Educational and Meaningful Time Outdoors: Cultivating Environmental Stewardship in Local Youth

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Introduction

Environmental problems are exponentially growing more common, entering the transnational and global arenas of resource management, conservation, and policymaking. Carbon Dioxide emissions, along with emissions from other damaging gases, are contributing to alarming rises in global temperature. In 2018, the United Nations declared that Carbon emissions must be reduced by 45% by 2030 in order to avoid a 1.5˚C increase in global temperature relative to pre-industrial levels (IPCC, 2018). Soil erosion and desertification are compromising the security of food systems and the livelihood of many farmworkers. In fact, climate change exacerbates soil erosion which contributes to more surface runoff, poorer vegetation coverage, and overall land degradation (JDP, 2013). Overconsumption and waste are resulting in significant resource strain and depletion. With food resources alone, the United States is predicted to waste around 30% to 40% of the food supply (USDA). Overall, these instances contribute to a whopping fifteen out of twenty-four existing ecosystem types facing immense environmental threats and subsequent degradation (MA, 2005).

These issues, while easily dismissed as isolated problems, are interrelated and exert disproportionate impacts on different geographic areas, demographics, and communities. Every living being on the planet, especially the human species, will inevitably be impacted by climate change and environmental issues. Ample existing scholarship declares that environmental stewardship may serve as a feasible solution for climate change. Environmental stewardship is a broad term but can be simplified as actions aimed at environmental protection taken at any scope ranging from individual and local to governmental and global (Bennett et al, 2018, p. 597).

This research investigates the relationship between spending meaningful and educational time in nature and resulting environmental stewardship. A brief discussion of environmental

stewardship is presented, following with a detailed overview of the research design. It is concluded that, despite the difficulty scaling this research outward, there may be a positive correlation between hands-on environmental learning and resulting environmental stewardship. It is concluded that further replication and investigation is necessary.

Literature Review

Definitions of environmental stewardship are highly variant and are not consolidated within existing literature. Johan Peçanha Enqvist and his colleagues, for example, define environmental stewardship as a "boundary object," meaning that it is a tool for eliciting participation, conversation, and collaboration from different actors (Peçanha Enqvist et al, 2018, p. 17). They draw from multiple complex realms of scholarship, including other forms of environmental science, to synthesize existing uses of environmental stewardship and propose their own framework that unites the variant definitions of the term. In other contexts, environmental stewardship is often synonymous with management, meaning it encapsulates how to handle and use different components of the environment (Yasol-naval, 2017, p. 4). Definitions of environmental stewardship are also challenging to consolidate because of how ethical claims are frequently assigned to it. Consequently, environmental stewardship is also described as "normative," making it more challenging to pinpoint a singular distinct definition (Yasol-naval, 2017, p. 4).

Because of how vast this concept is, there is variety regarding what is essential to acquiring and cultivating environmental stewardship. Professors, Fath & Beck, explore stewardship by placing the emphasis on stakeholders and their degree of concern for environmental issues. They draw from environmental attitudes and survey data to analyze public perceptions of the protection of a lake on the Chattahoochee watershed (Fath & Beck, 2005). It is

concluded that public perception of environmental issues, water quality in this case, is imperative for the success of stewardship (Fath & Beck, 2005, p. 496). Another case study examined motivations behind people displaying environmental stewardship behaviors through participating in several French community gardens. It was determined that motivation is a critical component of environmental stewardship and manifested commonly as social, self, and environmental forces (Torres et al, 2017, p. 7).

Other scholars have different perspectives on similar traits of environmental stewardship. Nathan Bennett and his colleagues conducted a conceptual review of environmental stewardship to further understand how to strengthen it at the local level. They expand upon a selected definition, positing that there are three defining elements of local environmental stewardship: actors, motivations, and capacity (Bennett et al, 2018, p. 599). Within their framework of environmental stewardship, actors are people carrying out actions of stewardship like erosion mitigation or communal tree planting (Bennett et al, 2018, p. 599). Motivations encapsulate the reason for participating in stewardship actions, ranging from an intrinsic valuation of nature to financial incentives for participation (Bennett et al, 2018, p. 605). Finally, capacity refers to the ability of a community or government to participate in stewardship actions over respective environments (Bennett et al, 2018, p. 600). Ultimately, it is concluded that the presence and strength of these three traits impact the success of environmental stewardship and a call for further research into the many components defining it is made.

