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ORIGINAL PAPER

Threshold concepts for Australian university outdoor education programs: findings from a Delphi research study

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Abstract

In Australia, when a person wants to work in the outdoor education or recreation field, they can follow a number of different pathways to gain the required knowledge, skills and experience. Typically, this involves the completion of a formal program with either a training organisation or a university, depending on the qualification sought. Programs delivered by training organisations typically use a national training package to define the specific competencies (knowledge and skills) and the curriculum and outcomes of these programs are clearly defined, and qualifications are usually transferable around the country. Outdoor education programs delivered by universities in Australia, however, have no such clarity. This paper describes a research study that used the Delphi research method to consult with academics working in university outdoor education programs across Australia. The research set out to establish a set of threshold concepts that articulate what a student who completes at least a major in outdoor education knows and is able to do. Over two rounds of consultation the six authors of this paper formed the Delphi facilitation team, which solicited input and feedback from an expert panel. Nineteen different university academics participated in the research and produced seven threshold concepts, which are shared in this paper to encourage discussion and invite feedback from a wider range of stakeholders. More research is required to ascertain the efficacy of these threshold concepts in describing what graduates of university outdoor education programs know and can do.

Keywords Threshold concepts · Outdoor education pathways · Outdoor leadership training · Delphi research

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A challenge for university outdoor education programs in Australia

In Australia, a person wanting to work in outdoor recreation or outdoor education can follow a number of different, but potentially overlapping, education or training pathways. The most common approach is to complete a formal program of study with a training organisation or a university. Programs delivered by training organisations typically use a national training package to define the specific competencies (knowledge and skills) that a person may require to perform a particular role in the outdoors (Department of Education and Training 2015). Different qualification levels, defined by the Australian Qualifications Framework Council (2013), allow training organisations and trainees to know what is covered in a particular program and what graduates of that program should be competent to do. The Australian government has funded and supported the development of this training package to make sure that there is a consistent understanding of qualifications both across and within a profession/industry. Unfortunately, there is no such clarity about university outdoor education programs (Polley and Thomas 2017).

For historical and cultural reasons, the provision of school-based education in Australia is largely determined at the state, rather than federal, government level. Consequently, in response to local imperatives, the education system in each state is slightly different – although in more recent times a national curriculum has been developed and implemented. How teachers are prepared to work in those states varies accordingly, which impacts on those people who seek to work within outdoor education or outdoor recreation programs in schools. These variations, combined with the liberal ideology common in higher education institutions (Martin 1998) means that to date there is no clear or common understanding of what university outdoor education graduates know and are able to do. This does not in any way imply that these graduates are not knowledgeable, capable or skilled facilitators of outdoor education, or that individual institutions have failed to identify what their graduates know and can do. Rather, it means that amongst the outdoor education/recreation profession the outcomes for graduates of university pathways have not been as clear as they are for graduates of training pathways using the *Sport, Fitness, and Recreation Training Package* (SFRTP) (SkillsIQ 2015). The SFRTP was developed via an open, government-funded consultation process which means that the training outcomes for programs based on the package are understood and accepted by stakeholders familiar with the package. The research described in this paper aims to provide more clarity on the outcomes attained by university outdoor education graduates for the benefit of all stakeholders in outdoor education programs.

This research project is focused on the graduates of university outdoor education programs. We have based our work on the premise that university graduates acquire additional skills, knowledge, and experience to those demonstrated by SFRTP graduates, and this study sought to identify them. The competency-based system of the SFRTP is not well-suited to describing these additional skills of university graduates for both ideological and practical reasons (see Martin 1998). The theoretical approach of threshold concepts, developed by Meyer and Land (2005), was chosen as a more suitable framework for this research because many other discipline areas have used threshold concepts to communicate what university graduates know and are able to do (see examples below). We have also proposed that threshold concepts could be an

effective way to describe the minimum capabilities of graduates from university outdoor education programs (Polley and Thomas 2017).

Why threshold concepts?

Threshold concepts have been described as "portals that lead to a transformed way of understanding or thinking, enabling learners to progress," and as a result they "have been enthusiastically adopted to inform teaching approaches and curriculum design" (Nicola-Richmond et al. 2018, p. 101). A number of professions have used threshold concepts to describe what graduates know and can do, including engineering (Meyer 2016), economics (Shanahan 2016), sustainability education (Barrett et al. 2016), and health sciences (Barradell and Peseta 2017).

