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Exploring the need for hands-on, expert-taught environmental education in Tasmanian formal schools: a survey for Greening Australia in Hobart, Tasmania

By Hannah Underwood Project Advisor: Kara Spence Education Coordinator at Greening Australia in Hobart, Tasmania Hobart, Tasmania

> Academic Director: Tony Cummings Home Institution: Smith College Major: Environmental Geoscience

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Abstract

Australia's history of environmental education began in 1970 with a conference meant to highlight and discuss the importance of environmental education in schools. Since then, the way environmental education is taught in schools has evolved and expanded to its current state, which is a way of teaching that highlights the interconnectedness of environmental issues to many different subjects and disciplines. Hands-on environmental education has also become increasingly valued, both in schools with gardening, waste, and energy programs, and from outside experts visiting schools to teach students experiential lessons about the environment. One such organisation that sends environmental experts to schools is Greening Australia, the Tasmanian branch of which is located at the new Sustainability Learning Centre in Mt. Nelson.

This study was undertaken as a way to see how formal school educators and administrators value experiential environmental education, and whether participants felt that they could easily access experiential learning opportunities outside their school. The study was done for Greening Australia in Tasmania, to provide information to inform their fledgling experiential environmental education programs.

The study was undertaken as a survey that was administered to participating schools through online, telephone, and in-person venues. The methods included developing useful and appropriate survey questions, visiting, telephoning, and emailing schools with the survey, and finally analysing the results from the survey questions.

The results showed that the majority of environmental education in Tasmanian schools is currently taught as an interdisciplinary subject, across many areas. Many schools use hands-on lessons to teach about sustainable life choices, and all the schools surveyed acknowledged the benefit that adding experiential lessons to their science, geography, and environmental education programs would-or does-have. All survey participants valued experiential education taught by outside experts to some degree, but 48% of respondents did not believe they could easily access these opportunities, citing lack of time or space in the curricula, budgeting, and distance from the opportunities as barriers.

While the benefits of environmental education, experiential education, and community expert involvement in schools were clear, the results of this survey indicated that many schools do not feel that they can adequately incorporate these aspects of learning into their curricula, leading to a potential deficit in the way students are learning to think about and interact with the environment due to a simple lack of time and resource availability.

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List of Abbreviations EE....Environmental Education GA....Greening Australia

SLC....Sustainability Learning Centre

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1. Introduction

1.1 Background & History

As in much of the world, environmental education as it is known today burgeoned in Australia during the early to mid-1970s. Public awakening to environmental issues during the 1960s and early 1970s led to the Australian Academy of Science's conference titled 'Education and the Environmental crisis' in 1970, which was followed internationally in 1972 by the United Nations Conference on the Human Environment in Stockholm, from which the Alliance for Environmental Education was formed (Australia, 2005). In 1977, the Tbilisi conference marked the first Intergovernmental Conference on Environmental Education, from which three principles of environmental education emerged. Those principles lay the groundwork for what would come to be expected of environmental education worldwide, and read as follows:

- 1. To foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;
- To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; and
- 3. To create new patterns of behaviour of individuals, groups and society as a whole towards the environment (Australia, 2005).

In Australia today, these guiding principles are still visible in environmental education curricula; from the interdisciplinary focus of many environmental education programs to the hands-on approach to environmental education that many theoretically favour. Though curriculum guidelines and requirements for environmental education vary from State to State in Australia, in Tasmania environmental education is integrated into documents concerning the core curricula (Australia, 2006). Example environmental education curricula published by

the Tasmanian government encourage an interdisciplinary approach to environmental education; incorporating the topic into many different subjects and teaching about both the natural world and human-created landscapes (Tasmania, 2007).

While the majority of the responsibility for teaching environmental education falls on educators in formal schools, recent years have brought an emergence of environmental education centres and programs for schools taught by outside experts. The purpose of these centres is generally for student and community engagement with sustainability issues, with experts teaching hands-on lessons in environmental education. One such centre is the Sustainability Learning Centre in Hobart, Tasmania, where the organisation Greening Australia bases its environmental education programs.

Greening Australia itself in an apolitical conservation organisation that focuses mainly on the restoration and preservation of Australian landscapes, and which has active branches in all states and territories of Australia. The organisation offers educational training and services across all Australian states, but the Sustainability Learning Centre is unique to Hobart (Greening Australia).

