

Does Engagement in an Applied Research Experience Affect Student Outcomes? Adventures at the National Aquarium

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Introduction

Experiential learning results in increases in student motivation (Drissner, Haase, & Hille, 2010), engagement with course material (Packer, Ballantyne, & Falk, 2010), and evaluation of the course and instructor (Clements, 1995).

The benefits of experiential learning extend to environmental settings, as students may develop a greater appreciation for the natural world when they are immersed in real-world problem-based environmental education (Krasny, Tidball, & Sriskandarajah, 2009).

In addition, experiential learning interventions can also improve environmental attitudes (Drissner, et al., 2010; Nepper & Dymond, 2012) and increase conservation behaviors from pre to post-test (Owen, Murphy, & Parsons, 2009).

Purpose and Hypothesis

The purpose of the present study was to compare two conditions of experiential learning, traditional semester-length group-based research projects and *applied* group-based research projects facilitated at the National Aquarium (NA) in Baltimore, MD. Although both of these conditions utilized hands-on problem-based experiential learning, NA projects may have possessed greater real-world salience, thus translating into deeper learning.

Thus, I predicted that students participating in NA projects would experience greater gains in intrinsic motivation, cognitive engagement, positive environmental attitudes, and self-reported learning than those participating in non-NA projects.

Method

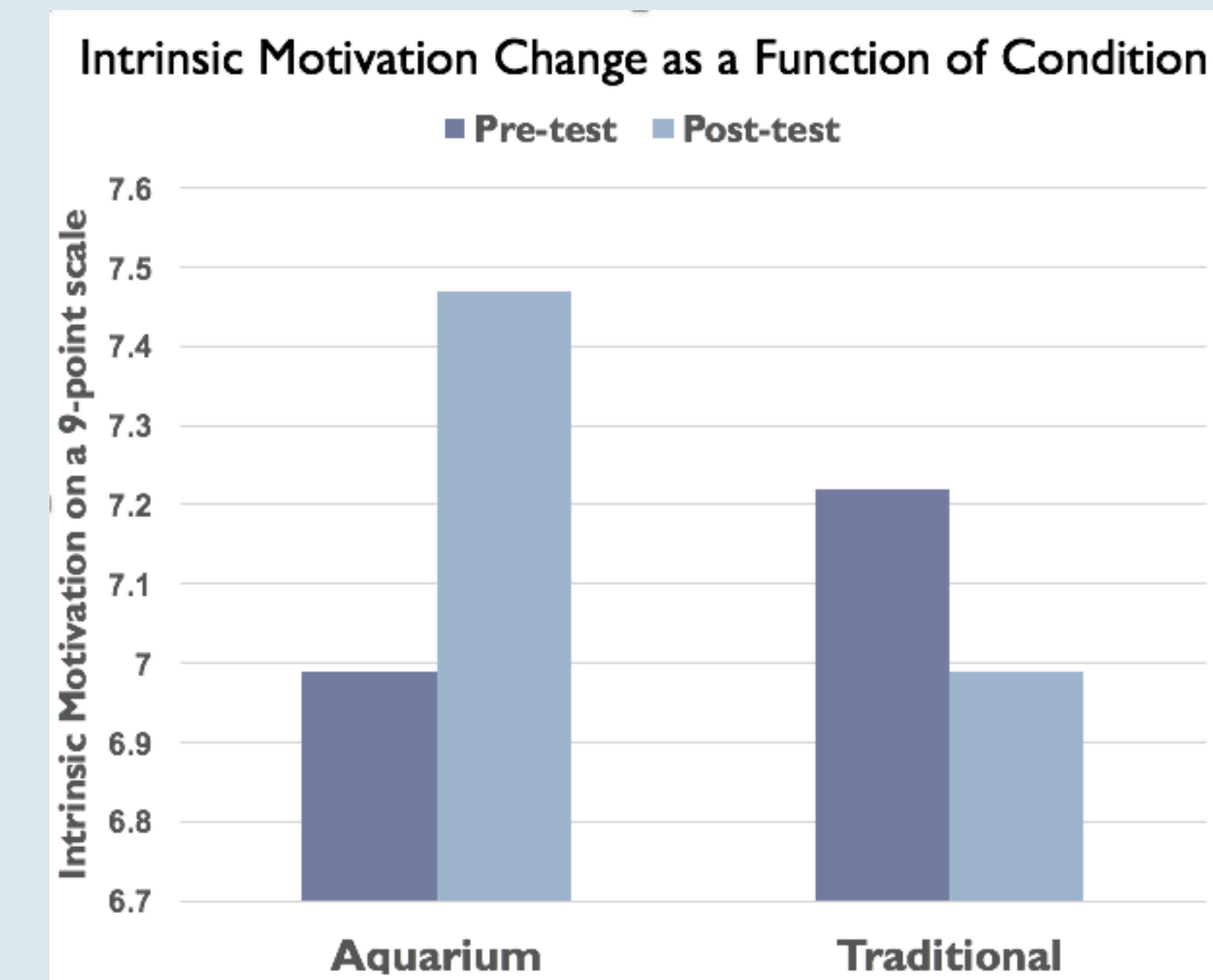
- Participants included two classes of students, an undergraduate experimental research methods class and a graduate-level social psychology class ($n_{\text{AQUARIUM}} = 19$, $n_{\text{TRADITIONAL}} = 24$)
- Students in the research methods class were matched on academic performance (grade in their previous methods class) and randomly assigned to one of six groups (3 aquarium groups and 3 traditional groups).
- Students in the graduate social psychology course self-selected their groups, with 4 students choosing to complete a project at the national aquarium and 10 choosing to work on one of two other applied projects.
- The content of the research topic was carefully controlled – all experiments tested the effectiveness of a social compliance technique.
- Students completed an *intrinsic motivation scale* (McEvoy, 2011), the *deep cognitive engagement scale* (Johnson & Sinatra, 2013), and a variety of environmental scales (*environmental self-efficacy* by Pane, & Chairiyani, 2015; *environmental concern* by Koenig-Lewis, et al., 2014; *environmental attitudes inventory* by Milfont & Duckitt, 2010) at the beginning and end of the semester. They also completed an item about self-reported learning at semester's end.
- This yielded a 2 (research context: national aquarium vs traditional) x 2 (pretest and posttest) mixed-subjects design.

