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Pre-service teachers' experiences of affective nature connection through intentional pedagogies on an extended expedition

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Abstract

Emotion plays a significant role in the human experience. Nevertheless, emotion (as an attribute of the affective domain), is often side-lined in formal learning environments (including Higher Education) in favour of a focus on the cognitive. This paper shares findings of a research project involving pre-service outdoor education teachers as they affectively experienced connections with nature on an extended expedition, while exposed to intentional nature connection pedagogies. It achieves this through the lens of the current shifts in outdoor education practice and pedagogy specifically, and curriculum and educational policies more broadly. The research was conducted as a case study, within a constructivist paradigm. The collection of data involved in-field observations on a six-day expedition, participant interviews, and researcher reflective journals. The data was analysed inductively which revealed a novel framework: the Affective Nature Connection Matrix. Through this matrix, the affective nature connection wave and heartbeat emerged. This theoretically derived and practice informed model highlighted the collective similarity of the expedition experiences, while acknowledging that these experiences were individually subjective. All participants experienced a rise and fall of affective nature connection, the wave, within individual and collective critical moments, the heartbeats, in response to intentional learning experiences which directly impacted and resulted in a deepened connection to self, others and nature.

Keywords Affective domain · Emotion · Outdoor education · Nature connection · Intentional pedagogies · Higher education

Extended author information available on the last page of the article

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Teaching nature connection

The research project which underpins this paper was guided by the authors' collective experiences of over 30 years, as researchers and practitioners, which motivated gaining a deeper understanding of students' experiences of intentional nature connection pedagogies in the affective domain in Higher Education. The project involved an exploration of pre-service teachers' emotional (affective) connection with nature during an extended expedition which was part of their university teacher education degree course. Of particular interest were the expedition leadership, and nature connection learning and teaching experiences. In this sense, the project went beyond an investigation of the merely aesthetic appreciation of nature. This paper draws on the research project along with the collective experiences of the authors in leading similar extended expeditions over many years.

Increased interest in research that explores teaching and learning in the affective domain has resulted from identification of the importance of, and difficulties faced, with teaching in the affective domain generally (Green & Batool, 2017; Rosiek, 2003; Shephard, 2008), as well as concerns for student achievement of affective learning outcomes and the assessment of these (Pierre & Oughton, 2007; Shephard, 2008). In outdoor education discourses a more specific call has been made for research which focuses on deepening understanding of the subjective engagement of individuals and groups with natural places and spaces (Wattchow, 2001; Wattchow & Brown, 2011).

We, the authors, describe ourselves as deeply connected with nature. David Hayward's personal experiences of emotional connection with nature as a pre-service teacher on a similar extended expedition instigated this investigation: exploring how pre-service teachers affectively experience place, teaching and leadership. Heidi Smith was directly involved in the extended expedition which became the empirical focus of the research, as lecturer of the associated unit of study (teaching informed by intentional nature connection pedagogies) and from a personal interest and wide experience in the value of experiencing and teaching nature connection. David Moltow, a philosopher, was drawn to the project as a result of his own experiences of connection with nature and how this sense of connection might be explored in the affective domain and shared with students. While we describe ourselves as being deeply connected with nature, we all agree that teaching those who may be less connected with nature is a challenging task that requires a reflexive approach with intentional pedagogy.

Heidi identified that the ways in which she had previously taught nature connection had not necessarily resulted in students achieving a deep connection with nature; and neither had this been achieved in any other attempts at teaching nature connection she had observed. A possible problem identified was that the traditional ways in which nature connection was assumed to develop was exclusively through an individual's own immersion in nature. Therefore, Heidi chose the iteration of the unit investigated in this research project to adopt a "new" approach to teaching nature connection using a selection of connection pedagogies in addition to, and in some cases overlaying, traditional outdoor education pedagogies (e.g., navigating, living and travelling in wild places). For example, bird language (Young et al., 2010) was included during the solo experience, overlaying this more traditional outdoor educa-

tion pedagogy. While some activities described by Young, Hass and McGown (2010) were used as a guide, Heidi drew much more widely on a range of pedagogies, and in particular on local cultural ways of knowing that reflected and connected to the specific place, thereby acknowledging the first people of this land. The underpinning commitment to achieving nature connection from Heidi's perspective could not be a simple process of dragging and dropping activities into a place or culture (Lloyd et al., 2018). Rather, a responsive approach to the places in which learning and teaching occurred, acknowledging traditional ways of being first.

The research project therefore provided an opportunity to investigate the effectiveness – or otherwise – of intentional nature connection pedagogies, and activities not previously used to explicitly teach nature connection in outdoor education, while on an extended expedition of six days. At the same time, the research provided an opportunity to gain a deeper understanding of the participants' overall experiences. We acknowledge that research in the affective domain is subjective in nature and the experiences of affective nature connection shared by the participants was individually unique, and yet commonalities were consistently demonstrated which reinforced the need to understand what happens when individuals encounter nature through intentional nature connection pedagogies.

