Factors affecting field-based natural history education: what the students say

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This paper discusses the results of a pilot investigation into the factors that students involved in a 6 day remote setting bushwalk report as “helping or hindering their learning about nature”. Students reported weather, leader characteristics, and the amount of exertion needed on any given day as the major factors that influenced their learning. These findings have repercussions for the planning and execution of field trips with a nature focus.

Introduction

Outdoor educational experiences may have a number of intended learning outcomes including physical activity, team building, personal development, therapy, and understanding human - nature relationships (HNR). One aspect of HNR – understanding natural history and ecology - has gained increasing attention in secondary and tertiary level outdoor education courses in Australia. While teaching and learning natural history shares subject matter with the more traditional disciplines of ecology and geography, our approach, in line with a number of authors underlines the need for local specificity in nature-focused programs as an alternative to the universalist conceptions of nature which usually characterise teaching in formal scientific disciplines (Brookes 2002a; 2002b; Pyle 2008; Stewart 2006).

There is however little available material documenting how this might best be undertaken (Stewart 2006; Stewart and Müller 2009). The majority of research into the efficacy of approaches and the factors that might influence nature focused outdoor education outcomes is mostly focused on outdoor excursions that are adjunct to classroom based learning (see the review in Dillon et. al. (2006), for example) or residential camps (Ballantyne and Packer 2009), and given the specificity called for by place-based and nature-based outdoor educators noted above, these research findings may have little relevance in these educational settings. Indeed, differences in the duration (long periods in remote settings versus short visits), physical setting (remote bushland versus accessible field study sites) and educational context (specific focus on places rather than using places as examples of generalised principles, or as adjunct to classroom learning) suggest that there may be considerable differences in the pedagogical approaches needed to optimise learning outcomes.

We began our investigation by critically examining our own teaching in a first year undergraduate subject Naturalist Studies, a core unit for students undertaking any of the six Bachelor degrees in Outdoor and Environmental Education at La Trobe University Bendigo. Our analysis was informed by two frameworks. First, that any understanding of learning should start with the student (see for example (Biggs et al. 2007; Ramsden 1992). Second, we sought to analyse the results of our enquiries using the Contextual Model of Learning developed to analyse free choice learning situations (Falk and Dierking 2000; Falk et al. 2001). While readers are referred to these sources for a full explanation, some background may help set the scene of our investigation.

Student centred teaching is based in a constructivist model of learning. If knowledge is constructed by the learner rather than transmitted from teacher to learner, then finding out how the learner sees their own learning is central to understanding and improving pedagogical practice.
Falk and Dierking (2000) also used a constructivist standpoint when developing their Contextual Model of Learning. This model was developed to examine free choice learning situations, notably learning taking place as a result of museum visits. Their model examines the personal context, socio-cultural context, and the physical context of each learning situation, and how these factors interact and change through time (Figure 1). (Some readers will note the parallels with the Self – Others – Environment model that has underscored many outdoor educational programs).

**Figure 1. Contextual Model of Learning (After Falk and Dierking (2000))**

We adopted this model for our analysis because there are considerable parallels between the learning that takes place informally in museums, and that which occurs in outdoor educational settings; perhaps more so than would first be apparent. In both situations outcomes are somewhat uncertain – on an extended field trip as in a museum visit a considerable number of variables come into play. Attention may be drawn by unexpected encounters or affective responses to events - sunsets, landscapes, the sound of the wind through needles of buloke (*Allocasuarina luehmannii*), an unexpected meeting with an echidna, or in the case of a museum visit, an unexpected display, unusual specimen or meeting with another visitor or museum guide. While local knowledge and well constructed pedagogical activities can embrace these uncertainties to some extent, they can’t be eliminated.

Free choice learning – the broader term coined by Falk and Dierking (2000) to describe out-of-the-formal-classroom type activities – also includes an intentional level of enjoyment or play, social interaction and variety in physical settings, all characteristics in common with outdoor educational pursuits. In the same way that a museum educator seeks to put in place learning environments that allow for the greatest learning (and enjoyment), in so far as they are under our control we also seek to put in place the right physical and socio-cultural settings that allow for personal learning experiences in the bush. We do have intended outcomes, but acknowledge that much of the valuable learning is somewhat serendipitous.
In terms of Falk and Dierking’s contextual model, this investigation is primarily concerned with the personal context, and how it interacts with the immediate social and physical contexts of our teaching situation. We have analysed elsewhere some of the broader cultural aspects of modern Australian attitudes to and understandings of the natural environment in which our programs are embedded and which makes up part of the socio-cultural context (Stewart and Müller 2009). This study complements that work, by looking at what the students report about the factors they think most influenced their learning.

