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The Relationship between Environmental, Outdoor and Field Education: A Study in Rural Communities

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Based on sociocultural constructivist theory, the purpose of this study is to understand the experiences, cognitive learning, and personal developments of a group of postgraduate students in environmental science and engineering who completed a six-week-long summer field research and outdoor education program. With a qualitative design, interviews, focus groups, remarkable item sharing, and diaries from 20 participants. The results indicate that learning from and observing nature, the balance between humans, animals, and nature, and transferring environmental protection knowledge and practice were the three key themes. Also, two subthemes observation to practice and cognitive knowledge, and sustainability arose from the participants' outdoor education program experiences. The outcomes of this study provide recommendations to university administrators, secondary school teachers, government departments, policymakers, and researchers aiming to establish and host field research and outdoor education programs to teenage and university students in order to build up a sense of environment and environmental protection.

Keywords: environmental learning, outdoor education, practical learning, reflective learning, sociocultural constructivist learning

INTRODUCTION

Background of the Study

The United States underwent urbanization after World War II, during the mid-20th century. Many rural communities moved to suburban and urban regions for the sake of career development, their children's education, and better healthcare facilities (Bounoua et al., 2018). Both local and federal governments and departments established green zones, city parks, and woods within urban regions and metropolitans, such as Central Park in New York City, because the percentage of land that constituted green zones was not high enough for individuals and groups to enjoy green environments within urban contexts (García Sánchez et al., 2018).

Although some individuals, particularly children, can experience green fields and natural environments, many people are only able to learn about nature from textbooks

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and short outdoor trips to regional areas (Nazarenko & Kolesnik, 2018). In other words, many people do not gain a sense of environmental protection because they have no field experience and no background involving natural resources and the environment (Moseley et al., 2020). Field research and outdoor education are key elements in helping environmental science and environmental engineering students to learn practical skills and gain vocational knowledge beyond classroom settings. A recent study (Shellman & Hill, 2017) indicated that college and university students might learn additional skills and acquire outdoor knowledge based on field trips and outdoor education opportunities, which they are not able to learn from classroom environments.

Unlike other liberal arts subjects and programs, environmental science and environmental engineering are concerned with our connections to the environment and how environmental professionals can develop their theoretical knowledge and contribute their expertise to practical environmental applications, particularly in regard to outdoor education and outdoor learning (Cuenca-López et al., 2021). Although many university programs require postgraduate students to complete at least a one-semester internship with partnered organizations or government departments, acquiring practical experience from field research and outdoor environments is also essential (Purc-Stephenson et al., 2019).

Purpose of the Study

Based on previous studies and reports (Kangas et al., 2018; Purc-Stephenson et al., 2019), many scholars believe that outdoor education, field research, and field trips may help students acquire additional hands-on knowledge beyond textbooks and classroom environments. In other words, to reiterate, in addition to regular classroom settings, environmental science education, knowledge, and practical skills must be gained from hands-on experiences, such as through outdoor education, field research, and field trips.

Therefore, coordinating with a postgraduate course leader, university department, and an instructor (a university lecturer in environmental science), this current study sought to understand and investigate the experiences and outcomes of a summer (six weeks) field research and outdoor education program in a rural community in the United States. With the co-operation of the university lecturer, the researcher sought to understand how the participants (postgraduate students in environmental science and environmental engineering program) described their experiences after they had completed field research and outdoor education program in rural communities in the United States.

It is worth noting that this study tended to understand the experiences of the students participating in summer field research, particularly their experiences and understanding in regard to this field research and outdoor education program as postgraduate environmental science and environmental engineering students. Thus, the research was guided by two research questions:

1) How does a summer field research and outdoor education program in a rural community influence postgraduate environmental science and environmental engineering students' understanding of environmental education and environmental protection?

2) How do postgraduate environmental science and environmental engineering students describe their experiences in rural communities?