Several authors have provided a comprehensive summary of key attributes of threshold concepts (Cousin 2006; Meyer and Land 2006; Polley and Thomas 2017) and readers are directed to these sources for a comprehensive discussion. To summarise this literature, threshold concepts are *transformative* because they open up "previously inaccessible ways of thinking, understanding or viewing … without which the learner cannot progress" (Meyer and Land 2003, p. 1). This journey is typically not a linear passage but is more likely to be recursive with "messy journeys back, forth, and across conceptual terrain" (Cousin 2006, p. 5). A student's understanding of a threshold concept is often *irreversible* (Cousin 2006) meaning that it is difficult to unlearn it and return to earlier ways of thinking. Threshold concepts often involve knowledge that is *troublesome* (Meyer and Land 2005, p. 374), meaning that it may be counterintuitive or alien and "mastery of a threshold concept can be inhibited by the prevalence of a 'common sense' or intuitive understanding of it" (Cousin 2006, p. 4). Threshold concepts are *integrative* (Meyer and Land 2005, p. 373), because they provide links and expose the "hidden interrelatedness of a phenomenon" (Cousin 2006, p. 4). Threshold concepts have been described as *bounded* (Meyer and Land 2005, p. 374) because they provide a conceptual space with "terminal frontiers, bordering with thresholds into new conceptual areas" (Cousin 2006, p. 6). Finally, Meyer and Land (2005) also suggest that threshold concepts bring new levels of *discursivity* by allowing an enhanced and extended use of language specific to the profession.

Threshold concepts have attracted some critique, with the primary concerns focused on the fuzziness of language describing threshold concepts and the unlikelihood of reaching total agreement within a profession over a comprehensive list of threshold concepts (O'Donnell 2010; Morgan 2015; Rowbottom 2007). There have also been concerns about how to measure the attainment of threshold concepts and if it is possible to make threshold crossings measurable. Nicola-Richmond et al. (2018) noted that the range of interpretations of the threshold concept, and a lack of methodological rigour in many studies, make measuring threshold concept attainment difficult. However, they additionally argue that:

> the progression of students through these stages of liminality and the variation of threshold crossing within student cohorts emphasises the need for educators to provide teaching and learning opportunities that are both appropriate and effective for students at different stages of acquisition. (Nicola-Richmond et al. 2018, p. 106)

The same authors also highlight that a range of assessment tools can be effectively deployed to measure attainment of threshold concepts, provided they are fit-for-purpose.

Research methods

The purpose of this study was to draw on the expertise of academics working in Australian university outdoor education programs to establish a set of threshold concepts that might be realistically attained by a student who completes a minimum of a six-course major (3/4 of one year of full-time study) in outdoor education. The six-course major was chosen as the minimum level of study because it allows students to develop an acceptable baseline level of skills, knowledge and experience in outdoor education. A six-course major is typically the required amount of study in the outdoor education discipline to qualify for an outdoor education teaching method in most pre-service teacher education program. We recognise that outdoor education graduates may complete more than six courses in their program and would expect these graduates to go over and above these threshold concepts. A Delphi research survey approach was selected because of its proven ability to draw on the expertise of people in a particular field, gather their input and feedback over a number of rounds, in order to collaboratively distil important concepts or information (Keeney et al. 2001; Fletcher and Marchildon 2014).

The history of the Delphi research method

The Delphi research method is allegedly named in deference to the legend of the Greek Delphic oracle who was able to forecast the future. One of the earliest recorded applications of the Delphi method was during the Cold War when it was used to identify industrial targets in America and determine their level of vulnerability. In this case, the method was used to "obtain the most reliable consensus of opinion of a group of experts" by using a "series of intensive questionnaires interspersed with controlled opinion feedback" (Dalkey and Helmer 1963, p. 458). The Delphi research method affords:

> an opportunity for experts (panellists) to communicate their opinions and knowledge anonymously about a complex problem, to see how their evaluation of the issue aligns with others, and to change their opinion, if desired, after reconsideration of the findings of the group's work. (Kennedy 2004, p. 505).

