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Exploring the Affordances of Place-Based Education for Advancing Sustainability Education: The Role of Cognitive, Socio-Emotional and Behavioural Learning

Felicity Hernandez Gonzalez

College of Arts, Business, Law, Education and IT, Victoria University, P.O. Box 14428, Melbourne, VIC 8001, Australia; felicity.hernandezgonzalez@live.vu.edu.au

Abstract: The present paper explores the affordances of place-based education (PBE) to enhance the goals of sustainability education (SE). UNESCO, the leading international body responsible for advancing SE, assigns a central role to the three dimensions of cognitive, socio-emotional and behavioural learning as a means for advancing sustainability and the seventeen Sustainable Development Goals. Thus far, little research attention has been given to examining pedagogical approaches that may be effective in supporting these learning dimensions. PBE has risen over the past years as a holistic educational approach that may be well situated for supporting SE goals. To evaluate its affordances, the study put forward the objectives to (i) examine the application of cognitive, socio-emotional and behavioural learning dimensions in empirical studies employing PBE; and (ii) examine the overall contribution of PBE to developing students' sustainability awareness, as reflected in the PBE case-study literature. Multiple case-study analysis was employed for examining secondary resources, comprised of four PBE case studies reported in the literature. It was found that the implementation of PBE in the context of SE produced holistic learning outcomes across the three dimensions, as early as in kindergarten students. Through direct content with nature and the local community, students' agency, voice and action competence increased, having ripple effects across the community, connecting the local with the global. PBE advanced inter-cultural sensitivity and promoted the inclusion of Indigenous knowledge in SE.

Keywords: place-based education; sustainability education; cognitive learning; socio-emotional learning; behavioural learning



Citation: Hernandez Gonzalez, F. Exploring the Affordances of Place-Based Education for Advancing Sustainability Education: The Role of Cognitive, Socio-Emotional and Behavioural Learning. *Educ. Sci.* **2023**, *13*, 676. <https://doi.org/10.3390/educsci13070676>

Academic Editors: Iris Alkaher and Efrat Eilam

Received: 27 April 2023

Revised: 26 June 2023

Accepted: 27 June 2023

Published: 1 July 2023



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1. Introduction

The present paper is situated in the field of sustainability education. Specifically, it focuses on the role of place-based education (PBE) as an effective pedagogical framework for applying the three learning dimensions of cognitive, socio-emotional and behavioural learning in sustainability education.

PBE is an educational approach that emphasises the local environment and community as the foundation for learning. It aims to connect students with place, including all its affordances, and the natural, cultural, and historical aspects. PBE often involves the application of a range of pedagogies such as experiential learning, interdisciplinary approaches, and community involvement to foster a deeper sense of connection, responsibility, and stewardship among students [1,2]. Common to these pedagogies is the intertwining of, minds, heart and hands a metaphorical concept used to describe a holistic approach to learning, where students are engaged cognitively, emotionally and physically in the learning task [3].

When considering PBE in the context of sustainability education (SE), it appears that both educational approaches share similar goals and pedagogies for achieving learning outcomes. For example, some of the goals set out by UNESCO [3] for SE include enhancing learners' knowledge and understanding of the interconnections between social, economic and environmental dimensions of sustainable development; and empowering

learners to actively participate in decision-making processes and contribute to sustainable development in their communities and beyond. Similar to PBE, UNESCO advocates for the achievement of these learning goals through experiential learning, interdisciplinary approaches and education outside the classroom. With the backdrop of the philosophical alignments between the two educational approaches, the present study focuses its attention on the central role played in both approaches by the three learning dimensions of cognitive, social-emotional and behavioural learning. Specifically, it aims to examine the potential contribution of PBE in effectively addressing the three dimensions in an integrative and holistic manner in the learning process, and, in turn, to contribute to the achievement of SE learning goals.

2. Theoretical Review

Place-based education (PBE) refers to teaching and learning which occurs outside of the traditional classroom setting [4]. Students learn ‘in place’, situated within the context of their local environment. Examples of PBE include learning about plant species and biodiversity while exploring a nearby natural space and observing the flora and fauna [5], or investigating important civic institutions within the city centre itself [6].