In doing so, this paper responds to the need to provide empirical evidence of students' experiences in outdoor education that is contextual to specific areas and/or places (Lugg, 1999; Martin, 2005; Wattoo, 2001; Wattoo & Brown, 2011). It explores affective experiences in terms of "what happens when people encounter places, experience them, and try to make sense of these experiences" (Wattoo, 2001, p. 1) with a focus on "the subjective responses of outdoor educators and students, specifically into their lived experience of particular outdoor places" (Wattoo & Brown, 2011, p. 104). Without this empirical evidence, outdoor education cannot support its claims to the effectiveness of education for the individual and society (Lugg, 1999); in this case, in terms of nature connection outcomes. In addition to this call for empirical evidence, the accepted position that connection to nature is an important and significant area of study in outdoor education must be addressed (Brown, 2008; Martin, 2004a, b, 2005, 2007; Wattoo, 2001, 2004; Wattoo & Brown, 2011). In order to understand this emotional connection to nature, it is imperative that we first clarify what we mean by the affective domain.

The affective domain

The use of affective learning alongside cognitive learning has long been considered essential for holistic education (Bloom et al., 1971; Buissink-Smith et al., 2011; Iozzi, 1989; Green & Batool, 2017; Pierre & Oughton, 2007; Shoffner, 2009). The centrality of the affective domain remains necessary for learning today (Green & Batool, 2017), with UNESCO identifying affective learning as an essential part of 21st century education and one not to be overlooked (Buissink-Smith et al., 2011). As such, the cognitive and affective components of education cannot be, and ought not to be, separated (Iozzi, 1989; Green & Batool, 2017; Pierre & Oughton, 2007; Rosiek, 2003). In Australia, where this study was conducted, affective learning and elements

of the affective domain can be found alongside the cognitive domain in the “General Capabilities” of the Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2023), the *Melbourne Declaration on Educational Goals for Young Australians* (Ministerial Council for Education, Employment, Training and Youth Affairs [MCEETYA], 2008), and continue to remain central to the *Alice Springs (Mparntwe) Education Declaration* (Council of Australian Governments, 2019).

Awareness of the importance of affective learning suggests the need for more research in this area. The combination of the cognitive with explicit affective learning is relatively uncommon in classrooms (Iozzi, 1989), as affective goals have repeatedly been avoided in education (Shephard, 2008) because of a preference for teaching in other domains (Pierre & Oughton, 2007). Various explanations are given for this avoidance, ranging from the Cartesian separation of body and mind, to teachers who spurn the confusion and unreliability of capricious students who do not know or understand their emotions, along with the stability of cognitive classroom predictability and the ease of cognitive learning outcome measurement (Camelia et al., 2018; Pierre & Oughton, 2007). The expedition that underpins this paper embraced intentional pedagogy for deep nature connection that was embedded within the place in which learning was experienced.

In the outdoor education literature we found minimal research which specifically considered affective learning together with nature connection. While a significant body of literature exists that explores the interrelationships of self, others and nature (for example, Martin 2005; Nicol, 2003; Quay, 2013), a central tenet of outdoor education, what is absent is a deep exploration of appropriate pedagogies in which to teach nature connection beyond immersion. Knapp (1989) called for the “humanizing of outdoor education” (p. 1), and discussed the inseparability of the affective, cognitive and psychomotor domains, and the resultant barriers to achieving affective learning outcomes in outdoor education. These barriers included the difficulty of evaluating affective outcomes and the length of time needed to see impacts of affective learning. Knapp’s (1989) identification of domain inseparability and barriers to affective learning in outdoor education echoes concerns more broadly in education (for example, Pierre & Oughton 2007; Rogers et al., 2017). Nature connection is rarely researched alongside affective learning. While Gilbertson, Bates, McLaughlin and Ewert (2016) refer to ecological relationships, they describe these largely through environmental education in terms of awareness, knowledge of and skills for protecting the environment. They do not refer to ways of teaching for emotional connection to nature, instead they focus on interpersonal and physical skill development with a strong reliance on immersion in nature for connection. We argue this is not enough and while it may work for a select few, we contend not necessarily and not for the collective whole.

Connection with nature and the affective domain

In Western-Eurocentric societies understandings of the term ‘nature’ are often diverse, expressed via two broad positions: humans viewing themselves either as a part of, or separate from, nature (Vinning et al., 2008). Greer (2010) described this as a disconnect between the biological reality of life and commonly used language to describe engagement with nature (for example, conquering, encountering, reclaiming, appreciating, adoring). Bratman, Hamilton and Daily (2012) enjoin researchers to consider the long running debate between the natural sciences and humanities over whether nature is a “social construction or if it exists on its own in an independent and constant form” (p. 120). This difference can be observed in students’ engagement in/with nature as demonstrated through either their excitement and curiosity, or insecurity and fear (Fägerstam, 2012). This difference feeds confusion regarding connection with nature, impacting the current cultural and environmental crisis (Quay, 2016). Such confusion exacerbates a lack of connection with nature, affecting environmental (e.g., global climate change) and social crises (e.g., rising poverty) which have together resulted in the sabotage of “social-ecological resilience” (Zylstra, 2014, p. 27).