Some of the key characteristics of a Delphi research approach include the establishment of a panel of experts, the anonymity of participants, the controlled nature of information flow over a number of rounds, the sharing of feedback from members of the expert panel, and the careful facilitation of the process (Keeney et al. 2001; Fletcher and Marchildon 2014).

Research procedures

The six authors of this paper formed the Delphi facilitation team and guided the research process. We were from five different universities from three different states of Australia. Over a number of teleconference meetings in late 2017 and early 2018 we: developed and refined the research problem, and the aim and context of the research; completed the research ethics process; and developed a draft list of threshold concepts. We shared our intention to conduct the research in two different presentations at the 2018 Australian Outdoor Education Conference in Hobart, Tasmania. The feedback we received in these sessions was used to refine the research process and revise the draft list of threshold concepts.

The members of the expert panel used in the study were recruited from the Australian Tertiary Outdoor Education Network (ATOEN). The ATOEN is a network of university academics from Australia with an interest in outdoor education research and practice. Several months after the conference in 2018, the invitation to join the expert panel and participate in the Delphi research project was emailed to all in the ATOEN; more than 50 academics. To qualify for the expert panel, respondents were required to have at least three years' experience working in the university outdoor education sector. However, if respondents did not meet this criterion, but felt they had some wisdom to contribute to the process, we requested an explanation of the alternate source/s of their expertise. All in the ATOEN who responded were deemed suitably qualified to contribute to the research as members of the expert panel.

Two rounds of consultation were conducted over a four-month period in 2018. In each round, the members of the expert panel, recruited from the full network list of the ATOEN, were given three weeks to contribute their responses by email to the project leader, and personalised reminder emails were effective in procuring more responses. As shown in Table 1, in the first round of consultation the members of the expert panel were asked to provide details of their expertise, their preference for the nomenclature that would be used to describe the graduates from university outdoor education programs, and their feedback on the draft threshold concepts. The project leader received, collated and anonymised the email responses ($N = 12$) from the expert panel members for the deliberations of the Delphi facilitation team. When the Delphi facilitation team met via teleconference, we made a decision about the preferred nomenclature and revised the draft threshold concepts based on the feedback provided by the expert panel.

In the second round of consultations, all in the ATOEN were again invited to contribute to the Delphi process as members of the expert panel. The guiding questions for the second round were: 1) What do you think of the changes and the rationale for the decisions made, and 2) Do you have any additional suggestions on how the threshold concepts could be improved? Twelve responses were received, although the responses were not from all the same people as the first round. Over the two rounds of the Delphi research process, 19 different individuals in the ATOEN responded to the survey. Again, the project leader received, anonymised, and collated the responses and circulated them to the Delphi facilitation team for consideration, before meeting to make further revisions to the threshold concepts. After the second round, the Delphi facilitation team determined that, given the general consensus amongst the expert panel

Table 1 Delphi round 1: Guiding questions

Delphi Round 1: Guiding Questions
1. What is your background or expertise in outdoor education within the higher education sector?
2. Do the three proposed levels (outdoor leader, outdoor education practitioner/outdoor educator, and outdoor education teacher) appropriately characterise the range of outdoor education employees? Yes/No? Please explain why.
3. What is your preferred term to describe graduates who have completed a minor or major in OE but have not completed a recognised Initial Teacher Education degree: *Outdoor Education Practitioner* or *Outdoor Educator*? Please explain why.
4. Do you have any feedback on the scope, focus and/or content of the draft threshold concepts? Please see below.

regarding the list of threshold concepts, theoretical saturation had been reached and more rounds of consultation with experts sourced via the ATOEN were not justified.

Research ethics

Full research ethics approval was obtained from the University of the Sunshine Coast. Leading up to the granting of approval, concern was raised over the confidentiality of the expert panel members, due to the impossibility of ensuring their complete anonymity because of how the research data was collected. However, an acceptable level of anonymity was achieved via management of the process by the project leader, who received the expert panel responses provided to the Delphi facilitation team and anonymised these before they were disseminated. In all communication and developmental work, the individual responses from the expert panel were kept confidential.

