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A Review of Research on School Field Trips and Their Value in Education

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The purpose of this paper is to examine the importance of science field trips as educational tools to connect students to classroom concepts. Experiential learning at formal and informal field trip venues increases student interest, knowledge, and motivation. The teacher's role in preplanning, implementation, and reflection often dictates the impact that the field trip will have on students. Science teacher education programs do not traditionally instruct preservice teachers how to plan or coordinate a field trip. Once teachers are empowered and learn how to develop and orchestrate a successful field trip, they will enable students to develop interest in science, which may lead to improved learning or improved science literacy. Because some school systems are limiting science field trips, this paper concludes by examining inexpensive or cost-free field trip ideas.

Keywords: experiential learning, informal learning, field trip, professional development, interest in science, science teacher education

Introduction

Students who directly participate during a field experience generate a more positive attitude about the subject. Many researchers have investigated knowledge gain and learning that occurred during field trips (Hudak, 2003; Kisiel, 2006a; Mawdsley, 1999; Michie, 1998; Nadelson & Jordan, 2012; Scarce, 1997; Scribner-MacLean & Kennedy, 2007). Research by Cwikla, Lasalle, & Wilner (2009) suggested that eighth grade students with an interest in science were significantly more likely to acquire science related careers than students with no interest in science. Yet, science is often limited in elementary school curricula despite the recognized importance of early development of science concepts and skills (Fries-Gaither & Lightle, 2011). Teachers are in position to motivate and capture students' interest in the sciences. Effective

methods to develop student interest include experiential activities and field trips, which create authentic learning opportunities for students, regardless of the content area. However,experiential activities and field trips do not simply happen, teachers need to understand that such activities require organization, planning, and student reflection to maximize the learning experience, the same as classroom-based experiential learning. The purpose of this paper is to examine literature concerning experiential learning activities and field trips, focusing on science-related field trips and the role of the classroom teacher prior to, during and after the field experience.

Field Trips

A field trip, which may also be termed as an instructional trip, school excursion, or school journey, is defined by Krepel and Duvall (1981) to be a school or class trip with an educational intent, in which students interact with the setting, displays, and exhibits to gain an experiential connection to the ideas, concepts, and subject matter. Tal and Morag (2009) described field trips as student experiences outside of the classroom at interactive locations designed for educational purposes.

> Field trips may be planned for five purposes:
> 1) To provide firsthand experience,
> 2) To stimulate interest and motivation in science,
> 3) To add relevance to learning and interrelationships,
> 4) To strengthen observation and perception skills, and
> 5) To promote personal (social) development (Michie, 1998).

Field trips take students to locations that are unique and cannot be duplicated in the classroom. Each student observes natural settings and creates personally relevant meaning to the experience. Interactive exhibits help students play with concepts, activities often not possible in the classroom. Earlier course content suddenly becomes relevant as students assimilate and accommodate new understanding and cognition (Lei, 2010a). The connection between the field trip venue and the classroom links the field trip's experiential learning with prior experiences and learning from the classroom (Lei, 2010b).

To save money and time from preparation and traveling, some instructors choose to simply use the school computers and take digital field trips. Options are plentiful and students no doubt learn from the digital experience, but students only experience what the media thinks is important, and the students do not encounter a multidimensional activity in which all their senses are fully involved (National Research Council (NRC), 2009). In contrast, field trips are experiential, authentic social events that create a new way of knowing an object, concept, or operation (Scarce, 1997). Quality experiences lead to deeper learning and interest development (NRC, 2009).

Kinds of Field Trips

Formal field trips consist of planned, well-orchestrated experiences where students follow a documented format. Government agencies, museums, and businesses offer excellent formal experiential learning activities and programs, which are usually run by the venue's staff. One student's experience is essentially the same as any other student's experience. Teachers find such programs comfortable because the students are bound to a choreographed agenda. However, there are minimal opportunities for students to personally interact and connect to the experience (Rennie, 2007).