From the perspective of environmental psychology, an individual’s capacity to identify with nature, as a part of nature, and to thereby play a part in easing the growing environmental crises, is directly impacted by their ability to connect with nature (Capaldi et al., 2014; (Tam, 2013a). In addition, connecting with nature has been shown to play an important part in health and well-being (e.g., White et al., 2019). Therefore, we argue that outdoor education is a practice in which nature connection can be facilitated through intentional nature connection pedagogies. These pedagogies may include immersion activities; however, this project found that immersion alone is insufficient if we are to deepen the nature connection of individuals and groups such that an enduring relation with nature results, expressed by a lasting and active awareness of the importance of humans’ responses to escalating environmental crises. The conceptual framework which arose as a result of the review of literature for this research brings together Martin’s (2005) key signposts to human relationships with nature with Krathwohl, Bloom and Masia’s (1964) long standing taxonomy of the affective domain. Both frameworks remain individually relevant to contemporary discourses, as is demonstrated by their consistent and current use to explore teaching, learning and assessing in the affective domain (e.g., Camelia et al., 2018; Green & Batool, 2017; Shephard, 2008) and human-nature relationships (e.g., Bates 2018; Dyment & Potter, 2015; Gray & Martin, 2012; Wattchow & Brown, 2011).

This research utilises a framework of connection to nature specific to Outdoor Education called the key signposts to human relationships with nature (Martin, 2005). These key signposts (Martin, 2005) provide one way to understand humans’ developing, changing and individually different relationships with nature. While the signposts (Martin, 2005) can be viewed as a continuum of human-nature relationships they are not, in themselves, a theory. Originally, they were descriptors used to encapsulate data sets from a longitudinal study on human nature relationships (P. Martin, personal communication, September 22, 2015). In the field, the signposts have been used in a diagnostic assessment capacity, in order to ascertain where on the

signposts a student might sit and what pedagogical procedures are of most use to that student to help the student be more comfortable in the environment and potentially move along the described continuum.

The four signposts suggest individuals move through stages of being (1) alienated from nature, (2) traveling through nature, (3) caring for nature and (4) integrated with nature in regards to developing a relationship or connection with nature (Martin, 2005). Individuals at the *alienated from nature* level see nature as frightening and do not affiliate humans as being a part of nature (Martin, 2005). Individuals identified in the *traveling through nature* category see nature as a place to go usually to have fun, relating to nature the same way as they would an indoor gymnasium. Pro environmental behaviour can be observed when in nature but is forgotten or neglected in the home environment (Martin, 2005). In *caring for nature* a sense of stewardship or friendship emerges. Pro-environmental behaviour pervades into the individual's everyday life, with the beginnings of deeper connection to nature not present in *traveling through nature*. Individuals display attitudes such as a reciprocal friendship with nature and an internalized desire to care for nature. Lastly *integrated with nature* can be observed through actions such as a pervasive concern for environmental wellbeing that impacts upon an individual's everyday life, seeing the self as an inseparable part of nature and, having a sensuous or kinesthetic relationship with nature indicating a deep ubiquitous connection (Martin, 2005). The key signposts to human relationships with nature (Martin, 2005) inform one facet of the theoretical perspective of this research.

The second facet of the conceptual framework of this research is the affective domain taxonomy (Krathwohl et al., 1964) used in education to understand and teach about feelings, emotions, values and beliefs (Pierre & Oughton, 2007). The affective domain taxonomy (Krathwohl et al., 1964) has five levels on a hierarchical continuum: (1) receiving information from stimuli by showing attention and a readiness to experience stimulus or selective awareness; (2) responding to stimuli by showing cooperation, conformity, satisfaction and contribution; (3) valuing certain stimuli by showing a preference of certain values over others and a commitment to certain values of importance; (4) internalization of values shows a clarification and organization of values into an order of preference; and (5) characterization by a value or value complex whereby individuals endeavor to create a philosophy of life that they can justifiably live by (Krathwohl et al., 1964). Learning objectives in the affective domain are multifaceted, ranging from the understanding of one's own emotions and the everyday implementation of personal beliefs and philosophies, to the emotional component of learning and the understanding of other beings' emotional responses (Shephard, 2008).

As the study aimed to investigate the feelings, emotions and values of initial teacher educators experience of connection to nature, the affective domain taxonomy (Krathwohl et al., 1964) was used alongside the key signposts to human relationships with nature (Martin, 2005) to form the contextual framework of this research. Together they provide a theoretical base for the research question, data collection, data analysis and findings. A precedent for laying the affective domain taxonomy (Krathwohl et al., 1964) alongside a connection with nature framework was set by

Kellert (2002) through the comparison of the values of Biophilia with the affective domain taxonomy, as illustrated in Fig. 1.

The values given to the size of each level are not indicative of the amount of time an individual spends in that stage but were designed to show the similarities and crossovers between the two facets which together are the underpinning conceptual framework. For example, an individual *traveling through nature* by their very situation is *receiving* stimulus from their environment, and an individual that *cares for nature* has at some point given a *value* to nature. This guiding framework, together with the research question, provided focus for the research: How do pre-service outdoor education teachers, in an Australian university, experience nature connection in the affective domain whilst on an extended wilderness expedition?

