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Back in the Classroom: Teacher Follow-Through after an Earth Education Program

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Little research exists describing what teachers do with new experiences and knowledge after participating in environmental learning programs and the students return back to the classroom. This qualitative study aimed to fill this gap by examining and describing the follow-through implemented by teachers after their classes participated in the Earthkeepers earth education program. Individual semistructured interviews were conducted with seven teachers—four who did a great deal in the classroom to follow through on the program and three who did little. Analysis produced informative descriptions of the follow-through as well as comparisons of the characteristics of the teachers and reasons that account for the differences. Student surveys before and after the program showed that students with a teacher who did a great deal of follow through had a higher rate of program completion. This study provides an informative and revealing description of what teachers do following an environmental learning program and why they do it. Based on this research, it is recommended that environmental learning programs that use follow-through provide more comprehensive support structures to both pre- and in-service teachers to better achieve their goals.

INTRODUCTION

Teachers commonly use out-of-school field trips as stepping-stones to new subjects and ideas, igniting curiosity and interests to be pursued back in the classroom and home (Orion, 1993). This is especially true with environmental learning, as these out-of-school experiences are often the method of instruction

widely touted as accomplishing student learning goals. Out-of-school environmental learning field trips such as the Earthkeepers earth education program, which will be described in future sections, usually begin at school with the teacher preparing the students for the ensuing experience. As Orion (1993) describes, educators unfamiliar to the students direct the field trip itself, providing experiences with concrete phenomenon and materials, after which students return to the classroom with the teacher for follow-through activities that may or may not occur (Orion & Hofstein, 1994).

Research has shown that these experiences give students exposure to concrete materials and phenomenon unavailable within the

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formal classroom, creating connections between classroom lessons and the natural world, as well as positively impacting student's cognitive knowledge (Carlson, 2008; Hofstein & Rosenfeld, 1996; Knapp & Barrie, 2001; Rudmann, 1994; Tal, 2001) and interest (Knapp & Barrie, 2001; Rudmann, 1994). When used correctly, the impact of out-of-school activities can stretch over a lifetime.

In order to make the most of these learning opportunities, teachers must ensure that the experiences are connected to classroom content and integrated into the long-term curriculum (Bracey, 1995; Smith-Sebasto & Cavern, 2006). There is still much to be learned about the use of out-of-school field trips as instructional tools—especially with the goal of examining what teachers do with new experiences and knowledge after participating in environmental learning programs (Anderson, Lucas, Ginns, & Dierking, 2000; DeWitt & Storckdieck, 2008; Farmer & Wolf, 1995; Jarvis & Pell, 2005; Orion & Hofstein, 1994; Smith-Sebasto & Cavern, 2006). The present article helps address this by providing descriptions of what some teachers actually do when they return to the classroom and what this follow-through looks like.

PURPOSE

Although it is widely acknowledged that field trips should be followed up in class, there is little information that describes what effective follow-through looks like. Aside from general recommendations, detailed descriptions of the follow-through simply do not exist (Bracey, 1995; Farmer & Wolf, 1995; Knapp, 2000; McClarnon, 2003; Rudmann, 1994; Smith-Sebasto & Cavern, 2006). This is particularly true for environmental learning programs that are often designed as out-of-school experiences to be continued back in school and home. The present study aimed to fill this gap by providing a narrative description of what teachers do

in the classroom following an environmental learning program designed to continue back in the class and at home. The new understandings of what actually happens in classrooms during posttrip activities can assist those who design and implement environmental learning field trips and the classroom teachers who participate in them.