Limitations of the study

What some consider the strengths of the Delphi research process are considered by others to be a weakness (Kennedy 2004). The anonymity of responses (to all but the project leader) provides a release from peer-pressure and a less constrained consideration of ideas based on their merit alone. However, it is possible that this level of anonymity can lead to a lack of responsibility for the contributions made. The way that the expert panel is selected and defined is considered to be another potential weakness (Keeney et al. 2001). In this study, we attempted to ensure the expert status of participants by clearly prescribing our expectations, while also allowing participants to demonstrate their expert status through alternate means. While the number of expert panel participants in the Delphi research process in this study was small ($N = 19$), this weakness was offset by the fact that all of the Australian universities offering (at least) a major in outdoor education had at least one academic contribute to the process. Finally, although traditionally a Delphi process may involve more than two rounds, in this study two rounds were sufficient given the levels of theoretical saturation apparent in the expert panel members' contributions.

Findings

In this section, a summary will be provided of the key findings regarding the preferred terminology for the university outdoor education pathway and the threshold concepts that emerged from the Delphi research process. Through the consultations with the expert panel in the two stages of Delphi research process, the Delphi facilitation team chose to identify three formal, educational pathways that allow people in Australia to work in outdoor education and outdoor recreation. The following terms were adopted to describe the graduates of these formal, education pathways in Australia:

- ***Outdoor leader***: Someone who has completed a vocational education and training course drawing on the SFRTP (or similar scheme) to describe their competencies.
- ***Outdoor educator***: Someone who has completed at least a six-course major (3/4 of one year of full-time study) focused on outdoor education within a larger university program.
- ***Outdoor education teacher***: an outdoor educator who has also completed an Initial Teacher Education degree (undergraduate or postgraduate teaching qualification).

To clarify the overlap in these pathways, outdoor educators may acquire all, or some, of the identical competencies (knowledge and skills) demonstrated by the outdoor leader. Some outdoor educators may gain further knowledge, skills and experience through an Initial Teacher Education program which allows them to become registered as a teacher. However, this research project is not attempting to describe the generic teaching knowledge and skills that outdoor education teachers may develop.

The draft threshold concepts developed in the research described in this paper are those that would be mastered by a university graduate at the outdoor educator level, who has completed a major in outdoor education (categorised as a minimum of 3/4 of a year of full-time study). It is possible that university graduates who complete a full three-year degree specialising in outdoor/environmental/recreation education may also acquire additional skills, knowledge and experience. The seven draft threshold concepts which emerged through the Delphi research method will now be presented, including examples of how they might be taught and assessed in a university outdoor education program.

Threshold concept 1: An outdoor educator creates opportunities for experiential learning

> *Experiential learning approaches require participants to be active in, and take responsibility for, their own learning. The outdoor educator creates optimal conditions for that learning to occur. An outdoor educator supports participants to make decisions about their learning and experience the consequences of those decisions whenever it is safe and practicable to do so.*

Experiential learning is a key learning approach that underpins outdoor education across the world (Williams and Wainwright 2016). With a longstanding history in outdoor education, experiential learning is informed by the educational philosophy of Dewey (1938) and is manifest in outdoor educator-facilitated, experience-based, participant-focused activities and reflection (Priest and Gass 2017; Thomas 2018).

The findings are consistent with this approach and suggest that an outdoor educator understands experiential learning theory and recognises that they are not personally the focus of learning for their participants. Instead, "the student is the primary actor in the learning process and they should have choices about what and how they will learn" (Thomas 2018, p. 3). Importantly, the outdoor educator does not sit back and do nothing. They are constantly making conscious and unconscious decisions, to create learning experiences for their participants (Blenkinsop et al. 2016; Thomas 2008).

This threshold concept could be evidenced on a bushwalk, for example, when an outdoor educator facilitates a Sound Map activity which engages participants to experience the place through a non-dominant sense by closing their eyes and listening to the place, drawing with pencil and paper what they hear around them and in relation to where they are. With support, the participants choose where they place themselves in the area and how much they engage with the activity. The participants then find a buddy and discuss reflection questions posed by the outdoor educator, designed to deepen their connection to the place. There was agreement amongst the expert panel that an outdoor educator, upon graduation, should be able to choose the area, timing, frontloading information and reflection questions for an activity, monitor the group but know not to intervene in either the activity or the reflection discussion unless a participant has a question, or their safety is under threat. This participant-centred approach can increase learning, engagement, and meaningful connections (Williams and Wainwright 2016).