Professor Affrica Taylor continues the exploration of the factors cultivating environmental stewardship, declaring that the current perceptions of it are insufficient (Taylor, 2017). Rather than continue the human-centeredness innate to many definitions of and approaches to environmental stewardship, Taylor posits that the people should learn and work

with the environment instead of about it (Taylor, 2017). Specifically, it is argued that, rather than study non-human beings and phenomenon as most forms of environmental stewardship suggest, people ought to learn with them in order to manifest it effectively. Further, Taylor describes the presumptuous "nature-culture divide" that often places the geographic location of people at odds with an environmental education (Taylor, 2017, p. 1449). Consequently, Taylor argues that people must learn collectively with nature (Taylor, 2017, p. 1455).

As reflected within the literature, there are multiple potential conditions that are argued to optimize environmental stewardship. Learning with the environment rather than about it in order to cultivate environmental stewardship is critically important and underrepresented within the literature. I will address this absence of reinforced knowledge through investigating if educational interactions with the environment and learning with it cultivate environmental stewardship. I will also examine if environmental stewardship can be instilled in local youth through creating and measuring a sense of inspiration and responsibility.

This research is intended to expand upon the idea that learning collectively with the environment can generate environmental stewardship. The hypothesis that this project investigates is, by spending meaningful, productive, and educational time in nature, subjects will be more inclined to be environmental stewards and advocates. Being in nature cultivates environmental stewardship because it provides people with a tangible experience. It takes theoretical discussions and ideas about the environment and adds a sense of immediacy, developing a stronger sense of care and ownership within participants. Consequently, it is predicted that participation in meaningful, productive, and educational time in nature will positively impact a stronger inclination for environmental stewardship among participants.

Research Design

This research began by reaching out to St. Columba School in Durango, Colorado. The school is comprised of students from Kindergarten to 8th grade and is geographically located close to the Animas River. Two samples of 13 participants were acquired using two different 7th grade science classes. Sample A is the control group while Sample B is the treatment group. Aside from one key difference, both groups followed the same process. Prior to receiving any intentional contact or information, participants were provided with a survey depicting the questions shown below in Table 1 on a Likert scale with 1 being strongly disagree to 5 being strongly agree (Table 1). The survey, like the subsequent ones, were anonymous and did not collect any personal information or identification. No names or other markings were used to identify the identity of the respondent. This survey, Survey 1, was handed to each participant as they walked in the door for class. Also depicted within Table 1 is the variable title used to reference each corresponding question.

Survey Question	Variable Title
1. I value spending time in nature.	Value
2. I feel inspired to spend more time in nature.	Inspiration
3. I am knowledgeable about my local environment.	Knowledge
4. Protecting the environment is important to me.	Protection
5. I feel driven to participate in environmental activism.	Participation
6. In the future, I would like to spend more time in nature.	Future
7. I believe my actions can have a positive impact on the environment.	Impact

Table 1. The survey that was administered to each participant in the study at three specified time intervals with their corresponding variable names.

Environmental stewardship is operationalized through the mean responses from each sample for each survey. The mean of the participant's answers to all seven questions for each respective survey measures and determines the level of environmental stewardship since these questions each serve to indicate actions of environmental stewardship. Each question was used to measure the presence of either inspiration or responsibility within participants, so the cumulative total of each of those answers for each participant represents the overall stewardship level.

After Survey 1 was completed, participants were provided with a short, educational lesson covering various environmental elements of the students' local environment of Durango, Colorado. The lesson was conveyed through a PowerPoint Presentation aimed to highlight the positive and interesting environmental aspects of the region. The lesson was seven slides long and roughly fifteen minutes in length, including discussion and classroom interactivity. Each slide focused on a specific element of Durango's regional environment including general perceptions, geology, trees, the Animas river, the infamous Gold King Mine Spill, and pH testing on water. Special attention was paid to the Gold King Mine Spill to represent a local environmental phenomenon that, based on the general classroom consensus, was memorable to the participants (EPA, 2020).