Theoretical Framework and Literature Review

Sociocultural Constructivist Theory

The study employed sociocultural constructivist theory (Vygotsky, 1978) to understand issues of environmental education. Sociocultural constructivism argues that individuals acquire new knowledge and practices from their social world, with practical interactions from other channels, such as their peers, environment, culture, life experiences, external stimuli, and so on (Dos Santos, 2019). Although learning can occur in classroom settings, practical learning is based on people's real-life experiences from their surrounding environments and other individuals. More importantly, Vygotsky (1978) advocated that learning behaviors, observations, and knowledge-absorbing processes are interconnected and interrelated to each other. In other words, all elements and factors influence the overall teaching and learning experiences for all parties, including teachers, students, and practitioners. Therefore, teachers could learn from their students within the sociocultural constructivist learning curriculum, and vice versa. Figure 1 outlines the relationships involved in social constructivist theory. In this study, the researcher investigated how the environmental and social elements of a field experience influenced the learners' understanding of and experiences with the sense-making processes involved in environmental education and environmental protection.

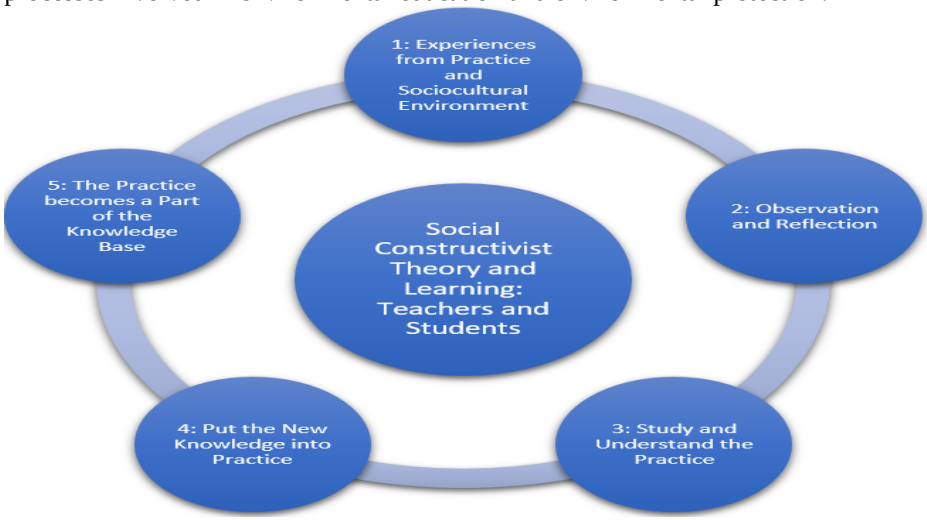

Figure 1
Social constructivist theory and learning

Sociocultural Constructivist Theory and Outdoor Education

Recent research (Purc-Stephenson et al., 2019) reviewed a number of outdoor education studies from the Canadian perspective. Outdoor education, field education, and

environmental education allowed students, regardless of their age and education level, to gain psychological benefits and self-efficacy in terms of both academic and personal achievements. According to van Staden (van Staden, 1996), environmental science students should understand how to improve current environmental protection and reform current plans to ameliorate environmental shortages. Many members of the general public do not have a background in environmental protection, such as in designing scientific strategies to protect water resources, but both credit-based and non-credit environmental education courses will increase people's knowledge in these areas (Dimick, 2012; Dos Santos, 2021a).

Some scholars (Ardoin et al., 2020) have asserted that environmental education increases public awareness of environmental protection. A curriculum and instructional program regarding environmental conservation can offer effective strategies and learning plans for environmental education. Instruction can provide students with theoretical knowledge, teach strategies regarding environmental protection, foster an understanding of local environments, deliver experiences with both destroyed and protected environments, discuss the relationships among humans, animals, and environments, and elaborate on vocational practices concerning environmental values and protection (Toomey et al., 2017).

Complete learning and knowledge transfer cannot be gained without actual practice. Some scholars (Bourn, 2014) argue that learners who have lived in a negative environment (i.e., bad and destroyed environments) will have a better understanding of the historical, social, and human factors that provide answers for social justice and environmental protection, because these individuals and groups have experienced practical and real situations. These individuals' values and sense-of-belonging will be increased. Another scholar (Merryfield, 2000) advocated that it is important to help members of the general public, especially young people, gain a sense of global citizenship, acquire knowledge of the green environment, and build an understanding of environmental protection in their daily practices and activities. Theoretical knowledge and promotional efforts from the government cannot fully impact individuals and groups in terms of furthering environmental protection. Unless individuals experience environmental issues and concerns in their daily activities, they will not gain a true sense of environmental protection (Nazarenko & Kolesnik, 2018).