With our prior knowledge and experience of nature connection on extended expeditions and our commitment to knowledge construction through reflection on direct experiences, the constructivist approach was chosen to underpin the research and supported the use of the framework to interrogate the data. In doing so, the strengths and weaknesses of the framework were also critiqued. While it was helpful to bring these two seminal theories/models together in order to organise and better understand the ways in which the literature informed the research through design and analysis, it was important to remain open to the findings emerging in the presence of intentional pedagogies, resulting in development of a further framework for deep nature connec-

Key Signposts of Human Relationships with Nature (Martin, 2005)	Affective Domain Taxonomy (Krathwohl et al., 1964)
Alienated from nature	Receiving
Traveling through nature	Responding
Caring for nature	Valuing
Integrated with nature	Internalization of values
	Characterization by a value or value complex

Fig. 1 Contextual Framework: Alignment of key signposts of human relationships with nature (Martin, 2005) and the affective domain taxonomy (Krathwohl et al., 1964).

tion we have called the Affective Nature Connection Matrix, Wave and Heartbeat. We shall say more about this in the [Findings and Discussion](#) section.

The study

Participants

The project's aim was to describe and understand the affective domain of participants' *experiences* of nature connection and drew from phenomenology to bracket the participants' own backgrounds and life-contexts (Vagle, 2018). While this knowledge may have been useful to understanding some of the external factors shaping the participants' affective responses to nature, the object of this project was the affect itself, as it derives directly from their experiences of nature connection, not its external causes. The participants were pre-service teachers enrolled in an outdoor education specialisation course with an extended expedition at one Australian university where the research was conducted and we, the authors, were based. Seven out of seven pre-service teachers consented to be involved in the research, however only specific data from two female and two male participants is represented in this paper due to reaching saturation of findings (Fusch & Ness, 2015). The participants ranged in age from 20 to 35 years old, and were all enrolled in their second year of a four year Outdoor Education teaching degree. They had various levels of experience with multi-day bushwalking expeditions. The unit involved the planning and participation in a six-day wilderness expedition, participation involved attending the expedition and being involved with all the activities, with each student asked to facilitate one activity over the course of the expedition. Assessment for the unit involved assessment of wilderness living skills, teamwork skills, facilitation skills and semi-structured reflective journal entries. Participant names and place names have been excluded from presentation of the data to maintain anonymity. When place names were required they have been replaced with general terms, for example "The Mountain." Pre-service teacher voices are represented using italics and inverted commas.

The expedition context

The context for the affective nature connection experience was a six-day extended expedition in the alpine region of an Australian national park. The expedition formed a significant component of the unit of study, with six additional tutorials at the University campus (five prior to the expedition and one on return). The unit of study had been carefully designed to incorporate intentional nature connection pedagogy and learning experiences, and Heidi had taught the unit more than 10 times in its various forms as it evolved over time, through a process of reflexive praxis. The tutorials on campus consisted of practical preparation for the expedition in terms of equipment, food, and navigation. In addition, students were exposed to nature connection learning experiences such as sit spot, bird language, attributes and gratitude sharing (Young et al., 2010) to prepare them for the expedition. All tutorials were held outside in a green space on campus under a tree, regardless of weather. The expedition

deliberately included time to allow for nature connection. The 25 km distance covered over the six days intentionally allowed for short days of traveling from place to place to enable time for explicit teaching by pre-service teachers and Heidi, as well as down-time when pre-service teachers could spend periods alone or with others in the National Park with no organised learning experiences, thereby allowing for nature immersion.

Pre-service teachers taught their own pre-planned lessons about place (national park history, Aboriginal history, geology, place names, flora, endemic trees, huts and fauna). When teaching lessons, pre-service teachers were encouraged to be creative in terms of pedagogy (e.g., storytelling, poetry, art); and while allocated a day and general time, were responsible for the choice of location for their lesson where possible. Some days were a mixture of pre-service teachers teaching and Heidi teaching, other days there were no formal lessons from pre-service teachers, and on others none from Heidi. Overall, Heidi taught “traditional” outdoor education technical and interpersonal skills (campsite selection and organisation, group travel, leadership, navigation including route planning and off track navigation day, sunrise, solo) while also providing nature connection learning experiences (e.g., wandering, storylines, tracking; Young et al., 2010) either as separate learning experiences and/or overlaying them over more traditional activities (e.g., solo and bird language, navigation and wandering).

Data collection and analysis

Data were collected through researcher observations conducted during the six-day extended expedition (Punch & Oancea, 2014). A one-on-one conversational semi-structured interview with each participant was informed by the observations (Patton, 2002) and the participants’ expedition journals were collected for interview data verification. The journals were a part of the unit’s assessed work and required students to reflect on their experiences of the expedition through guided reflection questions specific to each day of the expedition and requiring students to link reflection with broader literature. The reflective journal incorporated both structured and unstructured responses with the opportunity for students to self-direct reflection as they developed their individual skills of reflection (Dyment & O’Connell, 2010), and creativity was highly encouraged and assessed (O’Connell et al., 2015). This three-fold of methods enabled triangulation of the data (Yin, 2014).

