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Emma Savage Tara Tapics John Evarts Jeffrey Wilson Susan Tirone

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# Experiential learning for sustainability leadership in higher education

Emma Savage, Tara Tapics, John Evarts, Jeffrey Wilson and Susan Tirone

*College of Sustainability, Dalhousie University, Halifax, Canada*

## Abstract

**Purpose** – The purpose of this paper is to compare the program design of a sustainability leadership certificate to participants' perceptions of their in-program learnings and competencies development. The authors present the results from the analysis of one program evaluation component, a survey, which was delivered before the program start and at the program end.

**Design/methodology/approach** – The authors describe key design elements of a sustainability leadership certificate, which was framed around five key sustainability competencies. Using a pre/post self-assessment, participants ( $n = 32$ ) selected their level of confidence and competence in each of the key sustainability competencies and completed open-ended questionnaires. Quantitative data were analyzed using a Mann–Whitney U test, and qualitative data were transcribed and coded using a grounded theory approach in NVivo 10.

**Findings** – Based on the survey feedback, the program participants were generally excited by the program's experiential format and supportive community. They felt that they had improved their confidence and competence in the key sustainability competencies. Three themed clusters, community, future and personal development, emerged from the participants' open-ended responses. This supports the program design and can inform further program development.

**Practical implications** – The third theme, personal development, is notable, as it is not a typical focus of sustainability in higher education, but held high importance to participants. This strong resonance with participants suggests that sustainability programs should consider the role of the self to foster the development of key sustainability competencies.

**Originality/value** – The program's focus on "personal" was intentional in the program design. Based on participants' feedback, the inclusion of personal development exercises was a critical element for successful sustainability leadership development.

**Keywords** Leadership, Experiential learning, Personal development, Sustainability competencies, Undergraduate, Developmental evaluation

**Paper type** Case study

## Introduction

As the world faces urgent and rapidly unfolding sustainability challenges (Brown *et al.*, 2010; Tesoriero, 2010), higher education is called to take a lead role in training sustainability change leaders (Scott *et al.*, 2012). To bring about the level of social transformation required to meet today's sustainability challenges, change leaders need a new understanding of complex issues and new approaches to sustainability leadership

The authors would like to acknowledge the SLC Program Design Team: Brian Braganza, Cate deVreede and Leon deVreede.



(Doh and Stumpf, 2005; Lynham and Cunningham, 2006). Wals and Corcoran (2006) argue that universities have a particular responsibility to facilitate this alternative thinking. Sustainability in higher education (SHE) aims to enable people not only to acquire and generate knowledge, but also to develop graduates with capabilities and competencies to improvise, adapt, innovate and be creative (Barth *et al.*, 2007). Graduates require skills, such as interdisciplinarity, problem-solving, team working and holistic thinking (Thomas, 2009).

In this article, the notions of affective learning outcomes and personal development are explored in the context of an undergraduate sustainability leadership certificate offered at Dalhousie University. The program design is discussed in comparison with the program's developmental evaluation (Patton, 2011) and the SHE literature.

### Program overview

Launched in 2012, the RBC Sustainability Leadership Certificate (SLC) is an experiential learning program aimed at mobilizing change by developing participants' self-awareness and leadership skills. Participants examine personal and servant leadership (Greenleaf, 1967), explore tools that can be used to take effective sustainability actions and work to develop skills and capacities to lead change (e.g. building capacity in others and personal agency). Participants in the SLC program are primarily undergraduate students who are enrolled in programs from across the campus and who have completed a prerequisite introductory course with Dalhousie's College of Sustainability (CoS).

The SLC program includes the completion of prerequisite introductory sustainability course; attendance at three weekend training modules; completion of two reflective learning assignments; and completion of two engaged-learning projects (full program details available at: [www.dal.ca/faculty/sustainability/programs/slc.html](http://www.dal.ca/faculty/sustainability/programs/slc.html)). The prerequisite course introduces interdisciplinary learning using multi-dimensional perspectives on complex sustainability issues. In the prerequisite course, participants from varied disciplines and backgrounds are exposed to diverse perspectives and enter the SLC with a shared background in sustainability concepts. The weekend modules and assignments guide participants through an inductive learning process of introspection, community building and leadership capacity building.