Informal field trips are less structured and offer students some control and choice concerning their activities or environment. When observing students interacting in an informal education setting such as a science center or field station, teachers are often amazed by

how much students know and which students possess the most knowledge (Rennie, 2007). Informal education is a legitimate cognitive learning model. "Informal science experiences - in school-based field trips, student projects, community based science youth programs, casual visits to informal learning settings, and press and electronic media can be effectively used to advance science learning" (Hofstein & Rosenfeld, 1996, p. 106). Students feel at ease in an informal learning environment. The focus may be individualized, activities are not competitive or assessed, interaction is voluntary and unforced, and social interaction is encouraged. Together, these qualities create an intrinsically motivated student (Rennie, 2007) that encourages students to examine their connection to the local and national communities, as well as their connection to the local and global ecosystems (Krepel & Durral, 1981).

Non-school related informal field trips such as family activities, also contribute significantly to children's science knowledge (Rennie & McClafferty, 1995), although science knowledge and interest acquired at home may be compromised if the majority of experience occurs through the media such as television and the Internet, in which the children may have difficulty determining reality from entertainment.

Experiential Learning

It is important to understand experiential learning when discussing field trips. Experiential learning is authentic, first-hand, sensory-based learning. Experiential activities explore, touch, listen to, watch, move things, dissemble and reassemble. Learning consists of grasping an experience and then transforming it into an application or result (Kolb, 1983). The Association for Experiential Education defined experiential learning as a methodology in which educators direct students to a specific experience, and then guide the students through reflection to "increase knowledge, develop skills, clarify values, and develop people's capacity to contribute to their communities" (Association for Experiential Education, 2012, http://www.aee.org/about/whatIsEE). Experiential learning is not restricted to a certain age levels. Infants, toddlers, and growing children develop all their skills and knowledge through experience. Kolb (1983) described experiential learning using a spiraling four step cycle. A student has an experience. Reflection occurs as the student talks about the experience, and abstraction occurs as the student thinks about the experience. The student plans a new experience to test the new ideas, and the new experience takes place, and the cycle continues. Each time a cycle is completed, some learning has taken place. Although experiential learning appears to be simple, there are caveats to be considered. The learning process is not instant. Time is required to analyze and then synthesize a concept that accommodates into an already established knowledge pool. Experiential learning is not one dimensional. A learned concept will integrate with all previous knowledge. A student with many connections concerning a subject will accommodate new knowledge faster and with greater clarity (Kisiel, 2006a).

Experiential activities should play a significant, beneficial role in any science classroom. NRC (2009) illustrated that students who acquire hands-on, authentic experience may develop curiosity and interest, leading to a desire to learn more.Observation skills improve. Social skills develop as the students share perceptions and knowledge with others. Students may begin to look forward to classes and connect previous knowledge and experiences with the new concepts. A strengthened interest in science may lead the student onto a science related career path or establish higher quality scientific literacy. Teachers also gain many benefits. Students are interested and motivated, permitting the instruction to rise to new and higher levels. Students who are interested and alert in class will learn the concepts, thus standardized test scores may improve.

When learning is discussed, it is most often assumed to occur in the formal classroom setting. Learning is contextualized, affected by motivation, expectation, prior knowledge, experience, prior interests, beliefs, control, and choice (NRC, 2009). Learning requires time to

construct meaningful understanding (Kolb, 1983). According to Kolb's (1983) learning cycle, learning experientially requires the learner to have an experience and then reflect, analyze, and test the idea to develop knowledge and to create another experience.Teachers often use this learning format in the formal classroom through labs and projects. Informal experiential learning can be an equally powerful learning tool with unique virtues. Attendance and involvement are voluntary or free choice, the curriculum is varied, the learning opportunities are neither competitive nor evaluative, all ages may participate at any given time, and the effort is learner motivated (NRC, 2009; Rennie, 2007). Formal educators might consider increasing student interaction by adding informal learning opportunities to reinforce classroom knowledge and allow students to assimilate and accommodate experiences to their classroom knowledge. An informal education venue can be a valuable resource that reinforces classroom pedagogy (Nabors, Edwards, & Murray, 2009).

