam was over, he moved on in the curriculum to social studies. Steven discussed different ways of doing a curriculum-based field trip, for instance, going at the beginning of a unit to play around with concepts first before delving into them more deeply back in the
classroom. However, he was confident that he had planned the field trip to the Science Center in the most appropriate way given his purposes for it in the curriculum.

Steven’s wife was also a fifth grade teacher, however, in another district. He credited his marriage for some part in helping to affirm his choice of livelihood. He said:

I think everybody who knows anything about teaching knows that it’s not a lucrative business, so you do struggle, especially when you look at other people around you who seem to not be doing as valuable a job and get paid twice what you do. You do need that grounding from a spouse to just bring you back down to Earth, I guess, because you can get caught up in what you don’t have and it’s always nice to be reminded what you do have. (S2)

Because they were both fifth grade teachers, Steven was also able to partner with his wife in a literacy-focused school program which paired suburban and inner city classrooms. Six of the activities were joint field trips which brought the two classrooms together. Steven said:

I bounce ideas off her and she bounces ideas off me. A couple of years we were paired in [the literacy program], and we engaged in [a] field trip together, and that was a really valuable experience. She could offer me insights as to what could be done better next time, and I could offer [insights to] her… It really helps. (S2)

Steven’s focus on the curriculum and doing his job well had helped bring about participation in the joint literacy program, which, in turn had included a field trip with his wife’s classroom of students. He saw that overall experience as beneficial to his teaching practice, which included how he planned and implemented field trips.

In describing his concept map, Steven realized that it fundamentally was about his teaching practice in general, and that his field trip practice was one outgrowth of that. Therefore, the Science Center field trip was a temporary situation in which these factors played out, akin to the temporary nature of leaves on a tree. Steven noticed that his concept map was like a tree lying sideways. Influences on his practice lay at the core of the structure (e.g., his self-preservation, the fifth grade curriculum and CMTs) and in the “trunk” of the tree. His classroom was situated at a point from which all the branches originated. Meanwhile, what he did with students, how he thought about students, lay at the periphery. “The field trip is just one of the branches on this tree,” he said, “...It’s part of the
whole, the big picture, the big education picture. It’s not there [as another] piece to it, it’s part of the
whole learning” (S2). Ultimately, Steven recognized that students themselves were closely related to his
sense of self preservation, he said:

The students I would keep right here [on the map] because the students are part of my self-
preservation. Possibly too, like the second level in terms of doing my job, sense of integrity, because I mean, I really do care that they learn. I chose to be a teacher. It would be reckless of
me to not care, I think that would be atrocious. (S2)

Steven recognized that becoming a parent a few years ago was one experience which influenced
how he thought about students as well his field trip practice. He said:

You could have all the enthusiasm in the world as a brand new teacher and, that’s fantastic, and
you have all these great new ideas and different thoughts on how students learn, but ultimately,
unless you’re a parent, you can’t make that connection with other parents because you just
don’t know. I found I became a much more sympathetic teacher when I became a parent, and
when I look at a field trip, I look at it from a parent perspective too. … How would I feel watching
this teacher plan a field trip for my kids? … Number one, they’re off school grounds, will it be
safe? Number two, is it organized? You know, are they learning? Is it a waste of time or is it
valuable? All these questions I would ask as a parent about a field trip, I try to answer as a
teacher in the field trip itself. (S2)

Steven’s experience with being a parent allowed him to further enact his sense of integrity and pride in
his work. By enacting field trips in a way he, as a parent, would value them being enacted, he further
established that he was doing his job well and could take pride in that work.

**Personal attitude toward students’ science learning**

Steven personally enjoyed science; in particular, he was a fan of the *Mythbusters* franchise. He
noted that he wanted to “make geeky cool” for students, yet he had reservations about the extent to
which this affected his implementation of the field trip, since he based that so strongly on his
curriculum. As he said:

I’m kind of on the geeky side so all science interests me. I really try to push that onto my
students that it’s cool to be geeky and be into that kind of thing. … I’m really into the subject
matter, but we don’t choose curriculum based on what we’re into, we’re provided with a
curriculum that we’re expected to implement and so we do. In terms of being interested in a
subject matter, yes I am [interested in science], but that’s just by coincidence. There are other
teachers who really dislike the subject matter a lot but they still teach it because they’re expected to as part of their job. (S1)

Therefore, even though Steven liked science and was personally interested in science, he did not see it as an influence on the field trip. For Steven, it was all about the curriculum and he was resolute that his personal attitude toward science did not affect what he did on the trip, or whether or not there was a trip to the Science Center in the first place. However, there is every indication that his attitude affected how he implemented the trip. He said:

When your enthusiasm is there, their enthusiasm’s there; and when your interest is there, their interest is there. [Then, there’s] the whole idea of behavior. If you can be passionate about what you teach, the kids will buy into it, they really [will]... Unless there are severe emotional needs that you can’t access ... So, I’m going to put on here my attitude towards learning science (S2)

Steven’s earlier interpretation that his attitude toward science did not influence implementation of the field trip was consistent throughout the interviews. However, in the second interview it became clear that his attitude toward learning science had some influence on the nuances of the way in which the field trip was implemented. Steven clearly recognized that his attitude toward learning science affected student interest with science, and this had an influence on his practice.

External influences

Fifth grade curriculum, in general, and CMT science exam

The curriculum was the strongest influence on Steven’s field trip practice. Steven referred to the curriculum in tandem with every other influence on his field trip to the Science Center.

The fifth grade curriculum, in general, was an influence because Steven and his colleagues considered the cross-curricular links with math, writing, reading and social studies. Steven felt the range of fifth grade subjects had an influence on why the field trip was implemented the way it had been. However, even more so, the schedule for fifth grade science and the timing of the science CMT exam in March were influences on when the field trip was held. Consequently, the field trip was scheduled for
February. Even though other grade levels at the school, in fact, were first in line and “took” the opportunity for a field trip earlier in the school year from Steven’s fifth grade class, that worked out in his favor given the purposes he had mapped out for the field trip. About the field trip’s purpose, Steven said:

It really didn’t offer us anything new that we hadn’t already spoken about, but that was kind of the point of it. We wanted to fit the field trip in prior to CMTs. The programs and the experiences at the Science Center really reinforced what we’d already studied in school in good time for the CMTs. ... We looked at the exhibits that worked well with the sense organs and light, and we watched the sun movie and then we took part in the Senses Program. ... We found something for everything, really. Like I said, it just fit in perfectly with what we wanted to do, which is just reinforce what we’d already taught in class in preparation for CMTs. (S1)

Alignment of existing resources with the curriculum

Previous fifth grade trips to the Science Center were experiences which influenced Steven’s field trip experience. He said:

Fifth graders study sound, light, the senses and the earth, moon, sun system and we’ve come to the Science Center the last three years and the programs have always been really good. It’s based on [those] experiences that encouraged us to return this year. (S1)

From previous trips, Steven knew the Science Center exhibits which aligned with his curriculum. He knew about the Trail Guides. As a result, Steven saw the Science Center as a resource for reviewing the curriculum in anticipation of the CMT exam.

Furthermore, Steven felt the Science Center had materials that he didn’t have at school, like black rooms and LEDs for the Senses lab program, lasers as part of an exhibit, and a 3D movie theater. Steven found the materials to be very engaging to students. Even though the materials could not be found or expected at Steven’s school, their novelty was not as important to Steven. Rather, they “really reinforced everything we’d learned,” he said. Hands-on, engaging materials that were relevant and meaningful to students created what Steven called “authentic learning.” The Senses lab program and 3D Sun movie were two examples of authentic learning activities from the field trip. He felt it was so
important for students to engage in that kind of vivid learning to review science concepts from fifth grade right before the CMT exam.

**Job requirement to implement curriculum-based field trips**

Steven believed that even if teachers don’t “like” part of the curriculum, they still have to teach it “because they’re expected to as part of their job” (S1). Steven felt that it was a job requirement for him to plan field trips, and to plan them in a way which aligned with the curriculum. He made it his responsibility to download teacher guides and materials from the Science Center’s website and share with the other fifth grade teachers. He believed the cost of not following the curriculum would either mean administrative intervention or firing. Those ends would not coincide well with his need for self-preservation.

Steven had been part of about 25 field trips during his career, and the cumulative experience from leading trips, and learning initially through trial and error, did influence how he implemented the Science Center field trip. Steven felt that planning and implementing field trips was part of his job. Therefore, by factoring in previous planning and field trip experiences, he had a sense of pride and integrity with the Science Center excursion.

**Student interest**

The curriculum prescribed the content of the field trip and use of the relevant Trail Guides and programs. However, within that structure, there was room for student interest, at least, during the field trip itself. He said:

The Science Center had exhibits and content that connected to our curriculum. You know, we didn’t see the subject matter presented at the Science Center and decide to go based on the fact that it was interesting. Like I said, it really was a curriculum-based decision to support the curriculum, but when they saw the electromagnetism they related that to 4th grade, so we spent some time on that, too. There was flexibility in our schedule, if anything did pique their interest. So, some exhibits that were of interest to them, that they connected to, we went and
enjoyed [those] too. ... I provided the entire grade level with the map and said which exhibits they should see, but I didn’t make them stick to any kind of pattern. They chose in which order they went to the exhibit. (S1)

Student interest was important to Steven, and he recognized the important role that choice played in interest. In addition, he had determined which choices to give students when he planned the field trip, and how to set up the parameters in which those choices would be made. Besides the importance of choice, Steven made other connections to student interest, as well. During the second interview, he incorporated all student variables during the concept map exercise. However, he spoke most frequently about student interest. He also factored student interest into how the field trip schedule was designed to ensure that students were able to visit the gift shop, which, he said, “is always the first place everybody wants to go, so that’s kind of a disappointment from an educational standpoint, but I mean as long as you schedule that time in, then they’re satisfied with it” (S1).

Steven believed that interest during the field trip activities arose from student encounters with engaging materials which connected to what they had already learned in class. For instance, in the quote above, he noted that students were interested in an exhibit because it related to what had been covered in the fourth grade curriculum. He went on to say, “They were really interested in [the maglev car] based on what they’d learned previously. So, I mean, the fact that they were interested in it independent of what we were doing [in fifth grade], that worked out really well” (S1).

When students were interested, Steven determined that they were enthusiastic about learning. When students were enthusiastic about a topic, Steven believed that positive student behavior ensued while they studied that topic. He felt the positive student behavior was brought about by the Science Center’s engaging, hands-on materials and exhibits. Still, Steven felt previous field trip experiences influenced how he planned for student behavior during the Science Center excursion. Steven acknowledged that his field trip planning was done to bring out particular behaviors (good ones) while preparing for the range of possible students behaviors. He said, “I know which students work well
together, which students need guidance, size of groups, friends to separate and keep together” (S2).

Therefore, Steven addressed student interest indirectly via plans for student behavior. He felt his planning had worked since, he said, “All the students really behaved appropriately for what we were expecting them to do” (S1).

Steven identified a relationship between student interest and his internal motivation to make geeky cool. Steven understood that, as their teacher, his attitude towards learning science helped to set a tone in the classroom that could generate, and affirm, student interest in the subject. He said:

In 8th grade, it makes me so sad because the kids who are really interested in science and technology, unless it’s for texting or social media, most of them are made fun of and it’s really sad for me to see that because they’re our innovators and the people who can really make a difference, and they’re kind of being brought down by the students who don’t appreciate that. So, making geeky cool [is what I try to do]. (S2)

**Fifth grade colleagues**

Steven recognized that he and the other fifth grade teachers who were involved in the field trip that he organized were likeminded when it came to how to implement the field trip. He said:

My colleagues and I are all in a position where we really see field trips as not just a goof off. ... If you choose to take a field trip it has to connect somehow because, I mean, we really need to maximize instruction time, and then taking a field trip takes away instruction time. So there has to be some kind of authentic learning that takes place. You know, you can’t just go and have a party -- we all kind of follow that philosophy. (S1)

Steven had actually taken over leading the fifth grade field trip to the Science Center when the teacher (who had done it in the past) was unavailable. He felt the best resource for his learning how to do a field trip was someone who had previously led a field trip, which that unavailable colleague had done for fifth grade field trips to the Science Center over the past two years. He was eager to take the lead, and readily accepted what was offered to him from years past in terms of planning. But he modified some things based on what he knew “would work” from years of experience with field trips.

Steven had been part of a program (the same one is which his wife was also involved) which required field trips. As a result, Steven had been part of 18 field trips over the course of three years.
Those field trips were prepackaged to be aligned with the curriculum and aimed at literacy skills so delivering a curriculum-based field trip had been modeled for Steven. Furthermore, Steven admired and respected the work of that program’s director. The overall experience made a lasting impression on him. With the myriad of field trip experiences as part of that program, he was confident with knowing what to expect and plan for when leading student field trips.

When he asked for feedback from the other teachers about the Science Center field trip, the biggest concern was that they had not been able to stay long enough at the Science Center, and they would have liked another hour or so. The length of the visit had been determined by the district’s bus schedule, and Steven did not consider that something which could be adjusted. Steven was pleased that his current colleagues appreciated the results of the field trip to the Science Center. The experience of receiving positive feedback from these colleagues reinforced how he had enacted the field trip.

**Experiences Shaping Teacher implementation of Field Trips**

The previous sections presented the influences on teachers’ implementation of field trip practices, and how they managed and addressed these factors (research question 1). Included in those descriptions were experiences which had been identified as influential. This section will apply the theoretical framework to more closely consider the experiences which shaped teachers’ planning and implementation of field trips (research question 2). Recall that Kolb’s Experiential Learning Theory (ELT) and Pugh’s Transformational Experiences (TE) will be applied to assess which is better suited to explain experiences the participants identified as influencing their field trip practices. Note that tables 4.2 – 4.5 summarize the influences and experiences for each participant.
Applying Kolb’s Experiential Learning Theory

ELT posits that experience is an integral part of learning, followed by reflection, reconceptualization, and finally active experimentation. Learning is a cyclical process proceeding along a pathway, whereby experience serves as a means toward an end. Thus, ELT is commonly referred to as learning from experience.

ELT suitably describes each teacher’s description of their gradual change in field trip practices over time. All four recognized a process whereby they conducted field trips, reflected on what went well and what could have gone better, reconceived “what could be,” and then posited how they would do it the next time. Each also put those conceptualizations into action in their recent field trips to the SC. Monica had decided not to do Trail Guides, because she wanted students to have more time to pursue interests and see the exhibits. Natalie referred to the notes in her planner from the previous year. Hannah had decided not to do the lab program, which took time away from exhibits which were more central to her purpose. Steven looked at the plans another teacher had made for the annual SC FT, and he changed them based on what he knew would work out better towards the goal he had in mind. When the SC field trip and accompanying classroom activities had each run their course, participants also demonstrated how they continued on in the ELT cycle. Natalie wrote notes to herself in her planner book for the next field trip, Steven and Hannah gathered feedback from other teachers, and Monica jotted ideas into her teacher manual. Each teacher identified a reflective step after the SC field trip. Furthermore, they also each engaged in the ELT cycle on their own initiative, without facilitation. Therefore, ELT effectively explains how teachers learned from the accumulation of field trip experiences and benefitted from the cumulative effect of implementing field trips over the course of their careers.
The participants’ experiences as a whole can be explained by the ELT\(^5\). Kolb’s theory of experiential learning explains how each participant learned how to plan and implement educational field trips, and the “cumulative effect” of previous field trip experiences on their craft. Each was adept in using reflection on their experiences to reconsider their practice and change it or improve upon it. In addition, Natalie reflected on visits from past students who found field trips memorable. Steven was involved in a three year project that facilitated the active use of educational field trip materials. Monica’s use of experiential learning was particularly congruent with her internal drive to continuously improve. However, the case of Hannah was the exemplar when it came to ELT. Hannah’s first experience with the SC was a visit with her grade level partner three years ago. She said:

I think from that very first trip when my partner and I went up there we observed that kids just kind of run around and grab and do things because they’re so excited, number one, and there’s all those hands on opportunities, but they weren’t really taking the time to read and get things out of it. And I found myself even doing the same thing, I was all excited about the robotics exhibit. (H1)

Here, Hannah reflects on her concrete experience at the SC. She had then used this reflection as a basis to conceptualize what an excursion to the SC should look like, and actively applied it to her own students. One outgrowth of that was the Scavenger Hunt activity that she designed based on the Trail Guides. She felt this would help students focus on the intended learning goals. Hannah has returned to the SC year after year to experience it again, especially any new exhibits in place, and revised the Scavenger Hunt as needed. She was self-directed through the ELT process, spurred on by encouragement from colleagues and the state science standards. This was also driven by, and fuels, her internal sense of purpose.