The program curriculum was informed by a proposal drafted by staff and faculty from across Dal; recommendations collected through community consultations; and a campus-wide forum. The program design, curriculum and evaluation were developed by the CoS with the expertise of three community-based team members. Wiek *et al.*'s (2011) framework of key competencies in sustainability research and problem-solving offered a thorough conceptual framework for sustainability education in higher education and helped structure the SLC program goals:

- *Systems-thinking*: Analyze a sustainability problem from a holistic perspective.
- *Normative*: Assess a problem and its context comprehensively with respect to sustainability.
- *Anticipatory*: Construct scenarios about how the problem might play out in the future.
- *Strategic*: Create intervention strategies to avoid undesirable scenarios and realize sustainability visions.

- *Interpersonal*: Collaborate closely with researchers from other disciplines, as well as stakeholders in government, businesses, and civil society.

The SLC program's engaged learning design (Jones and Educational Resources Information Center (US), 1994 and VanDeWeghe, 2009) incorporated problem-based learning as an approach to addressing complex and multi-disciplinary sustainability challenges (Brundiers and Wiek, 2013). The engaged-learning design responded to feedback from the forum that emphasized the students' desire for experiential learning (Kolb, 1984) and collective action. In the engaged-learning model, the role of the teacher shifts from information provider to facilitator, guide and co-learner.

The program curriculum used various asset-based community development and youth engagement activities to foster a supportive learning environment. A facilitated learning format was selected to encourage participants to construct and produce knowledge and to then take meaningful action through engaged-learning projects and in-class student-led training workshops. Participants worked collaboratively in a classroom that promoted appreciative inquiry, multiple learning styles, creativity and the power of stories.

Developmental evaluation was incorporated as an integral part of the program design to evaluate the implementation and to influence the ongoing program development. Participants played a key role in the evaluation of this emergent program. Materials collected from participants as part of the SLC's developmental evaluation process included: a pre/post self-assessment survey; aspirations entering the program; program feedback collected during the modules; and personal reflections on their individual key learnings. These sources of evaluative information were continuously shared with the program designers/facilitators for ongoing program development.

Participant numbers for the SLC were limited to 40. Kwantlen University Institutional Analysis and Planning (2004) reports that small classes are more successful for courses that emphasize problem-solving, critical thinking, long-term retention and attitude toward the discipline. The small group size enabled an iterative process of community building within the SLC that helped to create an intimate place for creativity, risk-taking and innovation (Shriberg and MacDonald, 2013).

### Literature review

Sustainability education seeks three primary outcomes: knowledge of sustainability issues, the skills to act sustainably and the personal and emotional attributes that facilitate sustainable behavior (Chalkley, 2006; Carter, 1985; Bloom *et al.*, 1971). Sterling (2001) and Burns (2011) urge that if educators are to effectively prepare learners with the knowledge, skills and values they will need for creating more sustainable places and communities, a transition must be made from transmissive teaching models to transformative learning processes. Mezirow (2000) describes transformational learning as a process by which:

We transform our frames of reference to make them more inclusive, open, emotionally capable of change, and reflective so that they may generate beliefs and options that will prove more true or justified to guide action.

Learning approaches, such as problem-based, inquiry-based, experiential and collaborative learning methods, contribute to higher-order learning, which facilitate

“how to think” rather than “what to think” within the framework of sustainability (Shephard, 2008; Thomas, 2009; Donald, 2002). Sustainability teaching approaches should focus on the processes of learning, rather than the accumulation of knowledge (Thomas, 2009). This represents a shift from the traditional knowledge-focused and lecture-style teaching to a more process-based and student-focused approach to learning. In this way, the learning experience is personalized (Thomas, 2009), nurtures a sense of environmental and social responsibility and produces a capacity for enacting change.

Embedded in sustainability education is a need to enact change and develop leadership. Sustainability leadership requires identifying knowledge about the sustainability challenges, dialogue skills and the capacity to accomplish consensus-building processes in complex settings (Dunphy *et al.*, 2003; Maak and Pless, 2006). Taking leadership on sustainability issues also relies on the capacity to build and cultivate sustainable and trustful relationships with stakeholders, both inside and outside an organization (Graen and Uhl-Bien, 1995) as well as interpreting sustainability in the complex context in which the group or organization operates (Metcalf and Benn, 2013). Responsible leadership requires coordinating internal and external stakeholders to accomplish common objectives, to achieve sustainability and legitimacy and, ultimately, to realize an ethically sound and shared vision (Pless and Maak, 2009; Szekely and Knirsch, 2005).

