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ORIGINAL PAPER

Cross disciplinary teaching: A pedagogical model to support teachers in the development and implementation of outdoor learning opportunities

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Abstract

There is a growing body of empirical evidence documenting the positive effects associated with participation in environmental education and outdoor learning for students, teachers and the wider community. Despite this, there has been a substantial reduction in outdoor learning opportunities for school students, possibly due to the focus on evidenced-based outcomes, high-stakes standardised testing programs, and a lack of teacher knowledge, confidence and expertise in teaching and learning outdoors. Accordingly, this study presents an evidenced based model to support teaching practice. The model will assist teachers in the development and implementation of outdoor learning opportunities and offers applied examples that address curriculum outcomes. A comprehensive literature review methodology was implemented to identify peer-reviewed literature on teaching and learning outdoors and outdoor pedagogies. A thematic synthesis and constant comparative technique enabled development of themes, from which three themes emerged: the environment; the learner; and the educator, which inform the proposed model offered by the authors. The three interrelated components (the environment, the learner and the educator) require consideration for students to gain maximum benefit from outdoor learning experiences. The model, coupled with the applied examples, supports teachers to plan and facilitate immersive outdoor experiences that promote learning.

Keywords Outdoor learning · Outdoor pedagogies · Teacher knowledge · Environmental education · Teaching practice

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Introduction

With increasing evidence that reports on the value of learning experiences in outdoor settings, it is apparent that student learning does not only occur within formal classrooms (Gray, 2018; Sen et al., 2021). There is growing empirical evidence through literature documenting the positive effects associated with participation in outdoor learning, defined as experiences beyond the conventional classroom that occur in alternate settings (such as school grounds, community gardens, wetlands or other local places) that stimulate students' relationship with natural environments (Comber, 2016; Rickinson et al., 2004; Waite et al., 2015). Currently in Australia, outdoor learning is implemented in numerous ways including school-developed programs, commercial and private contract providers, short- or long-term stays at residential outdoor centres, and community-based programs (Passy et al., 2019). The scope for outdoor learning is dependent on school interests, teacher expertise and pre-service teacher training opportunities (Gray & Pigott, 2018; Passy et al., 2019). However, time constraints and highly prescribed learning outcomes are often perceived as insurmountable barriers to outdoor learning (Beames et al., 2012). A further underpinning challenge for taking teaching outdoors is a lack of familiarity with delivering the curriculum and managing classes outdoors (Dyment, 2005). Therefore, exemplification of how outdoor learning can be embedded within curriculum discipline areas is needed to support practicing teachers to adopt and enact this approach that supports student success.

Whilst somewhat dated, three meta-analyses (Cason & Gillis, 1994; Hans, 1997; Hattie et al., 1997), representing over 12,000 participants, demonstrate that outdoor education has a small to medium impact on personal transformation of self, including outcomes such as changes in self-confidence, self-concept and locus of control. More recent systematic reviews (Holland et al., 2018; Mygind et al., 2019; Thomsen et al., 2018) largely support results from these meta-analyses. These reviews identify the benefits associated with heterogeneous immersive nature-experiences on self-esteem, self-efficacy, resilience and academic and cognitive performance (Mygind et al., 2019). Holland et al. (2018) and Thomsen et al. (2018) both reported on wildland recreation experiences, defined as "recreational activities conducted outdoors in wildland areas that are dependent on the natural resources of that area" (Holland et al., 2018 p.199). In this context, a range of educational, psychological and social outcomes were associated with participation; personal development the most common (Holland et al., 2018). Similarly, Thomsen et al. (2018) found wildland recreation positively influenced physical and mental health, including improved self-esteem, increased levels of physical activity, and a reduction in perceived stress.

It is also apparent that the inclusion of outdoor learning experiences in K-12 curricula results in reduced discipline and classroom management problems, increased engagement in and motivation for learning and enhanced performance on standardised tests (Breunig et al., 2008; Fägerstam, 2014; James & Williams, 2017; Meighan & Rubenstein, 2018; Scott et al., 2013). The existing literature reviews and meta-analysis in the wider field of outdoor education provide a valuable overview of the positive effects and benefits that outdoor education programs offer for students.

However, it is evident that key teaching and learning strategies and practices facilitating this growth and development have been studied less frequently.

Despite experiences in the outdoors providing a positive platform for transformative growth and behaviour change, there has been a substantial reduction in outdoor learning opportunities for school students due to the current educational climate which places an inordinate focus on evidenced-based outcomes (Dyment, 2005; Gray & Pigott, 2018). One of the negative unintended consequences of the expansion of high stakes standardised testing programs in schools, particularly in the neoliberal Anglophone nations, is a narrowing of the curriculum as teachers increasingly engage in immense amounts of test preparation with students (Erskine, 2014; Polesel et al., 2014). Unfortunately, outdoor learning is perceived as an 'add on' and 'in competition with' other extracurricular activities (Dyment, 2005) possibly as teachers lack expertise in outdoor teaching and learning (Rickinson et al., 2004). To address this issue, outdoor learning experiences must be identified as a legitimate form of teaching and learning. To further support teachers in delivering well-structured and curriculum-integrated outdoor learning opportunities, it has been suggested in the literature (Beames et al., 2012; Dyment, 2005; Rickinson et al., 2004) that:

- greater training or professional development opportunities are required for pre-service and in-service teachers so that outdoor learning is a core competency;
- curriculum resources are increased;
- and there is greater institutional support.

