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Exploring Student Engagement in Sustainability Education and Study Abroad

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Abstract: This paper specifically outlines an investigation of the influence of sustainability education and study abroad coursework on levels of a key component of academic success, student engagement. A quasi-experimental design compared pretest and posttest levels of engagement (measured by the Deep Learning Scale) among undergraduate students enrolled in four types of courses. Data were analyzed using a repeated measures MANOVA and supported two significant 2-way interactions (Sustainability * Time and Study Abroad * Time) suggesting that student engagement (Deep Learning) is more likely to increase with sustainability (than non-sustainability) courses and with study abroad (than non-study abroad/campus courses). Findings provide empirical support for university initiatives that seek to incorporate sustainability coursework and study abroad opportunities into the undergraduate curriculum as means to enhance students' overall engagement and academic success. The paper provides insights into where sustainability education and study abroad courses have broad potential to promote engagement and, as such, should be considered part of the general learning requirement of university education. In terms of study limitations, the sample is drawn from one university and self-selection bias is possible for students choosing to enroll in study abroad and sustainability-focused courses.

Keywords: student engagement; sustainability education; study abroad



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1. Introduction

Generally, educators seeking to enhance teaching and learning in higher education have increasingly turned their attention to strategies for promoting student engagement [1]. Student engagement has been linked to such positive learning outcomes as timely college completion, achievement in general education classes, and gains in critical thinking [2,3]. During COVID-19, acute levels of disruption to global tourism industry and tertiary education sectors have led academics to also consider how they can use engagement with the academic community to instill hope in their charges and, for those in specific courses related to this paper, an “intention to continue with hospitality and tourism as their academic area of study and their future career” [4] (p. 194). The present study explores the degree to which sustainability education and study abroad (and the two in conjunction) can be potential loci for engagement.

Student engagement is a rich construct with a long pedagogical history [1]. While formal definitions of engagement may vary, the construct generally reflects a sense of

student emotional and temporal investment in learning activities (both in and out of class), as well as the policies and practices of institutions to encourage and accommodate those productive experiences [3,5]. Engagement is then an important component of global learning, which is defined as the “process of travelers becoming aware [and critically reflexive] of the interconnectedness of people and the environment that transcends local and national boundaries” [6]. It is also essential for the development of graduates with the nuanced ability to step outside of entrenched neoliberal educational hierarchies [7,8] and play a collaborative role in the development of an emancipatory tourism curriculum that can contribute to a democratic and just society [9]. The United Nations World Tourism Organization (WTO) has observed that through quality education there is the potential for the sector to “promote inclusiveness, the values of a culture of tolerance, peace and non-violence, and all aspects of global exchange and citizenship” [10].

Sustainability education has been proposed as a transformative pedagogical model, that is, a means to positively challenge student attitudes, beliefs, behaviors, and identities [11–13] as they relate to issues of global social, economic, and environmental significance [14,15]. As such, it is seen by many academics as something beyond instruction on the immediate operational issues of industry, to encourage consideration of the merits of the industry itself [16]. Student engagement is seen as integral to high quality sustainability education given that students must grapple with the complex, interconnected, and normative nature of sustainability concepts and solutions [17–19]. Ref. [20] argued in the present journal that students with higher levels of environmental knowledge are more likely to have empathy for issues facing the natural world. It was also observed that frequent exposure to nature “not only produces a pleasant mood and distinct sense of well-being but also promotes sustainable behaviors and responsible environmental behaviors” [20]. While questions persist regarding its potential to affect positive sustainability outcomes for host populations [21,22], sustainability education offers opportunities for a ‘high impact’ learning experience with the potential to enhance student engagement and the positive learning outcomes that follow. Following this, study abroad has been identified as a “high impact” learning experience with the potential to enhance student engagement.

Scholars and university administrators have promoted study abroad as a way to develop students’ post-cosmopolitan identities, intercultural awareness, and work readiness among other skills needed to negotiate a globalized society [15,23,24]. These initiatives form an important component of wider internationalization and globalization trends in the tertiary education sector, where the movement of students and staff is seen as essential for developing an “international or intercultural dimension into teaching, research and service through a combination of a wide range of activities, policies and procedures” [25] (p. 381). It is generally accepted, but not well documented, that increases in these traits accrue from the unique experiential learning environment, and potentially levels of student engagement, afforded by study abroad [26]. However, while one study found that studying abroad increases student engagement as measured at graduation [27], to our knowledge, no prior studies have explored student engagement in the context of sustainability education.