This threshold concept could be assessed through the learning approach itself – experientially. University outdoor education students could, for example, organise, plan and deliver an activity or a session for peers, a school or another organisation under the observation and supervision of an experienced outdoor educator or teacher. They would design the activity or session implementing the key aspects of experiential learning. Afterwards, they would reflect on their delivery of this experience through a guided self-reflection in addition to receiving feedback from a supervisor. The student would then evaluate their experience, in light of their own and their supervisor's reflections, in a critical evaluation assessment. This would enable staff to gauge students' mastery of the threshold concept.

Threshold concept 2: Outdoor educators use pedagogies that align their program's purpose and practice

> *An effective outdoor education program ensures that the learning activities and pedagogies (and assessment where applicable) align with the purposes or desired outcomes of the program. Outdoor educators demonstrate intentionality in their program design, the pedagogies they use, the places they visit, and the technologies they use.*

The findings of the Delphi research confirmed the view that an outdoor educator has a foundational understanding and knowledge about learning, the theory and practice of teaching and how this influences participant learning. There was agreement that outdoor educators are adaptable and flexible when designing a program and choose appropriate teaching and instructional strategies to intentionally deliver learning experiences. This is consistent with Biggs' (2014) concept of constructive alignment which

purports that teachers "engage students in learning activities that optimise their chances of achieving [the intended] outcomes" (pp. 5–6). The findings regarding this threshold concept are consistent with Dyment et al.'s (2018) development of pedagogical content knowledge unique to outdoor education. We concur that knowing the content of outdoor education is not enough and that it is also necessary to understand how to deliver and present the concepts to students in such a way that learning will take place. Future outdoor educators need to be supported to learn and use the most effective methods of delivery and presentation of knowledge that results in student learning of the content base of outdoor education (Dyment et al. 2018).

The application of this threshold concept is demonstrated in the following example of an outdoor education program that has learning outcomes focused on improving the participants' environmental literacy. The outdoor educator could include learning activities that focus on learning the names of flora and fauna, or helping participants understand their relationships to natural systems, or participating in environmental action. The learning activities selected are those that best align with the aims of the program. In another example, digital technology has the power to enhance participant learning in outdoor education, but decisions about inclusion or exclusion of such technology are made intentionally. Hence, decisions about when and where to use (or not use) technology are made after careful consideration of the intended and unintended consequences of the technology use, and the potential of the technology to contribute to the achievement of learning outcomes (Thomas and Munge 2017; Hills and Thomas 2019).

To assess mastery of this threshold concept, university outdoor education students could be encouraged to plan and facilitate key components of an outdoor education program in which the learning activities align with the aims of the program. Students would be required to identify a specific learning outcome and design a program which intentionally delivers the learning experience identified through the appropriate teaching and instructional strategies. The outdoor education student would be required to reflect on, and evaluate, the delivery of the learning experience and its intended learning outcome. These combined tasks would provide a clear opportunity to assess the future outdoor educator's mastery of this threshold concept.

Threshold concept 3: Outdoor educators are place-responsive, and see their work as a social, cultural and environmental Endeavour

> *Participant learning does not occur in isolation, and is shaped by the places, cultures, institutions, groups and environments they are immersed in. Particular attention is paid to the way Australian natural and cultural history contribute to environmental and cultural literacy, given their specific, unique and situated characteristics, with these literacies potentially offering new ways of being, doing, knowing and future action.*

The expert panel feedback confirmed the view that outdoor educators help their participants develop human, cultural, ecological, embodied and economic perspectives of the places they visit (Wattchow and Brown 2011). This includes perspectives of places prior to human existence, as well as pre- and post-European settlement land management practices, the environmental effects of these practices and the cultural

context in which these practices occurred (Stewart 2012). The findings of the research also confirmed that outdoor educators give participants insights into alternative ways of being, thinking, relating and living (Hill and Brown 2014).

An example of this threshold concept in a program is provided when an outdoor educator provides insights into two alternative ways of knowing the world. When visiting alpine environments in Victoria, Australia they could compare the knowledge of Country for the local Aboriginal groups which led to the annual summer gathering on the Bogong High Plains to harvest another seasonally abundant visitor – the Bogong Moth, with the values placed on the land that led to the European practices of grazing sheep and cattle and the establishment of mining, hydro-electricity schemes and recreational ski resorts in alpine areas. Or the outdoor educator might focus on the peri-glacial boulder streams on the Bogong High Plains to enable learning about natural history on a geological time scale (Rosengren and Peterson 1989), as well as witnessing the habitat of the critically endangered, alpine-endemic, Mountain Pygmy Possum (Morrison and Pickering 2013).