The term PBE has been used since the early 2000s [4]. Other terms used for PBE include ‘place-conscious’ education [7], ‘community-oriented schooling’ [8] and ‘pedagogy of place’ [9]. As an educational approach, connections can be made between PBE and constructivism, community-based education practices, outdoor education and Indigenous on-country learning [10], amongst other pedagogies [11]. Taken together, Gruenewald and Smith [6] view PBE as part of a broader movement aiming to reclaim the local in an era of globalisation, by creating “the new localisation” (p. xiii); where students do not only *reside* in a place, but rather *inhabit* it [12].

The PBE approach has its roots in the experiential pedagogies of progressive educators throughout history. The 20th century educator and philosopher John Dewey was an advocate for situating students within their local environment with the aim to enrich their holistic understanding of geographical, artistic, literary, scientific and historical elements, through forming direct contact between the concepts learned and students’ lived experience [11,13]. Dewey promoted learning that was hands-on and task-oriented. Young people were encouraged to develop a sense of responsibility over their community and become involved in decision-making processes [11]. Dewey’s former pupil and subsequent colleague William Heard Kilpatrick similarly advocated for experiential problem-solving, student-led learning, and creating direct sensory connections for students with the natural environment and local communities [11]. In accordance with Dewey’s legacy, there is no set preconceived curriculum. The curriculum is developed and morphed in response to the affordances of the environment. In this respect, the focus becomes the learning process rather than the learning contents [14].

PBE offers authentic opportunities to cultivate nature connectedness among students, and in turn promote sustainability values, attitudes and behaviour [15]. Nature connectedness refers to the formation of emotional and cognitive relationships with nature, where nature is valued, cared for and where its inherent interconnectedness as well as the humans implicated within it are appreciated [16,17]. Studies have found that students who had frequent and positive childhood experiences in natural environments are more likely to engage in environmental behaviours later in life [16]. Eilam and Trop [18] found that nature exposure was one of the six most influential variables affecting the development of positive environmental attitudes. Their study also revealed that schools have an important role to play in enhancing this effect. Their research among environmental and non-environmental schools and their communities in Israel showed that environmental schools had a positive influence on the environmental attitudes and behaviours of the students’ families and school communities as a whole. This effect likely occurred through the application of place-based approaches. Similarly, Rosa and Collado [19] suggested that meaningful interactions in and with nature can lead to more pro-environmental attitudes and behaviours, such as

increased concern for the environment, support for conservation initiatives, and sustainable lifestyle choices.

In its worldview, PBE strays from neo-liberalism. Here, the educational philosophy focuses on the intrinsic value of education, rather than on education as a means for ulterior goals such as serving society or creating work-ready citizens. In this respect, it echoes Biesta's critique, stating that "instead of asking what the schools should "do" for society—which seems to have become the most prominent way in which the task of the school is nowadays being conceived—I ask what society should "do" for the school so that the school can be a school" [20] (p. 9).

While the neo-liberal education advocates capacity development in the form of 'learning to earn', in the PBE pedagogy, the focus is shifted to students as members of their communities, rather than to the development of individualistic capacities [4]. Learners are encouraged to experience, learn, solve problems, critique and become active members of their community for its sake alone, rather than seeing education as a steppingstone to potential employment in the future. In this perspective, PBE serves the purpose of sustaining the "cultural and ecological integrity" of students' local areas [4] (p. 3) [21].

The holistic nature of PBE suggests that this approach may be well positioned to address the critical aspects of sustainability education (SE). In this article, the term SE is used as a general descriptor for addressing the various terms used in the literature to describe education with a focus on the environment and sustainability, including, for example, environmental education (EE), education for sustainable development [22] and ecological education [23]. In the context of this study, SE is understood as an overarching educational concept, which addresses the fundamentals of human relationships with the Earth and all of its inhabitants, including humans themselves. It encompasses environmental, social and economic challenges faced by the current and upcoming generations.