Education is inevitably value-laden, and education for sustainability is no exception with learning outcomes often consisting of affective attributes, such as morals, attitudes, dispositions and behaviors (Buissink-Smith *et al.*, 2011). Examples of affective learning outcomes in SHE include: increased attention to the future of society and intergenerational equality; empowerment of students and a heightened belief that they can make a difference; and increased personal willingness to participate in solving societal and environmental problems (Butcher, 2007). These affective learning outcomes, described as *critical reflection*, *values clarification* and *participative action* by Tilbury (2004) are core components for sustainability education, but pose challenges for assessment and program evaluation as they are subjective, imprecise, developed slowly and seldom easily articulated (Bloom *et al.*, 1956; Leng, 2002). Although assessing affective learning outcomes may be impossible to accomplish in the scope of an academic year, they are an important aspect of long-term sustainability program evaluation.

The pressing need in SHE for affective attribute development and higher-level learning calls for the implementation of higher-level learning assessment and evaluation. Buissink-Smith *et al.* (2011) suggest Krathwohl *et al.*'s (1964) taxonomy of abilities (to receive, to respond, to value, to organize and to internalize) as a useful framework to explore the measurement of affective attributes in sustainability education. The authors propose that Patton's (2011) developmental evaluation (DE) is well-suited for assessing emerging sustainability programs. DE brings a complex system orientation to evaluation and offers an approach often used in social innovation. DE is an adaptive evaluation that can respond to emerging issues, outcomes and questions, while focusing on understanding the ways in which the various program settings, components and participants interact with one another (Preskill and Beer, 2012). Defining teaching and learning approaches that generate affective outcomes and

identifying key factors that promote or limit attainment of sustainability competencies prompts the evaluation of Dal's SLC.

### Methods

As a component of the SLC developmental program evaluation, a multi-part self-assessment survey (Appendix 1) was designed to gauge participants' perceptions of their confidence and competence in the five key sustainability competency areas (Wiek *et al.*, 2011). Wiek *et al.*'s (2011) was chosen based on its synthesis of literature on sustainability competencies, which provided an inclusive theoretical framework to compare the SLC learning outcomes and analyze how the key competencies played out in the context of the SLC program.

On the first day of the program, participants completed a 15-question pre-survey created by the authors. The survey consists of three sustainability questions (actions) for each of the five key competencies (15 actions) using descriptions from Wiek *et al.* (2011). Participants used a four-point Likert scale from 1 (Disagree) to 4 (Agree) to rank their perceived confidence and competence to perform each action.

On the last day of the program, the SLC participants completed a post-survey that consisted of the same 15 questions and, in keeping with the DE adaptive approach, additional qualitative questions. The qualitative questions were included in the post-survey to better understand why participants' scores increased, decreased or stayed the same. Subsequently, participants' pre- and post-survey Likert scores were returned to them, and they were asked to respond to the following open-ended questions: "Explain why your response did or did not change", and "Do the questions [actions] represent each competency for you? Are they good indicators? Explain". Participants were also asked at this time to respond to the question, "What was your most significant learning from the SLC program not captured in the competencies?" This last question was not linked on the survey to any competency.

The survey data and open-ended responses were transcribed and analyzed using NVivo 10 (available from QSR International). An author neither involved with the survey design, data collection or SLC program nor familiar with the related literature, used a grounded-theory analysis approach to code the survey text in NVivo 10. The resultant codes were then exported and reviewed by all the authors, who identified concepts and further grouped them into thematic clusters. Each cluster represents a key area of learning from the SLC program, as perceived by SLC program participants.

### Findings

Participants' open-ended responses reflected positively on the program curriculum, with participants providing many examples of how they felt the program had enhanced their development as sustainability leaders. Self-assessments revealed an increase in participants' perceived confidence and competence in all five of Wiek *et al.*'s (2011) sustainability competency areas. A statistical analysis of the Likert data can be found in Appendix 2. The program's experiential, application-oriented instructional methods resonated strongly with all participants, who frequently mentioned the positive contrast to the traditional lecture-style learning that typified their university experience. The supportive, intimate environment provided by the program's small scale was also widely favored by participants.