LITERATURE REVIEW

Most of the literature on out-of-school learning experiences is on field trips; with studies ranging from pretrip activity evaluation (Bracey, 1995; Connolly, Groome, Sheppard, & Stroud, 2006; Hamilton-Ekeke, 2007; Orion & Hofstein, 1994) to the effectiveness of out-of-school trips (Carlson, 2008; Hofstein & Rosenfeld, 1996; Knapp & Barrie, 2001; McLoughlin, 2004; Rudmann, 1994; Tal, 2001), stretching all the way to the reasons why teachers use them (Connolly et al., 2006; Falk & Dierking, 2010; Farmer et al., 2007). Most have come to the same conclusion: **Field trips have the potential to impact students in deep and meaningful ways.**

Although many suggest the use of follow-through, only a few discuss its importance or reasons for doing it. Orion (1993) **claimed that the out-of-school experience should function as an integral part in the curriculum by covering basic concepts that could be best taught in the field. The follow-up activities should include those of interpretation and drawing conclusions; helping students to scaffold their learning into another level** (Bracey, 1995; McClarnon, 2003; Orion, 1993; Rennie & McClafferty, 1996). The actual model includes a relatively **short preparatory unit designed to decrease the novelty of the situation.** The field trip itself is next, followed by the “heavy” part of the curriculum: the summary (follow-through) unit, which includes complex concepts that demand higher abstraction ability and higher concentration levels from students. **In essence, the follow-through portion of a field trip is in**

fact the most important section of the whole experience and must not be limited to short-and-sweet strategies that serve as closure to the learning instead of extending it (Anderson et al., 2000; Buchanan, 1992; DeWitt & Storksdieck, 2008; Knapp, 2000; McLoughlin, 2004; Orion, 1993).

Only a few studies have looked at the impact of follow-through of out-of-school fields trips. Knapp (2000) found that students taking part in a field trip without follow-up retained positive attitudes over time but could not remember the content of the trip. He concluded that students need follow-through and repetition to transfer short-term learning into long-term memory. In the only study measuring the impact of using pretrip and posttrip activities with an environmental education program, Smith-Sebasto and Cavern (2006), compared pretest and posttest scores of groups who had gone on only an environmental education trip, received pretrip lessons along with the trip, posttrip lessons only and the trip, or received all three treatments. The follow-through activities took no more than 45 min to implement, yet even with such a short amount of time, the authors found an overall positive change in students "fundamental respect for the environment" (p. 15). Further, they claimed that it was only with the combination of both pretrip and posttrip activities in addition to the out-of-school experience that the desired change in attitudes towards the environment was realized (Smith-Sebasto & Cavern, 2006, p. 15). Although, as the authors point out, more research needs to be undertaken in the realm of follow-through activities to environmental field trips, the results indicate the need for greater attention and time to be spent on posttrip activities following the out-of-class experience.

Despite the acknowledged importance of follow-through activities, little research exists describing what teachers actually do after field trips. Some offer a one-page list of what to do afterwards, suggesting activities such as writing thank you letters, sharing pictures, bulletin board displays, or short discussions of the experience (Kiesel, 2006). Others suggest activities

like games, peer-teaching, and journaling to assess student learning (Connolly et al., 2006; McLoughlin, 2004). There is a clear need to study and describe what actually happens back in the classroom.

METHODOLOGY

This investigation included 5th and 6th grade teachers and their students who attended the Earthkeepers (Van Matre & Johnson, 1988) earth education program at a residential environmental center. Earth education programs like Earthkeepers are designed to help students construct ecological understandings, develop positive feelings for the natural world, and make choices about their personal environmental behaviors and actions (Johnson, 2003; Van Matre, 1990). As an earth education program, Earthkeepers follows a programmatic approach to field trips as recommended by Orion (1993), beginning with initial activities and a springboard 3-day immersion experience in a natural place away from school, and continuing back at school after the trip. As it is designed to be continued in and connected to the classroom and home after the trip, Earthkeepers provides teachers with an opportunity to carry out the follow-through in the way they feel best fits their classroom. This, in turn, provides a situation allowing for an in-depth picture of what actually happens when the students return back to the classroom and the onus of continuing the program falls back to the teacher.