In general, there is scant empirical evidence to support the notion that sustainability course content or studying abroad (and/or their additive effect) fosters student engagement, and therefore, potentially results in greater learning. Consequently, a need exists to better understand the role of these pedagogical interventions in enhancing student engagement. In the present study, the authors explore the effects of participation in courses in sustainability education and study abroad on student-reported levels of engagement using a quasi-experimental design. Results of this work can inform the design and implementation of sustainability education and study abroad programming in higher education, just as similar studies have yielded specific recommendations for service learning, first-year seminars, and undergraduate research [28].

2. Literature Review

2.1. Student Engagement

Not all educational experiences or instructional practices are equally efficacious in generating student learning. Refs. [3,29] for instance, identify a variety of such educational experiences that are loosely derived from experiential learning theory and linked to student temporal and affective engagement in their learning, and thus related also to positive student development [30,31]. These engaging experiences span both formal instruction and informal extracurricular activities while on campus or abroad. Thus, for example, the amount of time that students spend discussing course material outside of class with faculty is linked to higher levels of learning and concept retention [2]. Similarly, when students are asked to reflect on course material and integrate that material with knowledge obtained from other sources, greater learning occurs [32]. Contact with peers from a variety of cultural backgrounds is likewise related to high levels of engagement and ultimately to learning outcomes. Study abroad affords rich opportunities for several of these learning experiences. Therefore, it is unsurprisingly listed among high impact practices [3]. Indeed, even on-campus high engagement activities (e.g., assisting in faculty research or out-of-class peer discussion) result in heightened intercultural competencies such as ability to work with culturally diverse people and understanding complex global issues [33].

Generally, scholarly understanding about the impacts of engagement on student learning and development is made possible to a large degree by advances in measurement. In particular, the National Survey of Student Engagement (NSSE[®]) has been administered at over 1600 institutions to over five million students [34]. At the core of the NSSE[®] are a cluster of 15 items that tap “deep approaches to learning” [35,36]. Deep Learning denotes that students engage in activities, such as reading and discussing widely, that encourage understanding of underlying principles, application, and multiple perspectives. Three main domains of educational activities comprise the Deep Learning Scale: (1) Reflective, (2) Integrative, and (3) Higher Order Learning [37].

Reflective Learning, as the name suggests, includes educational experiences that require students to reflect on relations among newly acquired knowledge and their personal beliefs, past experiences, and knowledge. Experiential learning theorists have long contended that reflection activities are required for experiences to be made truly meaningful for participants [38]. Over the last decade or so, reflective principles have formed a part of scholarly inquiry into sustainability as a threshold learning concept [39,40]. Threshold learning concepts were first proposed by [41] as “akin to a portal, opening up a new and previously inaccessible way of thinking about something. It represents a transformed way of understanding, or interpreting, or viewing something without which the learner cannot progress” (p. 1). The authors of the present paper have made the concept of threshold learning a core plank of our sustainability teaching, arguing that by exposing students to tourism forms that many people would see as ethically or morally suspect [42], students will see the inherent values-based contradictions that exist across different tourism geographies and destinations. Six items in the Deep Learning Scale tap reflective educational activities including “Enjoyed completing a task that required a lot of thinking and mental effort” and “Learned something from discussing questions that have no clear answers.”

Integrative Learning pertains to the ways that students choose to access and synthesize information from various sources and diverse points of view. Sustainability education is inherently integrative, since it draws on multiple disciplines in the social and natural sciences, as well as on humanistic studies such as ethics [43]. Sustainability education, like study abroad, also challenges students to reconcile differing and competing views of the world and its resources [44]. Items in the Deep Learning Scale tap integrative educational activities, such as “Put together ideas or concepts from different courses when completing assignments or during class discussions” and “Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)”.