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Results

There were no significant differences between groups at pretest, thus groups were equivalent.

Although there were no significant effects for cognitive engagement or conservation attitudes, national aquarium students experienced significantly greater gains in intrinsic motivation in comparison to “traditional” students, $F(1, 41) = 5.41$, $p = .025$. See Figure below.



In addition, aquarium students *perceived* that they learned more ($M = 8.22$, $SD = 1.00$) than “traditional” students ($M = 7.68$, $SD = .75$), $t(41) = 2.03$, $p = .049$ (9-point scale).

Discussion

Experiential learning interventions do not consistently improve environmental attitudes (Drissner et al., 2010), and given that the projects focused on social influence tactics rather than explicit conservation efforts, it is not surprising (in hindsight) that students’ attitudes were not differentially affected.

Additionally, research methods and statistics are daunting content areas, thus expecting increases in cognitive engagement of the material was perhaps optimistic.

Discussion

Despite additional barriers to aquarium research (NA training, logistical issues, parking concerns), aquarium students’ intrinsic motivation increased over time, whereas traditional students’ motivation decreased. In addition, NA students *perceived* that they learned more than their traditional counterparts.

Intrinsic motivation is critical to the learning process because it mediates the relationship between perceptions of autonomy and deep learning (Núñez, & León, 2016).

Future Research

This project is just one of many grown out of a unique collaboration between the University of Baltimore and the National Aquarium. Given the critical nature of climate change, coupled with the pedagogical effectiveness of experiential learning, immersing students in important problem-based conservation research serves both students and our natural world.

Feature from the UB Magazine highlighting UB-NA research

Charted Waters

by Giordana Segneri, M.A. '10
Category: Features



the aquarium's Blacktip Reef exhibit; all photography: Chris Hartlove

UB psychology students dive into conservation research at the National Aquarium