The data collected through this naturalistic inquiry were analysed holistically in two phases, a descriptive phase and an interpretive phase (Patton, 2002). The descriptive phase involved the deconstruction of each case’s data set into a set of emergent categories (Patton, 2002; Yin, 2014). This involved two cycles of coding allowing for the classification and refinement of the collected data (Saldaña, 2009). The first cycle of coding consisted of descriptive and affective coding (Saldaña, 2009). The interpretive phase inductively followed the constructivist paradigm and a naturalistic line of inquiry.

Findings and discussion

An emergent model: the affective nature connection matrix

The theoretical perspective underpinning this research was formed through the combination of two frameworks that acknowledged both sides of the research question. The key signposts to human relationships with nature (Martin, 2005) reflected connection to nature research while the affective domain taxonomy (Krathwohl et al., 1964) represented affective domain research. It was found that this guiding framework (Fig. 1), while useful to help inform the data collection processes, was inadequate to explain the complexity of the participants' experiences. Emerging from the findings, then, was a matrix model which better explained the participants' experiences over the six days of the expedition (Hatch, 2002). We have called this model the Affective Nature Connection Matrix (Fig. 2). As depicted in Fig. 2, this model acknowledges that at no point in time throughout the expedition and interviews did students report to be, or were witnessed as being, alienated from nature.

Early on in the analysis of the empirical data, it became apparent that the guiding framework (Fig. 1) lacked the detail to explain the complexity that constituted individually subjective affective nature connection during the extended six-day expedition in this study. It also became clear that the original idea of each key signpost corresponding with an affective domain level(s) was not supported by the findings. Rather, the findings showed that participants displayed the whole of the affective domain taxonomy (Krathwohl et al., 1964): receiving, responding, valuing, internalisation of values, and characterisation by a value, within each of the key signposts to human relationships with nature (Martin, 2005) – traveling through nature, caring for

Integrated with Nature	Characterization					
	Valuing/Internalization					
	Receive/Respond					
Caring for Nature	Characterization					
	Valuing/Internalization					
	Receive/Respond					
Traveling through Nature	Characterization					
	Valuing/Internalization					
	Receive/Respond					
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6

Fig. 2 Basic features of the Affective Nature Connection Matrix as it emerged through analysis of the data

nature and integrated with nature – but not alienated from nature. The length of the six-day expedition also proved important and the decision to represent this along the bottom of Fig. 2 was to highlight the idea that affective nature connection changed through the course of the expedition, a circumstance we shall account for in further development of this model.

Over the six days of the expedition, a common theme emerged whereby participants demonstrated a shift in how they connected with nature, beginning with less connection, building to a peak of connection on day five, and then declining on the evening of day five and into the morning of day six as thoughts turned to going home. On day one, the participant’s connection to nature began as *traveling through nature* where they identified feelings of growing more comfortable as the expedition evolved, moving through *caring for nature* and becoming *integrated with nature* on days two-five, before returning to *traveling through nature* on the evening of day five and throughout day six, as their attention was turned towards returning home. This movement through the phases is represented as a ‘wave’ for the slow increase in connection and relatively sudden decrease when thoughts turned to home. We have called this rising, peaking and declining the affective nature connection “wave” (Fig. 3).

Interspersed along the wave were critical moments where students experienced instances of deepening connection. We have called these significant moments along the wave the affective nature connection “heartbeats” (Fig. 4). These moments of significance ranged from individual experiences which were unstructured with nature (quiet time, unstructured time to engage with the place), through to intentional learning experiences designed to connect participants to nature (wandering, story lines, student sessions on the national park, Aboriginal engagement with the landscape, past present and future, and solo time). Overall, the expedition was structured to