Higher Order Learning stands in opposition to rote memorization. It emphasizes creative analysis, principled evaluation, and extrapolation. Ref. [45] note that higher education institutions have increasingly “been challenged to move beyond measuring the success of study abroad in terms of student enrollment and satisfaction and to foster higher-order learning outcomes” (p. 1). Four items of the Deep Learning Scale tap Higher Order Learning including “Made judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions” and “Analyzed the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components.” Higher Order Learning activities are characteristic of sustainability issues which have real-world consequences.

In this study, Deep Learning is treated as a unidimensional scale encompassing the three domains of high engaging educational practices discussed above. Ref. [34] find support for a second-order factor model of the NSSE scale, suggesting that the three sub-dimensions represent a single higher order “deep learning” construct. Thus, these authors conclude that a unidimensional approach is appropriate when using the NSSE scale for analysis of student engagement.

2.2. Sustainability Education and Student Engagement

Although there is no universally accepted definition of sustainability, it is generally considered to be an abstract construct that represents an idealized or progressive state of human–environment interaction [46–48]. In this state of balance, the basic social and economic needs of society are met without compromising the ability of the natural environment to support human welfare, now or in the future [49]. Sustainability thinking has emerged from a recognition that the current global system of social and economic production is eroding the natural capital on which it which it depends, while perpetuating gross social, economic, and environmental injustice [50,51]. Reforming this system and achieving the idealized future envisioned by sustainability requires: a change in how organizations measure and assess operational effectiveness [52], sweeping reform in patterns of individual resource use and consumption in the age of the Anthropocene [53,54], and a change in the sense of obligation that individuals hold for one another and the environment [55,56].

Thus, sustainability concepts and the solutions to eroding global sustainability are complex, relativistic, and rife with moral dilemmas [46,47]. This complexity is in part the rationale for assigning sustainability content broadly in higher education. Evaluating sustainability concepts requires students to engage in higher order thinking, problem solving, and the negotiation of conflicting individual and collective values [14,15]. Basic knowledge of sustainability concepts is seen by some as an integral part of liberal education, particularly as sustainability, and the social, economic, and environmental issues it represents, become increasingly salient in local, state, and international discourse [11,57,58]. In fact, some have gone as far as to argue that sustainability education should be the defining theme of liberal education [42,59].

Teaching sustainability, however, is complex. While students often have positive associations with sustainability concepts, many have “limited knowledge of sustainability principles and technical aspects related to sustainable tourism” operationalization [60] (p. 101). A highly engaging pedagogical model is critical for students to effectively retain and assimilate the complex, often global, concepts associated with sustainability, or, as [13] stated in reference to student engagement, it “is particularly crucial in the case of sustainability education, where holistic insight and an ability to organize and structure disparate types of information into a coherent whole is central to the whole exercise” (p. 45). To date, however, it has been identified that tourism students often graduate with a narrow and un-nuanced appreciation of sustainability, which it has been suggested may be partly due to the presence of coursework programs that are based on “weaker conceptualizations of sustainability and a lack of holistic, critical and systematic thinking” [61] (p. 882). Going forward, ref. [61] argue that universities need to teach sustainability in a way that goes

beyond narrow neo-liberal viewpoints. The educational practices measured by the Deep Learning Scale are the very types of educational practices that are necessary for students to understand, retain, and engage with sustainability effectively. The extent to which courses focused on sustainability education foster high levels of student engagement, however, remains unknown.

2.3. Study Abroad and Student Engagement

Across academic disciplines, higher Deep Learning Scores predict higher grades, self-reported learning, and satisfaction with the college experience [35]. Study abroad programs are premised on the notion that students should be provided with “opportunities to engage with other cultures and gain valuable experience with the world beyond the college campus” [62]. Reflective of the fact that for many young people study, abroad programs represent a ‘rite of passage’ that can positively enhance self-identity [63], it is not surprising that students who studied abroad were found to have greater first-year-to-senior-year gains in Deep Learning than did their counterparts who never studied abroad [27]. Indeed, it is often surmised that the engagement potential inherent in study abroad programs (e.g., frequent faculty contact outside of class, discussion with peers from diverse backgrounds) is what accounts for the positive learning outcomes that general accrue from education abroad [26]. Limited evidence points to the impact of study abroad on other kinds of engagement. For example, in a study of more than 6000 alumni of study abroad programs, participants exhibited strong positive impact of past education abroad on current indicators of global engagement such as civic activity, philanthropy, and social entrepreneurship [23].