The mastery of this threshold concept could be assessed by requiring students to, for example, undertake place-specific research prior to a field trip in order to develop and deliver a place-responsive learning experience in a particular location to peers as part of this field trip. The range of themes available for research could be pre-determined and curated using a pre-course survey. Such a place-based learning resource and experience could be assessed using a range of criteria, including: the rationale used to demonstrate the creation of a comprehensive justification of the overall educational purpose and theme within specific contextual circumstances (place, time, experience and people); clear explanation of the relevance of the learning experience for the field trip in the specific place being experienced; as well as demonstration of the creation of a comprehensive introduction to the topic/issue.

Threshold concept 4: Outdoor educators advocate for social and environmental justice

> *Outdoor educators understand their role in advancing equity by effectively reducing or removing discrimination and/or disadvantage. Attention is given to the issues of gender (including gender fluidity and sexual preference), race, class, disability, and environmental attitudes. An outdoor educator supports their participants in recognising and considering these issues.*

The Delphi research process highlighted the need for outdoor educators to reflect on their own background and recognise that their worldviews are shaped over a long period of time by their personal traits, experiences, opportunities, circumstances, and the significant others in their lives. There was widespread agreement amongst the expert panel members that an outdoor educator needs to be aware of how their own worldview shapes their thoughts, feelings, and actions about themselves, others and the environment. In a non-judgmental way, an outdoor educator recognises the privilege they have experienced in their own life and they are aware of the challenges that other people face in their lives. In this respect, an outdoor educator advances equity and is a champion for social and environmental justice. These findings are consistent with social justice theory, which "embraces the idea that social identities such as race, class,

and gender exist in intersectionality" (Warren et al. 2014, p. 91) meaning that social identities do not exist independently but rather they are all interconnected and cannot be examined separately. Warren et al. have suggested that the outdoor education field has been slow to embrace this idea, but there are positive signs of change.

The application of this threshold concept could be demonstrated, for example, in program that makes a concerted attempts to raise awareness of gender bias, acknowledge the contribution of women to outdoor learning and leadership, and address gender equity issues in outdoor education (Bond-Rogers and Rose 2019; Gray and Mitten 2018). Given the role of place in outdoor education, Breunig (2019) has called for socially just outdoor educators to teach decolonising understandings of land and place that seek to undo the Western domination of Indigenous people groups and their land. Outdoor educators could be taught that "what they allow they teach." If participants in the outdoor educator's program use language or engage in behaviour that denigrates another person, an outdoor educator must address this behaviour with the group. Failure to do so, implicitly endorses the discriminatory behaviour or language. To do this, outdoor educators may need to develop the facilitation skills and courage to initiate this kind of difficult (but necessary and important) conversation with groups.

To assess mastery of this threshold concept, university outdoor education students could, for example, plan and facilitate part of a program with peers or near-peers that has a social justice focus. If those outdoor education students are then required to reflect on and evaluate those lesson components, this would provide students with the opportunity to assess the future outdoor educators' mastery of this threshold concept. Developing the social justice literacy of future outdoor educators is difficult but essential work that helps them to be change agents that can help to overcome systematic oppression, and examine stereotypes, biases, and unconscious prejudices (Breunig 2019).

Threshold concept 5: Outdoor educators continue to develop their skills, knowledge and expertise

> *Outdoor educators understand the importance of experience-based judgment, professional ethics, place-based education, and risk/safety management. The outdoor educator develops the skills, knowledge and experience to safely lead learning activities in specific places. Outdoor educators have passion for the content and knowledge of the places where they teach which allows them to demonstrate professionalism, establish credibility, facilitate student learning, and lead safely.*