Further review and synthesis of commonly identified teaching and learning strategies and practices that facilitate growth and development will contribute to progression of the field, as the design and development of outdoor learning programs can then be grounded in research findings, with the goal of improving student outcomes.

Accordingly, this study aimed to: (i) identify key teaching and learning strategies and practices that facilitate positive student growth and development in outdoor learning experiences; (ii) present a model to support teachers in the development and implementation of outdoor learning opportunities; and (iii) utilise the model to provide applied, effective outdoor learning examples from key learning areas of the Australian curriculum.

Method

A comprehensive literature review methodology was employed, using the framework of Onwuegbuzie and Frels (2015) to identify key teaching and learning strategies and practices that facilitate positive outdoor learning experiences for students. This methodology was considered appropriate as the authors were not driven by the statistical imperative of locating every relevant study as required for a 'traditional' meta-analysis, but rather in a purposive sample as required for interpretive explanation (Doyle, 2003; Thomas & Harden, 2008). The seven-step framework of Onwuegbuzie and Frels (2015) is comprised of three main phases. Phase one, the "Exploratory Phase" includes step 1 to step 5: (1) exploring beliefs and topics; (2) initiating the search; (3)

storing and organising information; (4) selecting and deselecting information; and (5) expanding the search using media, observations, documents, experts, and secondary data (MODES). Phase two, the "Interpretative Phase" covers analysing and synthesising information (step 6), and phase three, the "Communication Phase" conveys the information, analysis, conclusions and implications (step 7).

Exploratory Phase – search strategy, eligibility criteria, and study selection

In addressing the Exploratory Phase within this study, a comprehensive search of academic databases from 2000 to 2022 (A+Education; Academic Search Complete: ERIC (Education Resources Information Center); Education Research Complete; Google Scholar; Scopus; and Web of Science) was conducted to identify peer-reviewed literature containing information on teaching and learning within the outdoors. These specific databases were selected and justified based on the scope of journals that they covered, as well as their focus on education and coverage of multiple disciplines. Only English search terms were implemented, however multiple keywords and synonyms were used to capture all potentially relevant articles. Further, search functions including truncation, Boolean operators and related terms were applied. The search terms "outdoor education" or "outdoor learning" or "outdoor pedagogies" or "outdoor programs" were used in conjunction with "teaching and learning" or "learning outside the classroom" or "school". "Adventure education" or "environmental education" or "experiential education" were searched, and then used in juxtaposition with "pedagogy" or "teaching and learning" or "outdoor learning".

To be included in this comprehensive review studies needed to meet all the inclusion criteria: (a) published in, or after 2000. Inclusion of studies before 2000 would lead to the inclusion of dated pedagogical practices and outdated teaching and learning strategies; (b) an original peer-reviewed article presenting new data (e.g. not a review, editorial, or conference abstract); (c) written in English; (d) reported on the effects of an outdoor learning or outdoor education experience with school students; and (e) the reported data must have included detail of teaching and learning practices or strategies. For the purpose of this manuscript, the term outdoor learning was defined as experiences beyond the conventional classroom that occur in alternate settings that stimulate students' relationship with natural and built environments (Comber, 2016; Rickinson et al., 2004) and accordingly covered all kinds of learning that might take place outside the classroom.

Potentially relevant articles were identified by the first author based on screening of titles, abstracts, and keywords, with full text articles obtained for articles meriting further review. Following step five of the Exploratory Phase, we expanded our search to other sources, including the reference lists of included articles. To determine the appropriateness, articles were independently read and reviewed by two authors (IN & LP) to identify the key teaching and learning strategies and practices facilitating student growth and development in outdoor learning experiences. Where the two reviewers disagreed, the study was discussed, and a consensus decision reached.

### Interpretative Phase – data collection processes

As part of the Interpretative Phase (Onwuegbuzie & Frels, 2015), members of the research team applied a thematic synthesis approach (Thomas & Harden, 2008) to extract data relating to key teaching and learning strategies and practices. This approach facilitates the inclusion of rich, contextualized descriptive data from a range of methodologies (Price & Baker, 2012), with themes developed using a constant comparative approach (Thomas & Harden, 2008). For this review, relevant details from all included papers were aggregated in Microsoft Excel, with the key findings read and re-read independently by two authors to identify descriptive themes. The descriptive themes were discussed, and agreement reached between all authors, before the data were synthesised and condensed into the themes presented in this paper. The descriptive themes identified through the thematic synthesis form the main components (spheres) in the proposed model. The analytical themes represented through the intersections of the spheres in the model were developed through a process of interpretation whereby authors go beyond the primary studies to generate new interpretative constructs and/or explanations (Thomas & Harden, 2008).