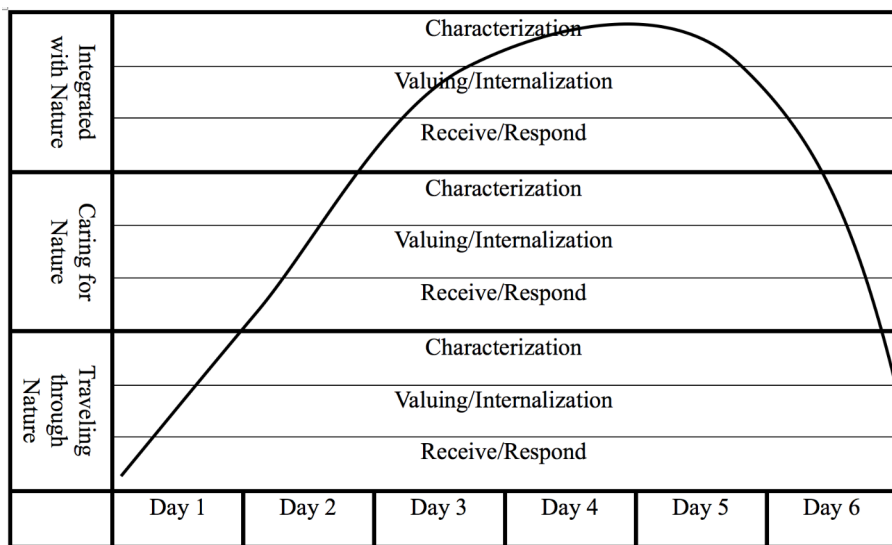


Fig. 3 Affective nature connection wave

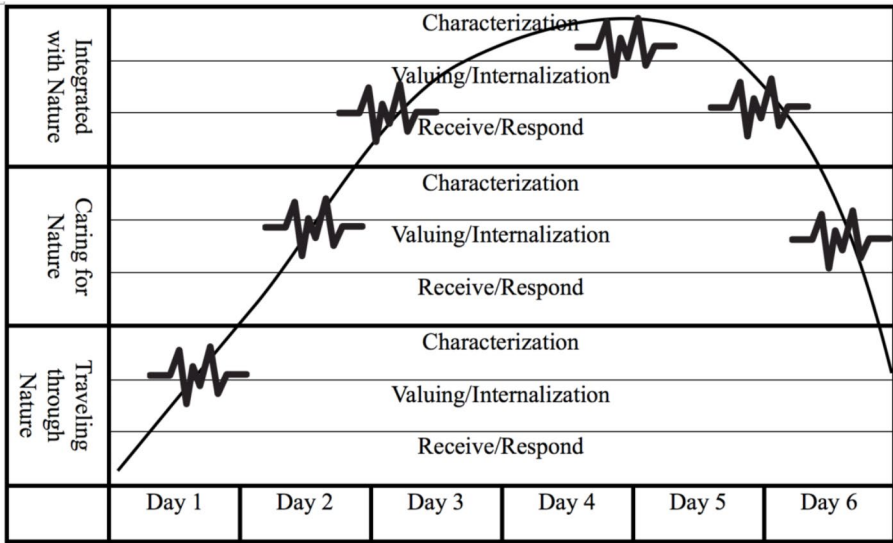


Fig. 4 Affective nature connection wave with heartbeats

be unhurried allowing time to be in nature and encourage spontaneous experiences where individuals (students and staff) and/or the whole group led moments of connection. Language to express these deep connections was explored together, allowing all to develop a shared language of understanding around connection, which included silence.

The emergence of the Affective Nature Connection Matrix from our analysis of the data is congruent with Martin's (2005) statement that over time participants can shift their perspectives across the signposts, and Krathwohl et al.'s (1964) notion that students will move their focus or differentiate between a separate "phenomenon, characteristic or value" (Krathwohl et al., 1964, p. 33) as and when it captures their affective attention. Therefore, the Affective Nature Connection Matrix creates a synthesis between the affective domain taxonomy and the key signposts to human relationships with nature. The following examples from the data support our theorising of the Affective Nature Connection Matrix and focus on either individual days or the expedition as a whole: individual participants or the whole cohort. The examples also target the observable and reported characterization by a value or value complex (Krathwohl et al., 1964), as it was this level of the affective domain taxonomy which was most observed throughout the data.

We now unpack this emergent model in its connection with the data, using it to reveal these experiences of connection as a wave, followed by exploring the heartbeats of deeper connection which significantly impacted overall connection and continuation of the deepening of connection along the wave: travelling through, caring for, and integrating with nature.

Affective travelling through nature

Evidence of affective travelling through nature was found predominantly when participants were engaged in activities that involved physical movement. Discomfort was characterized by the physical and emotional stressors that are inherent to an extended expedition, such as feelings of nervousness about the unknown and feelings of wanting to be at, or go, home. Three participants reported that while they had thoughts and feelings of wanting to appreciate their surroundings and having awareness of being in a place of great natural beauty, it was difficult to do so whilst undertaking an activity that required considerable physical effort. An example of this was on the first and last days; while they wanted to appreciate where they were, they were travelling through nature due to their physical discomfort (steep uphill ascent into the national park) on day one and/or eagerness to return home on day six. Travelling became a more dominant need than connection in these instances, only appreciating the surroundings when stopping for a break. On the first day, participants needed to be prompted to take in their surroundings during breaks. On the final day, while a return to travelling was present, when the group stopped for lunch, it was not easy to get the group moving again, participants preferring to linger a while. When individuals looked up from the track in front of them and noticed their surroundings they often needed to be encouraged to move on towards the carpark. Many stated that they would really rather stay. Therefore, while a return to travelling was observed, it was travelling with a deeper connection to the place on day six when compared to day one. Overall, the participants' enjoyment of being in nature was significant, *"the place doesn't need to change; it is beautiful as it is."* At the same time, the weather played a major role in participants' lack of enjoyment and discomfort at times, *"happiness with the rain wears off after a while."*

Directly linked to their connection was the importance of 'being present' on the expedition to enable emotional connections to nature as well as embracing a changing attitude towards the experience as the expedition evolved. This 'being present' was observed to increase along the way with connection. This was particularly observed on day six, where, while the call from home and all its distractions was strong, at the same time the natural world was keeping their attention when they let the voices of home quieten. Most agreed it was difficult to connect with nature when *"distracted by my own problems."* It would have been *"easy for me to just want to be home and let that spoil the rest of the trip. But I didn't want to do that, I wanted to make the most of it while I was out there."* During moments where distractions from home pulled their attention from the present, participants found themselves on the verge of alienation from nature. However, at no point in time throughout the expedition and interviews did students report to be, or were witnessed as being, alienated from nature.