The feedback from the expert panel confirmed the need for outdoor educators to be professional in the way they practice. According to the literature, a key aspect of an outdoor educator's practice is the commitment to using a code of ethics (Martin et al. 2017). The outdoor education community in Australia accepted a code of ethics over 15 years ago (Larkin 2003; Outdoor Education Australia 2017) and it should be a cornerstone of professional practice for outdoor educators. Another demonstration of professionalism is appropriate preparation. Prior to leading any field trips outdoor educators undertake journeys of a similar nature and have been assessed as sufficiently skilful and capable of leading the activity in such an environment. Experience based-judgement has long been acknowledged as a key requirement for outdoor educators and it is critical in avoiding serious consequences for participants (Galloway 2002, 2007;

Priest and Gass 2017). However, experience is also a key factor in the effective design, facilitation and evaluation of quality outdoor learning that meet specific learning objectives (Boyes 2004; Smith and Penney 2010). This is the essence of place-based outdoor education (Wattchow and Brown 2011) in which the outdoor educator uses a "sensory-perceptual and conceptual-theoretical 'sense' or 'possibility' of place" to determine what participants might best learn in any particular location (Payne and Wattchow 2009, p. 15).

The application of this threshold concept in a program could be demonstrated, for example, when future outdoor educators prepare for an upcoming bushwalk by spending time in the specific environment, researching the teaching and learning opportunities afforded by that place, and carefully consider the environmental hazards and evacuation options. As part of their professional preparation the future outdoor educator engages in bushwalks in this area to get to know specific environmental factors such as the weather, terrain, access to emergency services, specific hazards. They are aware of numerous bushwalking options and learn about the natural and cultural history of the area. They investigate the literature or arts associated with the area and consult locals, the traditional custodians, other outdoor educators, and land managers working in the area. Over many visits to the place, the outdoor educator develops a deeper understanding of this area and provides support to others who seek to conduct journeys in the same environment.

Mastery of this threshold concept could be assessed in a tertiary setting through evaluation of the planning, leadership and assessment of learning for an introductory experience with novices or near-peers. Assessment of the planning would demonstrate application of a code of ethics for professional practice; the application of previous direct experience with the environment; research and investigation of environmental and socio-cultural knowledge; competent and safe leadership; provision of learning experiences throughout the journey that promoted learning; and planned strategies to assess the level of learning.

Threshold concept 6: Outdoor educators understand and apply a strict aversion to fatalities

> *Outdoor educators demonstrate a depth of understanding in relation to safety and risk management and the critical nature of fatality prevention. They learn from case studies of past fatalities in led outdoor activities and are able to plan and lead effective and safe outdoor education experiences in a variety of contexts. Outdoor educators are able to continuously and critically evaluate the purposes of a program, the context of the program, and their own practices in relation to safety.*

The expert panel in the Delphi research process confirmed that an outdoor educator actively addresses the complex interactions between educational aims and safety management practices. They have the knowledge and disposition to continuously attend to these interactions at each stage of a program's development and facilitation. An outdoor educator synthesises key learnings from fatalities in similar programs or environments and particularly attends to factors such as experience levels, fatigue

management, site specific knowledge, appropriate use of technology, and communication devices. In doing so, outdoor educators keep fatality prevention at the forefront of their mind when making complex and critical decisions. In this way, fatality prevention "is not simply a matter of good intentions. It requires knowledge derived from counterfactual analysis of past tragedies. It is enacted, it can be observed, and it can be explained" (Brookes 2018, p. 22).

Mastery of this threshold concept could be assessed in action when an outdoor educator facilitates a program. If, for example, it was a skiing program, while the outdoor educator may have extensive personal knowledge and experience on how to prevent common skiing injuries, they may have little understanding of how to prevent future fatalities because skiing fatalities are rare in an outdoor education context. A case-based knowledge of previous fatal incidents reveals that while minor injuries often occur due to falls, often involving novices, fatalities are almost always the result of a skier (who is often more experienced) colliding with a stationary object (such as a tree) after generating excessive speed on a downhill slope (Brookes and Holmes 2014; Tough and Butt 1993). Although specific actions from the outdoor educator will vary depending on the context, they may include first-hand knowledge of potentially hazardous fixed objects on slopes, monitoring of environmental conditions during the day, and supervision of student speed on slopes with hazards (Brookes 2018).