The springboard portion of the Earthkeepers program, the 3-day out-of-school immersion, focuses on four main elements: Knowledge, Experience, Yourself, and Sharing. A key marked with its initial, spelling the word "KEYS," represents each component. At the Earthkeepers Training Center, the program site, the participants complete the Knowledge and Experience activities in order to earn the "K" and "E" Keys and become Apprentice Earthkeepers. For Knowledge, there are four activities, each focusing on a major ecological

concept: energy flow, materials cycling, interrelationships, and change. Each is a highly participatory outdoor experience designed to bring the abstract ecological concept into the concrete in ways that connect with students' personal experiences. Similarly, there are four Experience activities, one each for observation, discovery, solitude, and immersion. These activities are designed to engage the students in active, fun outdoor experiences, building their connections to the natural world. At the end of the 3 days, the students are Apprentice Earthkeepers, ready to return to school and home for the follow-through portion of the program. If they complete that portion and earn the last two keys, they will become full Earthkeepers. Completion of the program is optional; students are encouraged to do so, but it is left up to them to actually do the tasks and earn the keys.

To earn the "Y" (Yourself) key, a student must do two things to lessen impact (using less energy and fewer materials) and two things to continue experiencing nature and deepening their feelings towards the earth. The "S" key is earned after students share their experience with others. It is ultimately the responsibility of the students to complete the tasks and earn the keys, but the teacher keeps track of student progress and completion, and hopefully continues the ideas and lessons of the program.

Twenty-six teachers and their students who attended the Earthkeepers program at a residential environmental learning center in a state in the eastern United States during one school year participated in the study. This program and center were chosen as they included teachers participating in an environmental learning field trip that had substantial follow-through. The teachers completed a Program Follow-Through Survey in which they described any follow-through they did in their classrooms. Student Program Follow-Through Surveys provided additional descriptions, from the students' perspectives, of what was done in the classroom after the out-of-school experience. The authors read the surveys, and it was clear that there was a wide range of what teach-

ers did, from a great deal to very little. A decision was made to categorize the teachers into three groups: those who did high, medium, and low levels of follow-through. Categorization was based on how much time was built in for program follow-through, the extent to which students were involved in environmentally related events, projects or activities, and how often teachers included ideas or concepts from the program in classroom activities. Five of the 26 teachers received a high rating, 17 received a medium rating, and four received a low rating. The nine teachers who received either a high or low rating were invited to be interviewed regarding the details of their follow-through. The purpose of selecting only high and low rated teachers was to help us learn what involved and engaged teachers (high rating) do for follow-through, how they incorporate the follow-through into their classrooms and motivate students to continue the program, and have contrasting cases with little follow-through (low rating) to allow us to understand the obstacles to incorporating substantial follow-through and to see what happens when it is not utilized to any great extent. Individual, semistructured interviews were conducted with the seven teachers (four high-level follow-through, three low-level follow-through) who agreed to participate. In addition, we compared the program completion rates of their students.

RESULTS

Although the purpose of the study is to describe what teachers do as follow-through for the Earthkeepers program, it is revealing to examine the differences in those who did a great deal and those who did little. As can be seen in Table 1, Ms. Hartman, Ms. Sheade, Mr. Smith, and Ms. Simon were those teachers categorized as doing a high level of follow-through (all participants were given pseudonyms). These teachers all have a strong background in environmental learning (especially Earthkeepers) and

Table 1
Teacher Descriptions by Level of Follow-Through

	Undergraduate Degree	Graduate Degree?	Years Teaching	Grade Taught	Subject(s) Taught (in order of importance)	Years Attending Earthkeepers
High Level						
Ms. Hartman	Biology and Elementary Education	Masters in Science and Environmental Education	Over 21	Gifted Studies	Gifted studies, science, environmental education	Over 18
Ms. Sheade	Elementary Education	N/A	29	5th	Science, Language Arts, Social Studies	16
Mr. Smith	Elementary Education	Working towards Masters in Reading Curriculum Development	23	5th	Science, Reading, Language Arts	16
Ms. Simon	Elementary Education	Curriculum Development	13	5th	Science, Language Arts, Math	13
Low Level						
Ms. Baker	Elementary and Early Childhood Education	Elementary Science	5	6th	Language Arts, Reading, Science	3
Mr. Ortiz	Elementary Education	N/A	10	5th	Science, Reading, Social Studies	10
Ms. Roberts	Early Childhood and Elementary Education	N/A	10	5th	Language Arts, Reading	1

incorporate it into their curriculum throughout the year. They also teach students science content a minimum of 2 hr each week.