\(^5\) Note, however, that each has been punctuated by experiences considered to be transformative. See Figure 4.2.
Applying Pugh’s construct of Transformative Experiences

The central feature of Pugh’s Transformative Experiences (TE) construct is that the learner “makes the (mental) leap” and applies learning in the classroom to learning outside the classroom in a way that has personal meaning which transforms their perspective on the world, and things never look quite the same to them again. In this process of learning, an experience is not a means to an end, but a culmination of learning, and a goal in and of itself.

For the sake of this study’s use of TE, it must now be clarified what constitutes the “classroom curriculum” and what constitutes the “outside the classroom.” It was assumed that each participant, having completed a teacher credentialing program, had been instructed on how to construct a lesson plan aimed at student learning goals. Secondly, it was assumed that such lesson plans contained the equivalent of a beginning (e.g., Engagement, Hook, Pre-assessment, or Introduction, Inquiry Starter), a middle (e.g., Exploration, or Focused Investigation), and an end (e.g., Explanation, Closure, Shared Understanding, or Assessment). Lesson plans function as the “classroom curriculum” piece of the TE construct for each participant. The “outside the classroom” piece is the science center as an educational venue which can operate as part of an ongoing “lesson plan.” These assumptions are warranted because, by their very nature, the educational field trips put in place by the participants represent continuous lesson plans which incorporated the SC. Therefore, this part of the theoretical framework will more closely examine how teachers past experiences might have triggered teachers to extrapolate a good lesson plan beyond the classroom to include the science center as part of for the process of learning. Brief descriptions of the “lesson plans” are revisited here as reference: Natalie planned for her students to learn about reaction time, Monica intended for her students to learn weather concepts, Steven intended for students to review grade level science curriculum in preparation for the CMT, and Hannah intended to “resurrect” 3rd-4th grade science learning while also addressing a nonfiction reading

6 This also meant that this aspect of the framework could only be applied to those experiences which happened after the participant’s teacher preparation program.
goal. Each of these “lesson plans” had a beginning (in the classroom), a middle (at the SC), and an end (in the classroom).

TE suitably described experiences which were, in hindsight, revelations for teachers without the necessary step of reflection in ELT. Natalie’s encounter with her student over the eye hook was one such experience. She said:

[T]he fact that he came running to tell me about it, I think that just reaffirmed that if you’re prepared, and you know what you’re doing, ... [and] the students know what they’re looking for, then I think there’s more value to the experience. (N1)

Natalie realized that doing preparatory activities in the classroom could be significant to children, and this resonated with her internal motivators (i.e., her desire to give students opportunities, her sense of responsibility, and her goal of making field trips memorable). Her description of that experience aligns with the TE construct as it is applied in this study. Even though, along the lines of ELT, she was already experimenting with incorporating pre-visit activities for that field trip, that instance with the student transformed her perspective on field trips. This overall situation is illustrated by Figure 4.2. Natalie had been on a course consistent with the ELT, but that one instance became a transformative experience for her. It is likely the experience was especially provocative since Natalie was externally motivated by students themselves.

For Hannah, discovering the exhibits and Trail Guides and how they were explicitly mapped to the 3rd-5th grade science standards was a transformational experience. Hannah described the decision to plan a field trip as a “no-brainer” because of these attributes. Until that time, she had never considered that a field trip destination could be integrated into the curriculum to that magnitude.

Monica noted that the inservice PD experience on how to lead a field trip had prepared her to be more attentive to making the FT educational, and more aware of how to integrate the Science Center into her weather unit. She found the immersive nature of the PD transformational. Facilitators immersed her in the same learning activities in which her students would be engaged. She experienced
strategies for instruction firsthand, and then had a teacher manual with all of the activities written down in it so that she could use them and incorporate the strategies that had been modeled. About that experience, Monica said:

. . . I have to remind people, other teachers, that when you go to these workshops, they may be disappointed because they’re not getting content, which is what they think that it’s about, but it’s not about the content it’s about how you teach science and elicit questions so that kids can answer them. And absolutely, I have fully enjoyed all of the workshops at the Science Center and I believe it’s helped me be a better teacher. (M1)

Steven acknowledged how becoming a parent had transformed how he taught and the way in which he considered students. He applied this to his field trip planning, as well. He said:

One thing that struck me, a few years ago now, was becoming a parent makes you a better teacher. I mean, you could have all the enthusiasm in the world as a brand new teacher and, that’s fantastic, and you have all these great new ideas and different thoughts on how students learn. But, ultimately, unless you’re a parent you can’t make that connection with other parents because you just don’t know. And I found I became a much more sympathetic teacher when I became a parent, and when I look at a field trip I look at it from a parent perspective. . . . [H]ow would I feel watching this teacher plan a field trip for my kids? . . . Number one, they’re off school grounds, will it be safe? Number two, is it organized? You know, are they learning—is it a waste of time or is it valuable? Are there enough people? . . . [A]ll these questions I would ask as a parent about a field trip, I try to answer as a teacher in the field trip itself. (S2)

For Steven, parenthood was a transformational experience. It encouraged him to scrutinize field trips in terms of their learning potential.

Natalie’s encountering her student’s enthusiasm over an eye hook, Hannah’s experiencing the alignment among exhibits/Trail Guides/science standards, Monica’s PD workshop participation, and Steven’s fatherhood were transformative experiences that helped them extrapolate lesson planning to include the SC field trip excursion. Each of these experiences was spoken of emotionally. Monica’s eyes lit up and her voice inflected when talking about the PD, and she recognized that her advocating of the workshops sometimes put her at odds with other teachers’ opinion of them. Steven got choked up thinking of a student in class whose own father was going through illness, something he said he wouldn’t have necessarily felt before becoming a father himself. Hannah talked about her personal excitement and enthusiasm for the exhibits when she visited the center for the first time herself.
Natalie’s recounting of the Ellis Island episode was emotionally laden, for her, it was a culminating example of her personal sense of responsibility to give students a memorable time and opportunities they deserved. Each of these experiences operated in participants’ memories as demarcations between prior (field trip) practice, and subsequent practice. Each of these experiences was identified by participants as particularly influential on their SC field trip practice. Emotion, more so than the cognitive act of reflection, seems to have played an instrumental role in structuring these experiences to be influential.

Comparing suitability of experience theories

Both TE and ELT help explain how these experiences operated. ELT could more frequently be used to explain experiences which shaped teachers’ educational field trip practice, yet TE was better able to explain situations of particular significance to the individual. TE was particularly adept at making sense of those situations which were emotionally-laden and visceral, while ELT was able to explain more those which were more cognitive, reflective and routine. Experiences best explained by ELT were more cognitive in nature. TE experiences punctuated the development of field trip practice over time, while ELT sufficiently describes the overall process by which these participants incorporated experiences into learning. Therefore, the two models complemented each other. Concrete experiences could be considered transformative and integrated into the cycle of experiential learning. Figure 4.2 illustrates how transformative experiences were determined to operate in relation to the experiential learning cycle for participants in this study.
Data from each participant revealed a unique set of experiences which had influenced educational field trip practice. For Hannah’s educational field trip practice, the lynchpin experience was visiting the Science Center and seeing how the exhibits and Trail Guides aligned so well with the curriculum, an external factor. The curriculum, as well as, the alignment of the exhibits with the standards both resonated with her internal sense of purpose. She viewed the SC as a curricular resource and the outing as something that could be integrated into her overall plan for student learning. Collegial support was a particularly influential external factor at the time, and helped give shape to the educational field trip. For Steven, the experience of participating in a three year project fueled his sense of self preservation, allowed him to work with his wife, and incorporated him into planning and implementing 18 educational field trips. For Natalie, it was an encounter with a student on a field trip that fortified her sense of responsibility and purpose with field trips. For Monica, it was a workshop on how to lead a curriculum-based field trip to the Science Center. This simultaneously fueled her internal drive to continuously improve herself professionally and meet the external demand of the state science standards and 6th grade science curriculum. The standards and curriculum, in turn, were serving as
gauges by which to continue her professional development, contributing to an internal sense of confidence with teaching science.

**Summaries of Participant Results**

Teachers’ in this study were influenced by external and internal factors from which they struck a balanced perspective of their students and the grade level curriculum. That perspective helped create the vision for implementing an educational field trip. In order to avoid “chicken and egg” logic when considering experiences and influences, the study treated the field trip to the SC as a fixed reference point in time. Therefore, experiences prior to the trip (or rather, the memory of them) were considered to be a subset of internal influences. In addition, the study defined “experience” as any outward event which had been perceptible to the senses, participated in or observed, that may have included other individuals.

The following tables summarize the influences and underlying experiences for each participant. Experiences are shown in horizontal alignment with those internal and/or external influences with which they were found to be associated. Therefore, rows within the tables represent relationships between the internal influences, experiences, and external influences found to be connected to each other. There is some intentional duplication of entries in each external influences column in order to represent how they were linked to multiple internal influences. Where appropriate, the theory which best explained the experience is identified. Representation in table form is not meant to indicate that the internal influences operated discretely from each other. Rather, internal influences commonly operated together. For instance, Natalie’s sense of responsibility, idea of giving students’ opportunities they deserve and making field trips memorable were entwined, as were Steven’s sense of self-preservation, integrity and pride. As previously stated, internal influences were untangled during the process of

157
analysis and treated discretely for the purpose of this study. That warranted the representation of results on a case-by-case basis, so that the complexity of each case could be preserved during reporting.

Table 4.2  *Summary of Natalie’s results*

<table>
<thead>
<tr>
<th>Internal influences</th>
<th>Experiences</th>
<th>External influences</th>
</tr>
</thead>
</table>
| • Feeling responsible as teacher | • Previous visits to SC  
• Previous FTs, inc. to SC (ELT)  
• Accumulation of previous field trips (“a good lesson plan”) (ELT)  
• FT to Ellis Island/Student enthusiasm with making connections (TE)  
• Very first FT as a teacher | • Students  
• Student learning  
• Student’s low SES  
• Students’ science notebooks |
| • Making the field trip memorable by facilitating connections and capitalizing on the wow factor | • Reminiscing about field trips with former students (ELT) | • Students  
• Specific 5th grade science curriculum |
| • Giving students the kind of opportunities they deserve | • Childhood  
• Childhood vacations with parents  
• SES of childhood family  
• Being a parent, grandparent (TE) | • Students  
• Timing of field trip in school year  
• Grant funding  
• Existing educational resources aligned with curricular goals  
• Time length of visit (buses)  
• (Support of) other 5th grade teacher involved  
• Museum educator |
### Table 4.3  Summary of Monica’s results

<table>
<thead>
<tr>
<th>Internal influences</th>
<th>Experiences</th>
<th>External influences</th>
</tr>
</thead>
</table>
| • Internal drive to increase effectiveness in teaching the curriculum | • Previous FTs in general, hit or miss (ELT)  
• Open House event at SC  
• Multiple visits to SC (ELT)  
• SC PD in inquiry  
• Add’l grant-funded SC PD  
• Grant-funded SC PD workshops on FTs – modeled effective strategies (TE) | • Existing materials aligned with weather curriculum (Me in Meteorology packet and lab program; and exhibits)  
• Add’l exhibits at SC which tied in to 6th grade science  
• State science standards  
• Students |
| • An understanding of science and teaching science which resulted in confidence | • Professional background in science; previous medical career  
• Years of teaching experience (ELT)  
• Previous use of Trail Guides (ELT) | • Students  
• State science standards  
• Length and scope of weather unit content  
• Chaperone availability and support  
• Timing in school year |
| | • Students  
• Grant funding  
• Supportive spouse  
• Accessibility of SC staff  
• Previous principal  
• Timing in calendar year (avoid crowds) |
<table>
<thead>
<tr>
<th>Internal influences</th>
<th>Experiences</th>
<th>External influences</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sense of purpose</td>
<td>• Seeing other FT groups at SC (ELT)</td>
<td>• State science standards for Gr. 3-5, CMT exam</td>
</tr>
<tr>
<td></td>
<td>• Personal visits to SC (ELT)</td>
<td>• 3&lt;sup&gt;rd&lt;/sup&gt;-4&lt;sup&gt;th&lt;/sup&gt; gr. Curriculum</td>
</tr>
<tr>
<td></td>
<td>• Previous FTs to SC (ELT)</td>
<td>• 5&lt;sup&gt;th&lt;/sup&gt; gr. curriculum</td>
</tr>
<tr>
<td></td>
<td>• Open House event at SC (ELT)</td>
<td>• Existing resources aligned with standards (e.g., hands-on exhibits, Trail Guides)</td>
</tr>
<tr>
<td></td>
<td>• Collegial support</td>
<td>• Nonfiction reading goal</td>
</tr>
<tr>
<td></td>
<td>• Positive feedback from kids and parents</td>
<td>• Like-mindedness with other teachers in terms of FT goals and purpose</td>
</tr>
<tr>
<td></td>
<td>• Feedback from other teachers</td>
<td>• Support and enthusiasm from other teachers (LA teachers)</td>
</tr>
<tr>
<td></td>
<td>• Previous business career</td>
<td>• Support from other adults (principal, chaperones, parents, PTA)</td>
</tr>
<tr>
<td></td>
<td>• Worked in Hartford area</td>
<td>• Students, and their excitement with science; student behavior</td>
</tr>
<tr>
<td>• Lack of background in science; personal interest and enthusiasm to learn more</td>
<td>• Initial visit to SC to scope it out (ELT and TE)</td>
<td>• State science standards for Gr. 3-5, CMT exam</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 3&lt;sup&gt;rd&lt;/sup&gt;-4&lt;sup&gt;th&lt;/sup&gt; gr. Curriculum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 5&lt;sup&gt;th&lt;/sup&gt; gr. curriculum</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Existing resources aligned with standards (e.g., hands-on exhibits, Trail Guides)</td>
</tr>
<tr>
<td>• Distance from the SC/Time length on site</td>
<td></td>
<td>• Distance from the SC/Time length on site</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Possible inclement weather</td>
</tr>
</tbody>
</table>
Table 4.5  Summary of Steven’s results

<table>
<thead>
<tr>
<th>Internal influences</th>
<th>Experiences</th>
<th>External influences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-preservation</td>
<td>Childhood</td>
<td>• 5\textsuperscript{th} gr. curriculum</td>
</tr>
<tr>
<td>• Pride in work</td>
<td>• Upbringing/Parents</td>
<td>• 5\textsuperscript{th} gr. science CMT</td>
</tr>
<tr>
<td>• Sense of integrity</td>
<td>• Religious schooling</td>
<td>• Timing in school year</td>
</tr>
<tr>
<td></td>
<td>• Boy Scouts</td>
<td>• Alignment of existing (SC) resources with curriculum (e.g., Trail Guides, exhibits, lab, movie)</td>
</tr>
<tr>
<td></td>
<td>Parenthood (TE)</td>
<td>• Job requirement to do FT</td>
</tr>
<tr>
<td></td>
<td>• A wife who taught</td>
<td>• Supportive, like-minded 5\textsuperscript{th} gr. teachers</td>
</tr>
<tr>
<td></td>
<td>• Previous FT planning (ELT)</td>
<td>• Opportunity to plan trip this year</td>
</tr>
<tr>
<td></td>
<td>• Multiyear Literacy Project</td>
<td>• Students</td>
</tr>
<tr>
<td></td>
<td>• Previous FT to SC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Positive feedback from adults</td>
<td></td>
</tr>
<tr>
<td>Personal attitude toward</td>
<td>Seeing older students ridiculed by peers for science interest</td>
<td></td>
</tr>
<tr>
<td>students’ science learning</td>
<td>(“Making geeky cool”)</td>
<td>• SC had unique materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Students</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Student interest</td>
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<tr>
<td></td>
<td></td>
<td>• Student engagement</td>
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<tr>
<td></td>
<td></td>
<td>• Student behavior</td>
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<td></td>
<td></td>
<td>• Student choice</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Time length of visit (buses)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Flexibility of scheduling visits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Grant funding for FT</td>
</tr>
</tbody>
</table>
CHAPTER 5: DISCUSSION AND IMPLICATIONS

This chapter reviews the research study, discusses results in terms of the research questions, then identifies implications for practice and research. The chapter concludes with an epilogue regarding the process of conducting this qualitative study.