North and Brookes (2017) have studied the application of case-based teaching and assessing of fatality prevention in university contexts and they noted that assessing an outdoor educator's mastery of this threshold concept is difficult because fatalities are very rare. North and Brookes suggest that "logical inference—that our students can demonstrate understanding which would have prevented past incidents—is probably the best evidence available" (p. 200). To this end, we suggest outdoor education students could, from a previously selected list of led outdoor fatal incidents, select a fatal incident case to study and provide a short presentation for their peers. In this presentation the emerging outdoor educator could summarise the incident and what occurred, identify ways it may have been prevented, distil the lessons learned, and identify how to prevent similar fatalities in the future. Additionally, students could be required to construct a teaching and safety plan for an outdoor program that deliberately referenced lessons learned from previous case studies and in which the selection of environment, activities, approaches and /or technologies are discernibly influenced by that knowledge.

Threshold concept 7: Outdoor educators routinely engage in reflective practice

> *Outdoor educators use critical reflection to inform their understanding of program practices and outcomes. Outdoor educators engage in reflective practice at both personal and organisational levels, both on their own and with others, and implement changes based on their reflection.*

The findings of the Delphi research affirmed the view that throughout their career, outdoor educators will engage in professional development. A key part of this professional development would include reflecting on the programs they facilitate to assess

the ongoing and overall effectiveness in achieving the intended learning outcomes. This can happen both during a program, sometimes called "reflection-in-action" (Schön 1995), as well as after a program. Outdoor educators typically attend conferences or have professional conversations with colleagues to explore current thinking, research and practice and consider the implications for their own outdoor education practice. Engaging in these activities encourages reflection at a deeper, more critical level potentially allowing for "analysis of the methodological presuppositions that underpin pedagogy [which] is an essential habit for an educator committed to maturing their practice" (Blenkinsop et al. 2016, p. 354).

A practical example of this threshold concept occurs when an outdoor educator reflexively and reflectively considers what worked, what didn't work, and why. They explore particular issues that arose, how they were dealt with and the effectiveness of these methods. They evaluate specific leadership and facilitation techniques and consider strategies for implementing any identified areas of improvement during the program, or in the future. This "skilful practice of self-evaluation and reflexivity is essential for clarifying a vision" (Blenkinsop et al. 2016, p. 355) and improves professional practice (Sellars 2017). To do this, outdoor educators draw on their own reflections, reflections and feedback they receive from their participants, and feedback from supervisors or their peers, in order to maximise their learning and development (Blenkinsop et al. 2016; Sellars 2017).

To assess this threshold concept students could, for example, design and conduct a field experience with another organisation as an assistant leader. During the session or activity they lead, they might reflect in-situ, potentially with the supervisor, to make adjustments for learning as required. A reflective journal might be kept throughout the experience. Afterwards they could complete a guided self-assessment and the supervisor could complete an assessment. Using this evidence, students then complete a critical evaluation, demonstrating learning and including links to the literature, which could be used by the lecturer to assess the mastery of this threshold concept.

Conclusions and recommendations for practice and future research

The research described in this paper used a Delphi research process with Australian university academics working in undergraduate outdoor education programs. The goal was to develop a set of threshold concepts appropriate for outdoor educators who graduate from an Australian university outdoor education program with at least a six-course major in outdoor education. This was an important project because, to date, there has not been a strong, common understanding about university outdoor education programs and what the graduates of these programs know and can do. The research process concluded that the term outdoor educator was the preferred way to describe these university graduates. This project has clarified how outdoor educators differ from outdoor leaders (those who have completed a training pathway based on the SFRTP package) and outdoor education teachers (outdoor educators who have also completed a pre-service teacher education program).

The set of seven threshold concepts developed in this project will hopefully generate more discussion and research on what university outdoor education graduates know and are able to do. More research is needed to provide examples of how the threshold

concepts can be used to inform teaching and assessment practices in Australian university outdoor education programs. There is also a need for more research to establish if these threshold concepts meet the needs of employers and land managers and whether they contribute to greater clarity around the capabilities of outdoor education professionals who have graduated from universities. In the future it would also be beneficial to establish how the vocational training pathways and university pathways can complement and connect with each other, providing a more seamless training and education environment in outdoor education. While there is no imperative for any university to adopt the seven threshold concepts for use in their program, it is hoped that the consultative and collaborative process used in this research helps to illuminate the efficacy of the threshold concepts for Australian outdoor education academics in providing greater clarity around what university outdoor education graduates know and are able to do.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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