The sparse empirical literature linking study abroad to enhanced student engagement does not, however, warrant definitive conclusions. For example, higher increments in engagement across four years of college study could be the result of some other factor that is confounded with the choice to study abroad. A single case study, without a control group, did examine more proximal changes in Deep Learning activity by collecting data from 25 students enrolled in a short-term class that included a brief home-stay component [64]. In general, these students reported that they had participated in activities characteristic of Higher Order Learning and Integrative Learning on campus, and Reflective Learning while studying abroad. Clearly, more rigorous research that involves (a) students participating in a range of study abroad programs and (b) a control group (comprised of students who did not study abroad) is required before the link between study abroad and student engagement can be confirmed.

Sustainability education and study abroad are considered natural partners [65]. In situ, reflective, and participatory instruction optimize engagement in sustainability studies [13], and those same traits are characteristic of study abroad. Indeed, one prior study demonstrated synergy between sustainability instruction and study abroad in terms of fostering global citizenship; students enrolled in sustainability classes abroad evinced especially high increments in this trait [66]. However, that same study found no such additive effect of studying abroad when the outcome of interest was a measure of cultural competence. International experience and global competencies are also tightly linked to issues of sustainability as many of the world’s most pressing resource dilemmas transcend the boundary of the nation state [67]. Consequently, global learning can help to engender prosocial individual traits that are integral to social, economic, and environmental aspects of sustainability [14].

3. Methods

3.1. Hypothesis

It was hypothesized that location (study abroad versus non-study abroad) and course topic (sustainability versus non-sustainability) would produce significantly higher levels of student engagement as measured by Deep Learning. Specifically, sustainability and/or studying abroad is associated with higher increments (i.e., relative to the preceding

semester) in student Deep Learning activity relative to students not studying sustainability and/or not studying abroad; i.e.,

Hypothesis 1 (H1). *There will be a significant interaction of topic and/or location in levels of Deep Learning (from pretest to posttest).*

3.2. Data Collection and Participant Demographic Profile

This study took place at a large (enrollment > 35,000 students) land-grant university in the southeastern United States. Data collection occurred during the summer sessions of 2013 to 2018. Instructors teaching classes falling within the four combinations of two factors (study abroad in sustainability; study abroad in non-sustainability; campus course in sustainability; and campus course in non-sustainability) were solicited as collaborators. With instructor permission, students in those classes were asked to provide informed consent, as per Institutional Review Board requirements. Only students attending short-term courses (3–6 weeks) were surveyed. All courses took place entirely on campus or abroad (i.e., no online or hybrid courses were surveyed). Sustainability courses included classes in ecology, forest resources, anthropology, marine sciences, and sustainable development that were identified as meeting the university's Certificate in Sustainability. Non-sustainability courses included classes in world languages, business, communication, and instructional technology among others (that were not part of the Sustainability Certificate). Study abroad courses were identified as those classes offered through the university's Office of International Education. Non-study abroad courses were offered on campus during the sampling period.

Participants completed a pretest questionnaire on day one of the course and a posttest questionnaire on the final day of the course. Participants generated unique identification codes so that pretest and posttest questionnaires could be matched without violating their anonymity. Three thousand and ninety-six respondents completed the pretest and posttest surveys. The sample was comprised of 69.0% female (only slightly higher than the general undergraduate student population of 66% female) and 9.3% first year, 29.8% sophomore, 35.4% junior, 22.4% senior, and 3.1% graduate students. The breakdown of courses by topic and location was 31 sustainability abroad courses (n = 1028 students), 29 non-sustainability abroad courses (n = 447 students), 10 sustainability non-study abroad courses (n = 145 students), and 43 non-sustainability non-study abroad courses (n = 728 students).