The Sustainability Learning Centre (SLC) houses offices for CSIRO and Greening Australia, and offers environmental education programs for a variety of Tasmanian schools. The building is partnered with The Tasmanian Department of Education, CSIRO Education, Independent Schools Tasmania, and Catholic Education Office Tasmania. Since 2012, Greening Australia has offered its educational programs both onsite at the SLC and at the schools themselves, at no cost to participants. Currently, Greening Australia is partnered with Hydro Tasmania and TasWater to create two programs on water conservation, river ecology and catchment dynamics (Sustainability Learning Centre). Experiential education is at the core of both of these programs, with lessons using technology, toys, natural features in the

landscape, and the SLC itself as tools. Since the inauguration of Greening Australia's education programs in Tasmania, 15 different schools have been able to partake in the programs (Spence, 2013).

The programs taught by Greening Australia at the Sustainability Learning Centre offer the unique advantage of giving children an outside expert's knowledge of science and sustainability. This can also be beneficial to teachers, many of whom do not have substantial formal training in experiential environmental education. Science, particularly hands-on, experiential science, creates an understanding of the natural world that promotes environmental awareness and the development of an environmentally-conscious worldview (Hadzigeourgiou and Skoumios, 2013). The science, geography, and sustainability focuses in Greening Australia's lessons encourage this broad-scale environmental thinking, and the addition of having the lessons being taught by an outside expert in the outdoors (or in an alternative classroom, such as the Sustainability Learning Centre) provides benefit to students and their teachers alike. Additionally, the sustainability themes of Greening Australia's education programs fit into the sustainability portion of the cross-curriculum priorities developed by the Australian Curriculum (Cross-curriculum priorities).

1.2 Study Aims

The aim of this study was to gather the opinions of Tasmanian formal school educators and administrators about the involvement of environmental and experiential education in their curricula. The survey aimed to address the incorporation of environmental education, sustainability issues, environmental activism and hands-on lessons into subject areas at their schools, as well as asking questions relevant to the schools' participations with outside experts providing educational programs, such as those offered by Greening Australia. For the complete list of survey questions used, please refer to the Appendix.

The purpose of finding this information was to benefit Greening Australia in Tasmania as they move forward with their education programs. Questions were formulated with the expected end result of seeing whether Tasmanian schools feel that their school would benefit from increased experiential and environmental teaching from outside experts, as well as what barriers to these types of programs present themselves to the school, and finally what areas of study specifically are missing in the schools' current curriculum that could be filled by an outside, expert-taught education program. The hypothesis entering the study was that many schools would value experiential, environmental education programs taught by experts, but that many would not feel that they could easily access such programs.

2. Methodology

2.1 Study Group

The target group for the surveys were formal education professionals currently employed in the Tasmanian school system, be those professionals in administrative or teaching positions at the institution. State, Independent, and Catholic schools were contacted equally. Overall, 255 schools were contacted via telephone or email requesting their participation in the survey, which resulted in the participation of 14% of contacted formal school administrators and educators in the survey; 6 of whom had in person interviews, 6 of whom were interviewed over the telephone, and 25 of whom submitted their responses through an online survey.

2.2 Study Location

The schools surveyed represented a variety of locations around Tasmania, from schools within the limits of Hobart, the Tasmanian capital city, to schools located on the remote and sparsely populated islands on the outer coasts of Tasmania. Though Tasmania is Australia's smallest state, most of the state is quite rural, and Hobart is Australia's leastpopulated capital city with only 200,000 inhabitants. The main population hubs in Tasmania are Launceston and Hobart, with approximately 35% of all Tasmanian formal schools occurring within those cities (Australian Schools Directory, 2013) with many more occurring in their surrounding suburbs. Tasmania is one of only three of the Australian states and territories to have integrated environmental education into core curriculum documents (Australia, 2006), and is generally regarded as having a high level of environmental awareness. However, it is literacy and numeracy in schools that currently takes a greater concern over environmental education or other subjects, as 1 in 2 Tasmanians aged 15 to 74 are functionally illiterate, and more than half of the adult population is functionally innumerate (Dingle, 2013).

