Using digital photography and journaling in evaluation of field-based environmental education programs

Nicole M. Ardoin [a,b,*], Maria DiGiano [c], Jennifer Bundy [a], Stephanie Chang [a], Nicole Holthuis [c], Kathleen O'Connor [a]

[a] Graduate School of Education, Stanford University, United States
[b] Woods Institute for the Environment, Stanford University, United States
[c] Independent Researcher, United States

ABSTRACT

Interest, curiosity, and engagement are critical intermediary outcomes in environmental education programs and initiatives, many of which ultimately work toward enhancing participants' environmental attitudes, knowledge, skills, and behaviors. Methods to measure the construct of "interest" in the context of environmental education have the potential to enhance program evaluation practices yet remain underdeveloped. Therefore, we investigated how situational interest was triggered among participants in an environmental education day camp and tested two participant-driven tools for exploring interest within this setting: digital photography and journaling. Findings suggest that several key domains of interest might be revealed by using photography and journaling concurrently and/or independently as evaluation tools. We discuss potential benefits and challenges of their use for evaluating environmental education programs.

© 2013 Elsevier Ltd. All rights reserved.

Introduction

In the field of environmental education, the desired outcomes and impacts of programs in formal and informal settings are often some form of environmentally related knowledge, attitudes, values, skills, and behaviors (Ardoin, Biedenweg, & O'Connor, 2013). This, perhaps, is not surprising, as many programs are developed based on an understanding of environmental education derived from the classic Tbilisi Declaration definition—authored by 265 representatives from 66 member states—which emphasizes these five goals as key to environmental education (UNESCO, 1977). The Tbilisi Declaration also emphasizes social, economic, and political aspects of environmental education in urban as well as rural areas, in addition to individual, as well as collective, action (UNESCO, 1977).

Yet environmental education programs are often short in duration, ranging from one hour to one day to, perhaps, one week, thus necessitating measurement of intermediary outcomes (Heimlich, 2010). The lofty goals and ideals of environmental education can be challenging to achieve in such a short period of time with diverse audiences in a wide range of settings, and with

educators whose training, knowledge, and experience in the areas comprising environmental education may range from cursory to deep. Thus, expectations for outcomes from environmental education programs must be realistically adapted to reflect the actual programs under consideration, and intermediary outcomes become critically important when developing evaluation models. Intermediary outcomes can function as bridging indicators that link direct program outputs to short-, medium-, and longer-term outcomes. They also can serve as signals to program planners and evaluators that, while participants may not fully achieve the desired outcomes by the end of a short program, the participants may be headed toward deepened environmental knowledge or environmentally responsible behavior, among other goals aligned with the program's design, logic, and theory of change.

However, intermediary outcomes, particularly those that focus on affective rather than cognitive aspects of the program, are challenging to characterize, capture, and assess, and, therefore, are often not measured (Ardoin, Biedenweg, et al., 2013). The first step is to consider which intermediary outcomes might be meaningful or important to track, particularly recognizing that the participants are not homogeneous and bring a range of interests, backgrounds, experiences, and expectations. Subsequent steps involve oper-ationalizing a process for tracking intermediary outcomes, including being sensitive to preexisting differences among participants and recognizing contextual factors that may be influential. Research and practice in fields closely related to

* Corresponding author at: Graduate School of Education, Stanford University, United States. Tel.: +1 650 721 2231.
E-mail address: nmardoin@stanford.edu (N.M. Ardoin).

environmental education, such as informal science education, offer guidance in both of these areas. Prior studies suggest, for example, that interest, curiosity, and engagement are critical intermediary outcomes in sparking longer-term engagement in areas such as science and environment (Barron, 2006; Hidi & Renninger, 2006; Krapp & Prenzel, 2011; Renninger & Hidi, 2011; Renninger, 2009). Moreover, interest and engagement have also been linked with an overall positive affect toward learning, thus building on research in intrinsic motivation among learners, suggesting that elements such as contextualization, personalization, and choice are critical in sparking and maintaining interest in learning activities (Cordova & Lepper, 1996; Dweck, 1986; Patall, Cooper, & Robinson, 2008). Similarly, many years of research have indicated that pro-environmental behavior is heavily influenced by positive affect, including evaluations of how pleasant it will be to perform a behavior, how effective the behavior will be, and how others will view the behavior (Ardoin, Heimlich, Braus, & Merrick, 2013; Bandura, 1977; Heimlich & Ardoin, 2008). Therefore, better measures of affective responses to learning experiences, including those with a component of environmental or stewardship behavior—and, in particular, being able to better characterize the development of interest—may be essential to opening up the "black box" of the environmental education experience.