3.3. Measures

Students were asked to respond on a four-point frequency scale to 15 retrospective items measuring Deep Learning following the stem, "During the previous semester, how much did your coursework emphasize the following . . . ". Responses to items measuring Higher Order Learning were recorded on a scale where 1 = Very little, 2 = Some, 3 = Quite a bit, and 4 = Very much. Response to items measuring Reflective Learning and Integrative Learning were recorded on a scale where 1 = Never, 2 = Sometimes, 3 = Often, and 4 = Very often. All items were summed to form an index with a range from 15–60. Thus, changes in scores from the pretest to the posttest reflect differences in engagement, operationalized as specific educational activities, from the prior semester to the focal semester (i.e., during the study abroad program or during the sustainability course). A detailed description of Deep Learning items along with pretest and posttest means and standard deviations is presented in Table 1. The Deep Learning Scale demonstrated adequate reliability at both pretest (Cronbach's alpha = 0.87) and posttest (Cronbach's alpha = 0.91) [68].

Table 1. Mean and standard deviation of Deep Learning items at pretest and posttest.

Item	Pretest M (SD)	Posttest M (SD)
Synthesized and organized ideas, information, or experiences into new, more complex interpretations and relationships.	2.67 (0.85)	3.00 (0.81)
Applied theories or concepts to practical problems or in new situations.	2.86 (0.85)	3.07 (0.83)
Analyzed the basic elements of an idea, experience or theory, such as examining a particular case or situation in depth and considering its components.	2.75 (0.87)	3.04 (0.84)
Made judgments about the value of information, arguments, or methods, such as examining how others gathered and interpreted data and assessing the soundness of their conclusions.	2.75 (0.88)	3.01 (0.87)
Put together ideas or concepts from different courses when completing assignments or during class discussions.	2.84 (0.84)	3.06 (0.81)
Learned something from discussing questions that have no clear answers.	2.85 (0.86)	3.13 (0.82)
Examined the strengths and weaknesses of your own views on a topic or Issue.	2.82 (0.87)	3.08 (0.83)
Worked on a paper or project that required integrating ideas or information from various sources.	3.05 (0.89)	3.26 (0.86)
Enjoyed completing a task that required a lot of thinking and mental effort.	2.88 (0.87)	2.96 (0.86)
Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments.	2.65 (0.94)	3.02 (0.82)
Applied what you learned in a course to your personal life or work.	3.00 (0.86)	3.10 (0.82)
Tried to better understand someone else's views by imagining how an issue looks from his or her perspective.	2.86 (0.89)	3.13 (0.83)
Learned something that changed the way you understand an issue or concept.	3.04 (0.79)	3.15 (0.81)
Discussed ideas from your readings/classes with faculty outside of class.	2.24 (1.01)	2.62 (1.02)
Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.).	2.92 (0.86)	3.00 (0.87)

3.4. Analysis

A two-way repeated MANOVA in Stata/SE (version 13.1) was used to test the effect of Topic of Instruction (sustainability versus non-sustainability) and Location of Instruction (study abroad versus non-study abroad) on changes in Deep Learning over time (pretest to posttest). The two between-subjects factors were Topic of Instruction and Location of Instruction, the within-subjects factor was Time (from pretest to posttest). As there were only two dependent variables (Deep Learning at pretest and at posttest), the test of the within-subjects effect was measured using a simple ($k - 1$) contrast using effect coding, in which the levels of the two variables sum to one ($-1, 1$). A significant level of $p = 0.01$ was used.

4. Results

Descriptive means and standard deviations for each of the four subgroups at pretest and posttest are presented in Table 2. The final sample size was 2203 respondents, a total of 893 students were excluded from the analysis due to missing values in one or more of the variables measured.

The overall model for the between-subjects MANOVA was significant ($F_{(3,4404)} = 36.23$; $p < 0.001$; Wilks Lambda = 0.9081), but two significant interactions with the within-subjects factor were also observed: Sustainability * Time ($F_{(2,2203)} = 40.68$; $p < 0.001$; Wilks Lambda = 0.9819) and Study Abroad * Time ($F_{(2,2203)} = 25.18$; $p < 0.001$; Wilks Lambda = 0.9887). The 3-way interaction (Sustainability * Study Abroad * Time) was not significant ($F_{(2,2203)} = 2.00$; $p = 0.1578$; Wilks Lambda = 0.9991). These findings confirm the hypothesis that sustainability courses or studying abroad would yield the highest levels of