2.3 Data Collection

Surveys were issued in online, telephone, and in-person versions. All 255 targeted schools received an email on 8 November informing them of the impending survey, and requesting their participation. Schools that immediately responded with requests for online surveys were sent them, while other schools were eventually telephoned or sent the online survey to further encourage participation. In-person interviews were rarely scheduled, but happened as circumstance and opportunity allowed. Data collection formally began on 6 November and concluded on 29 November.

Two separate surveys were issued, one written for online presentation and one written for in-person and telephone interviews. The questions aimed to address

- a) The types of environmental and sustainability education currently in place in schools, and how these subjects are taught;
- b) Whether hands-on or experiential learning practices are currently used in the school, across which subjects it is used, and why educators value experiential education;

- c) Whether the schools values or employs outside experts for experiential education opportunities, what barriers to experiential education opportunities the school encounters;
- d) What programs would fill gaps in the current curriculum.

Both surveys are listed in the Appendix. The different surveys were written to make it easier for participants to respond in their chosen medium, with questions on the online survey employing multiple choice and scale questions, and telephone and in-person interview questions encouraging long form responses.

2.4 Data Analysis

Once data had been collected, answers to compatible questions on the online and inperson surveys were combined for analysis, while the questions unique to their respective surveys were analysed independently. Once obtained, the survey answers were evaluated using the seven step qualitative analysis method outlined by C. Marshall and G.B. Rossman (1999). The seven steps are defined as follows:

- Organizing the data this step served the purpose of making interpretation of data more manageable, as data was organized according to question and theme.
- 2. Immersion in the data a step serving to gain familiarity with the responses and results, to move forward confidently and knowledgeably.
- 3. Generating categories and themes the step served to find the overarching themes and patterns in the answers recorded, to focus in on the overarching response trends.
- 4. Coding the data the process of identifying and marking key works within the previously identified responses.

- Offering interpretation through analytic memos this step served to examine the plausibility of the emerging themes, to gain an understanding as to the usefulness of the gathered responses.
- Searching for alternative understandings a continuation of step 5, step 6 served to familiarize myself with alternative responses for a more unbiased presentation and analysis of responses.
- 7. Writing the report of the data (Marshall & Rossman, 1999).

3. Results

3.1 Environmental and Sustainability Education

When asked how environmental education was currently incorporated into their school's curriculum, 32 of the survey respondents answered that environmental education was integrated into other core subjects, four answered that EE was its own subject, and just one person said that there was no type of EE currently employed at their school. However, one respondent who said that EE was an incorporated topic also admitted that it was not strongly incorporated into the curriculum at present. Of the respondents who had integrated EE programs at their schools, the most common subjects for integration were science, geography, and history, with some schools also incorporating EE into religious education, the arts, and literacy.



A number of respondents indicated that a bulk of the EE and sustainability education at their schools took place through gardening and agriculture programs. There were 10 respondents that mentioned school gardening initiatives as a way to teach students about the environment and sustainability issues, and although some respondents mentioned the Stephanie Alexander Kitchen Garden Program¹, none of the interviewees explicitly indicated that their school partook in this program.

When asked whether teaching students about sustainable lifestyle choices or encouraging environmental action outside the classroom was a part of their schools' current curriculum, only three respondents answered negatively, though some who answered positively added that sustainable life practices were not heavily taught, or were taught "incidentally" through school recycling, composting, or gardening programs. When asked for teaching examples, many respondents cited hands-on activities as a core component of sustainability lessons, with school gardens, recycling and composting programs, worm farms, rainwater capture, tree planting, and livestock care each appearing as examples in more than one respondents answer. Additionally, multiple schools indicated that sustainability education was a good way for older students to become leaders in the community, with some schools having "green teams," "environment ambassadors," or groups of older students that take on increased responsibility in school sustainability programs, and sometimes help to lead younger students in these activities as well.

In the online survey, respondents were asked what sorts of education programs would fill current gaps in the environmental education curriculum. The most popular choices were for programs on 'biodiversity' and 'climate change science,' followed by 'bushfire ecology,'

¹ The Stephanie Alexander Kitchen Garden Program is an experiential education program founded by Australian chef Stephanie Alexander. Schools that participate in the program tend to school gardens and learn to cook with the vegetables their gardens yield. Currently, 16 Tasmanian schools participate in the program ("About the Program").