A further aspect of the cultural setting, which we can only touch upon here, is the educational philosophy and intention embedded in educational programs which both affect and are affected by the way we conceive of the subject of our teaching/learning. In addition to the differences in desired educational outcomes between our local nature focused and more traditional discipline based excursion, the detail of our natural history teaching reflects a difference of intention to many ‘field work as a classroom adjunct’ approaches. Pyle (2008) explains some of the differences in this approach:

...to a great degree environmental education has abandoned species-level objectives. Many educators seem to think it’s enough to teach a modicum of process and function, while confronting organisms at a coarse and shallow level, and then briefly. New approaches in place-based education too often make the same mistake. Place, of course, is fundamental; but place is nothing but geology without its plants and animals, and they all have names and faces. (p. 156)

The first year university subject examined here (Naturalist Studies) was developed at the La Trobe University Faculty of Education – Outdoor and Environmental Education, and takes students into the field to learn about the elements of a particular environment, predicated on the idea that students need to distinguish and recognise the elements of a particular place if they are to begin to understand and ‘read’ that environment.

Our approach is similar to that of Pyle although he was speaking of childhood experiences, and we are teaching university students. While we desire the ‘free-choice’ outcomes alluded to above, and in subsequent years of the degree program develop approaches to natural history that encompass culturally critical approaches to nature learning (Stewart and Müller 2009), in this introductory class we are explicitly focusing on the ‘alphabet and initial vocabulary’ of the natural history of Grampians/Gariwerd National Park.

The teaching practice

Students attend a 6 day pack-carrying bushwalk in the Grampians/Gariwerd range of Victoria. The Grampians/Gariwerd National Park is one of the most botanically diverse regions of Victoria, with over 800 species of vascular plants, 200 bird species and 35 different reptiles. It also has the added benefit of spectacular landforms and a rich collection of field guides unlike most natural areas of Victoria. (It is a sad reflection on the current status of natural history in Victoria that no comprehensive flora field handbook has been produced recently, and the older volumes even with their limited coverage are now long out of print).

The trip is constructed around visits and stays in 3 environments – a long-unburned granite woodland, sandstone-slopes open forest, and sub-alpine shrublands on the higher peaks. On the first day students undertake an easy to moderate walk with packs
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to a study site, camp there for one night, the following day and a second night, before moving to the next two locations, repeating the procedure. During the non-walking days students undertake straightforward learning/assessment tasks at each location: make an annotated sketch with diagnostic features of 2 indigenous plants; two types of fauna; and a landscape or habitat area. The sketching is in part a ruse, designed to make students sit quietly in one spot looking at elements of the local ecology. They need to carefully observe, for they also need to correctly identify their subjects, learning the names and characteristics of their (wild) neighbours and thereby gaining skills and familiarity with field guides. Field guides are heavy, and to reduce the weight they need to carry, each student only carries one guide book. Students are encouraged to share their field guides and findings, work in groups, and take plenty of time out to drink cups of tea and enjoy just sitting in the bush. Further details of this teaching/learning experience are outlined in Stewart and Muller (2009).

Students are prepared in the prior semester with a staged set of pack carrying bushwalks; we source knowledgeable and experienced leaders, our curriculum emphasises nature learning as a desirable and essential element of outdoor leadership, and we adequately staff and resource the trip. This preparation and the design of our activities based on our extensive experience in field studies overcomes many of the barriers to undertaking field trips identified by Dillon et al. (2006).

While anecdotal evidence and university required quality assurance surveys indicate that the program is successful, we sought to understand the elements that effect student perceptions to nature study, so we could extend the successes of this program to other environments and areas of study offered by our faculty. As noted above, a good place to start such understanding is to ask the students about their own learning. To that end we analysed written reflections from the students. An unmarked hurdle requirement for the subject is to submit a short (500-700 word) reflective piece addressing the question “What factors helped or hindered my learning about nature on this trip?”