Summary of Research

Field trips are a common activity used by teachers for science education. Statistics from the Census Bureau (2009) and Association of Science-Technology Centers (2009) indicate that over one ninth of the United Stated PreK-College student population is taken on field trips to science museums each year. Prior research has found that learning in these informal contexts does occur, but that a series of curriculum-connected activities (which occur before, during, and after the trip) make learning more likely. When used effectively, pre and post visit lessons can bring about student learning gains associated with the on-site visit activities, as well as improved student attitudes towards science and science careers. This series of connected and curriculum-based activities (before, during, and after a field trip) form what this study referred to as an educational field trip. Research has found that educational field trip practice is not common, even when teachers are aware of these best practice recommendations. Concurrently, the phenomena of teachers executing an educational field trip has been observed (Lucas, 2000; Jarvis & Pell, 2005; Davidson, Passmore & Anderson, 2010), but research has not established the influential factors on teachers who come to enact educational field trips. Researchers, science teacher educators, museums, and teachers would likely agree that the frequency of educational field trips should increase to improve the impact of this common strategy toward science education goals. In order to do this, we must consider how teachers have come to understand the importance of these practices to the point where they have been willing and able to implement them. Therefore, the purpose of this study was to understand and explore the influential factors and
experiences which played a role in teachers’ development of educational field trip practice. By considering experiences distinctly from influences, the study approached the problem from a constructivist adult learning perspective. Specifically, this study asked:

(RQ1) What factors influence teacher implementation of educational field trip practices and how do teachers manage or address such factors in their practice?

(RQ2) What experiences have shaped how teachers learn to plan and implement educational field trips?

The qualitative study purposefully selected teachers who were most informative in regard to the two research questions. Each participant had taken a school field trip to the State Science Center in the 2011-2012 school year. Data from four participants were included in the full analysis. Interviews, which included a concept mapping exercise, provided rich descriptions of curriculum-related field trips that had school-based components. Participants identified influences on their practice, relationships and hierarchies of influence on their practice, and experiences which had been partially responsible for the development of these influences. The study determined that educational field trip practice is complex and influential factors are highly interconnected. Furthermore, the study employed Kolb’s Experiential Learning Theory (ELT) and Pugh’s construct of Transformative Experiences (TE) as theoretical lenses by which to examine experiences which played a role in teachers’ development of educational field trip practice. Influences on teachers’ educational field trip practice were either internal, originating from within, or external, originating from others, at the time of the field trip to the science center.

Discussion of Results

Research Question 1: Influential factors and their management

Teachers’ educational field trip practices were influenced by internal and external factors. Primary external factors were the curriculum, colleagues, and existing resources explicitly aligned with
standards which could be used before, during, and after the field trip. Internal factors were beliefs and values that supported the integration of field trips into the ongoing curriculum. The core values and beliefs of teachers operated in tandem with external factors to giving rise to educational field trip practice. Therefore, educational field trip practice was dynamic with influences in place (seemingly at the operational core) of the individual teacher and external influences acting on the teacher. This interpretation is represented in Figure 5.1. The case of Natalie is used as an illustration of this model in Figure 5.2.

![Figure 5.1](image)

*Figure 5.1* A model for the educational field trip practice of study participants.

Even though influences were distinguished from each other another during analysis, there is overlap among them. For instance, in discussing any one main influence (i.e., Natalie’s sense of responsibility, her desire to supply her students with the learning opportunities they deserved, or her drive to create memorability), the other influences were inevitably mentioned as well. Natalie’s desire to help students make connections was based in both her sense of responsibility as a teacher and her desire to create memorability. This trio of influences, interconnected with each other and operating at the core of Natalie’s practice, has been reinforced by her past experiences. These experiences were internal factors which supported Natalie’s conviction and the foundation of her field trip practice. External factors,
including the students themselves, acted as parameters through which Natalie’s core influences operated as she enacted her field trip to the science center. The case of Natalie has been interpreted and represented in Figure 5.2 using the concentric circle model presented in Figure 5.1 as a template. Note the two layers of external factors. External factors which were traceable back to internal factors are connected, whereas those which existed, but were not established in relationship to experiences or internal factors, form the outer layer. Figure 5.2 serves as a graphic to represent the summary of Natalie previously presented in Table 4.2. It is a representation of how each participant’s influences and experiences might be envisioned in relationship to each other.

![Diagram showing interconnectivity between Natalie’s internal factors, experiences, and external factors.](image)

*Figure 5.2* The interconnectivity established between Natalie’s internal factors (grey), experiences (black), and external factors (white)

Thus far, results have primarily been discussed on a case by case basis which preserved the relationships between influential factors and experiences for each participant. The internal factors
identified by each participant are notably unique, having been generated and reinforced on an ongoing basis through experiences specific to that person. Conceivably, there are similarities among Natalie’s sense of responsibility, Steven’s self-preservation, Monica’s drive for continuous improvement, and Hannah sense of purpose. These seem professional in nature, suggestive of participants’ internal response to workplace requirements. Each of these can be connected to previous visits to the science center and previous field trip practice in general (refer to Tables 4.2, 4.3, 4.4 and 4.5). Interestingly, Hannah’s lack of background in science contrasts with Monica’s confidence and expertise with the subject. Steven and Natalie’s internal influences include desires for students. Natalie wanted to make field trips memorable and give students the opportunities they deserve while Steven’s wanted to “make geeky cool.” A summary of internal factors is included in Table 5.1.

Table 5.1  Summary of Internal Influences

<table>
<thead>
<tr>
<th>Natalie</th>
<th>Monica</th>
<th>Hannah</th>
<th>Steven</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Feeling responsible as teacher</td>
<td>• Internal drive to increase effectiveness in teaching the curriculum</td>
<td>• Sense of purpose</td>
<td>• Self-preservation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Pride in work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Sense of integrity</td>
</tr>
<tr>
<td>• Making the field trip memorable by facilitating connections and capitalizing on the wow factor</td>
<td>• An understanding of science and teaching science which resulted in confidence</td>
<td>• Lack of background in science; personal interest and enthusiasm to learn more</td>
<td>• Personal attitude toward students’ science learning (“Making geeky cool”)</td>
</tr>
<tr>
<td>• Giving students the kind of opportunities they deserve</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

While internal factors were teacher-specific and parallels cannot be established between participants, there were similarities between external factors. A complete summary of external factors influential on teachers’ educational field trip practice is included in Table 5.2.
<table>
<thead>
<tr>
<th>Table 5.2</th>
<th>Summary of External Influences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natalie</td>
<td>Monica</td>
</tr>
<tr>
<td>• Students</td>
<td>• Students</td>
</tr>
<tr>
<td>• Student learning</td>
<td></td>
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<tr>
<td>• Student’s low SES</td>
<td></td>
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<tr>
<td>• Students’ science notebooks</td>
<td></td>
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<tr>
<td>• Specific 5th grade science curriculum</td>
<td>• State science standards</td>
</tr>
<tr>
<td></td>
<td>• Length and scope of weather unit content</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>• Existing educational resources aligned with curricular goals (lab program, Trail Guides)</td>
<td>• Existing materials aligned with weather curriculum packet and lab program; and exhibits)</td>
</tr>
<tr>
<td></td>
<td>• Add’l exhibits at SC which tied in to 6th grade science</td>
</tr>
<tr>
<td>• (Support of) other 5th grade teacher involved</td>
<td>• Chaperone availability and support</td>
</tr>
<tr>
<td>• Museum educator</td>
<td>• Supportive spouse</td>
</tr>
<tr>
<td></td>
<td>• Accessibility of SC staff</td>
</tr>
<tr>
<td></td>
<td>• Previous principal</td>
</tr>
<tr>
<td>• Timing of field trip in school year</td>
<td>• Timing in school year</td>
</tr>
<tr>
<td></td>
<td>• Timing in calendar year (avoid crowds)</td>
</tr>
<tr>
<td>• Grant funding</td>
<td>• Grant funding</td>
</tr>
<tr>
<td>• Time length of visit (buses)</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
There were three external factors which played an influential role in each participant’s field trip practice (listed in the first few rows of the table): students, colleagues and other adults, and existing resources aligned with curriculum. Each of these will be discussed in more detail in the remainder of this section.

**Students**

While teachers have been referred to as novices in informal environments, Lebak (2007) reminds us that a teacher can be the expert when it comes to his or her students, wherever they may be located at the time. All teachers in this study recognized a relationship among student learning, interest, enjoyment and behavior which aligned well with research findings and recommendations. Teachers’ educational field trip practice was influenced by their perception of students. Ultimately, all the teachers identified a connection between student engagement and behavior. They believed that if students were focused and engaged in what they were doing, that good behavior would follow. These considerations influenced how they implemented the science center field trip. Natalie and Steven situated student behavior similarly, believing that planning for student engagement would mitigate the need to manage behavior. Monica planned for small groups of students primarily so students would have the type of learning experience with exhibits that she imagined; secondarily, this was about managing behaviors. Hannah designed her scavenger hunt, in part, to ensure the type of behavior she expected from students while on site. In addition, all the teachers described field trip plans for chaperones. All built out schedules for chaperones to follow, and reported taking the time before the trip to introduce chaperones to the schedule and to their goals for students. The size of Natalie’s group was small enough that each teacher was also able to travel with their class of students and their two or three chaperones. Overall, behavior was a secondary consideration for teachers who implemented educational field trips. Familiarity with the venue, communication with chaperones, and providing structured onsite activities were of primary focus and teacher effort.
Collegial support and the role of other adults

Other adults were important influences on educational field trip practice. Each participant described varying degrees of support from colleagues. For Hannah, the support and encouragement she received from others were important external influences and motivator. The other teachers in this study were more intrinsically motivated and didn’t appear to have as much of a need (or opportunity) for collaboration. Steven looked to peers for feedback after the trip, rather than with help planning. He enacted what he thought would work, and had assumed like-mindedness with colleagues. Monica “bounced ideas off” others, but as the sixth grade science teacher, she ultimately made judgment calls and deferred to her own background in science and understanding of science learning. For Natalie, the other teacher followed her lead, but Natalie felt sole responsibility for having a plan and a vision for the field trip. Each of these teachers was also supported by the chaperones they had. None of these teachers who implemented educational field trips reported feeling thwarted by others in their efforts.

Existing resources, science standards and curriculum

Teachers in this study, all of whom implemented pre, visit, and post activities were influenced by the state science standards, and consequently, their grade level curriculum. They had experienced field trips in their past which had not been done particularly well in relationship to the standards or the ongoing curriculum, and they were driven to improve and assume some responsibility to make the science center field trip more purposeful. One suggestion from Griffin and Symington (1997) was that teachers should be presented with alternatives to current practice that effectively model how to facilitate learning in field trip destination environments. However, it is important to note that teachers in this study made use of such alternatives only when they believed those resources (e.g., Trail Guides) would assist them in meeting curricular goals. Therefore, existing resources which were clearly aligned
with the state science standards and grade level curriculum were crucial influences on each teacher’s field trip practice.

Existing resources included the exhibits themselves, which all the teachers believed to be relevant to their grade level curriculum to some extent. All the teachers made use of the science centers’ website to help prepare and orient students. In addition, Hannah and Steven made use of the science center’s Trail Guides, three made use of on-site lab programs, and Steven also scheduled for students to view a content-relevant 3D movie. Each of the teachers was compelled to provide structured onsite activities in an effort to manage student interactions, student learning, student behavior, and the quality of the field trip. Natalie integrated student science notebooks throughout activities before, during and after the trip. She incorporated the strategy into the lab program, in part, because the museum educator used similar methods in her own instruction (i.e., prompting students to write down their observations and questions). Not all resources were necessarily adequate. Monica deemed the Trail Guides inadequate for student interest and choice alongside the other activities she had planned. Since Hannah wanted to cover a nonfiction reading goal as well as science content from grades 3-5, she modified the Trail Guides toward that end.

Research Question 2: Experiences which shaped the planning and implementation of field trips

Experiences were outward occurrences in a participant’s life, either participated in or observed, which were perceptible to the senses. The physicality in this definition allowed the research to focus in on what participants experienced firsthand which influenced their practice. It also allowed for the application of Kolb’s Experiential Learning Theory. Experiences were identified along with other influences during the coding process. Since the educational field trip was a fixed reference point, experiences prior to that were considered internal influences since they (or rather the memory of them) originated from within the participant at the time of the field trip.
Experiences were important to teachers who implemented educational field trips. However, experience was not one size fits all. Both external and internal factors at work for each teacher mitigated the extent to which experiences had meaning. For instance, Monica’s receptiveness to ideas in the PD workshop was partly because of her internal drive to continuously improve, as well as her self-confidence with science and science instruction. The science center’s evaluation work shows that not every teacher who goes through a PD workshop implements the ideas into their practice by actually doing activities with students before and after the field trip. Monica’s experiences and internal drive-to-improve help create relevance for certain external factors. Thus, the relationship between internal and external influences could be explained by certain experiences. Figure 5.3 illustrates this piece of Monica’s data set. Arrows represent flow and association. Note that the bracket is only meant to represent association, not flow.

![Diagram](image)

**Figure 5.3** One association in Monica’s data set between an internal influence (grey), experiences (black), and external factors (white)

Likewise, Hannah’s visit to the Science Center and realization of the extent to which the exhibits were aligned to her curriculum made an impression because they supplemented her limited training in that subject area. These experiences resonated with her internal sense of purpose and lack of science
background, and in turn effectively positioned her to navigate the external influences she faced. This relationship is shown in Figure 5.4.

Steven associated experiences from childhood and being a parent, as well as previous field trips and field trip planning, to his sense of self-preservation. These internal influences were aligned with certain external factors identified as influential on his practice, and that association is represented in Figure 5.5.
Therefore, experiences were commonly described by participants or interpreted during analysis to have a relationship to other factors, internal and external. Horizontal alignments in Tables 4.2-4.5 and Figures 5.2, 5.3, 5.4 and 5.5 sufficiently represent which experiences were determined to be related to which internal and external influences. Table 5.3 below presents a summary of experiences identified by participants in this study.
Table 5.3  
**Summary of previous experiences which operated as influential factors**

<table>
<thead>
<tr>
<th>Natalie</th>
<th>Monica</th>
<th>Hannah</th>
<th>Steven</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Previous visits to SC (ELT)</td>
<td>• Open House event at SC</td>
<td>• Initial visit to SC to scope it out (ELT and TE)</td>
<td>• Previous FT to SC</td>
</tr>
<tr>
<td>• Previous FTs, inc. to SC (ELT)</td>
<td>• Multiple visits to SC (ELT)</td>
<td>• Seeing other FT groups at SC (ELT)</td>
<td>• Previous FT planning (ELT)</td>
</tr>
<tr>
<td>• Accumulation of previous field trips (“a good lesson plan”) (ELT)</td>
<td>• Previous FTs in general, hit or miss (ELT)</td>
<td>• Personal visits to SC (ELT)</td>
<td>• Multiyear Literacy Project</td>
</tr>
<tr>
<td>• Very first FT as a teacher</td>
<td>• Years of teaching experience (ELT)</td>
<td>• Open House event at SC (ELT)</td>
<td></td>
</tr>
<tr>
<td>• FT to Ellis Island... (TE)</td>
<td></td>
<td>• Previous FTs to SC (ELT)</td>
<td></td>
</tr>
</tbody>
</table>

Other:

- Childhood
- Childhood vacations with parents
- SES of childhood family
- Being a parent, grandparent (TE)
- Professional background in science; previous medical career
- Previous business career
- Worked in Hartford area
- Reminiscing about field trips with former students (ELT)
- SC PD in inquiry
- Add’l grant-funded SC PD
- Grant-funded SC PD workshops on FTs – modeled effective strategies (TE)
- Previous use of Trail Guides (ELT)
- Collegial support
- Positive feedback from kids and parents
- Feedback from other teachers
- Positive feedback from adults
- Seeing older students ridiculed by peers for science interest

**These findings suggest that familiarity with the venue and field trip planning were important experiences for each participant. Familiarity was created through varied means. Hannah and Monica attended open house events and visited with family and colleagues on their own. In addition, Monica had participated in a PD workshop at the Science Center. All had taken previous field trips to the Science Center prior to the one of interest in this study. All had planned and implemented other field**
trips to other venues. These participants had familiarity with the Science Center, and extensive experience with field trip planning.

Experiences provided the underlying rationale and support for factors which were crucial to a teacher’s educational field trip practice. Some experiences operated as triggers and activated the teacher to apply knowledge of how to implement a lesson plan in a field trip setting. These experiences were best explained by Pugh’s construct of Transformative Experiences. Such experiences activated teachers to extrapolate classroom knowledge to the museum context. Alternatively, routine experiences which had sometimes occurred repeatedly over time, were better explained by Kolb’s theory of experiential learning. These two experience theories were seen as complementary rather than exclusive. Transformative Experiences were integrated into the ongoing cycle of experiential learning as modeled in Figure 5.6.