'catchment health,' 'water,' and 'other,' respectively. For 'other' respondents answered "forest management" and "not sure," with two other respondents adding to their answers that their school already addressed all of the above issues.



3.2 In-school Experiential Education

Survey participants were asked three questions concerning experiential education outside the context of environmental education, though one of the questions was specific to the online survey. Firstly, participants were asked whether their institution employed handson or project-based learning techniques across any areas of study at their school, and across which subjects. Only two respondents answered that their school did not use any types of hands-on learning practices. When asked about the subjects in which experiential learning was used, the most common responses were science, horticulture/agriculture/gardening, history, art, English, maths, and sustainability lessons (i.e. making re-useable bags, recycling, planting trees). Multiple schools brought up the issue of age in designing experiential education lessons, indicating that it is easier and more common to use hands-on learning for primary schools than in high schools and colleges.

Participants were then asked whether they believed that their current science, geography, and environmental science curricula could benefit or does currently benefit from experiential education practices. There were no survey participants who answered negatively to this question. When explaining why they felt that experiential education is valuable for science learning, many expressed that hands-on lessons "help kids translate the theory of what they've been learning into real life" (survey participant). Many highlighted the creative and team-building skills that are developed through experiential lessons and the higher level of student that is often observed through hands-on work. Multiple respondents also mentioned the value of experiential education as being "easily adaptable to all ability levels," (survey participant) making lessons engaging to both high- and low-performing students. One respondent mentioned that it is often disconnected students who can be most captured and engaged through hands-on learning.

Participants in the online survey were also ask to select from a multiple choice list in what areas experiential learning was seen to be most beneficial. All except one participant chose 'active learning' as a main benefit of experiential education, with 'higher level of engagement' and 'problem solving skills' also receiving an especially high proportion of votes. Respondents again noted here the importance of student ownership of work that is born from experiential learning, as well as the connections between theory and practice that develop from hands-on work. Alluding to the current literacy crisis in Tasmania, one respondent noted that "students with low literacy etc can still be involved and benefit from such involvement," illustrating the benefit of hands-on teaching to engage students that may be struggling in other areas of the curriculum.



3.3 Expert-taught Experiential Education

Finally, participants were asked a series of questions regarding expert-taught, experiential environmental education, which were aimed to be more specific to the programs that Greening Australia offers. Participants were first asked to state whether they valued experiential learning opportunities taught by outside experts, and if so why they valued it. Online participants were asked to quantify their response, by choosing on a scale of 1-10 how much they valued these types of education programs. All respondents to the in-person and telephone survey answered that they did value education programs from outside experts, because it gives students a new perspective, engages them in new ways, and connects them to the outside community. Some schools indicated that while they would likely value education programs from outside experts, they have not yet had the opportunity to utilise them. Said one school in the North West of Tasmania: "We do value it, but don't use it because we're located a long distance from anywhere" and it's hard for experts to get there. The school indicated that if there were opportunities closer to them, they would consider pursuing them. For the scale answers on the online survey, the results strongly indicated that outside experts are highly valued in schools, with the most common response being 10.



Though some respondents indicated barriers to expert-taught environmental education in their responses to the question of whether they valued these opportunities, a specific question was also asked to gather information on whether there were enough experiential learning opportunities available to schools, and what barriers to these programs existed. 18 of the respondents, 48% of the pool of interviewees, indicated that there were not enough opportunities for them to access. Common limiting factors that were brought up included distance, budgeting, and lack of time and space in the curricula for extra learning activities. Some respondents indicated that it was difficult to know who to contact when looking for experiential learning opportunities as well. One respondent who answered that there were enough opportunities to easily access acknowledged that time and money could still sometimes be barriers.

Finally, survey participants were asked whether or not they'd heard of the Sustainability Learning Centre, and what barriers they might encounter in participating in programs at the Centre. Only five of the respondents had not heard of the centre. Main barriers listed were similar to those listed previously, with transportation cost and time away from the main curriculum being main deterrents.

