Evaluating a private Hawai'i high school's experiential education opportunities: Student environmental literacy and parental/guardian interactions

MASTER'S OF ENVIRONMENTAL MANAGEMENT – CAPSTONE PROPOSAL

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1. Abstract

Over the past century, global environmental degradation has rapidly increased as a result of human actions that negatively affected species and ecosystems. Notably, an emotional and physical disconnect from the environment has distanced many individuals from the necessary behaviors that ensure the health of our planet. To address this separation and compounding environmental issues, holistic education philosophies have aimed to reinstate healthy relationships between humans and nature through environmental education (EE). However, students have limited influence which calls for the need to transform parental behaviors as well. This project aims to quantify the efficacy of EE-related programs, offered as experiential education opportunities, to develop student environmental literacy (EL) and environmentally responsible interactions with parents in a private Hawai'i high school. Additional goals are to create an adaptable framework that can be easily replicated while providing essential empirical evidence. This will inform future EE-related curricula as a means of environmental stewardship. To meet the objective of quantifying the impact of EE-related programs in developing EL, primary data will be collected via a structured in-school questionnaire consisting of the following sections: demographics, EE type and exposure, and an evaluation of EL and parental interactions. The high school participants will be grouped into three cohorts depending on EE exposure: extended (5+ years), moderate (2-5 years), and limited (0-1 years). The analysis will involve descriptive statistics with reliability tests and regression analysis of a 5-point Likert scale using R's survey analytics. Final outputs include a written capstone paper, final presentation, and data transcripts all of which will be available to the public. A 2-page brief and 10-minute presentation will also be given to the host school along with other applicable audiences. Outcomes will expose the efficacy of different types and extents of EE programs within a Hawai'i private school. These outputs will enable teachers, curriculum developers, and decision-makers, through the empirical evidence acquired, to consider the implementation of specific EE methods to increase sustainable community behaviors. Long-term, the ideal outcome is increased investments, at state and federal levels, into widespread, efficient, and diverse EE-related programs enabling all students to be change-makers for their future.

Keywords: Environmentally-friendly behavior, Environmental Education, Sustainability, Stewardship, Student, Youth

2. Motivation

Global

Since the Industrial Revolution, human resource consumption has risen sharply which has been accompanied by increased exploitation of natural resources and a coinciding increase in environmental degradation (Ahuti, 2015). The global degradation of ecosystems has expanded through countless anthropogenic behaviors –ranging from the burning of fossil fuels to overconsumption and a broad emotional/physical disconnect from nature (UNEP, 2019 and Louv, 2008). The United Nations recognizes global environmental degradation via calls for urgent actions to "reverse those negative trends and restore planetary and human health" (UNEP, 2019). Thus, drastic human behavioral change is essential to meet the needs of the present, without jeopardizing the needs of future generations.

There is no simple solution to inciting the drastic societal change that is warranted. However, a potential avenue may be through more strategic and effective education. The power of education lies in its provisioning of a platform to obtain knowledge, skills, and experiences which can begin to shape an individual's character and behaviors within society (Idris et al., 2012). There is also a growing number of studies that suggest youth are capable of transmitting education intergenerationally through household and parent interactions (Knafo and Galansky, 2008). With the capability to shape behaviors and influence communities, this project aims to evaluate different forms and extents of environmentally-focused experiential education in developing environmental literacy for students and their respective households.

Environmental education (EE) has expanded into a conservation tool that can increase and enhance knowledge and attitudes (Aipanjiguly et al., 2003; Vaughan et al., 2003), and potentially, influence behavior. The incorporation of EE through experiential learning can produce sustainable consciousness, referring to an individual's knowledge, attitudes, and behaviors in each dimension of sustainability (Olsson et al., 2018). However, the transfer of environmental knowledge and sustainable behaviors across generations, as derived from EE, is still largely unknown.

Although there are compelling reasons for addressing EE in youth, many pressing environmental issues demand pivotal and immediate action (Chopra et al., 2005). Youth often lack the capacity to provoke the necessary rapid change due to their limitations on household decision-making and voting capabilities (Damerell et al., 2013). However, youth can still be

change-makers through actions like sharing their education with their parents (Ambert, 2001), influencing purchases (Baldassarre et al., 2016), and inducing climate-related concerns (Lawson et al., 2019).