![Figure 5.6 Model of Transformative Experiences (Pugh) and the relationship to Experiential Learning Theory (Kolb)](image)

Transformative experiences were perhaps most provocative in teachers’ development of educational field trip practice. These situations instantaneously aligned internal factors (in the form of core values and beliefs) with external factors at work, without the necessary step of reflection indicated
in the experiential learning cycle. However, all teachers acknowledged learning through the trial and error of implementing field trips over the course of time, and reflecting on what worked and did not in order to inform a reconceptualization of practice. For instance, Natalie’s ongoing field trip experiences helped her extrapolate the concept of an effective lesson plan from the classroom environment to the field trip context.

Thus, each of the participating teachers acknowledged that their field trip practice had changed over time to include more pre and post visit components. They increasingly became aware of the role an informal institution can play in their curricular goals, and they increased their capacity to implement curriculum-embedded field trips. Experiences, like visiting the venue beforehand, played a brokering role among core ideologies, personal beliefs and external factors (see Figure 5.1). Experiences reinforced teacher beliefs, gave them acuity in light of external factors, and helped to generate a balanced perspective of students and curriculum which culminated in educational field trip practice. Inservice experiences had fortified (but not changed) teacher beliefs regarding field trip practice. Possibly, only those experiences which had aligned with internal influences and external factors in operation at the time proved useful and memorable for participants.

**Revisiting the Research Questions and Methods**

This section briefly revisits how the research questions framed the study and appraises the methods used to collect, analyze and report on data. The epilogue section at the end of this chapter reflects more specifically on the personal process of conducting the research.

A key conversation in this study, once the problem of interest had been identified, was the appropriate wording for the research questions. Other research has treated experiences equally to (other) influences and they have been lumped together during analysis. Due to this study’s constructivist approach, and the interest in understanding the role of experience from an adult learning
perspective, influential experiences had to be treated separately from other influential factors. This necessitated the second research question. However, the two questions in relationship to each other created a challenge for the pilot study to address. These challenges were resolved as follows: First, definitions were refined to reduce ambiguity between terms; second, educational field trip practices were not considered in general, but specifically in relationship to a recent field trip to the science center. More explication is given in the following paragraphs.

The definitions of experience and influential factor, included in chapter 1, had to be faithfully executed during each stage of the study. During data collection and analysis, those definitions made it possible to distinguish between “factor”, “influential factor” on educational field trip practice, “benefit” and “influence.” Following those definitions made it possible to pursue the research questions and distinguish between influences on field trip practice and educational field trip practice. For instance, buses did come up as a factor in Monica’s field trip, but they did not affect how she implemented the field trip to be educational. Buses did come up as an influential factor for Steven and Hannah, as their execution of an educational field trip was marginally affected by limitations imposed by district bus schedules.

While this current research took an episodic approach rather than a life history approach, Life history interviewing techniques (MacAdams, 2008; Bullough, 2008; Atkinson, 2002; Clandinin and Connelly, 1996; McGough, 1997, 2003) were vital to developing the interview protocol used during this study. Any researcher who wishes to investigate the underlying influences and rationale behind teacher’s actions is highly encouraged to consult these references. I believe that a firm understanding of these ideas heading into the pilot study interviews added a confident calm to my research demeanor that helped me focus on developing the interview protocol to do what it needed to do. I was aware of what I was asking teachers to do philosophically, I was aware I would be delving into personal storylines, and I was aware of the pros and cons of doing so. This allowed for comfortable, sometimes lengthy
pauses during the interviews and the strategic movement past expressed mental models toward underlying experiences and ideas.

The recruitment plan for this study was appropriate for finding the participants needed. The online questionnaire and free ticket incentive was an efficient and economical way of contacting teachers who might be potential participants. However, when it finally came time to contact the post-pilot study participants to be part of the interview portion, little time was left in the school year and there was concern that contact would be lost if recruitment went into June. Eight of the nine teachers contacted were willing to participate, yet contact with two of them was lost by the time schools closed in June. Therefore, recruitment should have begun earlier, or in waves rather than all at once. Also, when teachers were willing to be interviewed, each of their personal timelines and availabilities were different. Handwritten tables were helpful in keeping track of which potential participants had responded, which interviews needed to be scheduled, and who needed to be contacted when, by what means, and to what end. Once a participant opted in, each one had to be accommodated on a case by case basis. Steven missed the first interview due to a student incident at school, Natalie wanted to do the first interview by phone during her school vacation, yet was on call during the whole thing for a friend who might need medical transport, Monica wanted to wait until early summer to do the second interview, and Hannah was only available before mid-June during her lunch hour/prep period. Finally, file folders for each teacher were created for hard copy notes, a copy of the interview protocol, first interview transcript, questionnaire responses, and (eventually) their Post-it notes and a copy of their concept map. The content of these folders was useful during the data collection period and was also consulted during analysis and reporting.

It is noteworthy that two of the four participants in the study were teachers who had received grant funds administered by the science center to take the field trips we discussed. In addition, Monica had grant funding originating from her district, and Hannah had received grant funding from the science
center in the past. Natalie and Steven both took advantage of funding from the science center for 5th grade field trips. It was never stated or suspected, but it should be noted for the record, that participants might have felt compelled to participate in the research study since they and their students had received this benefit.

Four participants was an appropriate number for this research, however, I believe the appropriateness of that sample size had to do with who the four participants were and the data that each of them contributed. They were not the first four to be interviewed during the post-pilot phase, but they were the four who were most information-rich. There was enough diversity among the data to implement constant comparative practice during coding. The decision to include only four (out of the six who had been interviewed) in the full analysis allowed the final product to portray each participant as a singular case, and preserve the complex ecology of influences and experiences represented in each. However, the decision to only include four should have been made earlier, at the end of data collection. Similar studies which leverage life history methods might also benefit from the timely selection of a subset of data to fully analyze and report. Alternatively, and as appropriate to their methods, one might also seek more creative representations of such data such as narrative analysis (e.g., Lelliot and Pendlebury, 2009) or presentation of a singular, representative case (e.g., McGough, 2003).

The concept map exercise was challenging and teachers seemed overwhelmed at first with all the Post-its. It always took a while for each teacher to grapple with how they would map the ideas on a blank whiteboard. However, that effort was highly informative in regard to the research questions. These concept maps were used to further establish influential factors and experiences relevant to educational field trip practice, and they were also used to member check initial data analysis (since the Post-it’s themselves represented coded passages, and potentially uninvestigated mental models). The concept maps were consulted while participants’ data were being analyzed and interpreted.
The concept map was effectively positioned at the beginning of the second interview, where the participant might have the least fatigue with responding to interview questions. Participants were asked, and reminded, to think aloud during the exercise to reveal their logic. When participants referred to an area of the map in general, I spoke the concepts they pointed to so that the recording would capture the ideas. I feel that using the concept mapping exercise in tandem with the two interview structure was particularly effective at revealing, and even triangulating, ideas relevant to the research questions. Other researchers who use a similar concept mapping protocol should carefully consider the magnitude of the project, the length of time it will take, and how it will be introduced to the participant. Sufficient wait time needs to be included for the participant “to get going” and they may need substantial reassurance along the way that what they are doing is appropriate. Inquiries too early during this type of concept mapping exercise might communicate that the participant’s rationale or decision is being questioned.

I have two final thoughts regarding participation in this study. First, I do believe that the influences on these teachers’ field trip practice, may have also influenced their willingness to participate in this research. For instance, I believe that Steven’s sense of integrity and pride led him to accept my recruitment request. One teacher (not included in the full analysis), who was always trying something new in her career, acknowledged that some of their willingness to participate came from wanting to find out about doing a Ph.D. I did not formally ask participants why they agreed to be interviewed, yet all of the participants acknowledged that they “wanted to help me”, and each asked during the interview if I was “getting what I needed.” To me, this indicated that there was something in them or acting on them to influence their participation. Second, I was, at the time of the research, explicitly a student in a Ph.D. program. As a student asking teachers to participate in the study, I feel that I leveraged some sentiment of the teacher-student relationship. I felt aware that this sentiment was playing some role, as participants frequently asked me about my studies, my university, what I wanted to do with my degree.
These are common types of questions from interviewees, and it goes without saying that some people are willing to participate in research while others are not. I mention these ideas because they were palpable to me in conducting this research, and they may be useful consideration for other doctoral candidates doing research with teachers.

**Contribution of this Dissertation to Field Trip Literature**

The four teachers in this study are positioned alongside Angela (Jarvis & Pell, 2005), Ms. Norton (Lucas, 2000), and Mrs. V (Davidson, Passmore & Anderson, 2010) as illustrations of teachers who have implemented activities before, during, and after field trip experiences, with the ongoing learning of their students and the curriculum in mind. “[W]hile there is a rich body of literature on the potential as well as realized benefits of out-of-school science enrichment programs, few if any of these studies focus on the valuable insiders’ perspectives that could be provided by the classroom teachers involved” (Luehmann & Markowitz, 2007). This study emphasized the “insider perspective” and sought out teachers who had actually implemented educational field trips. The interview protocol with the embedded concept map exercise was a revealing method of eliciting and incorporating the voices of teachers in field trip research. Concept mapping of the interplay between a field trip’s components, pre and post activities, student factors, and teacher influences was determined to be an effective method of capturing teacher perspectives about field trips. As concluded in chapter 2, recent research includes an extensive body of literature on teacher perspectives of field trips. The original contribution of this study is the way in which teacher perspectives were framed by adult learning theory. This study demonstrates that a focus on experiences and experiential learning, independently from other influences, can reveal information specific to teachers’ perspectives of educational field trip practice.

There are two additional conversations in the field trip research literature to which this study can contribute. The first is a suggestion that has been forwarded to overcome the lack of educational
field trip practice by making excursions more self-contained. The second conversation is one regarding worksheets and worksheet use by teachers. I will discuss each of these ideas below.

First, in light of difficulty with finding widespread educational field trip practice, researchers have considered whether or not it might be most realistic to design “on-site resources to develop experiences that are self-contained and rely less on teacher activities back in the classroom” (Anderson et al, 2006, p. 381). While conceding that this may be the best course for some museums, I would suggest that the widespread practice might inadvertently thwart museum’s efforts to position themselves as partners with educators and part of the educational system. Such self-contained activities are less likely to be useful to teachers in meeting curricular goals. They would fracture the partnership that is necessary, and apparent in this study, between museums and teachers when an ongoing series of activities in the classroom and on site are devised. In the end, it is the teacher’s professional responsibility to assess student learning and prepare for student achievement tests. Therefore, such self-contained programs would leave up to question whose role it is to assess student learning. Disenfranchising teachers completely from the assessment of field trips by cutting off classroom connections may lead to greater deterioration of a museum’s value in its local educational system. On the national scale, separating museums activities from school activities will not effectively address the challenge of science education and scientific literacy. I argue that researchers and museums must continue to face the challenge of increasing educational field trip practice, even though it seems unbeatable. If we can forge this partnership to be done more effectively, rather than not at all, the long term payoff to student learning, student attitudes, and student enthusiasm for science is substantial. Recent research is a prime indicator of the potential magnitude of this impact, and this study shows how teachers have developed educational field trip practice.

Second, worksheet use during museum visits has been a matter of interest for researchers. Teachers and students might believe that worksheets are necessary during field trips for student
learning to occur (Griffin, 2004; Kisiel, 2003; Krombach & Harms, 2008). Teachers have been found to favor worksheet use on field trips (Michie, 1998). Other research suggests that worksheets have the potential to interfere with learning, by interfering with the socializing (Parsons & Muhs, 1994).

However, this was not the situation for teachers in this study. Hannah and Steven downplayed the significance of the worksheets in relationship to student learning. Steven used Trail Guides to help students review fifth grade concepts during the trip and to begin classroom discussions back at school. Hannah used the Trail Guides to resurrect third and fourth grade science concepts and to address a fifth grade nonfiction reading goals. She graded the Trail Guides in terms of the effort given to them.

Griffin and Symington noted that the majority of teachers used “task-oriented” rather than learner-oriented methods of instruction at the museum. These task-oriented methods were loaded with questions, the answers of which could be found on exhibit displays rather than through interactions with exhibits and others. Such a description might explain portions of Hannah’s “Scavenger Hunt.” However, we must recognize that her curricular goal was to engage students in nonfiction reading, made possible by exhibits labels, charts, and diagrams. This suggests that teachers implementing educational field trips may have curricular goals which warrant worksheets emphasizing reading. What remains highly in question is the extent to which worksheets in this study (the Trail Guides and modified Trail Guides) exemplified design appropriate for the informal setting, along the lines of what Mortensen and Smart (2007) recommend. The important contribution, however, is that none of the teachers in this study had equated worksheets with learning, and that worksheet use aligned with the curricular goals of teachers who implemented educational field trips.
Implications for Practice

Increasing the frequency of educational field trips and making student learning from such activities less equivocal is a systemic challenge. Therefore, this section will identify implications for museums, school district leaders, and teacher educators toward these ends.

Suggestions for Museums

Teachers in this study were influenced to use the science center as part of an educational field trip, with an ongoing set of activities in the classroom, partly because resources were made available to them, even if in need of modification to suit their goals (e.g., Hannah). At the very least, the Science Center’s existing materials served as a starting point for teachers, an indication that the field trip could be curriculum-relevant. Therefore, if a museum wants teachers to use their facility in an ongoing series of activities with students, they should offer lesson plans and activities clearly aligned with existing curriculum. The museum should commit to revising these resources on an ongoing basis. For instance, the Science Center in the study revises their materials on an annual basis to reflect changes in standards, exhibits, and improvements from ongoing monitoring and evaluation. The release of the Next Generation Science Standards slated for 2013 offers one such opportunity for museums to revisit their educational materials, and the explicit alignment and connection of these materials to grade level specific science content relevant to their collections and exhibitions. Museum educators are directed to Mortensen and Smart (2007), Kisiel (2003), Krombach and Harms (2008), and McManus (1985) for exceptional guidelines by which to consider and generating educative materials, like worksheets, for informal settings.

Given their organizational structure and capacity, museums might debate whose job it is to actually generate field trip resources aligned with the curriculum. Whatever each museum decides, Tran (2006, 2008) and Kisiel (2010) remind us that communication is paramount between museum
educators and teachers so that their respective roles, and educational responsibilities, can be clarified in the forging of effective partnerships focused on student learning. Museums must be clear and explicit in communicating what their role is in school field trips which utilize their site.

Each teacher in this study benefitted from having access to existing materials (i.e., exhibits, lab programs, Trail Guides, program packages, PD workshops) aligned with their curriculum and the grade level standards applicable. Yet none of them mentioned bearing witness to any of those materials in operation by another teacher. I suspect that the impact of these existing materials would be even greater, or perhaps would have occurred sooner in these teachers’ practice, if such stories of actual use were documented and disseminated by museums. In order to make educational field trip practice more widespread, accessible, and intuitive to teachers, museums must begin to expose them to the actual educational field trip practice of other teachers.

While it is tangential to this study’s findings, there is one final idea to forward to museums, wherein education department staff must work in close concert with visitor services, collections, development, and marketing. It may interest all of those internal stakeholders to consider that fostering an educational focus for teachers might help with customer service interests. The teachers in this study, who were all highly satisfied with the trip, gave every indication they would visit the science center again with students. For Hannah and Steven, the trip has become a fixture in their curriculum. The science center’s own field trip evaluation has found that teachers who had an educational purpose for their field trip tended to be more satisfied with the experience than those who cited a non-educative purpose for the trip. More interestingly, teachers who cited educational goals and claimed to implement pre and post visit activities were more satisfied with the field trip than those who had educational goals yet did not claim to have done pre and post visit activities.
A special consideration of science centers

As museums, science centers typically offer hands-on experiences with physical phenomenon through the use of interactive exhibits. Science centers are designed as “free choice” environments, whereby learning occurs based on which exhibits visitors choose to visit, with whom, when, in what order, and for how long. A science center’s free choice design demands unique consideration from teachers who are planning an educational field trip. A center’s interactive exhibits typically accommodate individuals or small groups rather than whole classes of students at a time. Thus, Monica planned for her students to travel in small groups of four, and Natalie and Hannah travelled with their classes, even though they sometimes broke up into smaller groups with their chaperone.

The science center venue in this study placed demands on teachers’ use of chaperones (who were parents or school personnel). Teachers in this study felt compelled to have enough chaperones for small group sizes (e.g., Monica), communicate with chaperones regarding how to move through the venue and manage crowds (e.g., Hannah). Each teacher in this study appears to have successfully managed his or her group and communicated effectively to chaperones the schedule, goals, and expectations for the visit. Science centers, in particular, are encouraged to do more than simply require a certain ratio of students to adults. The design of the science center inevitably fractures a larger group into smaller ones, and teachers in this study noted as much when they recapped their excursions. Therefore, teachers must be prepared for some loss of direct control over student learning experiences during a field trip to a science center.