We undertook an analysis of these responses, covering 134 students over the years 2005, 2006 and 2007. A small number of responses were incomplete or otherwise unsuitable, leaving 118 responses for analysis. These were analysed using Nvivo software (QSR International Pty Ltd 2002). Passages were initially coded as positive (236 passages in 95 documents) or negative (165 passages in 83 documents). While there was considerable variation in the responses, several major themes emerged (Table 1).

Table 1. Major themes in student responses

<table>
<thead>
<tr>
<th>Theme</th>
<th>Number of passages</th>
<th>Number of documents</th>
<th>Percent of total documents</th>
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<tbody>
<tr>
<td>Leaders and leadership</td>
<td>90</td>
<td>63</td>
<td>53%</td>
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<tr>
<td>Field guides</td>
<td>94</td>
<td>54</td>
<td>46%</td>
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<tr>
<td>Walking route and campsite choice</td>
<td>71</td>
<td>43</td>
<td>36%</td>
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<tr>
<td>Weather</td>
<td>50</td>
<td>39</td>
<td>33%</td>
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<tr>
<td>Assignment and assessment tasks</td>
<td>41</td>
<td>30</td>
<td>25%</td>
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Further analysis is revealing of student attitudes to the experience – many of these factors interact to bring about a positive or negative response.

Leaders

Forty-two students made positive comments about the leader assisting their learning. Most of these were in the context of leader enthusiasm (14 students), or leader knowledge (18), with the balance mostly commenting about leadership style.

“To have someone enthusiastic and genuinely interested in what we were learning also made a difference, ‘P’ was always around to help us identify flora and fauna, providing ample opportunities for us to learn more about our environment also, through getting up early to go bird watching or going on a walk to see what orchids we could spot.”

“P's energy and 'keenness' made the experience so fun and his passion and enthusiasm encouraged us to take notice and opened our eyes to what was beneath our feet and over our heads. I felt compelled to listen to everything so I didn't miss out on any links eg the orchid’s growing here because.... This is an emu's pelvis because.... The hands-on learning approach creates the link between lecture topics and seeing it in reality.”

These positive comments were limited to three of the eight leaders. Each of these leaders had a number of positive comments, suggesting that it was not an isolated occurrence. The lack of comments about the other leaders suggests either students didn’t miss this element of leading, or didn’t wish to comment on it. Lack of leader knowledge was only mentioned once.

Twenty one students made negative comments about leadership and learning. While only a small handful made comments about lack of knowledge or assistance from their leader, further analysis revealed that the majority of the negative assessments were associated with route choice or campsite selection, where students thought that the physical demands of the daily schedule, or poor choice of campsite hindered their learning (or their ability to complete the assessment task, of which more below).

“The last two days of the trip were particularly challenging, with large sections of off trail walking in very steep terrain. Although it was great fun, we ended the trip not having opened our nature diaries for the past two days, and physically exhausted.”

“In addition, our leader hindered our experience of learning because he pushed our group to[o] hard on the walk and because of this I was not able to study certain aspects of the landscape”

Field guides

There were 34 students who made positive comments about field guides. This is unsurprising – field guides are the most obvious tool for the identification and naming of plants and animals. Analysis of the negative comments about field guides was revealing. Twenty students made negative comments about field guides, with just over half (11) associating these with wet weather.

“It proved difficult to use the guidebooks for better plant identification, as most group members did not want to get the field guides wet. This lead to little nature identification being achieved on this day. This affected my learning experience, as I did not have as much opportunity to learn more about mosses, mushrooms and fungi, which appeared in abundance in the rain.”
A large number of the remainder were concerned with the difficulty of accessing field guides while walking with a pack.

“Such aspects like walking through dense scrub, up hill terrain and having a heavy pack, which doesn't allow for easy access to field guides, influenced what I learned about the environment in a negative way.”

This suggests the problems were not with the field guides themselves, but lack of access to them, either through weather conditions, or inconvenience.

Walking route, campsite selection and structure of the experience

Forty-five students reported the structure of the experience as a negative impact on their learning. These were primarily about days where the walking required close attention to the track, full hard days leaving no time for study, or where there were physically demanding sessions leaving no energy for nature study.