Results

It is evident from the results of this comprehensive literature review that outdoor learning pedagogy is a widely accepted international practice within the broader field of education, including the United Kingdom (Beames et al., 2012), the USA (Humberstone & Stan, 2011), and the Nordic and Iceland regions (Norðdahla & Jóhannessona 2014; Sarivaara & Uusiautti, 2018). In contrast to these countries where learning outdoors is practiced daily, Australia has been slower to embrace the pedagogical value of teaching and learning outdoors (Comber, 2016). Much of the Australian literature identified through the searching did not meet the inclusion criteria as it: explained what outdoor education is (Dyment et al., 2018; Quay, 2016); identified the aspects of outdoor education that make it distinctive from other learning areas (Gray & Martin, 2012; Martin, 2008; Quay, 2016); or articulated what content should be taught if outdoor education is to be considered a subject (Dyment et al., 2018; Gray & Martin, 2012). The synthesised literature described the process, pedagogies and approaches that underpin the delivery of positive student learning experiences within the outdoors (Beames et al., 2012; Blenkinsop et al., 2016; Dyment et al., 2018; Thomas, 2015).

Thematic analysis

As outdoor education is an emerging discipline the majority of teaching and learning models/frameworks identified within the outdoor learning literature were well established educational learning theories and models (e.g., social learning theory, place-based education, experiential learning, constructivism (Dennick, 2012; Mattar, 2018; Smith, 2002)). Whilst many of these include elements that are highly relevant to outdoor learning, there were other evidenced based outdoor teaching and
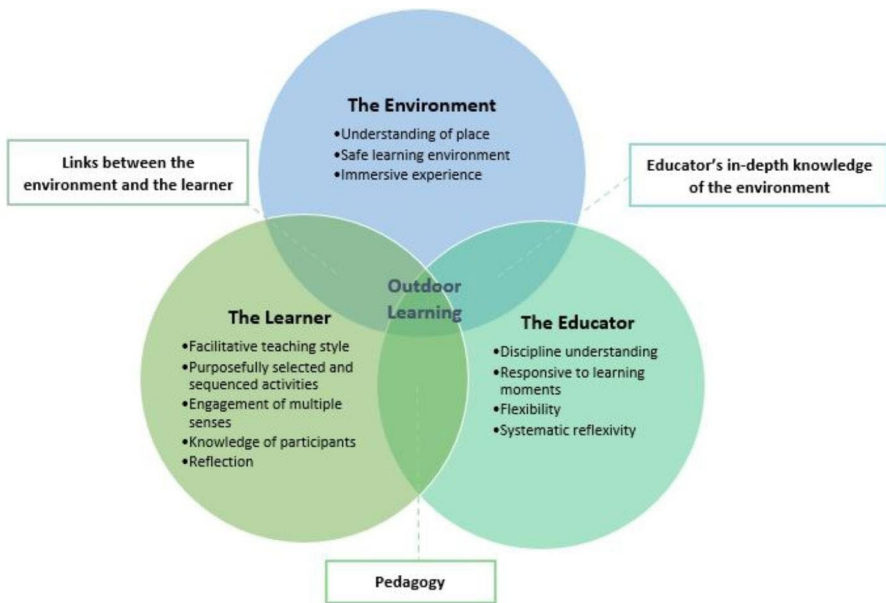
Fig. 1 Pedagogical practices that support outdoor learning experiences

learning strategies and practices identified through the literature review that result in positive outdoor learning experiences. The synthesis of the literature resulted in three descriptive themes: (i) the environment, (ii) the learner, and (iii) the educator and these have been applied as the main constructs in the proposed model, *Pedagogical Practices that Support Outdoor Learning Experiences* (Fig. 1). The three descriptive themes are contextualised with the salient effective teaching and learning strategies and concepts gleaned from the outdoor learning literature (presented as dot-points in the model and explained in the next section of this manuscript). The intersections between spheres in the model convey the analytical themes and focus on what is shared and common between descriptive themes. Therefore, *"Links between the environment and the learner"* represents the overlap of the environment and the learner; *"Educator's in-depth knowledge of the environment"* embodies the overlay of the environment and the educator; and *"Pedagogy"* signifies the nexus between the learner and the educator.

The Environment

The literature describing outdoor environments for learning indicates there are numerous possibilities and intentional activities teachers can consider facilitating to provide an immersive experience away from the usual classroom environment (Hindmarsh & Hunt, 2020). Rickinson et al. (2004) identified three main types of outdoor learning activities:

- *fieldwork and outdoor visits* to areas such as nature centres, farms, parks or gardens where the focus is on undertaking learning, often linked to discipline areas in the curriculum;
- *outdoor adventure education in local or distant settings* where the emphasis is typically promoting personal and/or interpersonal growth; and.
- *projects in the school grounds or the local community* which provide an opportunity to achieve curricular, cross-curricular or extra-curricular outcomes.

Identification of appropriate contexts and place(s) that might be suitable to facilitate outdoor learning experiences is critical for success.