Local

Hawai‘i is in dire need of a communal behavioral change to cope with the complex local environmental challenges and prepare for a resilient future. Future climate scenarios predict variability in rainfall, drought, and water availability, among other things, while sea-level rise will continue to threaten coastal communities (SOEST, 2014; Anderson et al., 2018). Aside from the challenges, Hawai'i's unique culture, environment, and communities continue to provide countless experiential learning opportunities for students.

In Hawai'i, private schools encapsulate roughly 16% of all school-age children and disproportionately encompass the higher socio-economic classes (Lee, 2021). Private schools, with more funding and freedom, can serve as pilot studies where programs can be studied and extrapolated. While public schools still require extensive research, I have decided to focus on a private school that has begun to incorporate EE-related programs (Appendix 1,2).

Overall, the motivation of this proposal is to better understand if EE-related youth programs can influence student/parent environmental literacy and environmentally friendly behaviors using a private school as the case study. Specifically, to evaluate if EE-related programs can transfer information and attitudes intergenerationally and, if so, what is the best type and exposure of EE to do so. A focus on EE-related programs and their effects inherently encompasses an interdisciplinary study by incorporating principles including but, not limited to, behavioral psychology, economics, and sociology (Heimlich & Ardoin, 2008; Jacobson et al., 2015).

3. Background

Environmental Education

The evolving concept of EE has the goal of developing individuals who are aware, concerned, and committed to the health of the environment (Adkins and Simmons, 2002). EE aims to build knowledge, skills, attitudes, and motivations for individuals to make informed decisions for the longevity and health of the environment. EE can be achieved through countless

programs, aside from traditional classrooms, such as experiential or place-based learning. This informal education ranges from a focus on local issues to collaboration with resources managers and/or community organizations, and exposure to out-of-classroom learning experiences (Ardoin et al., 2020). Experiential education is a teaching process, which helps achieve the goals of EE by presenting students with direct experiences and deep reflection (Kolb, 2014). Place-based learning aims to "provide meaningful contextual experiences - in both natural and constructed environments – that complement and expand classroom instruction" (Knapp, 1996). This teaching process also complements EE by exposing students to important local aspects such as their environments, culture, and community.

Environmental Literacy

The ultimate objective of EE is to formulate "environmentally literate people, who are conscious of environmental problems, in society" (Kişoğlu et al., 2010). Roth (1992) identified an environmentally literate individual to be one capable of comprehending the relationship of natural and social dimensions, who believes in the unity of humanity and nature, who is aware of the effects of human developments on the environment, and who understands that one can learn environmental information at any place or point in time. The appropriate application of EE should result in environmental literacy (EL) where EE is the process and EL is the outcome.

Since the 1980s, this field of research has drastically expanded. There are ever-evolving frameworks to determine an individual's EL. The Roth (1992) commonly accepted framework included four broad components: knowledge, attitudes, skill, and behavior. The Wilke (1995) framework was developed as an assessment tool and validated by professionals from various disciplines, where he clustered EL into four components: cognitive dimensions, affective dimensions, additional determinants of environmentally responsible behavior, and personal and/or group involvement in environmentally responsible behavior (Wilke, 1995). A more recent study, which developed and validated an environmental literacy scale for adults (ELSA), narrowed the dimensions to "environmental consciousness", "environmental anxiety" and "environmental awareness" (Atabek-Yiğit et al. 2014). This framework assesses dimensions that collectively can represent an individual's perception and attitudes which ultimately influence behavior.

Previous Research

EE and EL are growing bodies of research with unique situational studies from across the globe. Early research regarding EE and intergenerational transmission provide frameworks for education that help enable students as environmental stewards outside of school (Ballantyne et al., 1998, 2001; Duvall and Zint, 2007). Stronger empirical evidence that EE can be transferred intergenerationally came from the Republic of Seychelles where wildlife clubs were shown, quantitatively, to influence parental wetland knowledge and water use behavior (Damerell et al., 2013). Another quantitative study demonstrated EL improvements in students' parents and neighbors after receiving one month of EE on a local environment and natural history in Costa Rica (Vaughan et al., 2003). Hence, the implementation of EE can provide a potential means of provoking the necessary human behaviors to better the health and resilience of our planet (Olsson et al., 2016).

There are few studies that identify research in private high schools. A study examined private school students due to their privilege which assumed their disconnect from nature with an entitlement to influential occupations in the future (Mayer-Smith et al., 2009). This study collected over six years of empirical data, and demonstrated different results of the perception and practices of EE over time.