A recent study (Moseley et al., 2020) indicated that outdoor education with field trips is an effective way to help people apply the ecological concepts that they learn in the classroom, in terms of both formal and informal teaching and learning strategies. However, field trips are expensive. A previous study (Behrendt & Franklin, 2014) pointed out that schools usually do not have enough resources to cover the costs of field trips and the related insurance. Furthermore, in addition to attending field trips, students usually need to study other subjects and take exams during their academic terms. For these reasons, a short trip, such as a one-day-long trip, could work for most students, whereas field trips that are longer than a week may not be affordable for the majority of students (Basten et al., 2014; Behrendt & Franklin, 2014; Kamen & Leri, 2019).

Another recent study (Steward, 2020) found that outdoor education could not cover the

needs of many individuals, because outdoor and field education requires significant participation from both instructors and learners. Working professionals in particular find it almost impossible to enjoy week-long field trips without compromising their financial and personal obligations. Hands-on and practical experiences may increase students' sense of environment and understanding of pollution beyond traditional classroom environments and textbook materials, however (Bustami et al., 2020). Therefore, field research and outdoor education programs play important roles in students' sense-making processes in regard to environmental awareness and environmental education.

METHOD

Research Design: General Inductive Approach

The general inductive approach (Dos Santos, 2020, 2021b; Thomas, 2006) was employed. The general inductive approach allows the qualitative researchers to conduct qualitative studies in the systematic set of procedure to collect data, studies the data, and analyze the data from the qualitative design. Unlike other popular qualitative designs, such as case study, the general inductive approach does not have limitations for the size of participants, sites, and geographic zones. Therefore, the researchers may conduct the qualitative studies in general ways for qualitative studies. In this case, the concerns for field research and outdoor education program in the United States. More importantly, based on the research questions and purpose of the study, the qualitative research method with the general inductive approach would be appropriate in this case.

Participants and Recruitment

The purposive sampling strategy (Merriam, 2009) was employed to recruit 20 postgraduate students (N=20) who have joined the two summer field research and outdoor education program with their university lecturer. Please note that two trips were organised and conducted during the first and second intersessions within the summer semester. In other words, ten students joined each of the summer field research and outdoor education program with their university lecturer.

As this is not a new field research program, the researcher did not design the overall curriculum, instruction, government approval letters, and related administrative procedures for the program. Therefore, the university lecturer only needed to conduct the field research and outdoor education program as usual. As the researcher had no intention to evaluate and measure the effectiveness of the programs, the researcher provided no instructions and directions to any parties.

However, the researcher informed the department head, administrator, and the university lecturer about the direction of the current study as the researcher only tended to understand the experiences and voices of the students in this program. Therefore, once the researcher received the approval message from the university parties, the researcher sent the purpose of the study, data collection protocol, risk statement, consent form, the invitation for the study, and diary books to the lecturer. The lecturer officially agreed with the study.

Therefore, before the commencement of the summer field research and outdoor

education program, the lecturer contributed the abovementioned materials to the participants (i.e. 20 postgraduate students). All signed the consent forms and sent back to the researcher via email. After the summer field research and outdoor education program(s) were completed, the researcher arranged the one-on-one and semi-structured interview sessions and focus group activity with the students. Due to the nature, admission, and requirement(s) of this field research and outdoor education program, the participant needed to meet the following criteria: 1) postgraduate student, 2) major in environmental science or environmental engineering; and 3) at least 18 years old.

Please note, the current participants do not have any prior experiences in rural living style, outdoor education, and field trips to the rural communities. Therefore, the current study was their first experience, particularly for outdoor education.

Data Collection

Five data collection tools were employed, including semi-structured interview, focus group activity, remarkable item sharing, diary, and member checking interview. First, before the Fall semester commencement, the researcher arranged the one-on-one and semi-structured interview with each participant individually (Merriam, 2009) via a virtual-based social media application. During the virtual-based interview session, all were asked about their understanding and experiences during the summer field research and outdoor education program. Each interview session lasted from 89 to 137 minutes.