Out of those teachers classified as doing a low level of follow-through, only Mr. Ortiz teaches science over one hr a week. None of these teachers spoke of a teaching background that included environmental learning, and they had less classroom teaching experience than the aforementioned group.

Classroom Follow-Through

As can be seen in Table 2, the follow-through practices carried out by the teachers contrast drastically. Students who experienced a high amount of follow-through had teachers who included the posttrip activities as a part of their classroom lessons and curriculum. Extended class time was devoted to discussions, environ-

mental activities, and reminders, to help continue the ideas and content of the trip in the classroom. In contrast, very few of the teachers who did a low amount of follow-through did any of these; instead most of their students only experienced references to the program during the little amount of science content time in the classroom. In fact, the students were expected to be motivated to manage and carry out the follow-through activities entirely on their own at home, with little to no support from their teacher.

High Level of Follow-Through

Upon returning to the classroom, the teachers who do a high level of follow-through immediately take time to introduce, explore, and practice the tasks. Initial activities include class discussions, setting of goal dates and deadlines for completion, and modeling finished products.

Table 2
Follow-through activities by level of follow-through

	High Level	Low Level
Y key		
At school	Hartman, Smith, Simon	
At home	Sheade	Baker, Ortiz, Roberts
Calendar	Hartman, Sheade, Smith, Simon	
Reminders	Hartman, Sheade, Smith, Simon	Ferguson
Bulletin board	Hartman, Simon	
Special ceremonies	Hartman, Sheade, Smith, Simon	Ortiz
Game creation/playing EK games	Hartman, Sheade	
In-school Magic Spots	Hartman, Sheade, Smith, Simon	
Reteaches	Hartman, Sheade, Smith	
Extra credit for completion	Simon, Smith, Sheade	
S key		
At school	Hartman, Sheade, Smith, Simon	
At home		Baker, Ortiz, Roberts
Calendar	Hartman, Sheade, Smith, Simon	
Reminders	Hartman, Sheade, Smith, Simon	
Bulletin board	Simon, Hartman	
Special ceremonies	Hartman, Sheade, Smith, Simon	Ortiz
In-school Magic Spots	Simon, Hartman, Smith	
Reteaches	Hartman, Sheade, Smith, Simon	
Extra credit for completion	Smith, Simon, MacBeth	
Additional EK centered activities		
Creative story writing	Smith, Hartman	
Energy and water audits	Hartman	
Link to current science lessons	Hartman, Sheade, Smith, Simon	Ortiz
Tests on content	Smith	
Class discussions	Hartman, Sheade, Smith, Simon	
Uses as verbal examples	Hartman, Sheade, Smith, Simon	Baker, Ortiz, Roberts
Science experiments	Smith	
Time outdoors	Hartman, Smith	Ortiz
Environmental Learning Integration		
Environmental projects	Hartman, Sheade, Smith, Simon	Baker
Letter writing campaigns	Hartman	
Environmental News Share	Sheade	

In order to keep track of the follow-through and keep the students motivated, these teachers all create and distribute Earthkeeper calendars so students can track their progress, share with each other, and provide a foreseeable culmination point. Ms. Hartman also has her students eat lunch in class while doing an Earthkeepers-related activity designed to show the students impact and choices on energy and materials in their lunches. This activity is then done at various times throughout the year to keep Earthkeeper themes and ideas alive.

These teachers immediately set aside multiple days following the program for students

to work on their S (Sharing) tasks in class because they are related to classroom content. Students are given time to practice the Earthkeepers concept activities and eventually teach the activities to people who didn't participate in the program. Some teachers further enriched the follow-through by having students create Earthkeeper-related board games to play with others.