student engagement, relative to not studying sustainability and/or not studying abroad. The main effects of sustainability ($F_{(2,2202)} = 21.97; p < 0.001$; Wilks Lambda = 0.9804) and study abroad ($F_{(2,2204)} = 21.08; p < 0.001$; Wilks Lambda = 0.9812) were also significant but are not interpreted in light of the significant 2-way (between- and within-subjects) interactions. Finally, a significant between-subjects 2-way interaction for Sustainability * Study Abroad was found ($F_{(2,2203)} = 7.14; p < 0.001$; Wilks Lambda = 0.9936) suggesting that taking sustainability courses abroad is associated with higher engagement (Deep Learning) than non-sustainability courses and/or not studying abroad. However, the lack of a 3-way interaction with Time means that change in engagement (from Pretest to Posttest), as indicated in the hypothesis, cannot be determined by the Topic or Location of Instruction itself. Rather, we can only state that, students simply reported higher engagement in those (sustainability courses taught abroad) than in other courses. See Figure 1.

Table 2. Cell means (M) and standard deviations (SD) of the Deep Learning scale (pretest and posttest) by Location (Study Abroad versus Non-Study Abroad) and Topic (Sustainability versus Non-Sustainability).

	M (SD)			
	SA-SUS	SA-NSUS	NSA-SUS	NSA-NSUS
Pretest	40.91 (7.56) N = 996	44.31 (8.19) N = 430	41.90 (7.21) N = 136	42.12 (7.52) N = 709
Posttest	46.76 (8.09) N = 1004	46.60 (8.31) N = 426	44.62 (7.80) N = 140	42.86 (8.92) N = 704

Note: Mean summated responses to 15 deep learning measures. The maximum possible score is 60, indicating a student's belief that they experienced activities reflective of deep learning while enrolled in a course within that cell. The minimum possible score is 15, indicating a student's belief that they did not experience activities reflective of deep learning while enrolled in a course within that cell. Increasing values from 15 to 60 reflect increasing levels of deep learning.

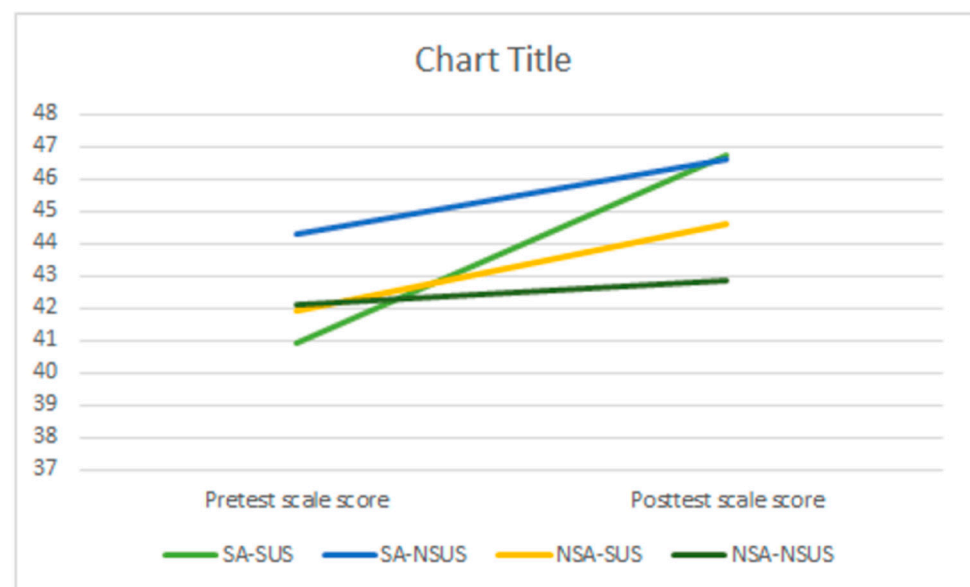


Figure 1. Cell means of the Deep Learning Cycle. Mean summated responses to 15 deep learning measures. The maximum possible score is 60, indicating a student's belief that they experienced activities reflective of deep learning while enrolled in a course within that cell. The minimum possible score is 15, indicating a student's belief that they did not experience activities reflective of deep learning while enrolled in a course within that cell. Increasing values from 15 to 60 reflect increasing levels of deep learning.