After all finished the interview sessions, the researcher arranged the focus group activity. During the focus group activities, all were asked how they would describe their experiences, personal growth, and knowledge development from the field research and outdoor education program. Also, a brief sharing from their diary was encouraged during the focus group activity. The focus group activity lasted from 199 to 218 minutes with two ten-minute breaks. During these data collection procedures, all might bring some remarkable items, such as pictures, observation notes, handbooks, diaries, marking, reports, and presentations, from their field research and outdoor education program (Morgan, 1998).

After the researcher transcribed the voiced messages to written transcripts, the researcher sent the related materials to each participant for confirmation. During the member checking interview, all agreed with their sharing for further analysis. The member checking interview lasted from 20 to 54 minutes.

Data Analysis

After all participants agreed with their sharing, the researcher started the data analysis procedure. Both general inductive approach and grounded theory approach were used to study and conduct the data analysis (Strauss & Corbin, 1990; Thomas, 2006). The researcher re-read the written transcripts multiple times to categorize the connections and relationships. The researcher first employed the open-coding technique to categorize the massive data to connective themes and subthemes. For this stage, the researcher could categorize the data as the first-level themes (i.e. 15 themes). However, further data analysis procedures should be employed. Therefore, the researcher

employed the axial-coding technique for the second-level themes (Strauss & Corbin, 1990). As a result, three themes and two subthemes were yielded.

Human Subject Protection

The privacy of all participants and the university lecturer is the most important element. Based on the consent form, the university's information, the background of the university lecturer and participants, personal information, contact information, grades, location, voiced messages, written transcripts, signed agreements, documents, computer, and related materials were all locked in a password-protected cabinet. Only the researcher can read the information. Once the research is completed, the researcher deleted and destroyed the information to protect all parties' privacy. The current study received support from the Woosong University Academic Research Funding 2022.

FINDINGS AND DISCUSSION

The researcher categorized nearly 2,000 pages of materials acquired through the study's data collection process. In this study, the researcher merged three themes and two subthemes that were based on interview sessions, focus group activities, remarkable item sharing, and diaries. Although all participants came from different family backgrounds and geographic regions (inside and outside the United States), they shared many similar stories and forms of personal growth in regard to the field research and outdoor education program. The current study yielded three themes from the data, as outlined in Table 1.

Table 1
Themes and subthemes

Themes and Subthemes
Learning From and Observing Nature: Acquisition of New Knowledge and Behaviors
From Observation to Practice and Cognitive Knowledge
The Balance between Humans, Animals, and Nature: Responsibility for the Environment
Sustainability: Protect and Save Resources for the Next Generation
Transferring Environmental Protection Knowledge and Practices: Desire to Teach the Next Generation

Learning from and Observing Nature: Acquisition of New Knowledge and Behaviors

After six weeks of living in the outdoor environment and experiencing teaching, observation, reflective learning, peer-based learning, and through guidance from their lecturer, all 20 participants had gained rich and engaging experiences and behaviors. All participants grew up in urban or suburban cities and towns before joining the summer field research and outdoor education program. Therefore, through the program, the participants acquired significant theoretical and practical knowledge about the subject (i.e., environmental science and environmental engineering) and were able to enhance their personal skills, theoretical knowledge, and ideas beyond traditional classroom and textbook materials. Based on their learning from the environment, two participants shared their comments about observing the river:

> *…my professor told me that storms, wastewater from the upper cities, and animal behaviours…can change the banks…of both sides of the river… although wastewater is purified…the chemical and waste cannot be clear…not 100%...the banks and the ecology will continue to be impacted…*(Participant #1, Interview)

> *…people and communities from the upper sides should provide the river…animals, nature, and the people from the lower sides need to use the water…we learnt that from the books…but this is our first time…to see the river and the water system from first-person experiences…we also learnt how to manage the wastewater from our trip…*(Participant #20, Interview)

Another group of participants described learning an interesting fact—that reasonable lumberjacking can protect the environment, especially through the avoidance of natural fires. The researcher captured the following stories:

> *…lumberjacking is not always wrong…if the forest is getting crowded, cutting off some trees will avoid fire…in California, wildfire…almost happens every year…some organizations disagreed…removing some trees from the forest…but after we observed and learnt from our field research…I have changed my mind with many hours of experiments…*(Participant #3, Focus Group)

> *…from the television or some social media platforms…we have to protect all the trees and the forest…this is also stated from some of the textbook materials…however, it is not always true…we have to manage the coverage of woods and trees…during the summer, for example in California…if we do not manage the trees, nature and heat will burn the trees…I learnt this from this outdoor education program…we have to make the balance…*(Participant #18, Remarkable Item Sharing and Focus Group Activity)

Many participants in the focus group activities agreed that environmental workers and professionals need to find a balance between environmental protection and reasonable living standards. Although people need to protect the environment, this balance should not be avoided.