Weather

“On the fourth day …rain started coming down heavily. Combined with a strong north-easterly breeze, these combined factors made it a bitterly cold day. . . . making all aspects of nature observation challenging due to the wet conditions.”

Most of the comments about weather were negative, and most of these, as in the quote above, related to wet weather. A small number noted hot weather as inducing lethargy, but in the conditions experienced in October in the Grampians, extremely hot days do not usually occur.

Assessment Tasks

No students complained about the assessment task, but a number of students associated the task itself with learning, rather than a tool by which learning may take place.

“now I feel like I can slow down more and enjoy the nature around me. Whilst this was probably the biggest change in myself from the Gariwerd trip, I really learnt how to use my field guides better which will help me in my exam more than anything else.”

Some students took a deeper approach:

“Our group took the time, after working on the assignment, to discuss it and engage in what others had learned. I find that it can be very easy to read something or look something up, but as far as recalling that information and applying it, it goes a long way to throw around ideas with people and do a bit of learning by teaching. If I had been working completely on my own, or done the assignment and then just forgotten about it for the day, I probably would have forgotten more of what I learned. It may sound simple or silly, but taking the time to actively think about what it is I just learned makes all the difference.”

“I guess that leads me to the appraisal of the work sheet that we were given. It is great to self learn and discover new things for myself, though I found it really positive to have the worksheet their to guide me in into the different ideas which should be looked at. I know I wouldn't have done a vegetation strata anywhere if I didn't have to, however once I did them it helped me to see the differences of each area, which then helps to link everything together. Eg.
The animals are here because the plants are here, the plants are here because the soil is here, the soil is here because the rock is here and so on. The worksheet helped to cover all the topics and definitely a good way to guide learning. I would only have done the work if I needed to.” (errors in original)

Discussion

Dillon et al. (2006) contains a relatively recent review of literature on outdoor learning. They summarise that:

Research indicates that fieldwork, properly conceived, adequately planned, well taught and effectively followed up, offers learners opportunities to develop their knowledge and skills in ways that add value to their everyday experiences in the classroom. (p. 107)

While their analysis seems predicated on the outdoor experience as an adjunct to classroom instruction, rather than seeing the learning activities as the primary educational experience, their conclusions on the factors that influence the outcomes of outdoor learning have some relevance. They identified the following positive and negative factors as major influences on learning outcomes from field trips:

- Age
- Prior knowledge and experience
- Fear (natural hazards) and phobias (‘disgust sensitivity’ to organic matter and handling natural objects)
- Learning styles and preferences (teacher-guided versus student-lead or self exploration)
- Physical disabilities and special educational needs
- Ethnic and cultural identity
- The setting (striking a balance between novelty and familiarity)(after Dillon et al. 2006).

In our tertiary level outdoor education programs, many of these factors are not under the direct control of the educator. Students’ age, prior knowledge (as distinct from preparatory learning), learning style and ethnic and cultural identity are qualities mostly determined prior to the student arriving at university. In addition, little work has been done on the educational activities and settings at the coal face – examining the aspects of the educational activities as they take place in the field.

Where most of the studies reviewed by Dillon et al. (2006) were set in formal educational institutions, outdoor learning about nature on extended field trips while having some similarities to such discipline-based learning, may have more in common with the informal and free-choice learning models developed for use in assessing museum education (Falk and Dierking 2000; Falk et al. 2001).

Concluding comments

The outdoor education research literature is largely quiet about student perspectives on learning natural history while undertaking overnight remote area journeys. Our findings suggest that tailoring placed-focused outdoor education experiences around learning natural history requires educators purposefully attend to: leader knowledge and enthusiasm, the structure of the experience (such as the nature of the travel and
campsite selection), use of supporting learning tools (particularly field guides), directed learning and assessment tasks requiring close observation, and consideration of the weather relative to location, time of year and route.

The outdoor education experiences we report here were deliberate in their attempt to construct situations that maximised students’ learning about the places they traversed and aspects of the local natural history. In our experience many outdoor programs include claims about investigating the natural environment, but an examination of the programs often indicate that many of the factors identified here as barriers to such learning are either structurally implicit in the programs, or overlooked, and may well preclude any learning about natural history taking place. While the students involved in these experiences were adults we believe their observations and the findings of this research project will be of interest to outdoor educators and researchers working with other age groups.

References


QSR International Pty Ltd. (2002) NVivo