This study focused on an outdoor environmental education experience to better understand triggers of interest *in vivo*—in the field, during the course of the program. We conducted an exploratory study to investigate how youth participating in a weeklong environmental education summer camp in a national park made meaning of their experiences. In particular, we explored how certain aspects of the experience sparked, or further supported, interest in the environment and natural world. Summer camp participants journaled and took photographs, which we then analyzed qualitatively using an inductive coding scheme to explore situational interest. Although we expected that elements of the natural environment (especially those that were novel to participants) would trigger interest, we found that social interactions were also important. In addition to investigating what triggered interest, our parallel methodological objective was to consider how these participant-driven tools captured aspects of the program and the overall experience that piqued students' interest. We selected these tools with the belief that, by their participant-driven, embedded, reflective nature, digital photography and journaling might be effective evaluation tools that would provide nuanced indicators of the development of interest in field-based environmental education settings.

Review of interest-related literature

Situational interest, in contrast with personal interest, is spontaneous, transitory, and environmentally activated (Hidi & Anderson, 1992; Krapp, Renninger, & Hidi, 1992). As each individual experiences stimuli differently based on his or her prior knowledge, expectations, and experiences, situational interest is also highly individualized. Researchers have identified possible sources of situational interest, including novelty, choice, physical activity, social involvement, hands-on activities, discrepancy, food, modeling, games and puzzles, content, biophilia, fantasy, humor, narrative, meaning, involvement, group work, and computers, among others (Bergin, 1999; Mitchell, 1993; Palmer, 2009). Of these, some situational interest sources common to multiple studies include novelty, challenge, and social interaction (Paris, 1997).

Regardless of the trigger, empirical studies over the last 30 years show that situational interest and learning are overwhelmingly positively correlated (Schraw, Flowerday, & Lehman, 2001). These studies suggest that interest plays an important role in what, how, and how well people learn (Renninger, Hidi, & Krapp, 1992),

as well as the level of engagement during the learning process (Flowerday, Schraw, & Stevens, 2004). Much of the early research in interest deals with reading comprehension in text-based studies. That work—as well as subsequent studies—suggests that, if students are interested in what they are reading, they do better on recall measures (Alexander & Murphy, 1998; Alexander, Kulikowich, & Schulze, 1994; Alexander, Jetton, & Kulikowich, 1995). Subsequent research has branched out to explore the impact of interest on perseverance, time on task, focus, willingness to return to the subject matter at a later point, and other elements suggesting that the internal motivation encouraged through a focus on interest can also have positive links with enhancing cognitive effects of the learning process (Krapp & Prenzel, 2011; Patall et al., 2008; Renninger & Hidi, 2011; Schiefele, Krapp, & Winteler, 1992).

More recently, researchers have focused on the role of interest in informal learning settings, which are "often characterized by people's excitement, interest, and motivation to engage in activities that promote learning about the natural and physical world" (Bell, Lewenstein, Shouse, & Feder, 2009, p. 58). Barron (2006), whose research agenda has carefully considered informal contexts, identifies the ways in which interest can be triggered and developed across different, but interrelated, contexts of a learning ecology, such as informal education programs, classrooms, museums, playgrounds, and kitchens, among others. Azevedo (2011) examines the role of science-related interests in long-term engagements in a hobby, such as model rocketry. Both Barron (2006) and Azevedo (2011), in their widely ranging contexts and contents, emphasize the importance of interests as an avenue toward learning-related outcomes.

As the study of interest among youth has broadened, differing theoretical and conceptual frameworks have emerged. Hidi and Renninger (2006), for example, have conceptualized interest "as a psychological state or as a predisposition that emerges from, and is sustained through, interaction" (p. 119). They develop a model that includes four phases of interest development: triggered situational interest; maintained situational interest; emerging (less-developed) individual interest; and well-developed individual interest. The phases are thought to be sequential and are characterized by varying amounts of affect, knowledge, and value. Extending on some of these notions, Barron (2006) applies a "learning ecology" model of interest in which she looks across a set of contexts, each of which provides opportunities for learning. Barron describes these contexts as "comprised of a unique configuration of activities, material resources, relationships, and the interactions that emerge from them" (p. 195), each being interdependent with the others. Azevedo's (2011) descriptive framework explores the interplay among preferences and conditions of practice to reveal "a more fine-grained structure and phenomenology of interest-based persistence" (p. 178).

In each of these frameworks and models—many of which are interrelated—situational interest is considered to be a catalyst or spark, something that is "activated" and then nurtured through subsequent experiences. Fortunately for educators, many of the factors that may evoke interest are, to some degree, under the control of teachers and program developers (Schraw & Lehman, 2001). Thus, by identifying specific elements of environmental and educational programs and interventions that contribute to participant interest, educators can focus on, emulate, and enhance those aspects, striving to create a more engaging, stimulating, and potentially meaningful learning experience (Paris, Yambor, & Packard, 1998; Tobias, 1994).

In this way, methods that help better conceptualize, understand, and measure interest in the context of environmental education have the potential to enhance program planning, implementation, and evaluation. Yet, to date, reliable and valid instruments for assessing situational interest—particularly in field-based