4. Discussion

4.1 Characteristics of Environmental and Sustainability Education in Formal Schools

Overwhelming, survey participants talked about the interdisciplinary nature of environmental education in their schools. In explanations for their answers in questions relating to both environmental and sustainability teaching practices, many educators and administrators pointed to examples of hands-on education practices for these subjects. From the answers emerged the theme of a common goal or understanding amongst educators that lessons of sustainability and environmental science are best taught in context – whether that be the context of sustainable food production through school gardens, or effective waste management through recycling, composting, and no-waste lunch programs. For environmental education in the classroom, educators pointed to the cultural, historical, social, scientific, and artistic components of environmental education, making it a subject that crosses and helps inform nearly all subjects. Put eloquently by one respondent, "education is life and it is out there. As often as possible it is best to give first hand experiences." The integration of environmental and sustainability education by so many Tasmanian educators shows students the broad context and importance of environmental and sustainability issues, aiding in the eventual development of environmentally conscientious worldviews.

When asked about potential outside environmental education programs to fill current gaps in the respective school's environmental education curriculum, most options on the survey were chosen equally, with only a six-response difference between the most and least popular options. This equality in response choice indicates educator enthusiasm for additional environmental education in a variety of subjects, again acknowledging the widespread appreciation of environmental and sustainability education in schools.

4.2 The Value of Experiential Education

Though examples were especially strong in issues of sustainability education, all survey participants agreed that increased experiential education practices in all curriculum areas would be of benefit to student learning processes. All survey participants agreed that science, geography and environmental education lessons benefit from experiential education, with many indicated that these areas would do well with an increase in hands-on learning. Excluding the category "other," the difference of only nine answers between the most popularly chosen benefit of experiential education (active learning) and the least frequently chosen perceived benefit (aids gifted students) showed the universally perceived attributes of learning experientially, particularly in the field of science education. These trends illustrate an argument for effective science education made by Michael Littledyke, who called for "suitable experiences of natural environments and living organisms, and science curricula that emphasise conceptual integration to demonstrate complex environmental effects, including the environmental consequences of human behaviour." The collective support for experiential science and environmental education can be extrapolated to show a greater collective acknowledgement for the need for holistic science and environmental thinking by students. This push is exhibited in school gardens and no-waste meals, recycling and composting programs, the integration of environmental education across many subjects, and experiential science lessons.

In school sustainability activities, such as school gardens, kitchens, and recycling and composting programs, are undoubtedly beneficial to students as they internalize the importance of living sustainably and consciously. The difference in responses mentioning age-appropriate environmental activities for students indicated that environmental education programs only deepen as students get older, with some high schools having the option for

increased field work, or classroom inquiries about the importance of living consciously for the environment.

When asked about the value of experiential education taught by outside experts, the answers received were largely affirmative. The named benefits were widespread, from increased student engagement due to a new teacher perspective, to active learning, to the benefit of integrating aspects of the wider community into the learning process. Said one respondent, it's "good for kids to interact with community members who are passionate about the environment." The positive responses obtained when asking about expert-taught experiential education illustrate the benefits of the alternative perspectives and in-depth knowledge that outside experts can make a part of the learning process.

4.3 Limitations to Access of Experiential Education Opportunities

Though nearly all survey participants expressed opinions as to the benefits of experttaught, experiential education, some had not yet used these opportunities, or were able to use them infrequently. While one reason for this is the already extremely full Australian curriculum, other frequently cited answers included distance from opportunities and cost, both of transportation and for the opportunities themselves. Multiple schools from the North West and North of Tasmania, and one rural school in the South, indicated that they aren't able to use outside experts because of their remote location. Two schools from the North West said that they didn't use outside experts because of their remote location; it was difficult for them to get to outside experts and for outside experts to get to them. We "could always do with more local people," one said. When asked about the Sustainability Learning Centre, one participant from a school in the North replied that the cost of transport from their school to the Centre would take hours, and cost well over \$1000 for a bus charter. Ultimately, nearly half of survey participants, 48%, answered that they did not believe there were enough expert-taught, experiential learning opportunities for them to access.

4.4 Study Limitations

Limitations to the study included the potential established interests of the schools that may have responded, the time of year that the study was conducted, and the short time frame of the study. Since such a few number of the contacted schools responded to the survey request, it is possible that the schools which did respond were those that had an established interest in environmental and experiential education, which may have produced biased results. Secondly, the time of year that the survey was administered is a very busy time for schools, as the academic year is ending and orientation and planning for next year has already begun. Many schools simply did not have the time to participate in the survey. Finally, given the time limitation of this study, one month, it was difficult to obtain a true perspective on the environmental and experiential education practices in place, and to yield a high survey response rate from schools.