A field trip with a single focus will provide a potential impact to students' cognitive skills, knowledge, interests, and future career (Hutson, Cooper, & Talbert, 2011). This may be particularly true for students who are academically challenged or described as 'at risk' due to low performance on high-stakes tests or performance in the classroom. Field trips offer a unique opportunity for students to create connections, which will help them gain understanding and develop an enjoyment of learning.

Students on field trips sharpen their skills of observation and perception by utilizing all their senses (Nabors et al., 2009). Students develop a positive attitude for learning, motivating them to develop connections between the theoretical concepts in the classroom and what has been experienced (Falk, Martin,&Balling, 1978; Hudak, 2003). Outdoor field trips provide an opportunity for students to develop increased perception, a greater vocabulary, and an increased interest in the outdoors (Hoisington, Savleski, & DeCosta, 2010). Developed interest stimulates curiosity, empowering students to ask questions, discuss observations, consider past experiences, or simply ponder the topic (Farmer, Knapp, & Benton, 2007b; NRC, 2009). When on a field trip, the venue is not the only location that affects students, they also gain knowledge and understanding about their neighborhoods and communities as they travelfrom the school to the field trip venue (Nabors et al., 2009).

Personal connections are important in environmental curricula, not only because students gain understanding through the connections, but also by developing emotional connections to the subject matter. Increasing awareness and care lead to increasing passion for the subject matter, no matter whether it concerns the environment, animals, or a social situation (Tal, 2004b; Tal & Morag, 2009; Variano & Taylor, 2006). With increased interest or passion, learning is promoted as students conduct deeper observations, give in to curiosity and conduct simple investigations, discuss the subject matter with peers and teachers, and construct more abstract connections (Falk and Dierking, 2000).

The majority of field trips occur during the school day, but extended field trips provide another option. Overnight field trips promote social growth for participating students by encouraging positive interactions among the students, teachers, and chaperones. Students experience independence away from home and the classroom. Some students will develop with the freedom, but others may possibly need emotional support and well defined limits (Pace & Tesi, 2004). Field trips, especially overnight experiences, also benefit teachers. Dillon et al. (2005) noted that teacher and student relationships develop or improve, and teachers may gain new perspectives and ideas of how to teach the subject matter in a more experiential manner.

Benefits from field trips are not guaranteed. Field trips are not meant to be short term teaching instruments. Students may acquire short term learning, but without reinforcement from reflection or debriefing, the learning or interest development may only be temporary. Short term memory does not constitute learning (Dierking & Falk, 1997). In contrast, Farmer, Knapp, and Benton (2007a) suggested that one year after a well-orchestrated field trip experience, many

students remembered what they had seen and heard, and displayed a newly developed pro-science attitude.

Barriers and Negative Effects

Field trip venues such as museums and zoos present problems that need recognized. Flashy exhibits and fancy displays often obscure the real science within the exhibit. Displays may have sloppy or poorly worded explanations that yield no learning potential. Ethical dimensions of the subject matter are sometimes ignored or glossed over. Science might be portrayed as easy and unproblematic, omitting any reference to failures and issues experienced by the scientists during research and discovery, thereby failing to communicate the scientific process or communication of scientific thought, and focusing on conclusions rather than the journey or process involved to make the discoveries (Rennie 2007). Michie (1998) identified seven barriers to successful field trips: 1) transportation; 2) teacher training and experience; 3) time issues such as school schedule and teacher's ability to prepare; 4) lack of school administrator support for field trips; 5) curriculum inflexibility; 6) poor student behavior and attitudes; and 7) lack of venue options. Finding time for the trip and making arrangements for students who cannot make the trip adds tasks to an already busy teacher schedule (Mawdsley, 1999; Scarce, 1997). Teachers need to determine the logistics to transport students. Large introductory classes present unique challenges due to the need of larger transportation facilities, safety issues, more student logistical planning, and time lost trying to organize the large group (Hudak, 2003).