5. Discussion

The primary contribution of this study was to link sustainability education and study abroad assessment with one of the dominant paradigms in higher education learning outcomes: student engagement. For several decades, the student engagement movement has demonstrated the potency of so-called high impact learning activities on a wide array of outcomes such as timely graduation, critical thinking, and student satisfaction with their college experience. Although exponents of the student engagement paradigm identify sustainability education, study abroad, and global learning as high impact activities, scant empirical evidence has previously plumbed those relations. Ref. [69] in this special edition examined the relationship between studying abroad and sustainable literacy. Interestingly, this included the notion that “studying non-sustainability courses abroad showed comparable growth in students’ sustainability literacy scores compared to studying sustainability on home campuses” [69]. In the present study, results revealed heterogeneity in reported levels of deep learning activity as a function of the topic of the coursework students were enrolled in (i.e., sustainability versus non-sustainability) and the location where it occurred (i.e., study abroad vs. on campus).

A second contribution of this study is to offer an additional exemplar of the type of pretest–posttest comparison group quasi-experiment that remains uncommon in the world of higher education instructional assessment [15,70]. Educators, generally, hope that all students will evince increments in targeted outcomes across a semester. The question for instructional improvement is, what interventions maximize those increments? In the case of sustainability education and study abroad in the present project, even short-term (three or four weeks) participation in complex learning can result in measurable improvements in student engagement. Thus, this quasi-experiment joins in the conclusions of other studies—studies conducted without the benefit of pretest–posttest comparison group designs—finding benefits for the shorter education abroad models that now dominate this enterprise [71] and adds a new finding to the literature on sustainability education assessment.

5.1. Sustainability Education and Student Engagement

A significant Time x Topic two-way interaction indicates that growth in Deep Learning activity was higher from pretest to posttest for students enrolled in sustainability-focused coursework than for students completing coursework without a focus on sustainability. Sustainability education, therefore, appears to be a potent mechanism for enhancing student engagement and consequent student learning and development. Ref. [13] posits that students must be highly engaged in order to comprehend the complex concepts associated with sustainability. The findings lend credence to the proposition that sustainability education is inherently integrative and applied and results in a high level of intellectual stimulation. Ref. [72] goes as far to state that sustainability education, as a pedagogical model, is capable of complementing and connecting avenues of inquiry across the academic disciplines that organize teaching and learning on campus. If sustainability is employed as a method of examining the relationship between environmental limits and the human values, decisions, and actions that shape the future, it will transform not only what we do on campus, but also how we think (p. 188).

Likewise, the engaging learning environment generated by sustainability education may be a mechanism for the transformation in values that is hypothesized to occur by studying about sustainability. As issues associated with global sustainability become more urgent (e.g., climate change, biodiversity loss, deforestation, etc.), universities should embrace the inherently interdisciplinary and normative nature of sustainability concepts and solutions as an opportunity to engage students in educational activities that encourage them to read, write, and discuss widely regarding issues of social, environmental, and economic concern. An important part of such processes is with recognizing the inherent contradictions in sustainability debates and with students reconciling what constitutes a valid dissenting opinion of ‘established’ scholarly orthodoxy [72]. Sustainability education

has the potential to transform the student experience through higher levels of engagement in Deep Learning activities and interaction with diverse perspectives on science, society, and the environment, in addition to transforming student attitudes, beliefs, and behaviors toward a more positive human–environment relationship [14,73]. Ref. [29] suggests that student engagement is not an outcome per se, but potentially moderates the level of learning that occurs during educational activities. Future research should seek to determine whether the higher levels of engagement that we observed during participation in sustainability coursework result in higher levels of actual student learning, especially as it relates to sustainability concepts and their application to their lives [74].

5.2. Study Abroad and Student Engagement

The significant Time \times Location two-way interaction indicates that students participating in short-term study abroad reported greater increase in meaningful educational activities than students completing coursework on campus over the same time-period. This finding confirms earlier pronouncements that study abroad is a “high impact” learning experience, capable of engaging students in ways that are similar to residential learning communities or independent faculty-sponsored research [29].