5. Conclusion

For the past 40 years, environmental education in Australia has been improving and evolving to be more comprehensive and better suited to the educational needs of today's world. The importance of teaching about environmental issues is widely acknowledged, and many seem to believe that interdisciplinary and experiential learning practices are best to communicate lessons about the environment. Many schools seem to enthusiastically be taking on this belief through in-school gardening, recycling, and composting programs, among others. However, in a curriculum that is already incredibly full, it can be extremely difficult for teachers to fit in important lessons about the environment, or to seek outside opportunities for environmental education.

Expert-taught, experiential environmental education programs benefit students-by giving them an alternative to traditional classroom learning, engaging them in new ways, and

providing active learning opportunities for students of all abilities-and teachers alike, by bringing an expert's perspective into the classroom, and perhaps providing the educator with new information as well. However, though all of the survey participants agreed that hands-on education is beneficial for students, not all schools used it, and nearly half of participants did not feel they could easily access outside opportunities should they desire them. The financial and locational restrictions that many schools have prevent many students from engaging in learning taught by outside experts, and experience that nearly all survey participants acknowledged the importance of. Finding a way to make environmental education more accessible still, whether through increased time in the classroom curriculum or through education programs taught by outside experts, will be a grand step in encouraging the next generation of active and environmentally-conscientious learners.

Appendix

Appendix A – Survey for phone and in-person interviews

1. Is environmental education currently incorporated into your school's curriculum? If so, is it its own subject or incorporated across multiple subjects?

2. Are lessons in sustainable lifestyle choices incorporated into environmental education at your institution, and do you encourage students to take action outside of the classroom (ex: planting a tree, saving water)?

3. Are any types of hands-on or project-based learning techniques currently incorporated into any areas of study at your institution? If so, how are these techniques implemented and across which subjects?

4. Do you believe that your current science, geography, and environmental education curricula would benefit/benefits from experiential education practices? How so? Be specific.

5. Do you value experiential education teaching conducted by outside experts? (eg. With Greening Australia or similar organisation). If so, why do you value it and how much?

6. Are there enough experiential learning opportunities for you to easily access? What barriers are there if any?

7. Are you aware of the Sustainability Learning Centre in Mt. Nelson? Are there any barriers that would stop you from visiting the Sustainability Learning Centre?

8. Would you like to be put on the Greening Australia email list for education programs? Additionally, would you like to see the results of this survey once they've been written up? Appendix B – Survey for online interviews

1. Is environmental education currently incorporated into your school's curriculum? If so, is it its own subject or incorporated across multiple subjects?

-Own subject -Incorporated in multiple subjects (explain)

2. Are lessons in sustainable lifestyle choices incorporated into environmental education at your institution, and do you encourage students to take action outside of the classroom (ex: planting a tree, saving water)?

-No -Yes (specify & explain)

3. Are any types of hands-on or project-based learning techniques currently incorporated into any areas of study at your institution? If so, how are these techniques implemented and across which subjects?

-No -Yes (which subjects)

4. How important is hands-on or experiential learning to solidifying students' depth of knowledge in a given subject?

-1 (not important) to 10 (very important)

5. Do you believe that your current science, geography, and environmental education curricula would benefit/benefits from experiential education practices? How so? Be specific.

-No, it would not benefit

-Yes, it would benefit (explain, please give examples).

6. How much do you value experiential education teaching conducted by outside experts (eg. with Greening Australia or similar organisation)?

-1 (not important) to 10 (very important)

7. What other sorts of experiential education programs would fill current gaps in the curriculum?

-Biodiversity -Climate change science -Water -Catchment health -Bushfire ecology -Other _____

8. Are there enough experiential learning opportunities for you to easily access?

-No

-Yes

8a. What barriers are there if any?

-Time

-Transportation -Financial barriers -No room in curriculum -Other _____

9. Are you aware of the Sustainability Learning Centre in Mt. Nelson?

-Yes -No

9a. Are there any barriers that would stop you from visiting the Sustainability Learning Centre?

-No -Yes (explain)

10. What is your school's name and in what region of Tasmania is it located? (North, North-West, South). Answers will be kept anonymous in report. (Question added 26/11.)

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