Factors that Influence Student's Satisfaction in an Environmental Field Day Experience^{*}

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Abstract

A field trip is a common strategy used by educators to bring out-of-school learning experience into schools. Many research studies suggest a field trip will not only bring an individual close to the real-world, but may also increase an individual's environmental knowledge and responsible behaviors. Program evaluations usually focus on the predetermined outcomes, such as increasing environmental knowledge and responsible behaviors, which were decided by environmental educators and programmer planners. It is known that positive emotions help promote creativity and attention for learners. This paper suggests that increased satisfaction on student field trip experiences, leads to the achievement of programs predetermined goals and outcomes. This study focuses on investigating the factors that influence students' satisfaction in a field day experience. In this study, we found that presenters, social content, and learning related condition are critical criteria to improve students' satisfaction in a field day experiences.

Keywords: Environmental education, field trip, out-of-school, satisfaction, confirmatory factor analysis.

Introduction

Environmental educators are aware of the importance of bringing real-world experiences to their teaching. Also, a lot of research studies suggest that students must integrate in-school environmental literacy with out-of-school natural world experiences (Dori, 2000; National Research Council, 1996; Tonye, 1993). A field trip becomes the most common strategies, which is used



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by most school teachers, to bridge student's environmental knowledge with real-world experience. For example, over 10,000 4th- to 6th-grade students participate in Environmental Field Day in each academic year in Minnesota (Carlson, 2008). Environmental field day not only provides various learning opportunities in different subjects, such as biology, chemistry, and wildlife and natural resource conservation, but also is a place that can bring students close to the natural world. Normally, these field day events require significant investments, such as time, people, and money. Therefore, having program evaluations to improve effectiveness of a field day is necessary. Educators and politicians are often concern that program planners will waste money (Benninga, Berkowitz, Kuehn & Smith, 2006) and not be able to achieve predetermined learning outcomes, such as increasing knowledge and promoting environmental friendly attitudes and behavior (Barney, Mintzes, & Yen, 2005; DiEnno & Hilton, 2005; Farmer, Knapp, & Benton, 2007; Goth & 2004; Knapp & Barrie. 2001;). Therefore, in most existing Hall, environmental education studies, program evaluation primarily focuses on educational intervention (Rickinson, 2001). Students play a less active role in terms of expressing their experience in a field trip.

Rickinson (2001) suggests when applied to students' learning in a field trip, program evaluations should consider what students want to say. However, the research studies that explore student's feelings and experience in a field trip are limited. In other words, most field trip evaluations rarely consider what students' are 'feelings' in a field trip program. In the field of educational physiology, a lot of research studies support that emotions change people's thoughts, actions, and physiological responses (Bolte, Goschke & Kuhl, 2003; Fredrickson, 1998; Isen, Rosenzweig & Young, 1991; Park, 2008). The research study from Seligman, Ernst, Gillham, Reivich and Linkins (2009) suggests that positive moods help facilitate students' engagement in learning and achievement. In other words, if students have positive feelings on a field trip, such as joy, interests, love, and satisfaction, the field trip is more likely to achieve its predetermined learning goals.

In this study, we investigated the factors that influence students' satisfaction in a field day experience. Field day and field trip are used synonymous in this paper.

Literature Review

There has been an increase interest in schools to use field trip as part of environmental education programs (Knapp & Benton, 2006; Storksdieck, 2006, Stern, Powell & Ardoin, 2008). Field trip helps students enhance their learning experience and knowledge. Hmelo-Silver, Marathe and Liu (2007) pointed out that rigorous school textbooks, cannot provide a dynamic and interactive learning experience to students when teaching students about what a natural system is and an ecological phenomena. A quality field trip program, which includes pre-visit activities, a field trip, and post-visit activities, can also enhance students' scientific literacy and communication skills in a very young age, such as kindergarten and first grade students (Gostev & Michaelides Weiss, 2007). However, few research studies with older students have focused on how student evaluate their field trip experiences.

Some literature suggested that a meaningful field trip should address student's educational need, or be base on school curriculum, or state standards (Carlson, 2008; Nabors, Edwards, & Murray, 2009; Orion & Hofstein, 1994). However, when James and Bixler (2008) asked 4th- and 5thgrade gifted students what makes a meaningful field trip, the answer was either addressing student's educational need, or the state standards and school curriculum. They found that students think a meaningful field trip should connect to their personal experience suggesting that students hold the key to meaningful field trips. Orion and Hofstein (1994) suggested high quality and novelty are two important factors that influence student's learning on field trips. In order to have a high quality field trip, environmental educators and program planners should consider the quality of learning materials, structure, and teaching and learning strategies (Orion & Hofstein, 1994).