Understanding the concept of "place" and place-based pedagogy has received much attention within the outdoor education literature, and recognising the environment/place as both co-educator and curricular source is important for maximising learning (Wattchow & Brown, 2011). It is evident that familiarity with the context and place of outdoor learning enables educational opportunities to be recognised and maximised if a learning moment arises (Blenkinsop et al., 2016). Accordingly, when planning and seeking to implement outdoor learning opportunities, it is important to recognise that some environments are more suited to wonder, reflection, quietness, or release of energy (Blenkinsop et al., 2016). Knowledge, awareness, and sensitivity of place(s) will enable teachers to select an environment that allows an immersive, safe learning experience that aligns with the desired learning or curriculum outcomes. For example, a local river could be selected to enhance the delivery and attainment of content descriptors in numerous learning areas of the Australian curriculum at a Year 7 level (ACARA, 2016) including: explore and reflect upon the impacts of various land uses on ecological health of a river (Geography, ACHGK040); wonder about the interactions between organisms including the effects of human activities (Science, ACSSU112); reflect on the sensitivity of place(s) and the nature of the sources for ancient Australia and what they reveal about Australia's past (History, ACDSEH031); or utilise time in the natural environment to plan, draft and publish imaginative, informative and persuasive texts, selecting aspects of subject matter and particular language (English, ACELY1725). Whilst any of these experiences could be delivered as part of the specific learning area, at a more advanced level, teachers could work together to utilise this riparian learning environment to provide an integrated, multidisciplinary experience, addressing all the aforementioned content descriptors within a safe learning environment.

Construction of a safe learning environment within the outdoors is critical, as the consequences of an unsafe learning environment can be fatal (Dyment et al., 2018). The literature review identified risk as a medium for producing functional change and growth in an outdoor learning context, and this is a key notion and distinguishing characteristic of an outdoor pedagogy (Cure et al., 2018). Appropriate levels of challenge are essential for any successful learning experience (Hattie, 2012). In an outdoor learning environment employing appropriate progressions and scaffolding will enable students to feel safe and supported, yet challenged. Additionally, this practice will ensure there is mutual trust between students and the teacher, allowing students to question and speculate without fear or risk of making mistakes (Hattie, 2012). As traditional classroom teachers are unlikely to be delivering thrilling, adrenalin driven

outdoor learning experiences and activities, they are well placed to design and implement a more contextualised approach to outdoor learning through connecting with students, and the social and environmental context (Brown & Fraser, 2009).

The Learner

As learning experiences are not independent of other experiences (Beames et al., 2012) understanding the learner, their background, and the conceptions and misconceptions they bring to the learning environment is critical for maximising outdoor learning outcomes (Sutherland et al., 2016). The learner theme identifies essential factors to ensure the learner is provided with an opportunity to be immersed in an authentic and powerful outdoor learning experience.

A characteristic approach to learning within outdoor education identified through the literature reviewed was student-centred approaches to learning, where the educator adopts a facilitative leadership style to achieve learning outcomes (Dyment et al., 2018; Thomas, 2019). To successfully implement a student-centred pedagogical approach, it is necessary to understand the interplay between students' interpersonal and intrapersonal development, and group development within each experience. This enables environments and activities to be purposefully selected and sequenced to enhance learning (Sutherland et al., 2016). Consistent with classroom teaching, this does not mean that the entire class will necessarily undertake the same learning activities within an outdoor experience. Teachers will use their knowledge and understanding of learners to differentiate learning tasks, promote inclusion and develop student agency, defined as "the capability of individual human beings to make choices and to act on these choices in ways that make a difference in their lives" (Martin, 2004, p.135). This approach will enable students to discover for themselves the value of learning outdoors, including opportunities: to take responsibility for themselves, others and the natural environment; for growth; and for meaningful student-centred reflection (Sutherland et al., 2016; Thomas, 2019).

Part of the appeal of learning in the outdoor environment is the departure from the familiar context of the classroom (Waite, 2011) where one can integrate Gardner's (1983) multiple intelligences and engage all the senses in different ways to the classroom (Beames et al., 2012). For example, outdoor experiences provide opportunities for students to know things in different ways, through listening, taste, touch, sight, smell as well as aesthetically, emotionally, intellectually, physically, and spiritually (Beames et al., 2012). Simply exposing students to the outdoors is however unlikely to result in a more holistic mode of learning that maximises environmental awareness and sensitivity. It is possible that the complexity or unfamiliarity of the environment may prove overwhelming for students, and the 'novelty effect' of visiting new and unusual settings may negatively impact on learning (Falk et al., 1978). As novelty can be an important mediating factor that may positively or negatively influence student learning, strategies such as prior preparation can minimise negative impacts through assisting students to adjust or be prepared for the experience (Cotton, 2009). Additionally, appropriately scaffolded, framed and facilitated learning experiences that encourage direct, sensory, affective and cognitive engagement with the outdoor environment will alleviate negative impacts. Finally, reflective practices that are

facilitated throughout the multi-sensory experience will support students connection with, and deeper understanding of the content.

Reflection was a main component within the learner theme, with reflection a key practice associated with positive outdoor learning experiences. Integrating reflection upon the learner's relationship with self, others, and nature is a well-established component of the learning process within outdoor education (Breunig et al., 2008; Martin, 1996; Wattchow, 2001). For outdoor educators, debriefing is a popular form of reflection (Brackenreg, 1993; Paisley et al., 2008; Povilaitis et al., 2019; Priest & Naismith, 1993; Thomas, 2015) and is characteristic that these take place at the conclusion of an experience for the participants to make meaning of the experience and to apply their learning to other areas of their lives. Separating "reflection" from "experience" is theoretically problematic (Seaman & Rheingold, 2013) with the tedious and predictable nature dedicated to such debriefs limiting their effectiveness with students (Thomas, 2015). Accordingly, to maximise authentic opportunities for learning and growth, consideration should be given to how student-led reflective processes can be structured and facilitated throughout an outdoor learning experience. A combination of traditional approaches (e.g., collaborative discussions with teachers, solo experiences, personal reflections or group ponderings, (Blenkinsop et al., 2016)) and more innovative methods (e.g. storytelling, artwork, poetry, journaling and creative writing, (Thomas, 2015)) may provide one strategy. A combination of these reflective practices is likely to provide an appropriate foundation to support students in constructing meaning from their experiences, developing sensitivity to the natural environment around them, and transferring new skills, values, knowledge and understanding to other areas of their lives.