Once the educational lesson was completed, Survey 2 was administered. This survey was the exact same as Survey 1, asking the same questions in the same order. The completion of Survey 2 was implemented in attempt to gauge if and how the environmental lesson altered participant's survey responses and to isolate any variables that may have contributed to that change. Survey 2 was distributed to each participant and collected upon completion.

After Survey 2 was finished, both groups participate in analyzing the pH balance of water samples. A store-bought water testing kit was used to provide 4 test vials, over 100 pill-tablets

that create the scientific reaction, and a chart portraying the variation in results and their corresponding meaning (LaMotte). To create a reaction, a vial is filled with water and one of the catalyst pills is placed within the vial. The cap is screwed securely upon the container which is subsequently rotated at 180˚ intervals to mix the pill around until the it is fully dissolved. Slowly, the liquid will become a different color which is matched to a color on the provided visual chart. Analysis and discussion of the process and results follow.

At this stage, the research process for Sample A and Sample B differs. As previously stated, Sample A is the control group, so their process continued by conducting simple pH tests on Animas River water samples that were collected beforehand within the confines of their classroom. Sample A was provided with verbal instructions on how to conduct pH tests, using actions as a visual aid. The 13 students were then divided by their teacher into 4 groups and provided with a vial of Animas River water and a reactionary pill that interacts with the water to present its pH balance. Each group had a delegated someone to place the pill into the vial and close it. Participants then took turns slowly rotating their vials until the reaction became visible and the water changed colors.

Once the pill was dissolved and the color was evident and final, each group matched the color of their water sample to the chart and discussed the results. This discussion lasted about 10 minutes with input from participants, their teacher, and the research facilitator. The final survey, Survey 3, was provided upon conclusion of the experiment. Again, Survey 3 was the exact same as the previous two and was administered to Sample A in the same location.

Sample B followed the same process in the same order, but as the treatment group, they were subject to the outdoor treatment. After the completion of Survey 2, Sample B was provided with the same verbal instructions on how to conduct a pH test. Sample B was then walked

outside to a nearby transect of the Animas River. The walk was roughly 5 minutes each direction and allowed Sample B to have access to a safe patch of land directly touching the water. River water samples were collected on site and the supplies were provided to each group. Participants completed the pH analysis and participated in another discussion about the environmental implications of the results. Upon conclusion of the discussion, participants were each provided with Survey 3. This survey differed in location as the participants completed Survey 3 outside by the river. Once the surveys were collected, the participants walked back into their classroom and the research concluded.

The survey data was coded into the Statistical Package for Social Sciences (SPSS) database. If the participants were exposed to the meaningful and educational time in nature, meaning they analyzed water samples on the river, they were coded with 1 and if they were not exposed, they were coded as 0. Responses exhibiting strong levels of inspiration, motivation, and responsibility, were indicated with a 4 or 5 on the Likert scale and are coded with 1 and 2 in SPSS. Responses indicating adverse environmental attitudes were reflected as 1 and 2 on the Likert scale and coded as -2 and -1, while responses demonstrating neutrality were coded as 0. This eradicates unwarranted stratification of results and mitigates the likeliness for skewed analyses. Responses indicating more than one value, for example, a 4 and a 5 were both circled on the Likert scale, were coded by selecting the lower number. This rule was applied evenly and assured simplicity throughout the coding process. An increase in the mean numerical responses within each sample's total surveys across each time interval will indicate an increase in environmental stewardship.

The treatment and control groups were distinguished from one another, then their subsequent survey responses were marked using the variable titles displayed in Survey 1. For

example, each question from Survey 1 had its own correspondent variable titled “Value_A” or “Inspiration_A” and continuing through the seven questions for all three surveys. Data from each survey for the control group and the treatment group remained distinct across all three individual time intervals, allowing for further analysis to occur.