Knowledge Gap

Although there are prior published studies, there is a lack of substantial empirical evidence that provides the rationale for implementing EE-related programs in youth to influence multigenerational EL. The literature also lacks exploration of different exposure types and levels of students that experience EE-related programs, but rather focuses on a specific EE event or program. Thus, this quantitative study aims to obtain a large dataset of the entire high school through a collection process that can be easily replicated in other schools.

4. Objectives

The overarching objective of this study is to assess the efficacy of youth EE-related programs on students and their respective households in developing EL. Specifically, the study objectives are (1) to quantify and understand the impact of EE-related programs on students and households EL; (2) to provide an adaptable framework assessing EE opportunities for other

schools to utilize; and (3) to provide essential data to guide future EE curriculum, development and implementation.

5. Approach

To meet the objective of quantifying the role of EE-related programs, primary data will be collected via a structured questionnaire (Appendix 3,4) for students that consist of the following sections: demographics, EE type and exposure, and an evaluation of environmental literacy (EL) and parental interactions. The analysis will involve descriptive statistics with reliability tests and regression analysis.

Study Site and Program Opportunities

This study will be conducted at Le Jardin Academy (LJA), a preschool - 12th-grade school in Kailua on the east side of the O‘ahu Island within the State of Hawai‘i. LJA is a part of the International Baccalaureate (IB) education program aimed at developing young people with elaborate curricula to create “a better and more peaceful world through intercultural understanding and respect” (IBO, 2021). Paired with rigorous academic pedagogy, LJA also offers numerous opportunities for environmental and community engagement. Specifically, LJA has recently begun to implement EE through experiential education with community impact projects to directly engage students locally in both nature and the community (Appendix 1, 2). This new teaching methodology enables students to venture into outdoor classrooms, actively engage in practical experience in restoration projects, and learn from practitioners and academic mentors, among other opportunities.

LJA is also partnered with The Wild Communities Foundation, which provides a variety of outdoor programs with the “hope to impart a lifelong conservation ethic and profound appreciation…necessary to our survival as human beings” (Hoe, 2021). This program welcomes K-8th grade, implements mentors from the high school student body, and encourages household participation to build a village of individuals cohesive in a commitment to care for one another and the planet. This program has been present at LJA since 2008 presenting an established explorative and adventurous form of EE.

Participants

The target participants encompass the current high school student population at LJA, which is ~200 students. Determined by the demographic sections of the questionnaire, participants will be grouped into three cohorts depending on level of EE exposure: extended exposure (5+ years); moderate exposure (2-5 years); and little to no exposure (0-1 years). In collaboration with the LJA administration, a quantitative data collection process will be conducted through a dedicated time slot during student advisories, which are structured 30-minute periods occurring three times a week. The large participant pool will aid in obtaining an adequate number of responses and appropriate representation from each cohort. At LJA, I will work directly with the Associate Director of Experiential Education, Christina Hoe, and Community Impact Project Coordinator, Avery Filer, who both will help facilitate the in-school questionnaire described below.

Questionnaire

To achieve the objectives, a questionnaire will be developed that will consist of sections regarding demographics, EE type and exposure, and an evaluation of environmental literacy (EL) and parental interactions. The questionnaire will be sent by email on a google form with anonymous responses. An analytical questionnaire design, which examines the interrelationship of multiple variables, will facilitate the ability to explore and decipher the relationships between EE programs and EL, and the behavior of students and households. Some questions will directly address experiences and principles shared through EE programs while others will explore personal actions and scenarios (Appendix 4).

The answers to the questionnaire, besides the demographics, will be constructed using a 5-point Likert scale, which was developed, validated, and approved in 1932 to scientifically assess ‘attitude’ (Joshi et al., 2015). The Likert scale is a way to answer questions on opinions, perceptions, or something that is implicit. The scale represents a single variable, which combined entail a “quantitative measure of a character or personality trait” (Boone & Boone, 2012). There are many studies that have used this scale and it has become a common method for quantifying a broad range of questions, including EL (Smith-Sebasto & D’Costa. 1995; Willits et al., 2016; Atabek-Yiğit et al., 2014). The 5-point Likert scale range (strongly disagree - 1, disagree - 2,

undecided - 3, agree - 4, strongly agree - 5) was chosen due to its frequent appearance in education studies and simplified use for students (Armstrong, 1987; Adelson & McCoach, 2010).