The Educator

Within the outdoor education literature, the nomenclature of 'instructor' is common, however the term 'educator' was selected for this theme as it is a broader term that requires a greater emphasis on quality learning and effective pedagogies (Brown & Fraser, 2009). Accordingly, this sphere of the model presents pedagogical content knowledge that will support the delivery of meaningful and effective outdoor experiences.

In adopting or implementing outdoor learning opportunities, teachers require profound pedagogical content knowledge, which is the integration of pedagogical knowledge and subject matter knowledge (Dyment et al., 2018). The 'knowledge quartet' of Rowland et al. (2005) affords a sound framework for understanding the requirements for successfully teaching outdoors. The 'knowledge quartet' includes a *foundation* component that reflects knowledge of the discipline (Rowland et al., 2005). The other components focus on application of knowledge and include: transforming content knowledge into forms that result in effective teaching (*transformation*); consideration of topic links and coherence in lesson sequencing (*connection*); and responding efficiently and effectively to unanticipated events (*contingency*) (Rowland et al., 2005). Thus suggesting effective outdoor teaching practice requires more than discipline knowledge.

Preparation for teaching in an outdoor environment is vastly different to a more conventional setting. The flexibility to pursue and embrace learning moments that emerge within the unpredictable but fertile outdoor environment is a key skill for maximising learning (Blenkinsop et al., 2016; Greenwood, 2013). Outdoor educators maximise the affordances of place and are spontaneous, emergent, progressive, and responsive to both students and the surroundings to maximise serendipitous learning moments (Blenkinsop et al., 2016; Thomas, 2008). It is this flexibility that provides an opportunity for students to have agency in their education and enables outdoor learning to expand from a single topic to multidisciplinary and transdisciplinary learning. A sound starting point for delivering integrated, multidisciplinary learning outdoors is to identify curriculum elements that are especially suited to learning in a more authentic setting. Working with a mentor experienced in taking their class outdoors to deliver the curriculum can provide support in building a repertoire of outdoor teaching skills, enhance teaching practices and build confidence in teaching outdoors (Beames et al., 2012; Oberle et al., 2021).

It is worthwhile highlighting that outdoor learning that takes the place of traditional classroom practice is not being suggested here, but rather that good teaching involves being in the classroom, in the school grounds, in the local community or other appropriate outdoor environments. The amount of time within different settings or allocated to outdoor learning is an area of ambiguity that teachers must face, and it is our contention that outdoor learning should not be restricted to a prescribed amount of time. In shaping an outdoor experience, teachers are encouraged to consider the perspective of Beames et al., (2012) who stated that meaningful learning experiences cannot "exist in a vacuum that is independent of other experiences" (p.12). Accordingly, we encourage teachers to carefully consider: the curriculum learning outcomes; the needs of their students; and the environment and resources available. Through considering these factors, contextualised learning experiences that include a combination of indoor and outdoor settings could be integrated into education and scaled out across schools.

Reflection is a necessary part of the education process (as discussed under the concept of the learner), although systematic reflexivity, defined as "the constant analysis of one's own theoretical and methodological presuppositions" (Coghlan & Brannick, 2005, p.6) is important for enhancing pedagogical practice. The five areas of reflexivity presented by Blenkinsop et al., (2016) are valuable to apply when reflecting on outdoor learning experiences. The first area focuses on teacher self-examination (e.g. How am I deepening my own understanding and connection with this context?; Why am I choosing to do x and not y right now?), followed by a focus on students (second area), both individually and as a group (e.g. What learning did I observe today?; What is a logical learning progression from here?). The third area addresses the same questions as area one and two, but through co-reflection with responses gathered from the community which may include students themselves, parents and/or teachers. The fourth area of reflection considers the role of the environment (e.g. In what ways can and did the place make a difference in our practices? Was I successful in integrating the natural environment?), and the final area considers the learning within the context of the larger learning community (e.g. What school infrastructure, psychological and physical, support or inhibit this work?; What kind of traditions, metaphors, systems

are establishing themselves in these new, outdoor learning experiences, and are those appropriate?). To fully maximise the effectiveness of outdoor learning experiences, reflection of teaching needs to extend beyond evaluation of lessons relative to the performance criteria. Considering the aforementioned areas of focus allows teachers to further augment their practice through deep levels of reflexivity.

Analytical themes: Links between the environment and the learner; Educator's in-depth knowledge of the environment and Pedagogy

Links between the environment and the learner represents the overlap of the environment and the learner. For rich learning experiences that extend students exposure and connection to place/s and produce cognitive, behavioural, and attitudinal changes, purposeful selection of the environment and scaffolded learning activities are required. Adoption of these strategies and practices enables the students individual and collective agency, permits student input into differentiation of learning tasks to promote inclusion, and encourages students to make authentic decisions (Brown & Fraser, 2009). Thus, maximising the likelihood that learners will experience an authentic and powerful outdoor learning experience.