Universities around the world increasingly embrace internationalization as a core mission of their educational enterprise. Study abroad, and especially short-term study abroad, has become a critical component of advancing internationalization initiatives [71,75]. However, empirical evidence for the benefits of participation in short-term study abroad, in terms of learning outcomes, is only now coming to light [76]. Evidence for the added value of short-term study abroad (i.e., outcomes that typically are not achieved on campus) is critical if universities are marketing overseas programs as offering a worthwhile return on investment for broad swathes of students. Concomitant with work that has demonstrated the added value of study abroad in shaping students’ global perspectives [15], intercultural competencies [77], and foreign language acquisition [78], this work demonstrates that engagement in Deep Learning—often attributed as the mechanism fomenting college success—is indeed enhanced by studying abroad [27].

5.3. Additive Effects of Sustainability Education and Study Abroad on Changes in Student Engagement

It was hypothesized that sustainability education and study abroad would interact in their ability to engage students in Deep Learning educational practices. For example, past work examining different student learning outcomes (e.g., pro-environmental behavioral intentions, support for environmental policy) has demonstrated greater increments of growth as a result of participating in sustainability learning while studying abroad [79]. Although the results demonstrate evidence for each (independently) as potentially high impact pedagogical models, and a significant two-way between-subjects (Sustainability \times Study Abroad) interaction was found, the influence of Time (suggesting a change in engagement from pretest to posttest) was not significant. Thus, while the present study suggests an association between studying sustainability abroad and student engagement, it cannot confirm that learning about sustainability while studying abroad fosters greater student Deep Learning.

5.4. Recommendations and Future Research

Although the findings presented here are encouraging, they are subject to certain limitations. First, the sample consists of students enrolled at a single university. That is, students in the sample share similar levels of academic achievement and socio-demography that may not be representative of the broader student body in the United States or abroad. The results presented in this study should be viewed with this in mind. Future research should seek to replicate these findings across diverse institutions and student academic and demographic profiles before more definitive conclusions can be reached regarding student engagement in sustainability education and study abroad. Research of this kind

will contribute to achieving the important goal espoused by [80] that, because of the interconnectedness of the global biomes:

We recommend that educators internationally seek to encourage their students, as citizens of the world, to develop levels of understanding of core environmental science, ecological, and economic concepts that allow them to comprehend the negative impact and consequences of any broken ecosystem—be it a polluted river, an overharvested forest, or a bleached coral reef overtaken by an invasive species.

A second limitation is that there were relatively few courses (and correspondingly a lower number of respondents) in the Sustainability/Non-Study Abroad group—simply, there were few courses taught in the summer semester period that met the requirements of the Sustainability Certificate. Third, the types of coursework that students were enrolled in during the semester prior to the pretest are unknown. A potential problem with interpreting the results exists for those students who may have also been enrolled in sustainability coursework in the prior semester. Our data do not permit us to identify that small subset of participants. Clearly the influence of self-selection can be viewed as a limitation, although the quasi-experimental (pretest–posttest) design addresses this concern. A related issue is that, because students could not be randomly assigned to location or course content conditions, the possibility that somehow students who self-select into studying abroad or into sustainability classes are more susceptible to change than are their comparison group peers cannot be entirely dismissed.

6. Conclusions

In this study, the authors examined the impact of two pedagogical models, sustainability education and study abroad, compared to traditional on-campus instruction and topic areas, to engage students in meaningful educational practices. The results indicate that sustainability education courses and study abroad do in fact engender more deep learning activities than do courses that occur on campus or courses that focus on other topic areas. These findings lend empirical support to the view that study abroad is a high impact learning experience and that sustainability education is a potentially transformative and engaging paradigm for teaching in higher education. The interdisciplinary, applied, and challenging nature of sustainability coursework can prepare students to tackle global sustainability challenges. The empirical evidence presented here suggests that universities should continue to invest in sustainability curricula and in delivering study abroad programs if student engagement continues to be a primary outcome of an undergraduate education. Broader investment in programs that teach sustainability concepts can enhance the student experience and potentially facilitate the transition to a more sustainable future [81].

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