It is imperative that the teacher prepares the students for the field trip in order to maintain a level of control that will allow for learning to occur when the class arrives at the venue (Ewert, 2009). Kalvaitis (2007) suggested that often,a teacher's biggest fearis losing control of the students once at the field trip location. Upon arrival at a field trip venue, students are often disoriented resulting in excited, explorative, and unrestrained behavior (Falk et al., 1978). The teacher should be prepared to focus the students' mental and physical energy towards participation at the venue (Lei, 2010).

Pedagogy and Role of the Teacher

Teachers have little training or pedagogical knowledge relating to the process of field trip planning and preparation **(**Michie, 1998; Tal and Morag, 2009). Preservice teachers experience a field trip during each clinical classroom observational visit, and it is not unusual if the preservice teacher went on a field trip during clinical classroom observations or student teaching. In spite of these many field experiences, preservice teachers generally are not taught the pedagogy or methods necessary to plan and orchestrate a field trip (Kisiel, 2006b; Tal, 2004). Anderson, Lawson, and Mayer-Smith (2006) illustrated that preservice teachers who gain field experience at a non-school venue gain a more functional, applicable view of constructivist education and teaching skills. For this reason, teacher education programs should include experiential education, and field trip preparation and implementation for all preservice teachers, who need to understand their responsibilities and role before, during and after a field trip (Tal & Morag, 2009).

According to Tal and Steiner (2010), teachers tend to fall into one of three patterns while on a field trip:1) Teachers are involved and participate in all the preparation and field trip activities;2) If the field trip is one that has occurred regularly over the years, school tradition may dictate that teachers follow an established routine, which may or may not be participatory;3) Passive teachers do not participate with the students during the experience. For example, a teachermay rely completely on the school administration to set up a field trip,the teachermay not personally communicate with or visit the venue, or during the field trip, the teacher disassociates from the field trip activities.

Just as professional development is necessary to train teachers how to present a new curriculum, professional development focusing upon field trips would help teachers understand the necessity of preplanning, participation, and student reflection (Dori & Herscovitz, 2005). Experience in planning and attending field trips is important for both teachers and students. The teachers need understand how to prepare and teach the students to learn out of the classroom., because the novelty of informal learning is a distraction to students who are unaccustomed to attending field trips or non-classroom settings.

Before the field trip. The teacher should visit the venue prior to the field trip, to learn the layout of the venue and determine whether the venue is suitable for all the students. Religious beliefs, for example, may require a realignment of the activities or development of a differentiated plan for the concerned students. During the student orientation prior to the field trip, the teacher should prepare students by describing the venue and its layout. The students should understand the focus or purpose of the experience, through a lesson designed to prepare a conceptual foundation on which the students may connect their experiences (Pace, 2004; Rennie, 2007). Orion and Hofstein (1994) cited three variables that prepare students for field trips: understanding the venue layout, the focus of the activities, and being prepared to be in an open, informal venue, what the authors call "novelty space." Reduction of the novelty space would enhance learning during the field trip. Prepared students know behavior expectations, increase interaction with the exhibits and look for the connections between the exhibits and classroom concepts.The school's science curriculum should connect to the venue and its focus. There is little question that a field trip is a valuable experience for the students, but it is important that the teacher connect the students' experiences on the trip with concepts and lessons taught in the classroom. The field trip should not be a stand-alone experience (Kisiel, 2006a).