There was also a concerted effort to emphasize the importance of the follow-through by including environmental learning throughout the curriculum and lessons, culminating in large projects. Ms. Simon and Mr. Smith have students participate in a "Rainforest Project" to

illustrate interrelationships and world impact. Students research and create a rainforest in the halls of the school, and raise money to buy acreage in the rainforest from donations from storytelling and leading tours. Other projects include letter-writing campaigns to state legislators suggesting they fund bills and take interest in environmental areas. Questions on quizzes, readings, and writing assignments often focus on the environment, as do movies that are watched in class. Every morning, Ms. Sheade has a News Share where the class discusses recent environmental news. Additionally, Mr. Smith holds essay-writing contests for a scholarship to go to another earth education program. Three of the teachers use class-, recess-, or after-school times to take kids to nearby school nature trails or areas to practice the Y tasks.

In creating and carrying out these activities, these teachers demonstrate their beliefs towards the importance of their role following the program, the success of the follow-through, and the overall impact on their students.

And when you look at their senior yearbooks and they ask the question “What made the biggest impact on you?” I’m telling you a high, high percentage will put [the site where they participated in Earthkeepers]. And I think it’s our love of it. It’s just a passion for us. And I think the teachers really make the difference too. I think that if the teachers are really passionate and they really love it, that gets extended to the kids. (Ms. Sheade)

By placing an obvious emphasis on the follow-through, modeling positive behaviors and attitudes, and including environmental themes and ideas throughout their lessons, the importance and instrumental nature of their teachers’ role in follow-through was an evident focus throughout the group. Actions like assigning class credit, holding class discussions, and spending extra time carrying out the follow-through in class sent a silent yet obvious message to their students on the necessity and deep meaning of continuing their new environmental behaviors and ideas.

Low Level of Follow-Through

As can be seen in Table 2, these teachers did a minimal amount of follow-through compared to those that do a high amount. Overall, teachers who do minimal follow-through do not do much else other than describing the tasks and running the key ceremonies and do not make time for any additional environmental lessons or activities to build on the program, or include further Earthkeepers activities or discussions in their classes.

Teachers who do minimal follow-through hold an initial discussion about a time frame for Y and S task completion. The next time the follow-through is addressed is usually when the students are finished with the Y and S tasks. One teacher chats with the students at her desk, while the others do things like hide the keys for students to find or hold a small ceremony for them.

The three teachers who did a low level of follow-through presented only basic information to the students and introduced little to no further environmental topics in their classrooms. As such, science and environmental lessons tended to get overlooked in the classroom. Basic follow-through activities practiced by Ms. Baker included giving students the opportunity and materials to make “crying suns” to put on light switches to signal energy waste while Mr. Ortiz does things like basic follow-through writing exercises, discussing environmental issues when relevant to class topics, and visiting the school nature trail for a few activities. These three teachers all claimed that their teaching approach is basically a “teach to the test” approach, with little time or lessons spent on environmental or ecological concepts.

Beyond these efforts, the teachers do not devote any further time to the follow-through. Completion of the tasks is entirely student-driven and done at home with little teacher involvement. As Mr. Smith stated, because of the lack of inclusion into classroom content and teacher priority, student motivation dwindles quickly. Two of the teachers felt disappointed

in themselves about the way they implemented the follow-through, but they all claimed they cannot do more with the follow-through due to pressure to meet state standards.

Reasons

The underlying question of “why” remains. Why do some teachers do so much and spend extensive time on the follow-through, while others do so little? Each teacher who did only a little follow-through discussed how the pressure of state standards and high-stakes testing left little time to do any more follow-through and focus on topics like science that students are not tested on. In fact, Ms. Baker claimed to deliberately avoiding further excitement in her students, as she was forced to essentially drop the program ideas as soon as they returned back to the classroom and focus instead on state test content.

Teachers who do a high amount of follow-through believed the lessons of the Earthkeepers program to be important to their students’ learning, and equally as important, to teach about and for the Earth, and therefore have found ways around this pressure. Instead, they use Earthkeeper related ideas as an integrating context, linking content areas to each other.