It is my belief that the relationship between teachers and chaperones is unique. The teacher is balancing a need for the chaperone’s voluntary service with the goals of the field trip. In essence, the chaperone is providing a service, usually volunteering their time or taking time off from work. Teachers are not typically trained to supervise the work of other adults, yet that is essentially what they must do when they employ the help of chaperones to extend their reach during the off site field trip component.
In order to enact an educational field trip to a science center, a teacher must be explicit with chaperones in terms of the learning goals for students and how the chaperones should operate to support those goals. Science centers must accurately represent and communicate their structure to teachers, who may not be familiar with free choice design principles.

_Suggestions for School Districts_

It is important to support teachers broadly in their professional context (Rapp, 2005) if they are to change in their communities with regard to museum field trip practice. If educational field trip practice is ever going to be more widespread than it currently is, the role of school districts and leadership personnel must be articulated and communicated. Steven’s personal sense of self-preservation resonated with his perception that it was a district requirement to plan and implement educational field trips. However, a perusal of the “Field Trip Checklist” sheet from his district’s teacher manual reveals no mention of activities in the classroom before and after. It is a purely logistical checklist. With the exception of Monica’s previous principal, Hannah’s grade level partner, and Steven’s wife and literacy project group, this study suggests that educational colleagues and district leaders are typically passive agents when it comes to teacher field trip practice. Other teachers, while supportive to varying extents, were not typically critical or particularly influential on field trip practice. The participants’ storylines suggests that other teacher were passive, and not active in planning the field trip or generating critical input and feedback. They were complimentary of Steven’s, Hannah’s, and Natalie’s practice. In fact, Steven and Hannah both cited their colleague’s feedback as reasons they will likely continue to implement the field trip as they have in the past. Principals operated similarly, and were more background figures who did not play significant roles.

Educational leaders have been effective in attending to the safety, logistics, and politics of school field trips. Thus, teachers have successfully educated each other on how to logistically lead a
field trip (Rebar, 2010). Educational leaders must become aware that there are suggestions for effective educational field trip practice, and then consider how they might employ these principles in their work with teachers. This section suggests a two part recommendation which school districts can do to help precipitate, shape, and support educational field trip practice by teachers. It is suspected that if districts take these measures, they will also help create a professional climate in which teachers continuously drive each other’s field trip practice.

First, school districts should utilize and promote existing “how to” lists for educational field trips along with any logistical guidelines and procedure for field trips. A list, based on DeWitt and Osborne’s research, may be particularly useful to districts given that it is what teachers in this study successfully accomplished. That list is as follows:

Teachers should:
1) become familiar with the setting before the trip
2) orient students to the setting and agenda and clarify learning objectives
3) orient chaperones to the setting and agenda and clarify learning objectives
4) plan pre-visit activities aligned with curriculum goals
5) allow students time to explore and discover during the visit
6) plan activities (onsite) that support the curriculum and also take advantage of the uniqueness of the setting
7) plan and conduct post-visit classroom activities (aligned with curriculum goals) to reinforce the trip experiences
8) assess student learning on an ongoing basis
9) evaluate the overall effectiveness of the activities in meeting curriculum goals

I have added in step 3 above to reflect a common practice utilized by teachers in this study. I have added in steps 8 and 9 due to revelations from this study research regarding Kolb’s Experiential Learning Theory. Hannah, Steven, Monica and Natalie each reported an ongoing cycle of implementing field trips, reflecting, and adjusting practice towards increasingly educative ends. Each teacher recognized there was less activity in the classroom before and after the field trips earlier in their careers than there was for the recent science center field trip. Having steps 8 and 9 incorporated into a district-based checklist for teacher implementation of field trips positions teachers to progress through the cycle of experiential learning in regard to field trip practice. Some teachers in this study acknowledged missteps
earlier in their careers when it came to the educational value of field trips. Each of these teachers would have appreciated some guidance and messaging from district leaders in regard to what constituted educationally valuable field trips.

Secondly, the final part of this recommendation is that, using the above list as a cue, school districts can bolster their field trip approval processes to help instigate a potentially new way of thinking about field trips. A district requiring any kind of written application from teachers to conduct a field trip should also request the written identification of student learning goals related to the trip, and a brief description of the activities which the teacher will do before, during and after the trip to meet those goals. The idea here is to generate a context in which a teacher is actually prompted to consider a format which integrates a field trip into the ongoing learning plan for students. Such (written) measures will help prompt and support the teacher seeking to accomplish steps 1-7. Furthermore, district leaders are encouraged to verbally follow up with teachers regarding the field trip, in terms of the student learning goals identified. Putting this additional measure in place will help create a context in which teachers are influenced to reflect on the field trip. Reflection, something which each teacher in this study did on their own, is important in the ongoing development of educational field trip practice.

Districts should know that for a field trip to have the highest possible educational value a coordinated series of activities must take place before, during and after the trip. If the goal is to advance student learning and provide curricular connections, then field trips need to be visualized as part of an ongoing plan, and districts need to help foster that vision.

**Suggestions for Teacher Educators**

Participants envisioned educational field trips to be continuous and integrated into the whole of their instruction. They could distinguish between what they did in the classroom before and after the visit, and what they did while at the science center. However, the working terms of this study’s
participants for what occurred before and after the trip was “before the science center” and “after the science center,” not pre and post. Use of those terms pre and post was discontinued during the interviews because it was interfering with actually understanding teacher’s conceptualization of the field trip as part of an integrated plan without definitive lines between what constituted classroom and science center-based learning. Therefore, the terms “pre-visit” and “post-visit” were found to be venue-centric and visit-centric during the interviews, and they did not reflect the actual language of the teachers themselves. For these teachers, it was not about the visit. They were centered on students and the curriculum. They packaged a field trip within an ongoing plan for student learning, and sometimes, student achievement.

Preservice teachers do not typically receive guidance regarding field trip practice, a suggestion in earlier research corroborated by this study. Rebar (2010) found that teachers primarily learned about how to conduct field trips from other teachers. This lack of formal address during a teacher’s incipient career stages creates an ongoing cycle of status quo in terms of teacher field trip practice. Without any formal consideration of field trip practice, preservice teachers will follow the course of apprenticeship by observation (Lortie, 1975) from their own experiences with field trips as youth. Exacerbating this situation is the likelihood that museum educators themselves lack a credentialing process which helps govern informal learning pedagogy.

A common misinterpretation of experiential learning is “just add experience” and professional learning will precipitate. This study suggests that experiences were catalysts because of the extent to which they aligned with internal factors and accommodated external factors. Therefore, teacher educators must not assume that experiences they plan for their students are one size fits all. Each preservice or inservice teacher enters into professional learning situations with personal histories, interests, and motivations which affect how they interpret experiences in which they participate.
In light of these ideas, I offer two recommendations for teacher educators. The first is specifically oriented toward preservice teacher educators and the second toward inservice educators.

First, I partially endorse a recommendation which Rebar (2009) offered: that during the course of their lesson planning assignment, preservice teachers be directed to integrate a field trip into an overall plan for student learning. This approaches the situation in terms of what the curricular goals are for students, and it nestles the field trip into that ongoing plan. However, such an experience with planning embedded field trips (on its own) is not likely to help instill the perspective that field trips can be embedded within the curriculum. Given internal influences at work, such an experience in the face of (future) external influences may not give rise to educational field trip practice. Therefore, teacher educators should also be prepared to drive reflection and consideration of the field trip. They can do this by taking the assignment one step further and prompting preservice teachers to consider how they will assess their goals for students at the end of the lesson, including any impact the field trip had on students. In summary, field trips can be integrated into both an ongoing lesson plan for student learning (of science content) and the assessment of student outcomes. Promoting an evaluative mindset on the utility of field trips towards educative ends is an additional measure which teacher educators can put in place to help preservice teachers progress into the step of reflection in the ELT cycle.

Second, how teacher PD is conducted is important, and the quality of that PD may play a role in teacher’s reception of the ideas. Research has previously suggested that professional development be provided for teachers (from museums) to move them to a place of knowing how to conduct field trips (Griffin, 2004). Following this advice, and rather than simply introduce teachers to resources or a tour of the facility, the Science Center used an immersion learning strategy, outlined in Loucks-Horsley et al (2003), by which teachers were treated like adult learners actively engaged in learning science content during activities designed for classroom use before, during, and after the trip. Teachers were also immersed in firsthand experience with the Trail Guides. This was an effective method for Monica in this
study and that PD workshop overall was a transformative experience which compelled her to implement the field trip that she did. By having the *experience* as a learner going through the learning activities, teachers may be able to appreciate the value of a continuous series of activities spanning before, during, and after field trip excursions. While the immersion learning strategy was appreciated by Monica, given her core influence to continuously improve, not all teachers will respond similarly. Again, experience is not one size fits all. The important thing is for inservice PD leaders to consider the most effective strategies for their purposes with adult learners.

**Recommendations for Future Research**

This study asked what influential factors and experiences played a role in teachers’ educational field trip practice. Internal and external factors were identified, as well as previous experiences which had established them as influences. Taken a step further, this research could occur across a variety of science museums (natural history museums, botanical gardens, planetariums) and non-science museums (art museums, historical sites) to determine the extent to which findings may be endemic to science centers.

This study benefitted from taking an exploratory approach and treating a field trip to a Science Center as a fixed episode, retrospectively, from which to engage teachers in conversation about what led them to implement that trip and the accompanying classroom activities. Since discrepancies between what teachers say and what teachers do has been noted in field trip research (Griffin & Symington, 1997), this study included only those teachers who could describe tangible student work which resulted from before, during, and after the field trip. Griffin and Symington (1997) investigated both reported *and* actual practice of teachers as reported by *both* teachers and students. Future research into how teachers have been influenced to implement educational field trips might benefit from identifying and interviewing teachers *and* students prior to their educational field trip, doing
observation of the before, during and after field trip activities with students, and then interviewing and/or surveying teachers after the field trip. That would allow a researcher to connect professed educational field trip practice, and influences, with actual practice. Such a connection would further clarify the contexts in which teachers internal influences (including past experiences) operate to manifest a balanced perspective on students and the curriculum which leads to educational field trip practice.

Future research should continue to test the effectiveness of researcher-teacher partnerships in establishing educational field trip practice, similarly to DeWitt and Osborne (2007). Teachers in the study reported herein were largely self-guided in attaining educational field trip practice. There were external agents from the past (such as the leaders of the literacy project and PD workshop in which Steven and Monica participated, respectively), however, the long term persistence of those external agent’s ideas seems to have depended on internal beliefs. Plans for researcher-teacher partnerships are encouraged to factor in ongoing consideration of internal and external influences on teachers’ practice, as these may support or hinder the intervention’s effort in the short term and affect long term persistence of practice beyond the research study. Plans for such partnerships could include experiences on which teachers can actively reflect, and/or transformative experiences meant to cause teachers’ extrapolation of their professional practice from the classroom to the museum. In the latter, researchers would first need to assess that classroom principles are currently in place which agree with informal learning theory, including free choice design.

It is left to question whether teachers who do not implement educational field trips are guided by similar influences, or not. One possibility is that similar internal and external factors guide their field trip practice, but they lack the experiences from which to effectively balance those influences and still maintain a focus on both students and the curriculum. A research study with similar methods to this one which looks at teachers who do not implement educational field trips would help establish whether
or not this is the case. Such research might bring experiences relevant to educational practice into greater relief.

Conclusion

This research concludes that there are layers of influence on a teacher’s practice. Internal influences originate from within at the time of the field trip activities. Internal influences include past experiences. External influences originate from others and the environment, and some external factors seem more influential than others when they coincide with internal influences in effect. For instance, while bus schedules and funding played a role, to some extent, they were minor influences on teachers’ educational field trip practice, at best. Students, colleagues and other adults, and existing materials aligned with the state standards were major influences on these teachers. Teachers found ways to enact their beliefs and values regarding teaching and students in relationship to external factors at work. In turn, their valuation of those external factors (e.g., state standards and curriculum) depended on core beliefs (e.g., sense of responsibility, sense of purpose, desire to continuously improve one’s craft, and self-preservation). Influential factors on teachers, not given much attention in recent research, turned out to be influential in this study. Timing of the field trip in the school year, potential inclement weather, and anticipated levels of crowdedness each came up as factors at work toward educational field trip practice.

Luehmann and Markowitz (2007) remind us that teaching is as much a professional endeavor as a personal one. Teachers in this study affirm this idea. Core values and beliefs, some in place since childhood, operated to bring about educational field trip practice in response to external factors at work. Monica’s drive to improve manifested in both her previous career as a medical technician and her current career as a teacher. Her spouse encouraged her to go ahead and spend money on professional development from the Science Center before district funding was available. Monica was confident in
her ability to learn and teach science, and she appreciated the state science standards and her grade level curriculum. Steven and Hannah were also strongly influenced by their grade level curriculum and the science standards, as well as the state’s 5th grade science mastery test. Steven credited his appreciation of the curriculum to internal beliefs regarding self-preservation, integrity and pride. The science center’s existing Trail Guides and exhibits struck a chord with Hannah’s internal sense of purpose and made the field trip a “no brainer.” Hannah was extrinsically motivated by her colleagues positive response to how she had planned past field trips, and she sometimes visited the Science Center with her husband to prepare for upcoming field trips. Steven connected leading an educational field trip to being a parent, as well as childhood experiences which instilled the internal qualities mentioned. Natalie also credited her personal experiences as a parent, grandparent, and child with playing some role in her field trip practice. Natalie’s own parents made her feel important by spending time together on vacations. She saw it as her responsibility as a teacher to give students similar opportunities which they deserved. While some might believe that it is just good enough for students with low socioeconomic status to go to a science center, Natalie believed that factor made it even more important to plan an educational field trip that gave students the chance to find relevance and excitement by connecting classroom and museum ideas. Using the Science Center towards educational ends and in concert with classroom activities was a manifestation of teachers’ balanced perspective of curriculum and students. This perspective was brought about by an interplay between internal and external influences. For these teachers, educational field trip practice was both a personal and professional endeavor.

Epilogue

Any research, especially qualitative, is a journey which is affected by and, in turn, affects the traveler. Therefore, this final section revisits ideas from the Position of the Researcher section in
Chapter 3 and approaches the study from a meta-cognitive perspective. Essentially, I can now return to earlier suppositions in light of the findings herein.

My personal interest in understanding influences on teacher practice has been previously established. As a result of this study, the bifurcation of influences into internal and external, and the treatment of past experiences as internal influences, was unexpected. Through this lens, I can consider how my own internal influences and past experiences played out in terms of external influences at work in my teaching practice. The field trip I led was an add-on activity. I was content to treat it as a stand-alone because I myself had benefitted from similar excursions in the past, coming to them as a student with internal self-motivation to learn geological and life science subjects. I assumed the same motivation for my own students, but that was not necessarily the case since each of them also had their own motivations. It never occurred to me then: “These students aren’t intrinsically interested in this.” I did not manifest a balanced perspective between the students and the curriculum. Consequently, I did not see the need to provide scaffolds for learning for them from the classroom, to the field excursion, and back again. Independent of student interest, steps which foster connections to the curriculum demonstrate relevance and interest in students. Perhaps the field trip itself wasn’t good enough to do that. In addition, no existing resources were in place to model for me how to integrate the excursion into ongoing classroom activities.

During the course of data collection and interpretation in this study, I was surprised at the teachers’ regard of the State Science Center’s Trail Guides. I have tended to agree more with admonishment of worksheet use in science centers. These teachers’ reception of that resource, and Hannah’s willingness to build from them, has given me pause. Aside from research suggestions that teachers show an inclination toward worksheet use, it occurs to me that worksheets (like the Trail Guides) may be an effective way to meet teachers “where they are” and scaffold them into using museums in the ongoing learning plans for students. To come face-to-face with the reality that these
existing resources are helping to provide a threshold experience for teachers like Hannah and Steven (and Diana), and to have to generate that interpretation, was humbling for me. I found Natalie’s use of them, in concert with science notebooks, innovative and compelling. Consequently, Monica’s dismissal of the Trail Guides after using them and Hannah’s modification of them strongly suggests, as I have previously felt, that there is some room for improvement. Conducting this research has given me renewed enthusiasm for this existing resource, and as part of ongoing evaluation work at the center, I believe evaluative measures can be put in place that can assess these Trail Guide documents, and that recommendations based on those findings can offer suggestions for improvement. Moving forward, a critical approach to appreciating these resources is warranted, but I look forward to a less skeptical perspective of existing materials to which teachers have been responsive. Such a response from teachers may indicate that the resources resonate with internal and external factors in effect for that individual. These were shown to be appreciative resources for teachers’ educational field trip practice. Steven and Hannah won me over regarding the potential utility of these resources, yet Monica and Natalie encourage my curiosity.