From Observation to Practice and Cognitive Knowledge

Sociocultural constructivist theory (Vygotsky, 1978) advocates that individuals absorb knowledge, learning, and development from their sociocultural environments, such as through environmental elements and their peers. In this case, the students' observations during the field research and outdoor education program played important roles. This is especially true of their first-person experiences beyond the traditional classroom environment and textbook materials. As all of the participants lived in outdoor environments, they could exercise and apply textbook knowledge and hands-on experiences in their practices and incorporate it into their cognitive knowledge bases. Many needed to play specific roles (e.g., picking and preparing food) during the field research and outdoor education program. One participant's story was captured in this respect:

> *…the laundry powder may harm the environment and water resources if we use it next the river…therefore, we used some environmentally friendly ways to wash our clothes…many of us care about the environment…but we could only learn from the books…now, we could practice it…with some of the appropriate practices…it is very useful…*(Participant #8, Focus Group Activity)

Another group of participants advocated that they had learned some behaviors and skills from the animals they had observed in nature, such as food picking skills. In fact, many participants did not have any previous experiences with food picking, hunting, and cooking. Therefore, peer learning, observation, and guidelines from their lecturers played important roles. One story was captured in this respect:

> *…more than half of us did not know how to pick food in the forest…but two students were raised in the farmlands…we learnt the skills from these two classmates…some food cannot be eaten, and some food should be cooked for at least 20 minutes…we are all glad that the knowledge from others…can be reflected…and we can learn from each other…*(Participant #11, Focus Group Activity and Diary)

In line with the research question #1, the participants indicated that their field experiences allowed them to gain the knowledge between theoretical ideas and practical skills, as said: *"I did not know that university students can protect the environment…in such effective ways…"* (Participant #11, Diary). According to sociocultural constructivist theory (Vygotsky, 1978), learning always happens in social interactions with a theoretical foundation. In the case of this study, the field trip participants absorbed and practiced their textbook knowledge, with the natural environment serving as their science lab (Biasutti & Frate, 2017). More importantly, the participants confirmed that their learning and new knowledge were gained based on their social backgrounds and their interactions with the environment and their peers. Reflections from a previous study (Moseley et al., 2020) confirm these findings and ideas as being part of the theoretical framework.

The Balance between Humans, Animals, and Nature: Responsibility for the Environment

In line with the research question #2, the current field experience strongly influenced the sense-making processes and understanding of the postgraduate environmental science and environmental engineering students. As mentioned above, because all of the participants and their lecturer lived in nature for six weeks, they had many encounters with animals and experiences with natural phenomena in the field camp's rural areas. Berry picking, hunting, fishing, and other forms of learning in the natural environment constituted some of their daily exercises. Besides this kind of first-person and practical learning, a recent study (Kangas et al., 2018) indicated that outdoor learning always increases learners' understanding and skills, especially in terms of engaging with the environment and developing a sense of responsibility for it. As for the topic of CO_2 control, the researcher captured one participant's sharing:

> *…I learnt a lot from my lecturer and my peers…eating and cooking meat and beef may increase the level of CO_2 and methane…human excrement will pollute the environment if we do not purify with it beforehand…the over-reproduction of microorganisms and algae…kill the living animals in the river…the wildlife will be negatively impacted…*(Participant #6, Interview)

All students shared interesting stories about hunting for the first time. Because all of the participants had grown up in the city without ever engaging in any hunting, all were surprised by their experiences with it. All 20 students and their lecturer expressed that respectful wildlife hunting was an important responsibility, and outdoor learning was a part of their environmental education. One comment was captured in this respect:

> *…all are not vegetarians…this is my first time to exercise fishing…I learnt fishing skills from my classmates…I learnt…how to show respectfulness to the wild and animals…I will not waste any food and resources…as animals sacrifice their lives for humans…human should show the respectfulness…to the environment…*(Participant #4, Interview)

Sustainability: Protect and Save Resources for the Next Generation

Besides the ideas concerning responsibility for nature and the forest, all participants believed that their actions and behaviors in terms of the environment might help to protect and save resources for the next generation. Many participants indicated that they did not understand or know how to set up environmental plans and personal activities to save the environment. However, from their experiences during the field research and outdoor education program, all indicated that they might combine their first-person experience and textbook knowledge and incorporate them into their practice, which would then allow them to gain a sense of the environment for the next generation (Sholahuddin et al., 2021). One story about saving food was captured in this context:

> *…in the United States, a lot of people order additional food…they cannot finish…therefore, they have to throw it away…however, just like our animals and friends in the forest…they only pick the reasonable amount of food they need…they save the food for next time or other animals…I think people in the United States should do that too…we have to save the food, and we need to care about the animal issues in the farms too…otherwise, no animals and people can survive 100 years later…*(Participant #6, Interview and Diary)

First, in line with the research question #1, according to sociocultural constructivist theory (Vygotsky, 1978), learning from society, one's peers, and surrounding individuals should be a key direction for education. In the case of this study, many participants observed the behaviors and followed the actions of their peers and their lecturer to acquire outdoor skills and education. In line with a recent study (Bustami et al., 2020), practical and hands-on experiences may increase learners' understanding and sense of environment. In this case, as many experienced trying certain activities for the first time, the learning involved increased their practical and cognitive understanding. More importantly, the summer field research in the rural community changed the

learning concepts and environmental-oriented issues of the participants beyond the traditional classroom environment (Nazarenko & Kolesnik, 2018).

In line with the research question #2, the sense-making processes of the participants have been changed significantly, particularly how the participants describe their ways of food consumption and environmental protection, said: *"we need to protect our environment and do not waste food from our dinner table…people are still suffering from food and fresh water…"* (Participant #6, Interview). More importantly, all gained a sense of environment and sustainability (Kwee & Dos Santos, 2021) from their first-person experiences during the field research and outdoor education program (Nazarenko & Kolesnik, 2018). Their comments confirmed the findings of a previous study (Kangas et al., 2018) stating that learning can be acquired through observation and practice.

Transferring the Knowledge and Practices of Environmental Protection: Desire to Teach the Next Generation

One of the goals for environmental education is to transfer knowledge of environmental protection to participants (Bourn, 2014). Because many participants will become environmental scientists and environmental engineers after graduating from university, they will become models for others in acquiring such knowledge and practices. All of the student participants expressed the desire to teach, share, and transfer their knowledge, skills, and ideas regarding environmental protection to the next generation. All 20 students indicated that, if possible, they would like to become mentors during future outdoor field research, outdoor education programs, and field trips. The researcher captured one comment in this respect:

> *…I want to become the outdoor coach for children…I want to show our children…the beauty of our nature and forest…many children in the city…do not know forest and river…only from their books and websites…outdoor education increases our sense of belonging…as we are a part of the world…the knowledge of environment and wildlife protection is greatly needed…*(Participant #5, Focus Group)

More than 10 participants indicated that they might like to gain an initial teacher's license (beyond their current postgraduate degree program) to teach elementary and secondary school students, particularly about environmental protection and geography in the classroom environment. One comment was captured in this respect:

> *…many children and students do not understand how to protect the environment…I did not learn that from my teachers in high school too…but I think it is very important…I want to take the role as a teacher…to teach some essential ideas and the sense of sustainability…from early age…there are many practice-based programmes in the United States for the Science, Technology, Engineering, and Mathematics teachers…perhaps I can take a year off after I completed my degree…for this meaningful initial teacher's license…I want to tell our children…this is the right time to protect the environment…*(Participant #15, Focus Group)

In line with the research question #1, the current field experiences significantly changed the participants' mind and even career pathways (i.e. to the education and teaching profession). Many indicated that their current experiences open their eyes and horizons, particularly educating the next generation and transfer the environmental issues and messages to the young generation (Dos Santos, 2021a).