Results

The survey data were analyzed in SPSS using a comparison of means. All of the coded responses from each survey were separated into their respective control and treatment groups and the environmental stewardship levels from each survey were taken. The means from all of the responses from every participant within each sample for all seven survey questions were calculated to achieve a level of environmental stewardship and are visually depicted below in Figure 2. Each point denotes a survey with its corresponding stewardship level in chronological order. The Indoor Treatment control group is represented with the blue dotted line and depicts a consistent environmental stewardship level across all three surveys. The Outdoor Treatment group is represented with the solid red line which displays a positive increasing trend in average stewardship levels across treatment group surveys.

The cells depicted within the table are numerical representations of varying results from the comparison of means test. The first two rows reflect the two samples and their corresponding mean values after being coded into SPSS. The bottom row shows the mean differences between both samples’ surveys at each time. This row also indicates if the value is statistically significant, which, as reflected in Figure 2, the difference of means between Survey 3 between Sample A and Sample B is statistically significant. This means that the p-value, or likelihood that the visual data are supportive of the hypothesis, is less than a 0.05 degree of uncertainty.

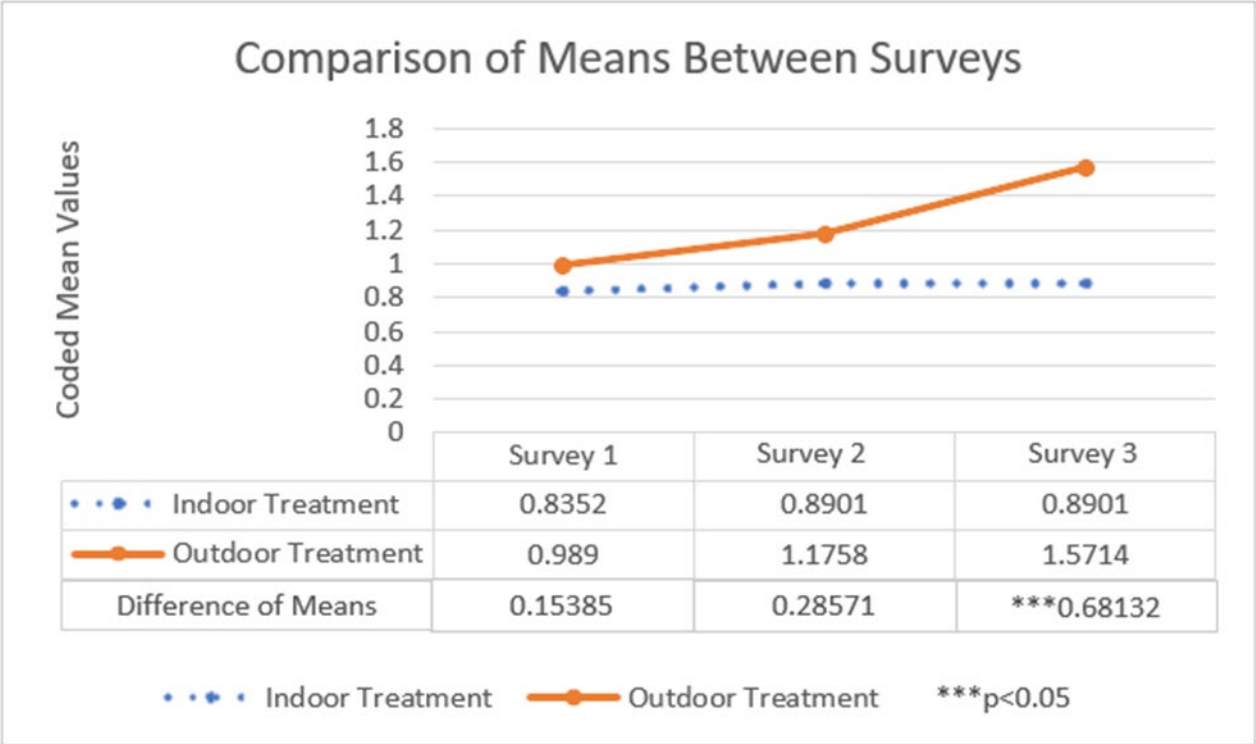

Figure 2. The comparison of environmental stewardship levels across all three surveys differentiates by treatment type.