Analysis

For each level of exposure, a descriptive analysis including the mean, mode, standard deviation, and Pearson's r will be conducted in R (Boone & Boone, 2012). The cohorts will then be compared using a generalized linear model to depict the relationships between EE exposure, EL, and parental/household influence. Next, a reliability analysis will be conducted to ensure the scale and measurements accurately represent the student's responses. Finally, a linear regression model will be conducted between cohorts and responses to identify trends and differences.

6. Proposed Outputs

Direct outputs of this project will be a written capstone paper and a final presentation with data transcripts that depict the relationship between exposure and types of EE by students, and the ability of these EE programs to influence multigenerational environmental knowledge and sustainable behaviors. A database, housing all data will be publicly available on my personal website. A 2-page brief and a 10-minute presentation will also be produced and presented to the LJA administration, with the potential of being shared at other private schools and relevant conferences as well.

7. Proposed Outcomes

Teachers, curriculum developers, and decision-makers will benefit from the empirical evidence acquired and could consider the implementation of specific EE methods to increase environmentally sustainable community behaviors and practices. Long-term, the ideal outcome would involve investments, at both state and federal levels, for widespread, efficient, and diverse EE-related programs that provoke sustainable behaviors throughout the community by enabling students to be change-makers for their future.

8. Resources Needed

To conduct this project, consistent cooperation with LJA and its community members will be needed for data collection. Other resources to support data collection and analysis include

computers with appropriate statistical analysis software, along with space and time to collect data. All the required resources are available or already obtained, and LJA cooperation will be sustained through my implementation of pono research practices as described by University of Hawai'i Sea Grant in Kūlana Noi'i (2018).

9. Timeline

This capstone project spans from January 2022 to May 2023 and involves 4 major stages: planning, data collection, data analysis, and final outputs (Figure 1). The first stage is the planning process which includes the MEM proposal, IRB, and questionnaire development and planning. Beginning in May of 2022, a month-long data collection process will commence at LJA during the student's advisory times. Next, data analysis will begin with >3 months allocated to summarize the results. Beginning in November 2022, I will start working on the final paper and presentation to be completed by February 2023.

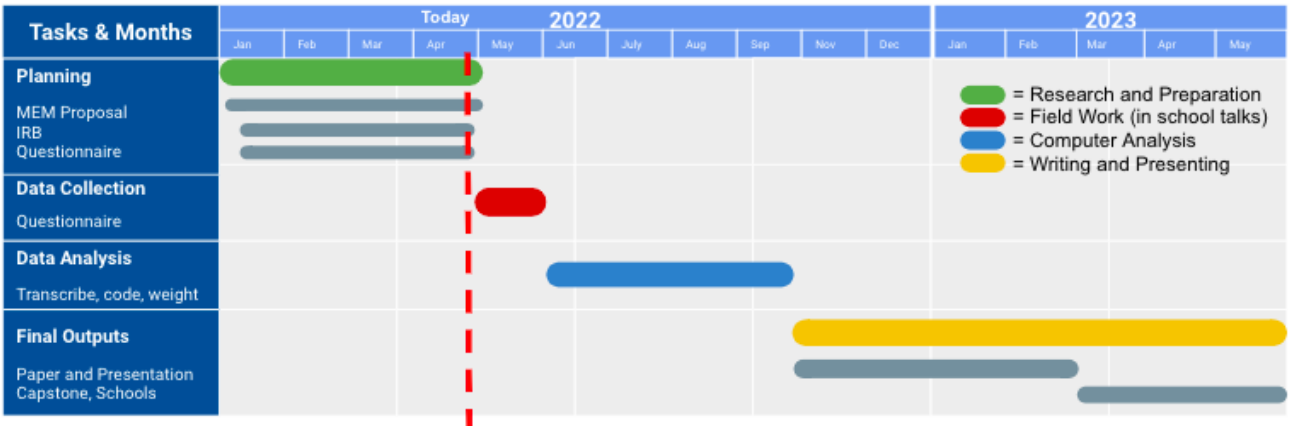

Figure 1. Timeline of different components in my capstone project beginning in January 2022 to May 2023. The green represents the planning phase including research and preparation. The red is the data collection phase which involves fieldwork at LJA to help facilitate questionnaire completion. Blue represents the data analysis stage and preparation of the results. The yellow entails the final output stage involving the completion of a final paper and presentation.