In 2017, UN General Assembly Resolution 72/222 assigned sustainability education the role of advancing the Sustainable Development Goals (SDG) by defining it as "an integral element of the SDG on quality education and a key enabler of all other sustainable development goals" [24] (p. 3). The sustainability education approach conceives schools as the arenas where societal change needs to take place. According to UNESCO [25], this can best be achieved through whole-school approaches, where students are provided with opportunities to grapple with the 17 SDGs and offer solutions. When it comes to climate change, for example, it is necessary to delve into the causes, consequences and solutions of climate change and develop behaviours for adapting to climatic changes and future adversity [23].

Gaining sustainability competencies at an early age can lead to the adoption of more sustainable lifestyles and behaviours, allowing young people to make informed decisions and take action when faced with an uncertain future.

UNESCO [3] outlined the competencies that allow citizens to engage effectively with the challenges of the SDGs. Competencies are defined as follows:

"the specific attributes individuals need for action and self-organization in various complex contexts and situations. They include cognitive, affective, volitional and motivational elements; hence they are an interplay of knowledge, capacities and skills, motives and affective dispositions" (p. 10)

The set of competencies includes systems thinking, anticipatory, normative, strategic, collaboration, critical thinking, self-awareness, and integrated problem-solving competencies. The system thinking competency relates to the ability to analyse relationships, and understand complexity and uncertainty. Anticipatory competency relates to the ability to consider future scenarios. Normative competency relates to the ability to negotiate conflicts and trade-offs related to values, principles and goals. Strategic competency relates to the ability to plan strategic actions for sustainability. Collaboration competency relates to the ability to collaborate with others. Critical thinking competency relates to questioning accepted norms and behaviours. Self-awareness competency relates to the ability to reflect

on one's own values and actions. Finally, integrated problem-solving competency relates to the ability to integrate various frameworks and solutions to problems [3].

When addressing the learning dimensions of SE, UNESCO [26] specifically focuses attention to the role played by the three learning dimensions of cognitive, social-emotional and behavioural learning. The three dimensions are defined by UNESCO [26] as follows:

- Cognitive: To acquire knowledge, understanding and critical thinking about global, regional, national and local issues, the interconnectedness and interdependency of different countries and populations, as well as social, economic and environmental aspects of sustainable development;
- Social and emotional: To have a sense of belonging to a common humanity, sharing values and responsibilities, empathy, solidarity and respect for differences and diversity, as well as to feel and assume a sense of responsibility for the future;
- Behavioural: To act effectively and responsibly at local, national and global levels for a more peaceful and sustainable world (p. 7).

These three dimensions are to be included across the school curriculum both vertically across subjects, and horizontally across year levels. It is suggested that the application of the three dimensions in a balanced way may lead to developing students' capacities to actively contribute to bringing about change toward sustainability [26].

UNESCO's [26] review of the extent of implementation of the three learning dimensions suggests that conventional SE pedagogies tend to disproportionately emphasise the cognitive dimension, often overlooking the other two. This disproportionate focus on one dimension over the others runs the risk of students being less likely to ultimately alter unsustainable behaviours and to go on to take action to build a more sustainable future [26]. Furthermore, the simultaneous application of the three dimensions is necessary for providing students with a holistic SE learning experience.

While the three learning dimensions are conceived as critical for achieving the goals of SE, thus far the literature provides scarce evidence concerning educational approaches that may be effective in addressing the three dimensions in a balanced way. Some evidence obtained from PBE research suggests that this pedagogical approach may be well positioned for providing a balanced learning experience, where all three dimensions are present. For example, in PBE, students can experience regional problems first-hand and take action to create tangible positive changes within their local environments [27].

Taken together, the various educational strategies applied in PBE suggest that this approach may be an effective way to achieve the goals of sustainability education. The present article puts forward the aim to investigate the affordances of PBE to sustainability education. Methodologically, this is carried out by conducting an in-depth examination of four case studies, where PBE was applied in the context of SE. Specifically, the study aims to achieve the following:

1. Examine the application of cognitive, socio-emotional and behavioural learning dimensions in empirical studies employing PBE;
2. Examine the overall contribution of PBE to developing students' sustainability awareness, as reflected in the PBE case-study literature.