During the field trip. As the field trip begins, the teacher may need to help some students become comfortable in the new environment. As activities begin, the teacher should be prepared to interpret the venue's program leader's commentary to any unfocused or confused students (Rennie& McClafferty, 1995). During the field trip, students experience learning in an authentic, informal, natural setting. Each student's prior knowledge, gained both from the classroom and from their personal out-of-school experiences, is used to make connections to the field trip experience (Pasquier & Narguizian, 2006). The teacher should keep the students engaged. The venue's staff should work in concert with the teacher to help students make connections between the experience and the concepts involved. Generally it is the venue's staff's duty to keep the activities interesting.

Teachers often utilize worksheets to help students focus on exploring and learning the targeted concepts. Worksheets are quite effective when one worksheet is given to a small group, in which the students are better observers, interact more frequently, discuss the concepts, and ultimately develop more connections between the concepts and the experience (Kisiel, 2003; Rennie, 2007). Simple fill-in-the-blank task completion worksheetsare not effective, when every student is responsible for his or her own data, where the focus is solely to fill in the data and not to explore or participate in activities (Kisiel, 2003).

Students respond to a field trip in a variety of ways. Average students may suddenly reveal a never seen before level of excitement, focus, and inquiry (Hefferan, Heywood, & Ritte, 2002). Conversely, some students known for strong classroom performances might be less proficient in the field and may or may not enjoy the challenge to succeed in the new, informal environment. Each student is unique and each field experience is unique, so that every field experience will result in many different academic, cognitive, and social gains (Rennie, 2007). Student prior knowledge and experience define the cognitive foundation onto which new connections can be made (NRC, 2009). If done properly, students will build long term memories of the field trip experiences, especially among high school and college students (Wilson, 2011).

***After the field trip*.** The teacher's actions after the field trip are very important. The students' experiences need to be reinforced through discussion, activities, reading, a television show or movie (Falk & Dierking, 2000; Kisiel, 2006a; Orion & Hofstein, 1994; Pace & Tesi, 2004; Tal & Steiner, 2006). Students need to solidify their new ideas and observations which have not yet made connections. Reflection will help build those connections, as well as reinforce the successful connections already made on the trip. Students generate greater understanding as teachers develop potential connections through reflection (Kisiel, 2006a). Students should discuss their observations and experiences, and in the case of elementary grades, create presentations to share with their classmates. During the remainder of the school year, the teacher should connect new classroom concepts to the students' field trip experiences (Rennie & McClafferty, 1995). In Tal & Steiner's (2006) examination of teacher's roles during field trips to museums, neither elementary nor secondary grade level teachers carried out quality post-visit activities. Teachers must recognize the importance of post field trip reflection and debriefing to maximize student interest and learning.

Teacher Engagement During Experiential Learning

Once teachers are empowered and learn how to develop and orchestrate a successful field trip, they will be more inclined to schedule field trips (Tal & Morag, 2009). Ferry (1993) noted that preservice teachers, reluctant at first, gained an increased desire to participate with informal, experiential lessons after receiving instruction about field trip pedagogy (Ferry 1993). Teachers and community experts should meet and develop a working relationship that would enable teachers to consider local field trips as viable options for curriculum differentiation (Michie, 1998).

Ellenbogen, Luke, and Dierking (2004) provided five suggestions to empower teachers to forge stronger links between formal science education and informal, free-choice learning:

1. Opportunities to learn from local and media resources should be investigated and considered.
2. Effective field trips should be an integral part of every science program.
3. Teachers should investigate local resources, such as museums.
4. Teachers should help local resources understand and interface the curriculum and standards with the resource programming.
5. The local resources need to communicate important issues with the teachers.

According to a zoo staff member, a school field trip was most effective when it was led by a teacher who was trained at a zoo sponsored teacher workshop. The trained teachers understood the necessity for preplanning and preparing the students about concepts that would be explored (Rennie & McClafferty, 1995). Conversely, in spite of research and literature suggesting otherwise, most teachers assigned tasks or worksheets and made little effort to connect the exhibit's theme to what was being studied in the classroom (Griffin & Symington, 1997). The teachers have to believe the field trip is an important aspect of the students' experience if the trip is to be a success (Shireen & Czerniak, 2003).