Three data clusters emerged from the coding exercise: future, community and personal development. Each data cluster (theme) and its subthemes can be found in Table I. To maintain anonymity, participants' names have been replaced with designated numbers (e.g. P1, P2) to identify the following participants' quotes.

### *Future*

The "future" was a common theme in responses to the survey's open-ended questions, but participants articulated different visions of this theme. Some participants wrote about the future as inherently uncertain and outside of their control, [P1]:

It is difficult to grasp the implications of present action on future outcomes – this lack of foresight is one of the greatest human weaknesses. However it becomes easier to comprehend when surrounded by such hopeful and positive energy. There is chance for change and the opportunity for sparking it is in our own hands.

Other participants imagined actively shaping the future [P2]:

Cluster	Cluster concepts	Competency	Competency concepts
Community	Interpersonal + group dynamics academic setting + community partners collaboration creating sense of place	Strategic	Strategies, action programs, (systemic) intervention, transformative governance Social learning Social movements
		Interpersonal	Functions, types and dynamics of collaboration (within and beyond academia; interdisciplinarity, transdisciplinarity) Strengths, weaknesses, success and failure in teams Concepts of leadership Limits of cooperation and empathy Concepts of solidarity and ethnocentrism
		Systems thinking	People and social systems: values preferences, needs, perceptions, (collective) actions, decisions, power, tactics, politics, laws, institutions, etc.
Future	Uncertainty, futuring, unknown, complex, unpredictable Articulating the vision (story-telling) Gaps Changes needed Optimism Sense of agency Strategy for change	Anticipatory	Concepts of time Concept of uncertainty and epistemic status including possibility, probability, desirability of future developments (predictions, scenarios, visions)
		Normative	Concepts of risk (Un-)sustainability of current or future states Sustainability principles, goals, targets, thresholds (tipping points) Concepts of risk, harm, damage

**Table I.**  
Comparison of thematic clusters with Wiek *et al.*'s (2011) five key sustainability competencies



The changes [in me] stemmed from the confidence instilled through the program especially with respect to personal visioning. That gave me the ability to see and help shape the future for me. The asset mapping helped me to realize just how much I have to offer.

Although participants diverged when articulating the level of control, they expected to have over the future, they converged with respect to their positivity regarding future outlook. For instance, participant [P3] said, "I am feeling more optimistic about my ability to define a vision of the future based on tools we used to set objectives and identify root causes (mapping)". Both participants who felt they would be subjected to whatever future might come, and those who felt that their actions would determine the future to come, linked their increase in optimism and sense of capacity to their SLC program involvement: [P4], "Already an optimist, my positive outlook is now bolstered by tangible tools & perspectives regarding thinking ahead/envisioning", and [P5], "I do now feel more prepared to do this but I also still feel that there is a lot of uncertainty and constraints. But I am hopeful!"

### *Community*

Participants repeatedly articulated the importance of community. Community was often mentioned with respect to sense of place, with an emphasis on feelings of belonging and of having a safe, supportive environment. For instance, participant [P6] said, "Outside of these competencies the most significant learning was the necessity to create a safe space where true community can form", and [P4] stated, "That I (now) have a community that shares, understands & supports/strengthens this side of me. HUGE". Others commented on the idea of community as a resource: [P7], "I have learned the value of reaching to your community for these resources".

Diversity was a theme in a number of responses, with participants noting both the value of diversity and the sense of tension that can develop while working with people of differing backgrounds and opposing opinions; that is, the tension that can arise from engaging with people who hold different opinions, values and perspectives than our own: [P5], "I still feel shakey when I am met with tension from another person because of an obvious difference. Difference is important though! I think it is critical to sustainability!"

Participants indicated that the opportunity to practice interpersonal skills and to collaborate with people of diverse perspectives were aspects of the SLC that they valued. For example [P8], "This grew through our community development and acceptance of each other giving our diverse backgrounds, maintained through community standards". Some participants asked that even greater emphasis be placed on the development of interpersonal skills in future iterations of the SLC program, for example [P9] suggested, "Yes [...] but could include more about understanding people's values and beliefs more".