Further data analysis revealed it was at times impossible to separate the value placed on connection to either self, others or nature. For example, *"mountains made me feel like the smallest thing in the world"* and the *"pine grove made me appreciate stillness."* Participants reported that the intentional nature connection learning experiences on day two (wandering and tracking) offered the biggest opportunity to connect and resulted in key heartbeat moments of the expedition. The valley chosen was, in comparison to other parts of the national park, fairly non-descript at first view.

Through these activities, they connected with the self through becoming comfortable with others, and to the valley itself through the group activities and slow movement/travel across the landscape. They connected through having the freedom to explore and create their own stories about the valley with plenty of time to do so.

Affective caring for nature

Participants' valuing of their connection with nature was heard and witnessed through expressions of "love": "*it was a cool view of the valley and the mountains*" and "*it was awesome to be [there].*" It was also witnessed through the stories they wrote and recounted, detailing their individual and shared experiences in the valley. This valuing of connection could be seen expressed via participants' affective caring for nature, which was also evident in comments shared, especially notable through their repeated use of the word love, including synonymous expressions. Participants expressed love for specific places, activities and experiences, or for their fellow participants. The participants' love and care for nature was most tangible in the middle part of the expedition, from day two onwards. As a cohort, they expressed that they valued the time given to discovering and getting to know places intimately, be this through organised intentional solos or personal quiet time (Nicholls & Gray, 2007). All participants described a wish to slow down and appreciate their surroundings, a wanting and needing to care for nature. This can be juxtaposed with the initial setting off on day one, where there was a need to get to the top of the hill, and then get to camp. This urgency slowly receded with the many planned stops and activities experienced along the way; and over the six days it reduced further as we all settled in to the rhythm of the expedition. This was a rhythm of unhurried engagement with the place through quiet times, loud times, individual and social, technical and interpersonal.

The value placed on emotion by the participants was at times positive and negative. The emotion displayed by one student during their taught lesson inspired a participant to use personal stories in a lesson, sensing that it would "*add to the experience ... if I put a bit of emotion into it. It will give [the lesson] a bit more depth.*" Negative emotions were displayed by the participants through the acknowledgement of personal distraction such as their "*emotional home life,*" and being "*challenged with the direction of my life.*" However, the expression of negative emotions paled in comparison to the displays of positive emotion across all participant reflections in terms of the place, activities, and events experienced.

Two distinct understandings became evident in the ways in which participants showed an appreciation of the interactions present between people, places, nature and intentional learning experiences. First, "*humans can have an impact on the wilderness even when they are not there*"; and second, the impact of the lessons and activities (heartbeats) were undeniable in influencing the participants' level of connection with nature. Specifically, in terms of learning experiences, one participant identified that "*story enforced connection to place*" (heartbeat) and another shared that while getting to know a tree (heartbeat) was a new experience for him, he could nonetheless remember his tree, describing its touch, smell and how it made him feel emotionally, weeks later.

Individual participant's emotional connections were made manifest in a number of ways. One participant felt "*proud and accomplished*" at the end of the expedition, while another had "*mixed emotions about leaving*" and was "*sad to leave but happy for the experience.*" An individual's ability to emotionally connect was dependent on the positive and negative personal influences present. One participant shared that it was hard to do simple tasks due to being tired and/or irritated. Another was emphatic that the lesson which stood out was the lesson with the most emotion (heartbeat). One participant felt that "*being alone on The Mountain was an emotional connection,*" (heartbeat) and another that while "*some people like social connections, some people seek emotional connections.*" For this participant, the solo experience of The Mountain was an "*intimate and deeper emotional connection*" rather than a "*social connection.*"

Affectively integrated with nature

Proportionally over the three observed and reported key signposts, participants were either observably leaning towards or locating themselves as affectively integrated with nature. The data revealed that emotional and social connection, feelings of intimacy and the development of relationships, and times of feeling most connected with nature, occurred from day three through to the end of the day five. All of the participants expressed a wish to remain longer in the wilderness. One student in particular connected deeply and intimately, which resulted in "*a special feeling of peace and home*" in the national park.

Intimate and emotional characterizations of affective integration with nature were directly entangled with participants' reflections and views of connection with nature, and their individual subjective relationships with nature. This we see as an example of being integrated with nature; an "eco-erotic" or "sensuous relationship with nature" (Martin, 2005, pp. 44–45). For example, one participant shared a deep insight into the meaning of nature connection, and their personal experiences of forming a deep intimate relationship with nature. "*I felt like, 'I don't want to leave this place, I just feel really comfortable here right now.' It felt almost sad to leave,*" they said. "*You've developed this relationship with this area and you're breaking it up. It's kind of like having a lover.... It's a relationship just not with a person.*"

Connection to nature was experienced in deeply personal ways by all participants and yet there was clear evidence of an increase in connection across the six days, as depicted by the affective nature connection wave (Fig. 3). Revealed was a significant increase from day two (travelling through nature), through to day five (integration with nature), and a return on day six (travelling through nature), facilitated by the mind returning to thoughts and stressors of home. The deeply personal connections with place, experienced individually by all the participants, as realised on this six-day wilderness expedition, were interspersed with equally individual heartbeat moments/experiences (e.g., wandering, quiet time) which served to further deepen connection.