On the other hand, it is a common belief that certainly moments in people's lives characterized by experiences of positive emotions, such as joy, interests, love, and satisfaction (Fredrickson, 1998; 2001), have the ability to broaden people's momentary thoughts-action repertoires. Fredrickson suggested "joy, for instance, broadens by creating the urge to play, push the limits to be creative" (Fredrickson, 2001). Research focused on student's field trip learning experiences suggested that affective perception and social interaction with others has a strong influence in creating a meaningful field trip experience. For example, Cline's (1996) study suggested that students emphasized the importance of social interactions with others on a field trip. Jones and his colleagues (1994) also suggested that the most memorable things for students were related to social and environmental factors, such as friends, night hikes, black flies, and campfires. These studies pointed out the salient things that students remembered the most, such as a party, hiking and campfires, were not only the things that they did with others, but also involved their affective perception, such as happy, afraid, likes and dislikes. These research studies suggest that affective perception and social interaction are important factors to consider in providing a meaningful field trip experience for students.

Method

This study was conducted at the eleventh annual Metro Children's Water Festival (MCWF). The MCWF was held at the Minnesota State Fairground on September, 2008. The setting included both indoor and outdoor activities where thirty one learning stations were set up. Each station had a theme that was relevant to water. All the learning stations were designed to provide students with hands-on, mind-on learning experiences. Most of the volunteer instructors in MCWF were scientists who work for State or Federal agencies, nonprofit organizations, or the University Extension. Each instructor had approximately thirty minutes to deliver his or her programs to twenty-five to thirty students. After thirty minutes, classes rotated from stations to stations. The sequence of the rotation for the learning stations and classes were assigned by the MCWF planning crews. During the days, one class visited five to six learning stations, and a one hour large group presentation. Although there were thirty learning stations at the MCWF, a class visited less than 25% of them.

Participants:

There were close to 1,200 fifth grade students, sixteen schools, 44 different classes from each of the seven Metropolitan counties in Minnesota attended MCWF. Although MCWF had approximately 1,200 participants, 841 valid surveys (89%) were returned within a week of the field day.

Instrument and Analysis:

The student's instrument was originally designed for another purpose, to test the validity of a field day observation tool. This was done by triangulating the data from the student survey with the observation tool (Carlson, Storksdieck & Heimlich, accepted 2011). The observation tool looked at 7 components of a field day that were supported in both the literature and through a Modified Delphi method with a team of 40 experts (Heimlich, Carlson, Tanner & Storksdieck, accepted 2010). The student survey questions were developed from the Instructor/Presentation and Audience Engagement components of the Delphi. Each item on the student survey had at least 2 questions that try to answer the construct. The tool was approved by IRB and appropriate forms were sent to principals, teachers and parents. The secondary use of the student's tool was to identity factors and model learning in field day programs. This secondary data from the student's survey was used to validate the relationship of the satisfaction constructs found in informal learning environments.

The survey contained forty-three multiple choice items and four openended essay questions. The student survey intended to measure three different dimensions, 1) MCWF learning objective, 2) overall field day experience, and 3) student content knowledge. The survey had twelve multiple choice items that measured learning objectives for MCWF, and had thirty-one multiple choice items that assessed the overall field day experience. The last part of survey had four open-ended essay questions to evaluate students' content knowledge. For the purpose of this study, only the second part of the student's survey, overall field day experience, was analyzed. After students filled out the MCWF student survey, school teachers mailed the surveys back to the researcher.

Instrument Design and Analysis

Thirty-one multiple choice items were designed to measure the overall field day experience. These survey items were on a five point Likert scales. Based on the purpose of the items, there were three sets of scales on a one to five rating for students' level of agreement or disagreement. The three sets of coding were 1) 1= strongly disagree, and 5=strongly agree; 2) 1= never, and 5= all of the time; and 3) 1= no way, and 5= oh yeah. However, there were six items that were reversed or using negative expressions that were randomly inserted in the survey. These items seemed to have cause confusions for fifth grade students. For example, the question, I felt there was nothing for me to do at the station, had a crying face to represent the scale of all of the time and a big smiley face to represent the scale of never. This seemed to confuse the students and the data bore this out so we exclude the reverse items.

We conducted reliability coefficient for the rest of the twenty-five items. However, there were four items that had less than 0.2 corrected itemcorrelation with other items and were excluded. These four items were 'At the learning stations, I knew what would happen', 'I got to do, hear or see things that I already knew', 'the Water Festival felt like being in school', and 'I enjoyed being away from school'. The item that had the highest correlation is 'I will recommend the Water Festival to a friend (0.767)' and the item had the lowest correlation is 'I had a chance to ask my questions (0.258)'. (Appendix A)

Based on our hypothesis, we categorized the rest of the twenty-one items into four subscales, satisfaction, presenter, social content, and learning related conduction (Appendix A). We ran a reliability coefficient for these four subscales. After we acquired the internal consistency of each subscale, we conducted confirmatory factor analysis to identify if these factors exist independently.