### *Personal development*

Participants stressed various elements of personal development in their survey feedback. In particular, answers to the question, "What was your most significant learning from the SLC program that was not captured in (Wiek *et al.*, 2011) competencies?" illustrated the significance of personal development to program participants. Participants underscored the significance of the personal well-being aspect of personal development. Of 22 responses, 12 contained either direct or indirect references to personal well-being, such as: [P4], "Giving time for [myself]. Personal retreat, 1h before bed [...], taking time for myself, recognizing

how this allows me to help others”, and, [P8], “I also learned to take care of myself + make time for myself before I can try to help others”. [P10] wrote, “Personal wellbeing should be the largest sector of the 8, because we cannot achieve what we want to if we aren’t personally well”, and [P11], “SLC helped me develop mental space and centre when approaching external issues”.

Improved self-awareness and growing sense of empowerment were also commonly mentioned personal development themes: [P12], “The SLC allowed me to do a lot of personal reflection, which led to an increase in confidence”, and [P13], “I got to better understand myself, my goals, what drives me and my place in the community as a leader”.

## Discussion

The analysis of the participants’ open-ended responses suggests that the learning outcomes can be clustered into three major themes: community, future and personal development. The three clusters that emerged were strongly related to the program design, implying that participants were absorbing the ideas that the program intended. These responses describe participants’ reflection on the entire program; therefore, they do not capture which specific program components or activities fostered the learning in these three clusters. The responses do, however, provide insight to which of the conceptual sustainability competencies the participants acquired based on self-assessments. The future cluster and community cluster echoed *Wiek et al.’s (2011)* five key sustainability competencies (Table I): the community cluster encapsulated the strategic, interpersonal and systems thinking competencies and the future cluster related well with the anticipatory and normative competencies. Personal development was not directly captured by any of *Wiek et al.’s (2011)* competencies but did reflect the SLC program’s growing focus on self-awareness and well-being.

Although not identified by *Wiek et al. (2011)* as a key sustainability competency, personal development nonetheless appears to nourish growth in the five key sustainability competency areas. As an example of personal development fostering growth in the key sustainability competency areas, consider self-confidence. Developing self-confidence is a necessary step toward having a sense of self-capacity to change the future (anticipatory competence). Similarly, self-reflection on personal values and understanding the bases for those values can assist in the development of better interpersonal relationships (interpersonal competence). As highlighted by *Ferdig (2007)*, we are called to recognize the leader within ourselves, to be “a leader *with* others instead a leader *of or over* others”. The feedback illustrates clearly, albeit indirectly, that the SLC participants felt that personal development exercises enhanced their ability to reach the program’s target sustainability leadership outcomes, specifically: attaining personal and emotional attributes that would help them behave sustainably, and, acquiring the skills to act sustainably. This finding echoes *Metcalf and Benn’s (2013)* argument that authenticity and managing emotion appropriately are essential to complexity leadership for successful implementation of sustainability. The importance of personal development to participants, as highlighted by the feedback clusters, suggests that a focus on personal development may be a critical element of the SLC’s program design and of future sustainability leadership development programs. The SLC will continue to develop its design and program evaluation to better understand how to best develop and assess sustainability change leaders.

## Conclusion

Sustainability education is intended to provide learning, training and practical experience, in both formal and non-formal settings, to foster personal development, community involvement and action for change in our human and natural worlds. The focus on personal understanding and self-awareness was foundational to the SLC program design. During the development of the SLC, students called for collaborative learning experiences and the tools to create collective action. After participating in the SLC, participants identified that the time and space for personal reflection and exploration was a significant part of their learning. Sustainability students often get overwhelmed and immobilized by the magnitude of challenges present in their daily lives. Including personal development in sustainability programming provides the opportunity for students to take an appreciative inquiry into their personal assets and values. With a heightened personal understanding, students are better equipped to engage in collaborative learning, collective action and the development of key sustainability competencies.

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Appendix 1. SLC participant self-assessment survey and questionnaire