Right now we talk about the bully standards: reading and math. Everything is reading and math, reading and math. I think that it’s up to . . . so many things are teacher dependent. If that’s an interest for you, you’ll make it a priority. Because you can use that environment and ecology as a springboard for everything. Because kids are naturally interested in it. (Ms. Hartman)

Beyond the lack of time is a lack of resources and knowledge. Teachers who do little follow-through have attended the Earthkeepers program less than those who do a lot of follow-through (see Table 1), and their lack of exposure to best practices and ideas on integrating content in their lessons diminishes their awareness of the many different possibilities and practices that exist. Although Earthkeep-

ers provides teachers with prepared follow-through activities, they remain unsure on how to extend and maintain the ideas in other contents and topics. In contrast, high follow-through teachers have attended the program a minimum of 13 years, allowing for years of practice, discussions with other teachers, and time to become comfortable with the content, methods, and goals.

Even with the stresses and strains of mandated curriculum, testing, and state standards, high level teachers make it a point to maintain program ideas and content in their classes. While low level teachers see Earthkeepers and environmental learning as topics entirely separate from the state mandated standards and curriculum and therefore yet another topic to be addressed, the high level teachers view state standards and testing in a much different light. As these teachers have had extensive time and experience teaching, they are more able to see connections between the standards and the follow-through, and instead view environmental learning as a way to enhance and connect their overall curriculum. In doing so, they model the importance they feel towards the program in the hopes these ideals and values gets passed on to their students as well as the belief that the environmental is a topic that permeates all facets of their education and lives.

Program Completion

There were substantial differences in the program completion rates for students in the classrooms with high or low implementation of follow-through. In the classrooms of the teachers with high level follow-through, almost all students (98%) completed the lessening impact portion of the program to earn the Y key, and most (78%) completed the sharing component and earned the S key. In contrast, those in the classrooms of teachers with little follow-through has much lower program completion rates, 44% for the Y key and 29% for the S key.

CONCLUSIONS

This descriptive study provided a picture of what really happens in classrooms following out-of-school experiences—with some teachers serving as ideal examples, and other teachers serving as examples of what changes could be made, and the responses of their students. As seen through these descriptions, there is a wide variety of types and amounts of follow-through that are being carried out back in the classroom, each with their own unique activities, emphases, and expectations. When teachers made it clear that carrying on the lessons and ideas was an important one, it seems that the students noticed, as shown by the greatly increased completion rates. Teachers did not want students to view the Earthkeepers experience as being over or as a one-time event. Instead, the lessons learned from the field trip in combination with in-depth teacher follow-through encouraged greater participation and extension of overall program goals over the long-term.

However, the teachers who did not do much follow-through highlight the importance and necessity for more attention to be paid to follow-through support by program developers and providers. It is simply not enough to provide teachers with activities. It is not that these teachers lacked the desire to carry out more follow-through. What they lacked was the knowledge and support to do so as well as a vision of how to better incorporate the ideals of the program over the long-term. Therefore, professional development, supplementary lesson-plans demonstrating curriculum integration, in-class assistance, and even teacher-to-teacher mentoring can provide the support these teachers need in order to best imbed and continue program goals in the classroom and realize the program's long term potential. As seen with these results and other studies (DeWitt & Storksdieck, 2008, Farmer & Wolf, 1995; Rudmann, 1994; Smith-Sebasto & Cavern, 2006), if programs and teachers want to make

a powerful impact on student learning, more attention needs to be paid to follow-through.

There remains a need for more research to better quantify the correlation between follow-through and achievement of program goals, both short-term and long-term. Further, the actual types and amounts of follow-through should be examined for impact, as well as their use with different environmental education programs.