Another group of participants also commented on becoming against animal experimentation in university and industry environments. Currently, many labs allow experimentation on animals for educational and practical purposes. However, these animals may suffer from pain and inhumane treatment (Smith, 2020). Over the decades, scientists have advocated for animals' rights, but no results have yet been produced. All 20 field trip participants expressed their concerns and promised to advocate for animal welfare. One participant shared:

> *…we all didn't aware the problems of animal's rights…but we learnt hunting from this trip…we learnt…to show our respectfulness and empathy to animals…animals have family members too…they sacrifice for us…in our kitchen and in our labs…we have to avoid animal tests as much as possible…once I can host my own lab in the future…I will avoid as much as I can…*(Participant #2, Focus Group, Remarkable Item Sharing, and Diary)

In conclusion, sociocultural constructivist theory (Vygotsky, 1978) served as the theoretical underpinning of this study in understanding the experiences and sense-making processes of these participants after completing six weeks of field research, particularly in terms of first-person and hands-on experiences (Sholahuddin et al., 2021). Many students advocated that the learning that had taken place during the trip had increased their understanding of environmental issues and had particularly affected their desire to teach environmental knowledge to the next generation. Reflecting on a previous study (Behrendt & Franklin, 2014), this study's results successfully outline the relationships between sociocultural constructivist theory and the expectations of environmental education.

LIMITATIONS

The current study collected data from a small sample size group of participants (N = 20). Although the enrolment (i.e., participant size) was not large, the data obtained were rich because of the study's multiple interview sessions, focus group activities, diaries, and remarkable item sharing. The general inductive approach design allowed the researcher to capture an in-depth understanding of all participants' lived stories, such as the remarkable item sharing. Future research studies may wish to expand the number of participants to capture additional information from programs using a similar background and field research.

Second, the current study captured information only from participants who were enrolled at the time as postgraduate students in university environmental science and environmental engineering programs. However, participants and students from different backgrounds could also benefit from such field research and outdoor education programs. Therefore, if lecturers host similar field research and outdoor education

programs in the future, they may wish to include additional participants and participants with different backgrounds to achieve a broader understanding of the issues under study.

Third, many studies have indicated that secondary school students should also study these types of field research and outdoor education programs during their teenage years, in order to build up a sense of environment from an earlier age. Future research studies may also encourage secondary school teachers undertaking similar outdoor education programs to compare the differences between secondary school students and postgraduate students in different educational systems and from different backgrounds.

CONTRIBUTIONS AND CONCLUSION

This study contributes to existing research in four ways. First, environmental educators can follow the recommendations of this research study to reform and polish their current curricula and instruction. In line with research question #1, currently, many environmental education curricula and lesson plans are textbook-oriented and solely use classroom instruction. However, outdoor education and field trips can greatly increase students' motivation to learn. Although school budgets may be limited, short trips to local parks and community centers can be informative and still satisfy limited budgets and resources.

Second, based on the current findings, participants indicated that the field experiences significantly opened their eyes and horizons in their profession and university experiences. Therefore, university leaders, department heads, and lecturers may wish to host quarter-long or summer-long field research, outdoor education, and field trips for their students. In the United States, students are currently encouraged to join outdoor education exchange programs, such as those hosted by Semester at Sea. Other universities can host similar programs and plan to increase opportunities for all students to enjoy outdoor education and field research during their academic journey.

Third, in line with the research question #2, understanding of the participants and potential students are very important to reform and upgrade the courses. Researchers in environmental education, environmental sciences, and environmental engineering can benefit from this study because the results gained from our students' descriptions of their experiences during field research and outdoor education fill gaps in our current understanding. Although this short study may not provide answers to all of the problems in these educational fields, our results can offer a blueprint for researchers in their efforts to upgrade schools' internship and practicum requirements and thereby provide a holistic and broad general education.

Fourth, in line with both research questions and findings, more than ten participants indicated that they want to gain their teaching licenses after the field experiences. Secondary school teachers and departments should take this study as an opportunity to establish field research and outdoor education programs for their students during their teenage years. The experiences and results of these programs may become stimuli for university admission advantages, university major decision-making processes, and long-term personal growth. Therefore, secondary school teachers should take a step forward in this direction.

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