Educator's in-depth knowledge of the environment embodies the overlay of the environment and the educator. As identified by Itin (1999), one of the educator's primary roles encompasses the selection of the environment and suitable experiences to enable learners to be engaged emotionally, intellectually, socially, spiritually, physically, and politically. In addition, educators are responsible for posing problems, developing safe learning environments, facilitating the learning process (through interaction between leaners, learner and educator, and learner and the environment), guiding reflection, and providing the necessary information to support learning (Itin, 1999). In essence, the educator's role within education, is to develop the context for which the student can make sense of the learning environment (Brown & Fraser, 2009).

Pedagogy signifies the connection of the learner and the educator and covers the three recognised and interrelated components of effective pedagogy (Marzano, 2007; Marzano et al., 2001; Payne & Wattchow, 2008; Thomas, 2015). These components include designing and implementing innovatively from the curriculum to engage students in learning; selecting instructional strategies that enable students to develop skills and conceptual understanding within the context; and employing management techniques to create and maintain supportive learning communities (Marzano, 2007; Thomas, 2015).

Depending on an individual's background, teacher training and professional experience one may be more confident and/or comfortable with content in one or two of the spheres, or intersecting areas. However, the overlapping spheres illustrate that all the interrelated areas are critical for the delivery of positive outdoor learning experiences. To demonstrate the interconnectedness and application of the concepts presented in the model, Table 1 provides applied work samples. This table does not provide a definitive list of all potential opportunities but provides examples from diverse learning areas from the Australian curriculum. The teaching and learning strategies outlined within the model are presented in italics (in Table 1) to demon-

Table 1 Examples of outdoor learning activities that can be designed and implemented to meet learning outcomes in diverse learning areas within the Australian Curriculum

Curriculum area and Content Descriptions	Possible Environments	Example of Learning Activity within the Environment
Year 7 or 8 English	A school bushland or local natural parkland	Purposively select and visit an outdoor environment of interest and/or with character. The teacher should be mindful of *knowing the place*, and selecting an environment suited to examining and creating literature.
Literacy – Creating texts: Year 7: • ACELY1725 • ACELY1726 Year 8: • ACELY1736 • ACELY1810	An outdoor natural area with intrigue: Forest Beach Desert An urban area with imagination: Busy marketplaces Café Graffited city alleyway Skatepark	Within the environment, allow students some time to roam, explore, and connect with the place (*through use of multiple senses*). Through *facilitated discussion and reflection* ask questions and propose theories; use *knowledge of participants* and embrace *serendipitous learning moments*, to enable connections to sustainability and spirituality and/or discovery of flora and fauna and/or art and culture (*purposefully scaffolded activity* to develop comfort, confidence and inspire learning). Utilising a student-centred approach (implementation of a *facilitative teaching style*) of collaborative learning, students work together in pairs or small groups to complete a 'five senses' writers grid. Evoking the five senses (through completion of a writer's grid) is a writing activity used by teachers and authors to develop more creative and descriptive writing. The final component of the *scaffolded session* will be for pairs and/or small groups to write a narrative of their choice (e.g. story, poetry, song, anthem or ode) drawing upon their experience, senses and knowledge. Teacher will utilise *discipline knowledge, and knowledge of participants* to determine whether a scenario or topics for the narrative is required for learning.

General Capabilities
• Critical and Creative Thinking
• Literacy
		Educator to utilise *systematic reflexivity* to evaluate outdoor learning experience, considering the following questions:
		    How am I deepening my own understanding and connection with this context?
		    What learning did I observe today?
		    What is a logical learning progression from here?
		    Was I successful in integrating the natural environment?

Year 9 Science **Science Understanding – Biological sciences** • ACSSU176 **Science Inquiry Skills – Planning and conducting** • ACSIS165 **Processing and analysing data and information** • ACSIS169 • ACSIS170	The school ground or local natural parkland Any outdoor natural area with biodiverse flora and/or fauna: Forest Beach Desert Rainforest	Visit an outdoor natural area and utilising a *facilitative teaching style* allow student to *immerse themselves in the environment*, specifically focussing on differences within the area. For example, perhaps there are more daisies, grass, and dandelions in one section of the school ground, or more ants in another section. Specifically ask students to observe biotic and abiotic factors of the ecosystem. Within role as facilitator, use *knowledge of place* and *responsiveness to learning moments* to guide students to consider how the ecosystem differs from one area to another and why this may be the case. Allocate students into groups and enable agency by allowing them to identify and select two places within the environment: one that appears to be affected by human impact (e.g. an area in the playground; on the soccer pitch) and one that does not appear to have been affected. Groups construct 1 square metre quadrants and use quadrant and transect methods of sampling to survey the biotic and abiotic components of the ecosystem. Students could use a local field guide to identify anything that they do not recognise. Utilise *knowledge of participants* to select from the example learning activities below (or purposefully design others) to *engage multiple senses*: • Draw a sketch of the abiotic and biotic factors inside the quadrant; estimate and record the percentage of the quadrant covered by the factor. • Take a picture of the abiotic and biotic factors inside the quadrant; for all biotic factors count and record the number. • Draw a picture of the ecosystem and describe the interactions between the biotic and/or abiotic factors within the ecosystem. • Design a data collection sheet to record the abiotic and biotic factors within the ecosystem; this should include date, time, temperature, a description of the factor; number/percentage covered within the quadrant; etc.