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Appendix.

A1. List of Le Jardin Academy's Highschool Impact Programs occurring biweekly for 70 minutes where students enroll quarterly for their desired option. This list was retrieved from Le Jardin Academy's Impact Program webpage (https://ljaimpact.org/).

Impact Electives	**Description**
Band	Offers additional rehearsal time to band students, as well as further exposes students to a variety of musical genres and techniques.
Chorus	Exposes the novice singer to the exciting world of singing in an ensemble.
Debate	Participate in a series of workshops to build your skills and experience with civil discourse, debate, and using logic in arguments.
Independent Art	Pursue a greater understanding of the arts and improve on their technical skills.
Psychology and the Good Life	Learn how inner-narrative and habits of being can impact your quality of life.
Theater for Change	Learn how theater can help disenfranchised populations through intentional storytelling and how acting can change the world!
Structured Work Structured Study Hall	A quiet place for students to work.
Photography	Practice and learn essential camera, photo editing, and portfolio skills while documenting the work being done in our community.
Wild Kids Academy	Become active stewards of your community! The Wild Kids Academy includes a variety of Impact Projects that will enable students to explore their own passion, develop their change-making capacity, and hone their self-management and communication skills.
Work-Based Learning	Internships within the school include; operations/administration, tech team, impact program, peer tutoring, and office assistance.

A2. List of current Wild Kids Academy projects that offer hands-on experience and collaboration with the surrounding environment and community. More projects can occur due to student initiative and community needs. https://ljaimpact.org/hs-impact-projects-2021-22

Wild Kids Academy Projects	**Description**
Forest Restoration	Help introduce and maintain native species to the forest adjacent to campus.
Happiness Hut	Student-Run Coffee Shop, Composting System, Dishwashing Station, and Waste Audit
Kahana'iki (at Kawainui Wetland)	Native Plant Restoration with goals of growing food for the school and community
Nā Pōhaku (at Kawainui Wetland)	Restoration of a native fishpond
Interning at Hamakua Wetland (Wednesday during early release)	Field work with Healthy Climate Communities including, but not limited to, invasive removal and native tree out planting
Plastic Free Mural	Creation on campus to bring awareness to plastic consumption, waste and pollution
Keiki Team	Engage Lower School students with the forest
Activism Team	Working with legislators on climate change initiatives
Plastic Makerspace	Upcycle plastic using extruders and 3D printers
Bring The Light	Random acts of kindness and focused projects to support our community members through the pandemic
Photography Team	hone essential camera and photo editing skills while documenting the work being done in our other projects
Houseless community in Waimanalo	Helping to build a community garden

A3. The first part of the online questionnaire was to acquire the necessary information to group the students into three separate cohorts.

Demographics and EE Exposure	
What grade are you in?	
What impact terms have you participated in?	
What B Blocks have you been in?	
Are you in the Wild Kids program? If so for how long?	

A4. Draft student questionnaire for Environmental Literacy and parental influence with questions randomized in the google forum.

Items	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Environmental Consciousness	**To what extent do you agree to the following**				
Q1. I am responsible for the health of the environment.					
Q5. I carry a reusable water bottle with me at all times.					
Q9. Governments should support renewable energy sources (sun, water, wind, geothermal).					
Q14. I always use reusable products.					
Environmental Awareness	**To what extent do you agree to the following**				
Q4. I like learning about ways to help improve the environment.					
Q8. Human actions have caused environmental problems.					
Q12. I prefer carpooling or public transportation.					

Q15. Governments should support growing local foods.					
Environmental Anxiety	**To what extent do you agree to the following**				
Q2. I am concerned there will be fewer beaches in the future.					
Q6. Natural disasters, such as hurricanes and heat waves, will get worse because of climate change.					
Q10. Next generations will not experience the same quality environments as me.					
Q13. Students should plant and care for a tree as a requirement to graduate.					
Parent/guardian Interactions	**To what extent do you agree to the following**				
Q3. I would ask my parents/guardians to buy environmentally friendly products.					
Q7. I would tell my parents/guardians to conserve energy, such as turning off lights when not in use.					
Q11. I would ask my parents/guardians about purchasing locally sourced foods.					
Q16. I would ask my parents/guardians to reduce our family's plastic use.					