3. Methods

This study applied a qualitative multiple-case studies methodology for studying the complex phenomena of learning domains in PBE contexts [28]. In a case study methodology, the *case* can be an individual, organisation, community, event, or any bounded system that provides an opportunity for a detailed analysis [29]. In our study, the *cases* consisted of empirical studies examining the application of PBE. An illustrative approach was applied for deriving a descriptive illustration of four case studies reported in the literature [30]. These secondary sources were used for demonstrating the application of the three learning domains (i.e., cognitive, socio-emotional and behavioural), in which PBE was employed in the context of SE. Secondary sources rely on the use of existing data analysed by others [31].

In the context of this study, the data analysis of the primary sources also served as data for analysis, used for addressing the research questions of the present study.

Purposive sampling was used to carefully select the sample of case studies. In purposive sampling, the researchers “hand-pick the cases to be included on the basis of their judgement of their typicality or possession of the particular characteristics being sought” [32] (p. 156), and, as such, the sample is produced for the specific research needs [33]. In the present study, a set of selection criteria were developed to select appropriate case studies from the literature for analysis. Purposive sampling techniques are known to provide a greater depth to qualitative studies, regardless of the small sample size [33]. Such is the case in the present study, where the sample is small, yet due to the high specificity of the selection, the derived data are of high value.

The secondary sources used for the analysis consisted of case-study articles, which reported on the findings of empirical studies where PBE was applied in the context of SE. To gain an in-depth understanding regarding the affordances of PBE for SE, the aim was to cast the net wide by capturing diverse educational settings. This ensured the applicability of the findings to PBE broadly as an educational approach, rather than to its application in specific settings only. The process of selecting articles for the sample relied on a set of criteria, by which the applied PBE programs were case studies reporting on empirical findings. Additionally, the programs (i) took place in diverse geographical settings; (ii) represented diverse sociocultural settings; (iii) clearly reported student learning outcomes; (iv) varied in regard to student year levels; (v) included both formal and informal educational settings; and (vi) were published in the past ten years. Articles that did not meet the five criteria were excluded from the sample.

Accordingly, the four selected articles described PBE projects across four continental regions: South America, North America, Asia and Oceania. They represented diverse sociocultural settings including Indigenous communities. The students’ year levels varied from early childhood education to high school levels, and included both formal and informal educational approaches, comprising both official curricular processes as well as PBE activities taking place outside of the fixed school year. Finally, for ensuring relevancy to current sustainability challenges, the case studies were relatively recent. Furthermore, as the sample in this study consists of articles, similar to other qualitative sampling, the process of article selection was aimed at reaching a data saturation point. Data saturation can be described as the point at which little new information is forthcoming within the data collection process in response to the research question [34]. The information provided in the ongoing analysis of case studies reaches a level of redundancy, while the information gathered within the previous samples has been able to produce robust themes and findings [35]. Lincoln and Guba [36] proposed collecting data until redundancy and until a saturation point has been reached: “If the purpose is to maximise information, the sampling is terminated when no new information is forthcoming from new sampled units” (p. 202). Studies have shown that most new information in qualitative analyses occurs early in the research process, with “a relatively sharp decline in new information occurring after just a small number of data collection/analysis events” [34] (p. 6). In the present study, it was determined that data saturation had been reached through the analysis of four case studies. At this point of saturation, the comprehensive data obtained through the analysis were consistent in their outcomes. Therefore, it was determined that a further analysis of more PBE cases was unlikely to change the results, and the obtained data were sufficient for answering the research questions in a trustworthy way.

The article search consisted of using two search engines: the EBSCO research database via Victoria University, and Google Scholar. These search engines cover the vast majority of publications in the fields of education and sustainability. The search terms included: “Place Based Education”, (“Placed Based Education” AND “Sustainability Education”), (“Placed Based Education” AND “Sustainable*”), (“Placed Based Education” AND “case study”). The search was limited to the past ten years.