Table 1 (Continued)

Curriculum area and Content Descriptions	Possible Environments	Example of Learning Activity within the Environment

General Capabilities
 	
• Critical and Creative thinking
• Numeracy
• Sustainability
		Based on the data collected, the final component of the *scaffolded session* will require groups to complete one or both of the following *multi-sensory* activities:
		
		  • Determine what type of graph would be best to display the abiotic and biotic factors identified within each quadrant; construct a graph and use this to explain the differences in each of the identified quadrants.
		  • Utilise data collected to create a food web of the ecosystem and explain how energy is flowing through the web. Comment on the health of the ecosystem and make suggestions as to how the health and sustainability of the ecosystem could be enhanced.
		
		Educator to utilise *systematic reflexivity* to evaluate outdoor learning experience, considering the following questions:
		  Was I successful in integrating the natural environment?
		  What is the scope to broaden this learning activity in future to be multidisciplinary through linking with the mathematics or art curriculum areas?

Year 9 or 10 Mathematics
 	
Measurement and Geometry -
Units of measurement and
Pythagoras and Trigonometry
 	
Year 9:
• ACMMG216
• ACMMG217
• ACMMG218
• ACMMG222
• ACMMG224
 	
Year 10:
• ACMMG242
• ACMMG245
 	
General Capabilities
 	
• Critical and Creative Thinking
• Numeracy
• Personal and Social Capability
	School grounds or local natural parkland
	
	An urban area:
	  Busy marketplaces
	  Café
	  Graffitied city alleyway
	  Skatepark
		Through *facilitated discussion and reflection*, revisit learning of shapes (for example parallelograms, trapezium, rhombus, kite, polygons, prisms etc.). Encourage students to explore and immerse themselves in the environment, with a focus on identifying various shapes. For the educator, having *place-based knowledge* will enable purposive selection of a location that has diverse shapes with a range of complexities. A *facilitative teaching approach with integrated reflection* will enable the educator to *scaffold student learning* through questioning such as: what shapes are evident when observing park benches, basketball rings and backboards; drink fountains; what about shapes created within the natural environment, consider tree branches, the leaves, or flowers. Why do these shapes re-occur in nature? What are their structural benefits or purposes?
		
		Using a *student-centred approach and knowledge of participants*, encourage students to work in pairs to draw the shapes they find, estimate and/or measure the dimensions of the shapes and calculate their surface area and volume. Support students in applying trigonometry to solve problems related to right-angled triangles.
		
		Responsiveness to serendipitous learning moments could enable opportunities for multidisciplinary learning and maximising the opportunities that come from learning outdoors. For example, *educator knowledge of students*, combined with student knowledge of shapes and an *immersive nature experience* could lead to the educator and students collegially identifying a school or local community project they could implement to enhance the environment. This could include designing and constructing an indigenous garden or vegetable garden (where knowledge of shape could inform design; whilst volume and surface area would be relevant for filling and planting); possum and/or bird boxes (shape and size requirements also necessary to consider based on species catered for); or a frog bog (shape could inform design, and volume and area relevant for materials/fill).
		
		Educator to utilise systematic reflexivity to evaluate the outdoor learning experience, considering the following questions:
		  Why am I choosing to do x and not y right now?
		  In what ways can and did the place make a difference to my practice and/or student learning?
		  What school infrastructure, psychological and physical, support or inhibit this work?

strate how teachers could address these concepts when designing and facilitating outdoor learning experiences.

Discussion

There is compelling evidence of the wide-ranging academic and cognitive educational benefits of outdoor learning, including increased engagement in and motivation for learning, reduced discipline and classroom management problems, and enhanced performance on standardised tests (Breunig et al., 2008; Fägerstam, 2014; Mygind et al., 2019). Further, outdoor learning positively influences psychological and social outcomes such as improved self-esteem, self-efficacy, resilience, and a reduction in perceived stress (Mygind et al., 2019; Thomsen et al., 2018). Despite the growing body of evidence supporting outdoor learning, numerous institutional and logistical barriers including: a lack of teacher confidence and expertise; fear and concern about young people's health and safety; school curricular requirements; shortages of time, resources, and support; and wider changes within the education sector (Rickinson et al., 2004) have limited the prevalence of outdoor learning opportunities. For outdoor learning to be successful, this practice needs to be recognised as more than an 'add-on' initiative and acknowledged as a pedagogy that provides opportunities for an integrated, cross-curricular approach to engaging students in learning and achieving educational aims. There is however a dearth of evidence to support classroom teachers, particularly in secondary school settings, in designing effective outdoor educational learning experiences. This includes how outdoor learning can be planned in line with curriculum guidelines across a range of curriculum areas (Beames et al., 2012), as well as illustration of what effective outdoor teaching and learning experiences look like. Accordingly, the authors provide an evidence-based model along with applied examples to demonstrate how teachers can provide scaffolded outdoor learning experiences that articulate with the school curriculum and maximise students learning opportunities.