Name:				
I feel confident and competent to: 1 = Disagree 2 = Partially Disagree 3 = Partially Agree 4 = Agree	Response		1. Explain why your responses did or did not change.	2. Do the questions represent each competency for you? Are they good indicators? Explain.
	1 <sup>st</sup>	2 <sup>nd</sup>		
<b>Normative</b>				
1. Articulate a vision of a just and sustainable society				
14. Understand your own strengths and weaknesses as a sustainability leader				
5. Collectively assess the current and future states of social-ecological systems				
<b>Interpersonal</b>				
9. Motivate positive change in others				
11. Pursue collaborative approaches to problem-solving				
15. Work together across differences (e.g., discipline, sector, nations, perspectives, professional/nonprofessional)				
<b>Strategic</b>				
4. Assess the resources available and necessary for an action				
7. Design integrated actions that draw on resources from across disciplines				
8. Develop practical tools to advance a sustainability agenda				
<b>Systems Thinking</b>				
3. Analyze complex problems drawing from multiple disciplines				
2. Account for individual and cumulative social, environmental, and economic implications of a decision or process				
12. See both the whole system and its parts, as well as the extent to which you can place yourself within the system				
<b>Anticipatory</b>				
6. Deal with uncertainty and future predictions				
10. Predict and consider possible repercussions of our actions and decisions prior to their implementations				
13. Understand the future as open and something that we can help to shape				
<b>3. What was your most significant learning from the SLC program not captured in the competencies?</b>				

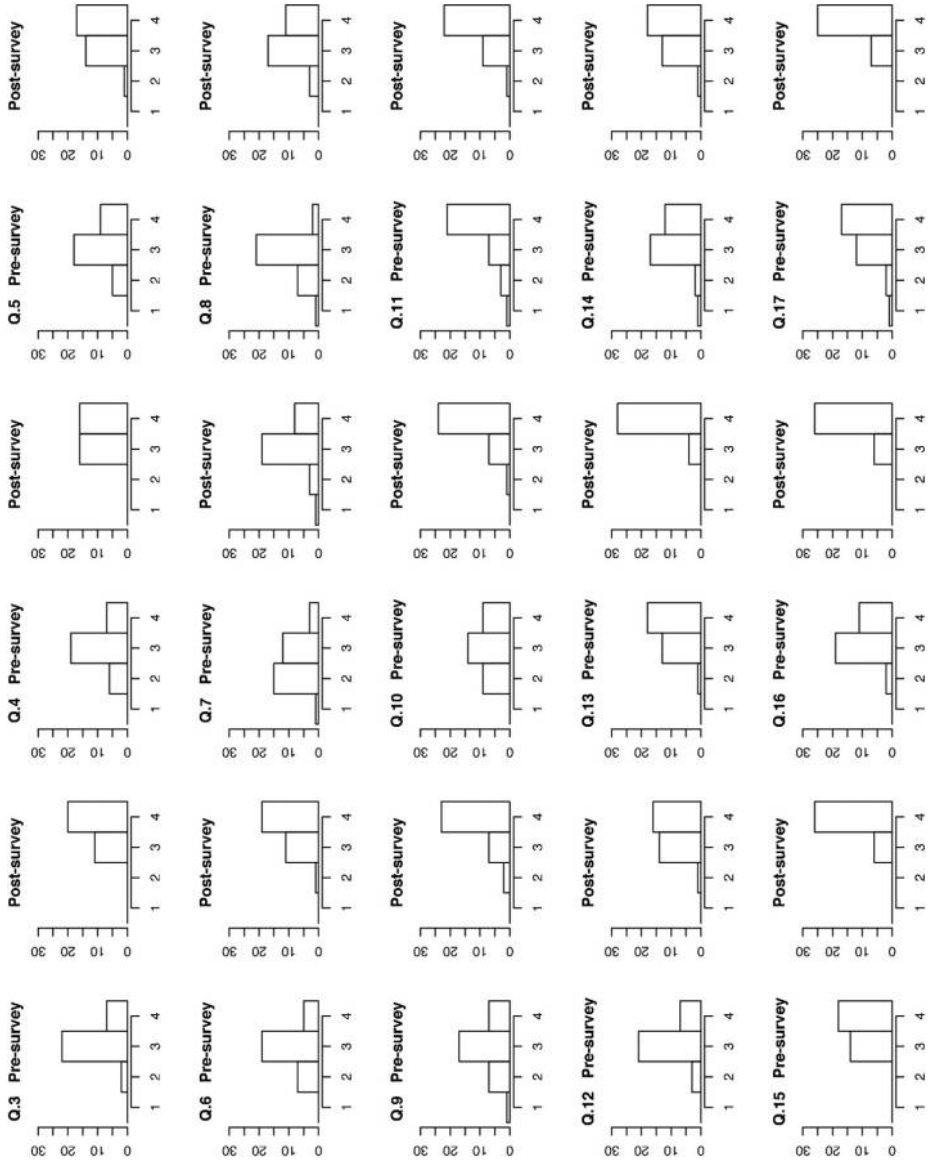
Table A1.