Finally, we use multiple regression to learn more about the relationship between the four subscales. Both SPSS 1.60 and R, sem package were used to analyze our data.

Result

Subscales Internal Consistency:

The internal consistency of the four subscales was estimated by the Cronbach's α Reliability coefficient. The items measuring satisfaction had the best internal consistency ($\alpha = .917$). However, the rest of subscales displayed moderate reliability (Social content, $\alpha = .676$; Learning-related condition, $\alpha = .661$; Presenter, $\alpha = .626$).

Confirmatory Factor Analysis (CFA):

We conducted confirmatory factor analysis (CFA) to test the proposed factor structure. The four categories (subscales) to be measured through CFA were satisfaction, presenter, social content, and learning related condition. Based on our research question, the factors influence on student's satisfaction, we hypothesized that the presenter, social content, and learning related condition are independent variables and highly correlated with student's satisfaction. First, CFA was performed with four-factor model (satisfaction, presenter, social content and learning related condition scales). The result showed that four-factor model was not a goodness-of-fit (χ^2 (210) = 8055.1, RMSEA = .066,

Goodness-of-fit index = .90, NFI = .892, NNFI = .90, SRMR = .053, CFI = .913). However, the three-factor model (presenter, social content and learning related condition scales) was examined through CFA and showed a goodness-of-fit model (χ^2 (78) = 2518.1, RMSEA = .046, Goodness-of-fit index = .969, NFI = .932, NFFI = .942, SRMR = .036, CFI = .955). Table 1 presented the factor loadings and error for the three subscales. The corresponding items are positively and substantially loaded on presenter, social content and learning related condition. The CFA result suggests that presenter, social content and learning related condition independently exist in the survey. The item, "the presenters at the Water Festival were nice to me", had the highest factor loading in factor one. The item, 'kids in my class had fun at the stations", had highest factor loading in factor two. The highest factor loading item in the factor three was "I found the stations interesting". (Table 1)

Table 1.

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Subscale	Factor loading	Std Error
Factor 1: Presenter		
Presenter told us who they were	0.403	0.038
Presenter asked us questions that I could understand, even though I did not know the answer	0.404	0.039
I could hear and see the presenters at the stations	0.489	0.037
The presenters at the Water Festival knew a lot	0.597	0.037
The presenters at the Water Festival were nice to me	0.616	0.037
Factor 2: Social Content		
Kids in my class listened when they were supposed to	0.406	0.037
Kids in my class really got into the activities at the stations	0.749	0.033
Kids in my class had fun at the stations	0.764	0.033
Factor 3: Learning-Related Condition		
I had a chance to ask my questions	0.348	0.036
I learned something new at the stations	0.596	0.034
I paid attention at the stations	0.559	0.034
I found the stations interesting	0.715	0.033
I got to do, hear or see new things	0.614	0.034

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Multiple Regression:

A multiple regression was conducted to examine the relationship between satisfaction and the other three predictors. Table 2 summarized the statistics and the analysis results. The result showed all of the factors are positively and significantly correlated with satisfaction. The standardized coefficients result suggested that learning related condition may be a more important predictor ($\beta = 0.45$, p < .001) than either social content ($\beta = 0.27$, p < .001) or presenter ($\beta = 0.13$, p < .001) to predict student's satisfaction in a field trip experience. Overall, the three factor model was able to account for 54% of the variance in student's satisfaction at the Children Water Festival,[F(3, 837) = 328.69, p < .001].

Table 2.

The relationship between satisfaction and presenter, social content and learning related condition in correlation and multiple regression

Variable	Mean	Std	Correlations with Satisfaction	b	в
Satisfaction Presenter	$3.34 \\ 4.23$	$0.84 \\ 0.60$	0.528*	0.188*	0.134
Social Content Learning Related	$3.86 \\ 3.96$	$\begin{array}{c} 0.73 \\ 0.69 \end{array}$	0.582* 0.687*	0.308* 0.548*	$\begin{array}{c} 0.271 \\ 0.455 \end{array}$

**p* < .001

Discussion

One of the common indicators to evaluate a successful educational program is satisfaction. Student's satisfaction is often study in other field, such as on-line learning (So & Brush, 2008) and higher education course evaluation (Endres, Chowdhury, Frye & Hurtubs, 2009), but rarely can be found in a field trip's evaluation. So and Brush (2008) suggest that course structure and emotional support are two important factors that will lead to a successful on-line learning. In this study, over 50% of student's satisfaction in a field day experience was composed by three important factors, presenter, social content, and learning related conditions.

The finding suggests the presenter factor has positive correlation with student's satisfaction in a field trip. We suggest a high quality field trip should not only be concerned with learning materials, structure, and teaching and learning strategies (Orion & Hofstein, 1994), but also need to have presenters who are knowledgeable and friendly to implement educational programs to students.