The Environment

Teachers committed to integrating the outdoors into their practice are encouraged to consider the 'four zones of outdoor learning' identified by Beames et al., (2012) or Rickinson et al.'s (2004) three main types of outdoor learning activities (presented under the environment component of the model) to inform their practice. Both approaches consider areas in, around and beyond the school, and we recommend teachers design initial experiences in environments that they know and are easily accessible (e.g. zone 1 and 2, school grounds and local neighbourhoods, respectively (Beames et al., 2012)) and progressively work towards the inclusion of more distant locations that can provide increasingly demanding experiences (e.g. zone 3: day excursions and field trips requiring group transport; and zone 4: residential outdoor education centres and overnight expeditions (Beames et al., 2012)). The resources to advance teachers thinking, capacity and confidence to integrate outdoor learning presented in this manuscript (the proposed model and applied examples) acknowledge

that the immediate locality will be different for schools located in rural, regional, and urban environments. For example, teachers in a rural secondary school might make use of local bushland, water environment, built environment or skatepark, whilst an inner-city secondary school might make use of parkland, graffitied alleyways, busy marketplaces, and cafés or the local skatepark and surrounding built environments to maximise the learning opportunities within the local environment. If the selected experience is planned in line with curriculum guidelines, and the outdoor setting selected: aligns with the learning outcomes; provides a safe learning environment; and is supportive of the learning needs and abilities of students then teachers are likely to maximise the learning potential of these experiences.

The Learner

Whilst Outdoor Education is not recognised as a learning area within the Australian Curriculum (ACARA, 2016) facilitating opportunities for students to connect with and experience the natural environment is critical. The inclusion of outdoor learning provides classroom teachers an opportunity to: develop student understanding of the environment and sustainable development issues; bring curricula alive, as students can touch, smell, see, listen, and even taste the materials they are learning with and from; and encourage physical activity which has health and well-being benefits (Beames et al., 2012; Dyment, 2005). It is evident that children and adolescents are spending less time in the outdoors and more time engaged in screen time sedentary behaviour utilising an increasingly growing variety of technology-related devices (Lissak, 2018). This is resulting in some youth viewing the outdoors as remote, mysterious, and frightening (Larkin, 2011). The school environment provides an ideal context to provide children and adolescents with exposure to the natural environment through carefully constructed outdoor learning experiences, which provide opportunities to see the interconnections between their education, their environment, their home life and their future (Dyment, 2005).

The Educator

Deep, meaningful and long-term learning occurs when learning in both contexts (in classroom and outdoor learning) scaffold and support each other (Fägerstam, 2014), and the proposed model, *Pedagogical Practices that Support Outdoor Learning Experiences*, should serve as a point of provocation and contemplation for traditional classroom teachers that do not have qualifications or training in outdoor education. The perception that outdoor education should take place some distance from school, often at residential outdoor education centres that offer specialised activities and/or the scarceness of resources available for secondary school teachers may somewhat explain the underutilisation of outdoor learning (Beames et al., 2012). It is important to recognise that to successfully implement outdoor learning: teachers do not require specialised outdoor education training/qualifications; high levels of personal ability in traditional outdoor activities (canoeing/kayaking; abseiling and/or climbing; challenge ropes courses; skiing and snowboarding or mountain biking) are not necessary; and a one-off week to a residential centre is insufficient (Williams & Wainwright,

2016). Whilst outdoor experiences should be scaffolded, the inclusion of outdoor learning can be viewed as an extension of, or an integral part of teaching and learning activities to meet curricular outcomes (Beames et al., 2012). To enhance pre-service teachers' confidence and capacity to implement outdoor learning, teacher education and training programs could consider the inclusion of outdoor education pedagogies and experiences that showcase how to integrate outdoor learning across the curriculum. This would assist pre-service teachers to develop the intellectual and technical skills required to successfully implement outdoor learning.

Conclusions

Given the increased body of evidence-based literature relating to the positive impacts of outdoor learning on students, teachers, and the wider community, it seems a profound loss that opportunities for outdoor learning have decreased for school students. A lack of teacher confidence and expertise, a shortage of time, and school curricular have all been identified as barriers to teaching and learning outdoors. This study contributes to knowledge and improved practice in this area by providing: (i) a model for enhancing pedagogical practices that support outdoor learning experiences, and (ii) applied examples to support classroom teachers planning and implementing outdoor learning in line with curriculum guidelines across a range of curriculum areas.

To underpin the model's authenticity, the three key elements *"the environment; the learner and the educator"* were descriptive themes that emerged through a comprehensive review of research literature relating to teaching and learning strategies and practices that facilitate positive outdoor learning experiences. The three interrelated spheres of the pedagogical model, demonstrate the need for teachers to consider all three of the interrelated areas within their pedagogical repertoire. The authors anticipate that this model, coupled with the applied examples will support teachers in planning and facilitating outdoor learning experiences that motivate and inspire students, whilst addressing formal curricular and aspects of an informal curriculum. However, to fully maximise the robustness and value of the model, further research studies are needed to gain an understanding from teachers that have used this model to implement outdoor learning opportunities. It is anticipated that such discussions would enable the potential role of outdoor learning to be more fully endorsed and help to ensure that the pedagogical model provides a useful tool for supporting teachers in regularly embedding outdoor teaching and learning into their traditional classroom practice.

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Declarations

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