As I have mentioned before, to bear witness to details of these teachers’ lifeworlds and the paths down which our conversations led was curious to me in light of the topic under investigation, yet one which I was prepared for given training in life history methods. We connected field trips to the science center with childhood, to earlier careers in medicine and business, to the Boy Scouts and religious schooling. The episodic life story about the science center field trip involved relationships with other teachers, spouses, parents, principals and other adults. Even though other research suggests that field trip practice is connected to these ideas, I found it all enthralling to approach, encounter, apprehend, analyze, interpret, and represent. This overall experience has shifted my perspective on teacher development and practice. I now clearly see how teacher development and practice begins in childhood. Through Transformative Experiences or experiential learning, teachers may come to
extrapolate formal practice to informal environments. In current situations (including teacher preparation programs), internal factors interpret the utility of experiences in light of external factors in operation. This perspective invigorates my interest in other areas of museum evaluation, besides programs with teachers and students. The study suggests that how teachers come to enact field trip activities with students develops across the lifespan of a teacher. Therefore, work with families in informal settings is valuable, and evaluable, toward educational field trip practice. Families are rearing the next generations of teachers, and other adults who will be in positions of support around them. Family behavior (at museums) has thus become part of my overall conceptualization of teachers’ educational field trip practice.
Appendix A: Recruitment Materials

First email sent to recruit participants to take online questionnaire:

Dear ____,

Based on your responses to our Field Trip Survey, I would very much like to know more about your particular field trip to the _____ Science Center.

I am conducting an in-depth research study on how teachers implement field trips, and I hope that you will consider participating. If you would be willing to help out, please take 5-10 minutes to read more about the study and fill out a brief questionnaire online at: (URL LINK)

*To thank you for completing this questionnaire, you will receive a FREE general admission ticket to the Science Center.*

Please let me know if you have any questions or would like more information before making the decision whether or not to participate.

Thank you for your consideration.

Final email reminder to complete questionnaire:

Dear ____,

Just wanted to send one final email reminder to you--

I am working on my doctorate at UConn and studying how teachers implement field trips. I hope that you will consider participating in my research.

If you would be willing to help out, please take about 5 minutes to read more about the study and fill out a brief questionnaire online at: (URL link)

*To thank you for completing the online questionnaire, you will receive a FREE general admission ticket to the Science Center.*

Thank you for your consideration.
Online Questionnaire:

Please read this first:

Thank you for your interest in participating in this study! Even though I currently work as the Research and Evaluation Manager with the ____ Science Center, this research is primarily being carried out as part of my dissertation with the University of Connecticut. Participating in this research will give you the opportunity to contribute to an understanding of how teachers implement field trips. This information will likely help other teachers, schools, museums and teacher education programs. You may even learn something about yourself or your teaching practice. Your participation in this study is completely voluntary and you can withdraw at any time.

The first step is to complete this brief online questionnaire. It should take no more than 10 minutes to complete the following questions. The information you provide will be confidential, which means that only I will have access to the data. It will not be shared with anyone else in a way that can identify you. To thank you for completing these questions, you will be mailed a free general admission ticket to the ____ Science Center.

Besides the questionnaire, you may also be asked to take part in two 75 minute interviews, each of which would be arranged at a time and location of your convenience. You may complete the questionnaire now, and later choose not to participate in the interviews.

If you have questions, you can reach me anytime at: (contact information followed)

1. Please provide the following information:
   First name:
   Last name:
   Phone number:
   Best time to reach you by phone:
   Best email address to reach you:
   Grade level(s) you currently teach:
   Your school:
   Your school district:

2. Please briefly describe what you did with your students prior to, during, and after the field trip you took to the Science Center

3. How was the field trip related to your curriculum (if at all)?

4. Please enter:
   Undergraduate degree
   Graduate degree (if applicable)
5. Please enter the total number of years you have:
   Completed teaching
   Taught in your current district

6. Please list any other school field trips that you have taken part in as a teacher.

7. Please list any school field trips that you can remember taking as a student.

8. Please list your previous work history as a teacher (grades, school, district).

9. Was the cost of you field trip to the Science Center subsidized by a grant or was it paid for by the school?
   Covered (at least in part) by a grant
   Paid for (in whole) by the school
   Other (please specify)

10. Would you be willing to provide any of the following for the purposes of this research study:
    Copies of lesson plans used before, during, or after the field trip (Mark One: Yes, No, Maybe)
    Field trip notices, forms, or schedules (Mark One: Yes, No, Maybe)
    Student work related to the field trip (Mark One: Yes, No, Maybe)

11. Do you have any thoughts or ideas to share at this time about how you implement field trips, especially the one to the Connecticut Science Center?

Your mailing address (this will ONLY be used to send the free admission ticket):
   PO or Street Address:
   City/Town:
   State:
   ZIP:
Thank you letter sent out to all who completed the questionnaire in January-March 2012:

Thank you for recently completing the 2012 Field Trip Study survey online! I may be back in touch with you soon about the possibility of participating in the interview part of the study.

In appreciation of completing the online survey, I have attached one free admission ticket to the ___ Science Center. If you wind up visiting this summer, my hunch is that they will again be offering teachers with an ID the chance to get in free (so you might hold on to the ticket for future use or for a companion).

Thank you again, and enjoy!

Thank you letter sent out to people who completed the questionnaire March-April 2012:

Dear ___,

Thank you for recently completing the 2012 Field Trip Study survey online.

In appreciation of completing the online survey, I have attached one free admission ticket to the ___ Science Center.

I would very much like to talk with you further and hear more about how you implemented the field trip. By now, you should have received my email inviting you to participate in the interview part of the study. I have also gone ahead and included a hard copy of the consent form. The interviews would be scheduled at a time and place of your convenience. I usually do the first interview over the phone.

I hope to hear back from you soon about whether or not you will be able to take part in the interviews.

Thank you again for completing the online questionnaire,
Email sent March-April 2012 to potential participants for pilot study:

Hi ___,

I am following up on the survey you filled out for me earlier this year about your field trip with us.

Your practice is the exception. Believe it or not, the majority of teachers do not plan pre-visit, visit, and post-visit experiences for students that are related to each other and serve as part of the ongoing classroom curriculum.

So, I’d really like to interview you to find out more about how you planned and implemented your field trip. There will be two interviews total, each one lasting less than 75 minutes. If you are willing, we can schedule the first interview at a time and place of your convenience, on the phone is fine, and then go from there.

I’ve attached more information about the study, and the specifics of what the interview will include.

Let me know what you think when you get a chance,

(IRB Consent Form attached)

Final letter mailed in April 2012 to potential pilot study participants:

Dear ___,

I am following up with a recent email that I sent to invite you to participate in the interview part of my dissertation study at the University of Connecticut. In the hopes that you might be willing to participate, I have included here a hard copy of the consent form and a self-addressed, stamped envelope which you can use to return it to me.

The two interviews would each be scheduled at a time and place of your convenience. I usually do the first interview over the phone, and it takes about an hour.

Please do not hesitate to contact me if you have any questions or concerns before you make the decision to participate or not. I hope to hear back from you soon about whether or not you will be able to take part in the interviews.

This will be my final invitation as I do not want to become a nuisance. Thank you again for completing the online questionnaire. My very best wishes for a smooth and healthy end to the 2011-2012 academic year!
Letter sent to eight potential post-pilot study participants in early May 2012:

Dear ____,

Thank you again for your responses to the questionnaire earlier this year. I appreciated reading about the pre, visit, and post field trip experiences you planned with students.

Believe it or not, your field trip practice is the exception and not the norm. I have enclosed a copy of your responses to the online questionnaire for your reference. Researchers and practitioners alike know very little detail about how teachers implement educational field trips like yours.

So I hope that you are willing to participate in two interviews which will explore these ideas in more detail. The interviews would be scheduled at a time and place of your convenience; I will drive to you. I have typically done the first interview over the phone, so that’s an option, especially if that helps make the decision easier. While it would be great to get at least the first interview done in May or June, the summer is also an option. It really all comes down to what works for your schedule.

I hope to hear back from you soon about whether or not you will be able to take part in the interviews. Included is a hard copy of the consent form which I would need you to sign. Feel free to contact me anytime with any questions or concerns before making your decision.

Final email sent to eight potential post-pilot study participants in early May 2012:

Hi ____,

I am following up with the letter I mailed to you earlier this week to invite you to participate further in my research into how teachers implement educational field trips.

Based on what you reported about your field trip to the Science Center, you are a great candidate for this and I am really hoping you will consider it. I am flexible as to when and where the interviews will be. I can’t pay you for your time, but I will gladly supply food and beverages during these conversations.

Please let me know what you think when you get a chance, and have a great weekend!
Appendix B: Memo regarding a participant who dropped out of the study

The study included one participant (Joslyn) who completed the first interview but not the second. During the two months following the first interview, several attempts were made to contact her in order to schedule the second interview. At the end of the data collection period, and without a second interview, I made the decision to not include any of Joslyn’s data in the analysis.

I believed that each of the second interviews, which had occurred, had clarified substantial ideas from the first, gauged the extent to which each participant corroborated earlier ideas, had allowed me to member check my own interpretations, and had strengthened the overall set of data provided by each participant. Therefore, without the second interview with Joslyn, I felt that including only the ideas from the first interview would weaken the overall results. This appendix briefly describes this participant, provides some detail about her field trip provided in the questionnaire and first interview, and presents a tentative list of influences identified from the first interview.

Joslyn was a fifth grade teacher in an urban district in the Northeast United States. At the time of the interview, she was in her 12th year of teaching. Joslyn took her students on field trips about once a month as part of a special program she was involved with in her district. She had also been on numerous field trips as a student to science museums, aquaria, and historical destinations.

During the first interview, Joslyn described the field trip to the Science Center and how it was situated within a unit of study on light in grade 5 science. For the field trip we discussed, she had just taken her own class (about 20 students) on the trip. She placed emphasis on the role of the lab program at the Science Center (which was facilitated by a museum educator and lasted 45 minutes). She downplayed the significance of the exhibits during the field trip. Prior to the trip, the students had extensively studied circuits and electricity. Joslyn intergrated reading opportunities and language arts into the science lessons. Afterward, the main goal was to develop a persuasive brochure to pique other students’ interest in going to the Science Center.
Joslyn identified a number of influences on her field trip to the Science Center. Had there been a second interview, versions of these would have been the concepts written on Post-it notes for her to work with during the mapping exercise. The following is a list of influences mentioned during the first interview:

- Students get to apply what they know in a new situation
- Time management (to see all the exhibits)
- Balance between providing structure and allowing freedom for students
- Lab program at the science center on Light
- Students’ maturity level
- Existing district-based grant funding
- Always “inquiry”—how inquiry permeates all that she does
- Using the science center as springboard into Light unit
- The science center’s use of technology
- The importance of questioning
- Common core curriculum
- Non-affluent student population
- Kids can be competitive
- Kids can be prepared for life
- Advocate for kids in poverty
- Personal decision to teach in that urban district
- Previous teachers she had
- Teacher training (e.g., PAR) she had in her certification program
- Reflection on previous field trips she had led
- Provide a valuable educational experience
- Career change that took place several years ago—a chance in teaching positions
- Ease of use/available materials from the science center
- A parent that was especially influential
- Necessity of having to do field trips as part of her current position
- “Maximize” the trip for students
- Willingness to try things out
- Student can make connections back and forth between classroom and science center
- Making students active participants
- Science content at hand
- Timing in school year
- Field trips while growing up
- Personally experienced benefits from prepping for a trip abroad
Without a second interview, it is difficult to say which of the above might actually be unique and which might echo what other participants reported. One idea that I was especially looking forward to developing in the second interview was that she had personally benefitted from prepping for a student trip abroad, as she had said, “You get so much more out of it when you go in there and you know what to look for and you know what questions to ask, than if you’re just thrown in there blind...” Joslyn thought that this had an influence on why it was important for her to have students prepared for field trip learning experiences. I was also looking forward to hearing more about how field trips she had taken as a student, and how her teacher training program had affected her field trip practice.
Appendix C: Summary of the pilot study

The pilot study for this research was conducted specifically to test and revise the interview protocol in relationship to the research questions. This appendix describes how that pilot study progressed toward this end.

*Pilot Study Preparation*

Prior to the pilot study interviews, the interview protocol was critiqued and refined to operate similarly to life history interviewing (McAdams, 1993, 2008) and perspective interviewing (McGough, 1997, 2003). Life history interviewing positions participants as both the story and the storyteller. The method relies on the concept of narrative identity, “which refers to an individual’s internalized, evolving, and integrative story of the self” (McAdams, 2008, p.242). Based on life history interviewing ideas, the goal of the first interview became to discuss and reflect on the field trip the teacher planned and implemented. This description was viewed as story-like: with a beginning (the pre-visit in the classroom), middle (the visit to the science center), and end (what happened after the visit). The rest of the conversation was then a reflection on how that field trip in particular was implemented. In addition, the decision was made to send the message clearly to participants that they were a special case, an exception, and their particular story and personal reflection was useful to the research study at hand.

Perspective interviewing causes participants to reflect on meaning and direct experience, so it was useful for refining the second half of the first interview. As a set of guiding concepts rather than an interview technique, McGough (1997) describes four dynamics which interplay during an interview: structural, procedural, relational, and symbolic (McGough, 1997). He positions the researcher as a “weaver of the dynamics” who, at all times, maintains the balance while allowing the conversation to “emerge of its own volition.” He cautions the researcher against over-reliance on any one dynamic. This “perspective interviewing” concept makes the interview both researcher-directed and participant-centered. The perspective interview’s basis in Kolb’s experiential learning theory (Kolb, 1984), and
therefore, its orientation and the focus on meaning making from direct experience held great promise in relation to the research questions of this study. McGough’s ideas were continuously revisited during the pilot phase of the study and heavily used to refine the interview protocol. Similarly to McGough, I began to make “concluding statements within the interviews and (ask) for verification of my grasp of their stories” (McGough, 2003, p. 455). I did this increasingly during the course of each interview such that the second interview and concept map exercise essentially operated as a form of a member check.

One final influence during preparation for the pilot phase was literature on card sorting exercises. One in particular used card sorting during a visitor study at a National Park (Gyllenhaal, 2002). Their technique, materials, and results were incorporated into the method for concept mapping planned for the second interview of this study. A medium sized white board, dry erase markers, and Post-it notes were purchased for use during the concept map exercise in this study. Unlike card sorting, participants in this study were directed to arrange the words in relationship to each other. Gyllenhaal’s methods illustrated how participants could all at once use words to convey understanding, develop understanding, and reflect on meaning. Some of his participants’ card sorts looked like concept maps, and those images resembled what this researcher was looking for during the second interview of the current study. Consequently, these ideas were represented in the concept map protocol.

First Interviews

Lisa was the first pilot study participant. The interview was conducted by phone which allowed the researcher to continuously consult the interview questions and protocol. Going through the experience of implementing the interview protocol, and having success with it in relation to the research questions, was highly useful to the researcher.

Immediately after this first interview, the researcher reviewed and coded the interview protocol and identified those questions which were useful and extracted those questions which interrupted the flow of conversation and proved unnecessary. The pacing of the questions could now be integrated into
the protocol. If the goal was to get at the richer meanings underneath, the influences that precipitated action, a sufficient amount of time (about 20 minutes) had to be spent discussing the field trip itself and for both the participant and researcher to gain trust with each other and understanding of conversation dynamics. Finally, towards the end of the interview, the researcher had chosen to summarize the influences that Lisa had identified during the course of the interview, having kept a running list in her notes. This gave the participant a chance to clarify the running list, and propelled her into further consideration of other influences. This step was then incorporated into the first interview protocol.

Natalie was interviewed next. Again, the interview was conducted by phone and served to further clarify which questions were useful in generated information for the study, and how to word those questions to have a conversational tone. The interview with Natalie made a clearer transition between the description of the field trip and the influences on that practice. The second half of the interview had a reflective tone. Immediately following the interview, the actual questions spoken by the researcher were captured because of their operation in relation to the research questions and their promise in having participants identify influences and experiences.