Teachers should plan and manage the field trip so that once the students are oriented and on task, they have the freedom to explore their own interests. An inquiry based strategy allows students to connect classroom concepts to field trip experiences. Students learn to explore for answers to their questions, rather than rely on the teacher or venue's staff member. Students should learn to develop questions to stimulate personal curiosity and interest while on the field trip.

The teacher should participate where appropriate, to model how the students and chaperones are expected to behave and be engage in the activities (Snyder, 1994). Too often, the teacher hands the class over to the venue leader, and then stands back to talk or relax. The teacher should model the behavior that is expected from the students. The teacher should remain connected with the well-prepared students, but allow them to experience the activities, being available to answer questions and offer direction when needed.

If the chaperones are to participate or lead an activity, they require training before the field trip. The teacher needs to orient all the chaperones, describing the venue, the expectations of the students, and the expectations of the chaperones. Once at the venue, even though the majority of the activities are the responsibility of the venue's exhibits or staff members, the teacher is ultimately responsible for all that happens, so the teacher needs to maintain control of the students and chaperones (Kisiel, 2006b).

Student Engagement During Experiential Learning

Students find outdoor learning activities to be realistic, interesting and interactive, although it is not surprising that students who prefer to be indoors often prefer to avoid the outdoor climatic conditions (Hudak, 2003). But to maximize connections with past knowledge and classroom concepts, students still need somebody to discuss those connections. A method to connect concepts to experiences is through the immediate social network. Students may peer teach, explain what to look for or how to complete a task, read placards and signs to each other, and discuss their personal understanding of what they are experiencing. Rennie (2007) observed that quite often the students who stepped out as peer instructors have been students who performed poorly in class.

Conclusion

The outcome of an experience depends on a person's interests, motivation, life circumstances at that time, needs, and prior experiences and knowledge (Rennie, 2007). Field trips offer an opportunity to motivate and connect students to appreciate and understand classroom concepts, which increase a student's knowledge foundation, promoting further learning and higher level thinking strategies. With understanding comes confidence and intrinsic motivation.

A successful and quality field trip requires teacher preparation and interaction. Some factors should be addressed before the trip. The experience needs to be planned. The teacher should previsit the venue to meet the staff and arrange the activities, and then prepare the students by orienting them to the venue's layout, activities, and expectations. Student groupings should be set up prior to arrival at the venue. Chaperones need to be trained. The trip needs to connect to the curriculum, students should be actively engaged, and all students should be able to take part in the trip regardless of financial, physical or intellectual status. Teachers need to consider safety issues and should prepare to embrace the unexpected.

On the day of the field trip, the teacher may hand the program to the venue's staff, but the teacher should remain involved, participating with the activities and guiding students when necessary. Perhaps the teacher's most difficult task is to allow the students freedom to experience the activities. Back at the classroom, it is imperative that the teacher spend sufficient and quality time to reflect on the experiences and help students build connections to the curriculum concepts. All aspects of the trip's success are directly or indirectly dependent on the teacher (Millan, 1995).

Field trips have become less common due to limited funding and limited available time due to each school systems' focus on standardized testing. Non-traditional field trips are still quite possible. Campus field trips provide a cost-free alternative, while retaining the benefits of traditional field trips. Outside, students might explore around the school grounds, focused on a specific topic or concept. In the classroom, students might create their own classroom museum exhibits, or a local university or science museum might share mobile exhibits with the school. No

matter whether the school is urban, suburban, or rural, ecology is everywhere (Lei, 2010). There is much to be learned from a vacant lot, the edge of a parking lot, a puddle, or a bush. Field trips can stimulate new learning, increased attitude towards science, trigger interest development, and provide many rewards to both the teacher and the students (Scarce, 1997).

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