Discussion

This research yielded significant results. The increase in stewardship levels displayed by the Outdoor Treatment group supports the hypothesis that, by spending meaningful and educational time in nature, subjects will be more inclined to be environmental stewards and advocates. Further, the statistical significance emerging from Survey 3 isolates the difference between the Indoor and Outdoor Treatment from the previous elements of the experiment. The numbers reflected within the Survey 3 column reflect the outcome emerging from the pH testing. Consequently, the statistically significant values of environmental stewardship displayed from the Indoor Treatment group may be reflective of a lessened impact on participant desire for environmental stewardship and activism as opposed to the significant increase from the Outdoor Treatment.

In contrast, the increasing environmental stewardship values displayed from the Outdoor treatment indicate a strong correlation between hands-on environmental education and resultant environmental stewardship. This trend fits well into existing claims positing the learning with nature is essential for environmental education. It implies a relationship between experiencing meaningful, educational time in nature and exhibiting inclinations for environmental stewardship as opposed to the lack of that experience and a resulting absence of environmental stewardship.

While the results from this research are significant, several noteworthy factors may have impacted them. First, the sample size is small, making scalability a challenge. While no claims are being made that the relationship between educational, meaningful time outdoors and environmental stewardship is causal, the strong correlation demonstrated by these data may not be generalizable. Second, the way these data were coded may have had an influence. Coding survey responses that indicated two values as the lower of the two, while consistently applied in this manner, may have disproportionately impacted results from the Indoor treatment data. While still only accounting for a small portion of survey responses, there were more values that needed to be rounded down within the control groups' surveys compared to the treatment group, possibly contributing to the flatter line. Similarly, coder bias and human error may have contributed in less evident ways. It is necessary to be cognizant of confirmation bias as it has the potential to influence any data analysis.

There were also several, minor discrepancies with how the experiment was administered to the control group and the treatment group. First, human participants are dynamic, so each sample likely had subtle changes in the way the educational lesson was provided as well as the discussions integrated into these presentations. Comparably, the weather was also gloomy, rainy, and cold, likely inflicting some influence onto the participants and their survey responses. The

Treatment group also found out that they would be going outside early within the experiment, possibly contributing to the jump in stewardship responses between their Survey 1 and 2. Finally, the Control group took their final survey indoors, within their classroom, but the Treatment group took their final survey outside by the river. This may have influenced the attitudes and subsequent survey responses from the participants, contributing to the concluding data.

Conclusion

Environmental stewardship is a broad topic. Many scholars are contributing their input and pointing to different components that are essential for environmental stewardship to be present and successful. A growing body of scholarship is emerging, positing that hands-on experience and learning with nature is the necessary condition for environmental stewardship. The results emerging from this research, showing an increasing level of environmental stewardship within the Outdoor Treatment group as opposed to the stagnant levels of environmental stewardship displayed among Indoor treatment group participants, support this emphasis on learning with nature.

Since the sample size is small, these data may not be scalable. However, this research and our findings could be indicative of a larger underlying trend and an emerging, positive correlation between hands-on learning and resulting environmental stewardship. The statistically significant values present at the Survey 3 interval suggest that the large difference in stewardship levels between both samples is supportive of this relationship with a high degree of probability. As a result, replication of this research design is essential for accumulating generalizable knowledge. To accrue scalable data, this design should be extended to many different case studies, including large scale investigations. Similarly, peer review of the data emerging from

those research projects is necessary. This will contribute to the merit and credibility of the knowledge emerging from these studies.

Finally, an overall expansion of the concept of environmental stewardship is a necessary next step. In the context of evolving climatic and environmental contexts, environmental stewardship is manifesting as a complex and fluid notion. In order to achieve a sufficient understanding of how to cultivate and use environmental stewardship as a solution to some of these environmental problems, it must be explored further.

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