Erica was the final participant interviewed during the pilot phase. Because she had not actually done curriculum-connected pre and post visit activities with her students, this interview allowed the researcher to focus squarely on how questions were worded and ordered during the conversation. In contrast with earlier interviews, Erica’s interview suggested that teachers who had not actually done pre nad post visit lessons might have very different responses, a phenomenon which suggested that the interview protocol was specific to the purposes intended by this research study rather than field trip practice in general. For instance, the primary influences that Erica identified on her field trip practice were cost, student behavior, and other teachers’ limitations. Some of the questions might have even been insulting because she had not implemented a curriculum-related field trip with pre and post visit components.
Second interviews

The second interview with Lisa began with a series of questions that had not been addressed in the first interview and then it shifted into the concept map exercise. Two conclusions were drawn from this experience. First, it was not helpful to have questions which generated new ideas and influences immediately before the concept map exercise and all the interview questions would be best situated within the first interview. Second, the concept mapping exercise needed to be focused on the field trip to the science center, rather than field trip practice in general. In Lisa’s case, the directions for the concept map was to illustrate how she planned field trips in general (see figure X below for Lisa’s concept map). This detached the conversation in the second interview from all that had been discussed in the first. The conversation swirled around field trips and school dynamics, rather than the ideas pertinent to the science center field trip specifically. In addition, Lisa had not yet implemented the post-visit activities that she felt were relevant to the field trip (which had taken place months before).

Further modifications were made to the concept map exercise after Lisa’s second interview and a second interview with Erica was scheduled to pilot the revised protocol. For instance, in Lisa’s case, her transcript was coded to identify influences, but the influences were simply listed on a piece of paper, which was presented to her during the second interview, giving her the responsibility of transcribing the ideas (or not) to Post-its. In Erica’s case, her first interview transcript was coded and all influences were represented on Post-its. In Lisa’s second interview, there were many predetermined concepts on Post-its that spanned three pages. In Erica’s, only 17 predetermined concepts were included and they were represented, alongside the influences she had identified, on one single sheet of paper.

Erica’s second interview was very short, only about 20 minutes. The main purpose of conducting the second interview with Erica was to pilot and gain confidence with the concept map
protocol. The concept map exercise had worked and the participant had situated the influences alongside the field trip practices (see Figure B.2. below for Erica’s map).

With a finalized protocol in place for both the first and second interviews after Erica’s final interview, the last interview with Natalie was conducted with the intention of including all her data alongside all future participants. Natalie was the only pilot study participant who had done all three desirable activities that were prerequisites for the study. Inclusion of Natalie’s data in the final results made sense and it became a goal of conducting the second interview with her. This signaled the shift out of the pilot phase of the study.

Therefore, the second interview with Natalie covered any outstanding questions which future participants would be asked in the first interview. Based on missteps with Lisa, this was done after the concept map and not before it. Any newly discovered ideas were then incorporated into the concept map itself, or not, based on the participants’ choice. Covering the same questions with Natalie that would be covered with all participants ensured that there would be comparable data sets from each. The concept map prompt and protocol worked effectively with Natalie, and it was subsequently used with all remaining participants.

Other Pilot Study Effects

During the pilot study, it was realized that teachers do not use the terms “pre-visit” and “post-visit.” One teacher, who had been through the teacher professional development workshop, did not necessarily incorporate these terms into her natural speech, but (used) them when referring to the science center’s materials. Therefore, the pilot study influenced how the researcher “talked” with participants. Rather than force the terms “pre-visit” and “post-visit” onto participants and reformat their language, the researcher adopted the descriptions of these activities that participants themselves used. By incorporating and reinforcing participant terminology, the researcher gave an ethnographic tone to the interview questions (McGough, 1997). Even though “pre visit” and “post visit” remained
concepts on Post-it notes because of their strong presence in the research literature, the terms were left open to the interpretation and application of the teacher during the concept map exercise.

During the pilot study, it was also noted that teachers happened to mention certain things about their field trip. For instance, teachers mentioned how they moved students through the exhibit galleries, if they had any kind of workshop or handheld guide for students, whether or not they had participated in any lab programs on site, and how they communicated with chaperones. Rebar’s research on teachers’ sources of knowledge (Rebar, 2010) was also consulted to identify others which had not yet been raised by pilot study participants. It was useful to see how these common considerations (e.g., chaperones, worksheets, gallery movement) factored into and revealed ideas in relation to the research questions. Therefore, the pilot study phase, prior to Natalie’s second interview, identified a common list of prompts that would be included in future interviews (see interview protocol in Appendix D). In summary, this list was partly informed by the pilot study participants and partly informed by Rebar’s research on teachers and field trips (Rebar, 2010).
Lisa’s concept map. Based on the direction to illustrate how she planned field trips, particularly the one to the Science Center. The direction too easily gave way to a conversation of logistics and a map which distinguished practice from influences and experience. Also, Lisa had to generate her own influences (in orange), based on a list the researcher prepared from the first interview.
Figure C.2 Erica’s concept map. Directed by the prompt to illustrate “My field trip to the science center.” Note how the predetermined words (in yellow), offered to all participants, have been interspersed with the influences identified in first interview (pink). Erica also effectively developed new words (orange) to incorporate during the concept map exercise.
Appendix D: Final Interview Structure

Overview of protocol:

The overall scheme of the interview structure is as follows: The first interview describes the field trip in detail and then identifies the underlying influences on how the field trip was conducted that way. The first interview takes an inductive approach: the participant generates the descriptions and the influences. The second interview explores the connections between these---how the field trip went with what influenced the teacher to lead it that way. Thus, the concept map exercise becomes a vehicle to revisit ideas from the first interview and do a member check. The map also provides a platform to probe deeper into underlying experiences. For instance, in Natalie’s interview, stemming from how “students” influence her field trip practice, I learned about how her family’s annual vacations and their socioeconomic status developed into her pervasive desire for the underprivileged students she teaches.

The first interview had two parts, and each lasted about half an hour. Part one asked the participant to describe the field trip in detail. Certain prompts were included to ensure each participant would address certain aspects of the field trip (e.g., what happened in the classroom beforehand, afterward, details about how chaperones operated, etc.).

Part two of the first interview then asked the participant to share what influenced how they came to implement the field trip in this way. This part began as very open ended and participant-centered. The goal was to identify all the influential factors on the teacher’s field trip to the Science Center. The conversation often referred back to the description of the field trip itself. The researcher worked with the participant to identify influences during the interviews. For instance, Steven identified a sense of loyalty to the curriculum as an influence—wanting to keep his job, that why he did the field trip this way. But as we explored this path, he revealed that his sense of loyalty and integrity came from values instilled by his parents, and experiences in the Boy Scouts.
At some point during the second part, the list of influences was summarized by the researcher and the participant was asked to check for accuracy and add on any additional influences. Finally, certain prompts were included, as needed, to ensure that each participant addressed whether or not certain factors were influential. To summarize, the first interview began as very open ended and concluded with consideration of a specific list of factors, and the extent to which these had influence on the teacher.

Prior to the second interview, the transcript from the first interview was coded to identify influences on field trip practice. Influences were pulled from both parts of the first interview: as the participant was describing the field trip and as they considered influences on their practice. Each influence was put on a separate Post-it note prior to the second interview. These Post-its were then used during a concept mapping exercise in which the participant arranged them in relation to each other. Therefore, the second interviews allowed the researcher to member check her interpretations and allowed the participant to add clarifying details to each of the influential factors identified.

Overall, the second interview revisited the ideas originally generated in the first interview. The concept mapping exercise clarified the connections between the implementation of the field trip, and influences on that implementation.

The following is the protocol that was used during the interviews. The bolded, capitalized passages represent the different stages of the interview process. The italicized portions represent ideas and questions that were conveyed verbatim to participants.
Interview 1:
INTRODUCTION
- Reintroduce purpose of the study, go over IRB
- Explain confidentiality
- Ask if there are any questions from the participant regarding the study
- Start recording
- Emphasize conversational aspect, free to talk about what comes to mind

Part 1: PARTICIPANT DESCRIBES THE FIELD TRIP AND ESTABLISHES A FRAME OF REFERENCE
1. I’d like to start by talking about the field trip you took with the Science Center. I’d like you to describe that specific field trip in as much detail as possible, so, Can you tell me what happened before, during, and after the field trip?

The following prompts should be used, as needed, if they do not come up on their own:
- In the classroom before/pre
  - Did they do any kind of pre-orientation to the science center itself, in terms of the physical space?
- During visit
  - How did they tour exhibits
  - How they worked with and arranged chaperones/other teachers
  - How they oriented students during the field trip
  - Lab or movie experiences
  - Had they visited beforehand
- In the classroom after/post
  - How did the post-visit connect with the onsite visit? How did the post visit connect with the pre-visit?
  - How did students make connections between the pre, during, and post activities?

PARTICIPANT DESCRIBES ROLE OF FIELD TRIP IN THE CURRICULUM
2. Can you tell me (more) about how the field trip was connected to your curriculum?

Part 2: PARTICIPANT IDENTIFIES INFLUENCES ON FIELD TRIP PRACTICE
3. What compelled you to do the field trip this way? What influenced you?

Variations of this question:
- a. How did it come to pass that you implemented the field trip this way?
- b. How did you decide to do the activities – before, during, after?
- c. What things were most helpful and most important to you in preparing the pre visit, visit, and post-visit components?
  - i. Why were these things helpful/important?
  - ii. Was anything else helpful/important?

4. (As needed) Do you do pre and post activities in general when you take students on a field trip, or did you do pre and post for this trip in particular?
RESEARCHER PROMPTS TO EXPLORE ADDITIONAL INFLUENCES

5. **Past experiences** that affect how you planned this field trip?
   Prompt re:
   - Previous field trips -- as a student; with family; as a teacher; -- refer to questionnaire responses
   - Try to develop connections between experiences and influences; move past mental models

6. **Training or mentoring** on how to conduct field trips?
   Prompt re: Preservice; Inservice; Professional Development, Other teachers

7. **Science content** influenced how you approached this field trip and/or ran the pre and post visit activities? Did the science content interest you personally?

8. **Timing** of the field trip in the school year influence what you did before, during, after?

9. **Cost**?

10. **Principal**? Did they influence how you did the field trip?

11. **Other teachers**? Did they influence how you did the field trip?

12. How has your field trip practice changed over the course of your career and what caused those changes?

RESEARCHER SUMMARIZES participant-identified influences.

13. As you’ve been talking, I’ve been listing out the influences you’ve identified. Here they are, let me know if I’m representing your ideas accurately or not: (list influences)

14. Anything else, any other factors or experiences that influenced how you led the field trip and the classroom components before and after the trip?

WRAPPING UP

15. In the past hour or so, I’ve asked you to describe the field trip, what you did before and after in the classroom, and we’ve talked about factors and experiences that influenced you to enact the field trip in this way. Is there anything else that you would like to add?

16. If you do think of anything you want to add, please feel free to email me or bring it up at the next interview.

17. Debrief the interview process with participant. Briefly discuss the interview process, invite input, and answer any lingering questions. Thank participant for time and effort.

Stop Recording

**Note:**
Clarifying questions used during second half of interview included:
- How is X diff than Y?
- Can you tell me more about that?


Interview 2

INTRODUCTION
- Thank participant
- Review purpose of study, IRB
- Start recording

RESEARCHER REVIEWS FIRST INTERVIEW
Last time we talked about the field trip to the science center in detail and what influenced you to conduct the field trip that way, with all the before and after-visit connections in the classroom.

Is there anything you’ve thought of since last time that you wanted to add?

RESEARCHER GUIDES CONCEPT MAP EXERCISE
1. After the first interview, I went through the written transcript and pulled out the influences that you identified. I represented them on these Post-it notes here. (Briefly review the ideas on Post-its)

2. Introduce idea of a concept map, along the lines of:

   So, I am going to ask you to create a concept map with these words on this whiteboard.

   A concept map is a way of organizing ideas around a topic so that relationships can be shown. So, concept maps are graphic organizers. Here is an example of a concept map (show example). Do you have any experience with concept maps or have you seen them before? ...

   No experience is necessary. This concept map exercise is just like the rest of the interview—it’s meant to explore and develop what compels you to implement field trips like you do, specifically, the one to the Science Center.

3. Ask participant to create a concept map about their field trip to the Science Center.
4. Introduce words they can use. These include the influences from the first interview, already discussed and represented on Post-it notes. The other set of words is a predetermined list of terms from the literature and field trip location that have to do with the various activities and with students (see below).
5. Offer blank Post-it notes in a different color for the participant to generate more terms as needed.
6. Offer additional materials (referring to markers and blank Post-its).
7. Direct participant to “think aloud”
8. Encourage creativity.
9. Allow for thinking time.

PARTICIPANT AND RESEARCHER DISCUSS CONCEPT MAP
10. Examples of the types of questions to be asked:
   a. Connections, or lack of connections, between ideas
   b. You wrote X. Please explain what you meant?
   c. You wrote x and y. How do you see them related?
d. You did not discuss X. Why is that?
e. How is x different than y?
f. Tell me more about...

WRAPPING UP
11. Looking at this word map, can you think of any other influences on your field trip to the science center?
12. ... Can you think of any other underlying experiences that brought about these influences on your practice, or caused you to implement the field trip this way?
13. Is there anything that we have not discussed in either interview that you think is important or related to how you conducted the field trip to the science center, and the classroom activities that went along with it?

Debrief the interview process
Stop recording

Note:

List of concepts offered to participants in all second interviews:

Things having to do with field tripping:
1) Pre-visit
2) Post-visit
3) Exhibits
4) Lab program at science center
5) 3D movie
6) Classroom
7) Curriculum
8) Students
9) Science
10) Science content

Things having to do with students, based in literature:
11) Student learning
12) Student interest
13) Student enthusiasm
14) Student behavior
15) Student attitude
16) Student choice
17) Student interactions

Additional concepts (identified from first interview):
Various
Figure E.1  Natalie’s Word Choices for concept map (yellow = predetermined, pink = from first interview)
Figure E.2  Natalie’s Concept Map
(yellow = predetermined, pink = from first interview, orange = generated during second interview)
**Figure E.3** Steven’s word choices for concept map (yellow = predetermined, pink = from first interview).
Figure E.4 Steven’s concept map (yellow = predetermined, pink = from first interview, orange = generated during second interview)
Figure E.5 Helen’s word choices for concept map (yellow = predetermined, pink = from first interview). Note that scavenger hunt was added for her in yellow since that activity was a pivotal feature of her field trip.
Figure E.6  Helen’s concept map (yellow = predetermined, pink = from first interview, orange = generated during second interview)
Figure E.7 Monica’s word choices (yellow = predetermined, pink = from first interview). Some information is masked.
Figure E.8  Monica’s Concept Map. Some information is masked. (yellow = predetermined, pink = from first interview, orange = generated during second interview)
Appendix F: Coding lists and NVivo models

This first list of codes (see Table F.1) was used as part of the starter codebook and it was applied throughout coding to identify those passages in which the teacher described what had done before, during, and after the field trip as well as the curriculum connections which were identified.

Table F.1  Starting list of codes

<table>
<thead>
<tr>
<th></th>
<th>BEFORE field trip</th>
<th>DURING field trip</th>
<th>AFTER field trip</th>
<th>CURRicular connections</th>
</tr>
</thead>
</table>

The next list (see Table F.2) shows those potentially influential factors which were always checked on during the interviews, from the interview protocol. As coding began, passages which addressed these topics were coded whether or not influence was indicated by the participant. As coding proceeded, only those codes which were identified as influences were utilized. Open coding was also used to cover some of these topics, since there were nuances present for each participant.

Table F.2  Codes developed during open coding process

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST</td>
<td>Cost of the field trip and its effects on the teacher’s planning and implementation</td>
</tr>
<tr>
<td>ORIGINS</td>
<td>Participant addresses the origins of their learning on how to do a field trip</td>
</tr>
<tr>
<td>OT</td>
<td>Participant identifies other teacher(s) as having some level of influence in some way</td>
</tr>
<tr>
<td>PFTaS</td>
<td>Previous field trip(s) as student</td>
</tr>
<tr>
<td>PFTaT</td>
<td>Previous field trip(s) as teacher</td>
</tr>
<tr>
<td>PRE</td>
<td>Preservice teacher education influence is considered or forwarded by participant</td>
</tr>
<tr>
<td>PRIN</td>
<td>Principal’s influence on participant is addressed</td>
</tr>
<tr>
<td>SCICON</td>
<td>How participant feels about the influence of the science content on the trip or science in general</td>
</tr>
<tr>
<td>TIM</td>
<td>Timing in the school year</td>
</tr>
<tr>
<td>TRAIN</td>
<td>Participant addresses if and or how inservice training or PD that had an influence on how they did field trip</td>
</tr>
</tbody>
</table>

This final list (in Table F.3) shows the codes which may have been used to identify passages dealing with the teacher’s perspective on students during the course of educational field trips.
Table F.3  *Codes related to teacher perspective of students*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATT</td>
<td>Student attitude</td>
</tr>
<tr>
<td>BEH</td>
<td>Student behavior</td>
</tr>
<tr>
<td>CHOI</td>
<td>Student choice</td>
</tr>
<tr>
<td>ENTHU</td>
<td>Student enthusiasm</td>
</tr>
<tr>
<td>INTERACT</td>
<td>Student interactions</td>
</tr>
<tr>
<td>INTEREST</td>
<td>Student interest</td>
</tr>
<tr>
<td>LEARN</td>
<td>Student learning</td>
</tr>
<tr>
<td>STUDENTS</td>
<td>Students</td>
</tr>
</tbody>
</table>

Finally, note that codes beginning with the acronym “KiM” stood for keep in mind. These were passages which were not coded in relation to the research question, but about which I felt would be useful during further analysis and interpretation.