On the other hand, the Contextual Model of Learning can be considered as a key theoretical framework to investigate learning within an informal setting (Falk & Dierking, 2000; Falk, & Storksdieck, 2005), such as a field trip. In the Contextual Model of learning, the sociocultural context is considered as one of the substantial components that engage learners to lean. Our finding suggests that a fun learning environment may intrigue learning behaviors between students with their peers. In other words, a positive learning environment where one arouses learner's positive emotions, such as a fun and interesting learning station in a field day, may be part of a fundamental cornerstone to building the sociocultural context. This finding of a fun or an interesting learning environment is also a critical factor to promote students' social interaction with their peers corresponds to Cline's (1996) and Jones and his colleagues' (1994) findings. As Fredrickson's "broaden-and-build" theory (1998, 2001) asserts that positive emotions not only build people's momentary experiences in social and physical behavior, but also support intellectual, cognitive and artistic behavior (Fredrickson, 2001; Isen, Daubman, & Nowicki, 1987, Isen, Rosenzweig, & Young , 1991), such as broadening student's attention (Bolt, Goschke, & Kuhl, 2003; Fredrickson & Branigan, 2005).

One of the critical criticisms that out-of-school educational program, such as a field trips face, is that some educators believe students only have fun, but learn nothing from the out-of-school experiences (Shortland, 1987; Wymer 1991). However, based on our findings and the literature, a meaningful field trip experience will occur when social interactions and positive environmental factors, such as a friendly and knowledgeable presenter, and an interesting learning station, are fulfilled. This paper argues that an interesting and fun learning station, well taught, is one of the most important factors which contribute to student's satisfaction. High satisfaction, leads to learning related behaviors, such as attention, engagement and creative student/presenter interactions. In other words, it results in field trip program planners and educators achieving their educational goals. From a student's perspective, the antecedent for learning is that students need to have fun and enjoy the field trip experience. So, in order to create a quality field trip experience, instructors and program planners should design a fun and interesting learning environment, and provide various opportunities for students to interact with both instructors and other students.

Conclusion

This study provides concrete evidence to support a fun or an interesting field trip experience relate to high satisfaction of students. Many research studies support that high satisfaction leads to positive motions which can promote predetermined learning outcomes, such as increasing learning interests, broadening attentions, and stimulating positive social interactions. This has been studied in on-line learning environments but this environment has limited connections to field trips. Therefore, in a informal learning environment, when a student has fun on a field day, he or she is more likely to transfer the field trip experience into a meaningful learning experience. This study also suggests that satisfaction plays a role in strengthening the dimensions of environmental citizenship and should be a key outcome for engaging young people. Because of the limits of this secondary data, we suggest further studies in order to explore additional factors that influence student's field trip experiences. We suggest first, more studies to investigate other variables that influence students' field day experience. For example, other than a knowledgeable, skillful and friendly instructor, social interactions and do and see new and interesting things, what other factors will increase student's attention during a field trip? In addition, what do students think a fun and interesting learning environment should look like? Last but not least, additional studies should verify the ways these factors interact with each other as reported on in this study.

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Biographical statements

Hui-Hui Wang is a graduate student in Science Education in the Department of Curriculum and Instruction at the University of Minnesota. Her research interests are across both nonformal and formal settings. Her research primary relates to inquiry-based instruction, STEM integration, and experimental learning in science education. She is also interested in developing STEM curriculum for both non-formal organizations and K-12 science teachers. E-mail: wangx773@umn.edu

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Appendix A. Categories of Survey Items and Correlation

Subscale	Item
	Correlation
Satisfaction Items	
1a. I enjoyed the presenters	0.580
1b. I love the things we did at the stations	0.651
1c. I enjoyed at the Water Festival	0.753
1d. I would recommend the Water Festival to a friend	0.767
1e. I would like to come back next year	0.731
1f. Other kids who did not come to the Water Festival would like the Water Festival	0.700
1g . The Water Festival was what I was hoping it to be	0.649
1h . I liked the water Festival	0.743
Presenter Items	
2a. Presenter told us who they were	0.286
2b. Presenters asked us questions that I could understand, even though I did not know the answer	0.296
2c. I could hear and see the presenters at the stations	0.271
2d. The presenters at the Water Festival knew a lot	0.450
2e. The presenters at the Water Festival were nice to me	0.489
Social Content Items	
3a. Kids in my class listened when they were supposed to	0.261
3b. Kids in my class really got into the activities at the	0.586
3c. Kids in my class had fun at the stations	0.628
Learning-Related Condition Items	
4a. I had a chance to ask my questions	0.258
4b. I learned something new at the stations	0.495
4c. I paid attention at the stations	0.427
4d . I found the stations interesting	0.718
4e. I got to do, hear or see new things	0.565

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