REFERENCES

- Anderson, D., Lucas, K. B., Ginns, I. S., & Dierking, L. D. (2000). Development of knowledge about electricity and magnetism during a visit to a science museum and related post-visit activities. *Science Education*, 84, 658–679.
- Bracey, G. W. (1995). Getting the most from field trips. *Phi Delta Kappan*, 76(7), 567–568.
- Buchanan, H. (1992). *ESL Field-trips: Maximizing the experience both in and out of the classroom* (Unpublished master's thesis). Brattleboro, VT: School for International Training.
- Carlson, S. (2008). Environmental field days: Recommendations for best practices. *Applied Environmental Education & Communication*, 7(3), 94–105.
- Connolly, R., Groome, M., Sheppard, K., & Stroud, N. (2006). Tips from the Field. *The Science Teacher*, 73(1), 42–45.
- DeWitt, J., & Storksdieck, M. (2008). A short review of school field trips: Key findings from the past and implications for the future. *Visitor Studies*, 11(2), 181–197.
- Falk, J., & Dierking, L. (2010). The 95 percent solution: School is not where most Americans learn most of their science. *American Scientist*, 98(6), 486.
- Farmer, A. & Wolf, J. (1995). Field trips and follow-up activities: Fourth graders in a public garden. *Journal of Environmental Education*, 58(3), 33–42.
- Farmer, J., Knapp, D., & Benson, G. (2007). An elementary school environmental education field trip: Long-term effects on ecological and environmental knowledge and attitude development. *Journal of Environmental Education*, 58(3), 33–42.
- Hamilton-Ekeke, J. T. (2007). Relative effectiveness of expository and field trip methods of teaching on students' achievement in ecology. *International Journal of Science Education*, 29(15), 1869–1889.
- Hofstein, A., & Rosenfeld, S. (1996). Bridging the gap between formal and informal science learning. *Studies in Science Education*, 28(1), 87–112.

- Jarvis, T., & Pell, A. (2005). Factors influencing elementary school children's attitudes toward science before, during, and after a visit to the UK National Space Centre. *Journal of Research in Science Teaching*, 42(1), 53–83.
- Johnson, B. (2003). A programmatic approach: Purposeful experiences. *Zeitschrift Fur Erlebnispädagogik* [Journal of Earth Education], 5/6, 14–22.
- Kiesel, J. (2006). Creating meaningful field trips. *Science Activities*, 43(2), 7–10.
- Knapp, D. (2000). The Thessaloniki Declaration: A wake-up call for environmental education? *Journal of Environmental Education*, 31(3), 32–39.
- Knapp, D., & Barrie, E. (2001). Content evaluation of an environmental science field trip. *Journal of Science Education and Technology*, 10(4), 351–357.
- McClarnon, C. (2003). *Enhancing learning with pre- and post-field trip experiences* (Unpublished master's thesis). Vancouver, British Columbia, Canada, Royal Roads University.
- McLoughlin, A. (2004). Engineering active and effective field trips. *The Clearing House*, 77(1), 160–163.
- Orion, N. (1993). A model for the development and implementation of field trips as an integral part of the science curriculum. *School Science & Mathematics*, 9(6), 325–332.
- Orion, N., & Hofstein, A. (1994). Factors that influence learning during a scientific field trip in a natural environment. *Journal of Research in Science Teaching*, 32(10), 1097–1119.
- Rennie, L. J., & McClafferty, T. P. (1996). Science centres and science learning. *Studies in Science Learning*, 27(1), 53–98.
- Rudmann, C. L. (1994). A review of the use and implementation of science field trips. *School Science and Mathematics*, 94(3), 138–141.
- Smith-Sebasto, N. J., & Cavern, L. (2006). Effects of pre- and posttrip activities associated with a residential environmental education experience on students' attitudes toward the environment. *Journal of Environmental Education*, 37(4), 3–17.
- Tal, R. (2001). Incorporating field trips as science learning environment enrichment—An interpretive study. *Learning Environments Research*, 4, 25–49.
- Van Matre, S. (1990). *Earth education, a new beginning*. Greenville, WV: The Institute for Earth Education.
- Van Matre, S., & Johnson, B. (1998). *Earthkeepers*. Greenville, WV: The Institute for Earth Education.