The remaining lists are those open codes which were developed and used for each participant.
Table F.4  *Natalie’s list of codes*

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>assessment of student learning</td>
<td></td>
</tr>
<tr>
<td>Benefits of interview process</td>
<td></td>
</tr>
<tr>
<td>Bus</td>
<td>comparison of first time, second time, etc., field trip experiences</td>
</tr>
<tr>
<td></td>
<td>creating an experience that is memorable</td>
</tr>
<tr>
<td></td>
<td>cumulative effect of FT experiences</td>
</tr>
<tr>
<td>CURR</td>
<td>Description of curricular connections</td>
</tr>
<tr>
<td></td>
<td>description of concept map</td>
</tr>
<tr>
<td>Description of trip</td>
<td></td>
</tr>
<tr>
<td>emergent influence during trip - museum educator</td>
<td></td>
</tr>
<tr>
<td>Exhibits not important to focus of the trip</td>
<td></td>
</tr>
<tr>
<td>Existing resources- from exploratorium</td>
<td></td>
</tr>
<tr>
<td>Exp Being a parent</td>
<td></td>
</tr>
<tr>
<td>Exp_Childhood</td>
<td></td>
</tr>
<tr>
<td>Exp_Ellis Island episode</td>
<td></td>
</tr>
<tr>
<td>Idea that students had to be prepared to get the most out of it</td>
<td></td>
</tr>
<tr>
<td>memobrability</td>
<td></td>
</tr>
<tr>
<td>relationship between memorability, preparation, and something that can’t be done in classroom</td>
<td></td>
</tr>
<tr>
<td>relationship between value of doing and preparing students</td>
<td></td>
</tr>
<tr>
<td>Something students can’t do in the classroom</td>
<td></td>
</tr>
<tr>
<td>Exp_First field trip as teacher to [...]</td>
<td></td>
</tr>
<tr>
<td>F_Curriculum</td>
<td></td>
</tr>
<tr>
<td>F_Time length of visit</td>
<td></td>
</tr>
<tr>
<td>Familiarity with FT location and or programs</td>
<td></td>
</tr>
<tr>
<td>FT experiences over time</td>
<td></td>
</tr>
<tr>
<td>Giving kids the moments they should have</td>
<td></td>
</tr>
<tr>
<td>idea of gradual change in FT practice over time, punctuated by Ellis Island episode</td>
<td></td>
</tr>
<tr>
<td>Importance of connecting pre and post visit</td>
<td></td>
</tr>
<tr>
<td>making it a positive experience</td>
<td></td>
</tr>
<tr>
<td>memorability again - in terms of students coming back with future family</td>
<td></td>
</tr>
<tr>
<td>PFTaP_previous field trips as a parent</td>
<td></td>
</tr>
<tr>
<td>preview and review of other curricular topics</td>
<td></td>
</tr>
<tr>
<td>Sense of responsibility</td>
<td></td>
</tr>
<tr>
<td>struggle between how to situate herself in concept map</td>
<td></td>
</tr>
<tr>
<td>student behavior</td>
<td></td>
</tr>
<tr>
<td>student engagement</td>
<td></td>
</tr>
<tr>
<td>Student excitement and enthusiasm</td>
<td></td>
</tr>
<tr>
<td>student learning</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>students making connections across experiences</td>
</tr>
<tr>
<td>Talk circle method described</td>
</tr>
<tr>
<td>Transfer of ideas from other areas of practice - a good lesson plan</td>
</tr>
</tbody>
</table>
Table F.5  Monica's list of codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acc</td>
<td>Accessibility to facility and staff</td>
</tr>
<tr>
<td>acce</td>
<td>accumulation of previous field trip experiences in general</td>
</tr>
<tr>
<td>CT_</td>
<td>AFTER field trip</td>
</tr>
<tr>
<td>Avail</td>
<td>Availability of staff to answer questions</td>
</tr>
<tr>
<td>Back</td>
<td>Background in science</td>
</tr>
<tr>
<td>Bec</td>
<td>Became unimportant during 2nd interview</td>
</tr>
<tr>
<td>BF</td>
<td>BEFORE field trip</td>
</tr>
<tr>
<td>Chap</td>
<td>Chaperones and group size</td>
</tr>
<tr>
<td>Conf</td>
<td>Confidence with teaching</td>
</tr>
<tr>
<td>Con</td>
<td>Connectivity across the curriculum</td>
</tr>
<tr>
<td>COSC</td>
<td>COST_cost of the field trip as an influence</td>
</tr>
<tr>
<td>CURR</td>
<td>CURRicular connections</td>
</tr>
<tr>
<td>dec</td>
<td>decision not to use Trail Guides</td>
</tr>
<tr>
<td>diversifying</td>
<td>diversifying unit activities for students</td>
</tr>
<tr>
<td>driven</td>
<td>driven to continuously improve, and take part in continuous professional learning</td>
</tr>
<tr>
<td>DUR</td>
<td>DURING field trip</td>
</tr>
<tr>
<td>Educ</td>
<td>Educator Open house event at SC</td>
</tr>
<tr>
<td>Exhibit</td>
<td>Exhibit tie ins with other areas of curriculum</td>
</tr>
<tr>
<td>Existing</td>
<td>Existing resource-- Program package - Meteorology</td>
</tr>
<tr>
<td>Existing</td>
<td>Existing resource--Lab program</td>
</tr>
<tr>
<td>Existing</td>
<td>Existing resource Weather exhibit area</td>
</tr>
<tr>
<td>famil</td>
<td>familiarity with SC location</td>
</tr>
<tr>
<td>foundation</td>
<td>foundation in science</td>
</tr>
<tr>
<td>grant</td>
<td>grant funding for PD workshop</td>
</tr>
<tr>
<td>Importance</td>
<td>Importance of hands-on activities</td>
</tr>
<tr>
<td>Impre</td>
<td>Important that students have Connectivity between pre, lab program, and post visit for students conceptual understanding</td>
</tr>
<tr>
<td>Impre</td>
<td>Impression made by museum educator</td>
</tr>
<tr>
<td>Inquiry</td>
<td>Inquiry week workshop</td>
</tr>
<tr>
<td>Med</td>
<td>Med tech experience</td>
</tr>
<tr>
<td>origin</td>
<td>origins of field trip practice- colleagues</td>
</tr>
<tr>
<td>OT</td>
<td>OT_other teacher(s) as an influence on their practice</td>
</tr>
<tr>
<td>Other</td>
<td>Other exhibit areas not necessarily related to target content</td>
</tr>
<tr>
<td>PFTaT</td>
<td>PFTaT_previous field trips as a teacher as an influence</td>
</tr>
<tr>
<td>position</td>
<td>positioning of the field trip in the unit</td>
</tr>
<tr>
<td>PRE</td>
<td>PRE_preservice teacher training influence</td>
</tr>
<tr>
<td>Preview</td>
<td>Preview of coming curricular topics</td>
</tr>
<tr>
<td>Prev</td>
<td>Previous field trips that had been poorly planned</td>
</tr>
<tr>
<td>Pre</td>
<td>Previous teaching of the concept and use of program package</td>
</tr>
<tr>
<td>prev</td>
<td>previous trips that students took</td>
</tr>
<tr>
<td>Use</td>
<td>Previous use of trail guides on trip to SC</td>
</tr>
<tr>
<td>prin</td>
<td>PRIN_principal as an influence</td>
</tr>
<tr>
<td>prof</td>
<td>prof dev inquiry strategies modeled</td>
</tr>
<tr>
<td>dev</td>
<td>prof dev modeled strategies for teaching</td>
</tr>
<tr>
<td>workshop</td>
<td>prof dev workshop on meteorology packet</td>
</tr>
<tr>
<td>prof</td>
<td>professional development workshop at SC</td>
</tr>
</tbody>
</table>
Quality of SC PD workshops
Review of previous curricular topics
SCICON_science content AND scientific literacy as an influence
state science standards
Students
Supportive spouse
Taking advantage of teachable moments
the way field trip prof dev worked
TIM_timing in school year as an influence
TRAIN_inservice training influence
Wants to be prepared because things happen
weather

Table F.6  *Hannah’s list of codes*

<p>| 2nd year FT - just did the lab to get free admission |
| 3rd year field tripping at SC |
| Accomplish something as a teacher |
| AFTER the visit |
| Alignment of exhibits and trail guides with curriculum |
| BEFORE the visit |
| BEFORE_Preorientation to students prior to the trip |
| Business background |
| Chaperones supportive of trip structure |
| CMT |
| Collegial support |
| Congruence of teaching methods-- but this was from 2nd FT |
| Cost as a factor, not nec. an influence here |
| CURRIC_3rd-4th grade science curriculum |
| CURRIC_5th grade science curriculum |
| DESCRIPTION_re grade level set up |
| Distance from SC limits time on site |
| Do things for a purpose, making for easy justification |
| DURING the visit |
| DURING_Chaperones role |
| Ease of use bc SC was aligned with curriculum and could serve reading purpose |
| EMERGENT_Availability of Staff Scientist to be on the floor with kids at rocks |
| EMERGENT_Weather |
| Everyone involved rallies around the trip |
| Existing ed material-- Trail Guides |
| Existing Material_SC exhibits |
| Existing resource_ Trail Guides |
| Exposure to other landmarks and subject area tie ins |
| Familiarity and comfort with Hartford |
| Feedback from other teachers |
| Focus on nonfiction reading as a goal |</p>
<table>
<thead>
<tr>
<th><strong>Get kids reading</strong></th>
<th>Focusing students on slowing down and taking time to read</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Getting hands-on</strong></td>
<td>with 3rd-5th grade science ideas</td>
</tr>
<tr>
<td><strong>Grade level partner</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Hands on experiences</strong></td>
<td>for students relative to previous curriculum</td>
</tr>
<tr>
<td><strong>Hands-on learning</strong></td>
<td>influenced by inquiry</td>
</tr>
<tr>
<td><strong>[ ]</strong></td>
<td></td>
</tr>
<tr>
<td><strong>I'm not the reason for the field trip</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Initial interest</strong></td>
<td>3 yrs ago</td>
</tr>
<tr>
<td><strong>Key factors versus minor factors</strong></td>
<td></td>
</tr>
<tr>
<td><strong>KIM_Hannah's layering of factors</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Kolb Experiential learning</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Lack of science background as a teacher</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Language Arts connections and support of LA teachers</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Like-mindedness between teacher, school and SC in terms of science teaching methods</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Museum educator</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Open house event</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Open House experience</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Other teachers</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Other teachers excitement</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Other teachers spec. in other subject areas rallying around FT to SC</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Parent support</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Personal excitement and enthusiasm</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Personal Visits to the SC with husband</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Positive feedback from kids and parents</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PRESERVICE_teacher prep program logistics for FT</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Previous trips to the SC</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Previous visit to the SC-- scope it out</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Principal support</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PTA support</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Pugh_Transformational Experience visceral</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Quotes to use</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Rock cycle and hands on with rocks_can't do full inquiry in 5th gr on it</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SC website - this was a tool, not an influence</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Scavenger hunt's purpose was to spend time reading and thinking</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Seeing other field trip groups that were not suitably structured</strong></td>
<td></td>
</tr>
<tr>
<td><strong>She takes on role of lead teacher for field trip</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Special offers from SC</strong></td>
<td></td>
</tr>
<tr>
<td><strong>State Standards</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Student and chaperone interest</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Student behavior and focus</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Student Excitement_Get students excited about science</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Students</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Time length of visit</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Travelling exhibit content</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Unpredictability of other school groups' movement</strong></td>
<td></td>
</tr>
<tr>
<td><strong>We_meaning her grade level partner_commonality in purpose</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Weather and Timing of FT in the year</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table F.7  *Steven’s list of codes*

<table>
<thead>
<tr>
<th>[Literacy] Project […] FT planning experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td>5th grade curriculum in general, science in particular</td>
</tr>
<tr>
<td>AFTER ft in the classroom</td>
</tr>
<tr>
<td>Alignment of SC exhibits with curriculum</td>
</tr>
<tr>
<td>all subjects classroom</td>
</tr>
<tr>
<td>Authentic learning</td>
</tr>
<tr>
<td>BEFORE ft in the classroom</td>
</tr>
<tr>
<td>Being a parent</td>
</tr>
<tr>
<td>Boy Scouts</td>
</tr>
<tr>
<td>Buses</td>
</tr>
<tr>
<td>Chaperones</td>
</tr>
<tr>
<td>Chose to be a teacher</td>
</tr>
<tr>
<td>CMTs influence on when FT took place</td>
</tr>
<tr>
<td>Colleagues who share FT approach</td>
</tr>
<tr>
<td>cost not a factor</td>
</tr>
<tr>
<td>CURRIC curriculum connection</td>
</tr>
<tr>
<td>Description of Concept Map</td>
</tr>
<tr>
<td>District FT Checklist</td>
</tr>
<tr>
<td>DURING ft at CSC</td>
</tr>
<tr>
<td>Enjoys teaching</td>
</tr>
<tr>
<td>Feedback from adults to repeat FT again the same way</td>
</tr>
<tr>
<td>Flexibility in scheduling w SC staff person</td>
</tr>
<tr>
<td>FT practice as an outgrowth of overall teaching practice</td>
</tr>
<tr>
<td>Hands-on</td>
</tr>
<tr>
<td>He sees SC as a resource for teaching</td>
</tr>
<tr>
<td>His attitude toward learning science</td>
</tr>
<tr>
<td>idea of free reign</td>
</tr>
<tr>
<td>importance of gift shop for students</td>
</tr>
<tr>
<td>Integrity</td>
</tr>
<tr>
<td>job requirement</td>
</tr>
<tr>
<td>[Literacy] Project […] FT planning experiences</td>
</tr>
<tr>
<td>Making geeky cool</td>
</tr>
<tr>
<td>maximize instruction time</td>
</tr>
<tr>
<td>Modeling for students how to figure out exhibits</td>
</tr>
<tr>
<td>Not sure of student response to FT</td>
</tr>
<tr>
<td>Opportunistic with free Senses program offered</td>
</tr>
<tr>
<td>Opportunity to plan the trip opened up</td>
</tr>
<tr>
<td>Parental influence</td>
</tr>
<tr>
<td>Previous FT planning - trial and error</td>
</tr>
<tr>
<td>Previous trips to SC were good, encouraging future trips</td>
</tr>
<tr>
<td>pride</td>
</tr>
<tr>
<td>Recognizes relationship between his attitude toward science and student interest</td>
</tr>
<tr>
<td>Reinforcement of learning prior to CMT</td>
</tr>
<tr>
<td>Religion</td>
</tr>
<tr>
<td>SC materials</td>
</tr>
<tr>
<td>School set up</td>
</tr>
<tr>
<td>Science Content - his opinion of</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>self-preservation</td>
</tr>
<tr>
<td>Size of group</td>
</tr>
<tr>
<td>Student behavior</td>
</tr>
<tr>
<td>Student choice</td>
</tr>
<tr>
<td>Student enjoyment enthusiasm</td>
</tr>
<tr>
<td>Student interest</td>
</tr>
<tr>
<td>Timing in school year-other grades FT first</td>
</tr>
<tr>
<td>Trail Guides</td>
</tr>
<tr>
<td>Wife is a teacher</td>
</tr>
</tbody>
</table>
Appendix G: Models of coded passages

This appendix includes the models generated in NVivo 9 for each participant.
Figure G.2  Monica’s NVivo Model
Figure G.3  Hannah’s NVivo Model
Figure G.4  Steven’s NVivo Model
REFERENCES


McIntosh, L. M. (2011). *Museum Educators Teaching Others to Teach*. The University of British Columbia, Vancouver, B.C.