**Appendix 2. Statistical analysis of pre-/post-survey Likert data**

We ran Mann–Whitney U tests on participants' paired pre-/post-survey Likert responses, which were collected on a four-point scale (see Methods). A table summarizing the results of the Mann–Whitney U tests can be found below (Table AII). For each of the 15 Likert-scale questions, we collected 24 or 25 (“n”) paired pre-/post-survey responses. The number of responses varied from question to question because in some cases, participants failed to fill in either a pre- or post-survey Likert-scale response, or both. All data for which a paired pre- and post-survey were available were included in this analysis. Effects are significant at the 95 per cent level of confidence where  $p < 0.05$ . U = U-statistic; Z = Z-value;  $p$  =  $p$ -value;  $r$  = effect level;  $n$  = sample number. Histograms of the Likert-scale response data can be found in Figure A1.

Question	U	Z	$p$	$r$	$n$	Mean rank pre-survey	Mean rank post-survey	Median pre-survey	Median post-survey
1	268.0	-3.42	0.00	0.61	31	24.6	38.4	3.0	4.0
2	320.0	-2.90	0.00	0.51	32	26.5	38.5	3.0	3.0
3	358.0	-2.30	0.03	0.41	32	27.7	37.3	3.0	3.0
4	234.5	-3.81	0.00	0.68	31	23.6	39.4	3.0	4.0
5	281.0	-3.06	0.00	0.55	31	25.1	37.9	2.0	3.0
6	303.0	-2.87	0.00	0.52	31	25.8	37.2	3.0	3.0
7	244.0	-3.92	0.00	0.69	32	24.1	40.9	3.0	4.0
8	247.5	-3.91	0.00	0.69	32	24.2	40.8	3.0	4.0
9	481.0	-0.50	0.63	0.09	32	31.5	33.5	4.0	4.0
10	330.5	-2.41	0.02	0.43	31	26.7	36.3	3.0	4.0
11	350.0	-2.78	0.01	0.49	32	27.4	37.6	3.0	4.0
12	404.5	-1.62	0.12	0.29	32	29.1	35.9	3.0	4.0
13	384.0	-2.14	0.06	0.38	32	28.5	36.5	4.0	4.0
14	266.0	-3.82	0.00	0.68	32	24.8	40.2	3.0	4.0
15	373.5	-2.24	0.03	0.40	32	28.2	36.8	3.0	4.0

**Table AII.**  
Mann–Whitney test  
results for pre-/post-  
survey Likert scale  
responses



**Figure A1.**  
Pre- and post-  
Likert-scale survey  
responses, by survey  
question

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### About the authors

Emma Savage is a Teaching Assistant and, previously, a Research Assistant for the College of Sustainability at Dalhousie University. She was a significant contributor to the development and evaluation of the new RBC Sustainability Leadership Certificate program, available to students across the university. She also led the design of a developmental evaluation protocol for program-level outcomes of the Environment, Sustainability & Society undergraduate Major. She holds a Master in Environment and Sustainability. Emma Savage is the corresponding author and can be contacted at: [emma.savage@dal.ca](mailto:emma.savage@dal.ca)

Tara Tapics studies the big impacts of small things: she studies phytoplankton, their ecology and their interactions with our environment. Tara was a Teaching and Project Assistant for the College of Sustainability. She is working on a doctorate in the Physics of Remote Sensing at the Université de Sherbrooke, where her research focus is the ecology of phytoplankton communities.

John Evarts is a Teaching Assistant for the College of Sustainability and Master of Environmental Studies candidate at Dalhousie University. He has previous teaching and leadership experience as submarine officer with the United States Navy. His current research focus is energy and sustainability.

Jeffrey Wilson is an Assistant Professor with the School for Resource and Environmental Studies and an Adjunct Professor with the Rowe School of Business, Dalhousie University. He has a PhD in Ecological Economics and an MA in International Development Studies. Some of his current research focuses on the connection between economics, well-being and sustainable behavior change.

Susan Tirone, PhD, is a Professor and an Associate Director of the College of Sustainability at Dalhousie University. She is a social scientist and the academic lead and co-developer (with Brian Braganza) of the RBC Sustainability Leadership Certificate Program.

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