While the affective nature connection wave (Fig. 3) visually shows the participants' affective experience of nature connection over the course of the extended expedition, it does not explain causal factors. Reports from participants point to critical moments such as the lecturer-led intentional nature connection pedagogies: learn-

ing experiences of wandering, storylines and solo time, the student led lessons, and times to be personally alone in the wilderness (quiet time), as the affective *heartbeats* of the expedition (Fig. 4).

These heartbeat activities across all days of the expedition facilitated achievement of the nature connection wave. Without these heartbeats we believe that the deep and intimate relationships formed by the participants would not have been possible; or if they were possible, prior experiences had by Heidi suggest that they would not have been as profound.

Conclusion

The evidence given above for the creation of the Affective Nature Connection Matrix as a model incorporating the affective nature connection wave and heartbeats, can be claimed only in connection with the context investigated here. In other words, this is evidence of affective learning outcomes in a cognitive learning environment when intentional nature connection pedagogies are present. This combination extends the idea of outdoor educators focusing on “teaching the whole student” (Knapp, 1989, p. 41) to include perspectives that attend to the ways places in nature can affect human feelings and our need for a reciprocal caring attitude towards nature (Martin, 2007).

The Affective Nature Connection Matrix, with wave and heartbeats, is not intended as a generalisable trend applicable to all situations; rather, the visual representation is of the combination of affective travelling through nature, affective caring for nature and affective integration with nature, and is the expression of an observed trend revealed through holistic analysis of pre-service teacher experiences of nature connection during this extended expedition. However, we believe that these observations are not limited to this one expedition and similar experiences have been observed on other expeditions of similar length and/or longer expeditions with day five being significant in terms of connection to nature and personal growth.

If, as the findings and literature suggest, students can develop affective nature connection through intentional nature connection pedagogies, then this research provides an insight into one way of negating the false dichotomy prevalent in the common discourse surrounding human relationships with nature (Bratman et al., 2012; Greer, 2010; Vinning et al., 2008). The learning of affective nature connection also speaks to Buissink-Smith et al.’s (2011) assurance that the skills and knowledge learnt by students to combat the social and environmental crises (Quay, 2016; (Tam, 2013a, b; Zylstra, 2014) are employed in the future because of “affective, rather than cognitive” influences (Buissink-Smith et al., 2011, p. 102). The negating of the false dichotomy and the teaching of affective nature connection provides a way for the affective domain and environmental sustainability aspects of the *Alice Springs (Mparntwe) Education Declaration* (Council of Australian Governments, 2019), the “General Capabilities” of the Australian Curriculum (ACARA, 2023), and UNESCO’s 21st century essential learning guidelines (Rosiek, 2003) to be combined in order for Outdoor Education learning outcomes to explicitly target the environmental crisis (Quay, 2016; (Tam, 2013a, b; Zylstra, 2014) and the health benefits of nature connection (Alcamo et al., 2003; Capaldi et al., 2014; Mallar et al., 2009; Richardson et al., 2016).

As outdoor education moves from a period of infancy to a period of adolescence (Nicol, 2014), we propose a paradigm shift from neo-Hahnism (Brookes, 2003a, b) to post neo-Hahnism (Hayward, 2016) which we plan to address in a subsequent paper. Pre-service teachers who are taught and learn how to teach others affective nature connection through maximising the affordances of the outdoor places in which they travel and integrate, have the potential to teach others how to make considered affective choices in regard to acting in personal, social and environmentally healthy ways, as well as cognitive ones (Adolphs & Damasio, 2000; Shephard, 2008; Smith & Kirby 2000).

When educators pay direct attention to the affective domain when designing intentional learning experiences for nature connection, these experiences have the potential to directly impact individuals and groups, deepening connection(s) to self, others and nature. Educators, sharing in these heartbeat moments with participants, are able to observe these connections and receive feedback on our own effectiveness as educator/facilitator. Discussion with colleagues and others about this research has revealed general support for these heartbeat moments and the importance of the penultimate day (day five in this study) on extended expeditions. Further research is needed into this phenomenon to further deepen understanding and improve pedagogical praxis. This is essential if we are to continue to grow and develop as educators who focus on the affective as well as the cognitive in our design of learning experiences which include developing and deepening connection to self, others and nature. The affective experience is key to learning and creating positive change for humans, more-than-humans, and our planets shared future.

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Code Availability An example of coding/analysis is presented in the original thesis online. https://eprints.utas.edu.au/23510/1/Hayward_whole_thesis.pdf.

Declarations

Conflicts of interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

Ethics approval and consent to participate Ethical approval was granted February 2016 from the University of Tasmania H0015490.

Consent for publication All participants consented to the findings of the research being published in academic peer reviewed journals and at conference presentations.

Consent to participate All participants consented to participate.

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