4. Findings

This section presents the descriptions and analysis of four diverse PBE projects. The first project explored the experiences of PBE play for a group of kindergarten children in Tasmania, Australia, who spent time within two local natural reserves as part of their learning program. The study was tied to the teaching principles of Early Childhood Education for Sustainability [ECEfS] [37]. The second project was based in the city of Yokohama in Japan, where primary school students created eco-picture diaries documenting environment issues within their communities and came up with ideas for creating a more sustainable future for their city [38]. The third project took place in southern Chile among eight primary schools, accompanying their students and teachers. The educational focus was on integrating Indigenous, local and scientific perspectives in educational experiences, termed “STEM education for sustainability” [39] (p. 1). Finally, the fourth project involved 34 high school students from Colorado, USA, who took part in a film-making project to explore the impacts of climate change on their local communities [40]. Together, these diverse projects demonstrate the specificities of places and communities, which are at the roots of this educational approach [11,41].

The findings of the analysis of the four projects are presented chronologically, by their publication year. Each project is first described briefly, followed by an in-depth analysis of the alignment between the projects’ learning outcomes, and sustainability education’s three learning domains. The data for constructing alignments are based on the analysis of the studies’ findings. The analysis of the four projects is followed by a summary of commonalities across the projects.

4.1. Project 1: “Kindergarten Children’s Introduction to Sustainability through Transformative, Experiential Nature Play” by Haas & Ashman (2014) [37]

This research provides an example of place-based learning within the early childhood context. The project focused on a kindergarten program of children aged between three and a half and five years in Hobart, the capital of Australia’s island state of Tasmania, which incorporated place-based nature play into the regular learning schedule. Throughout the course of the year, the children, together with accompanying adults, spent time in two local nature reserves which were within walking distance from the school. These excursions took place on a weekly or fortnightly basis. At these locations, the students engaged in nature play including digging, climbing, observing different plants, exploring the landscape, imagining themselves as animals and spending time contemplating the sensory elements of the natural environment. At another location, the children were able to view their landscape from a wider viewpoint and take photographs and document their experiences. The data sources for this publication included observations of the 25 children who took part in the place-based initiative, field notes and information gathered from informal conversations with the children. Researchers also recorded photographs, children’s comments and art pieces, as well as information from interviews conducted with the children’s parents [37].

4.1.1. Alignment between PBE Learning Outcomes and the Cognitive, Socio-Emotional and Behaviour Dimensions of Sustainability Education Evidence for Cognitive Learning

The evidence suggested that this PBE program provided the opportunity to acquire knowledge about the local environment, which the children had not previously had access to. The authors noted that “Children were shown pictures from popular children’s culture and pictures of local flora and fauna” [37] (p. 24). Prior to this activity, “few could identify a gum tree or recognise carrots or beetroot or a kookaburra. This may have indicated that much of their time is indeed spent in front of screens rather than outside in nature” (p. 24).

The physical contact with the authentic place meant the students could directly observe the environment, including the natural seasonal cycles. The authors suggested that “returning to authentic places in nature allows children to become more ecoliterate in the concepts of change, growth and cycles. Children observed seasonal changes to Providence

Valley” (p. 27). This direct observation gave rise to authentic learning experiences which may not have had the same effect within the four walls of a classroom, such as exploring the natural environment at night-time to observe local animals. The authors explained that on one occasion, a large group of children built a dam to provide water for the nocturnal animals. This interest initiated a learning sequence in the class about local animals that come out at night. A night excursion with families was organised with Parks and Wildlife called “Where the wild things are” (p. 25).

When a group of children initiated an idea to build a bridge across a stream, the children continued adding more elements to their play as they went along and demonstrated new knowledge regarding natural phenomena. The researchers explained that “eventually they had collected enough sticks and bark to make a weight-bearing bridge ‘for winter when the creek is high and a lower crossing for summer’” (p. 25). Finally, the authors noted that “many children’s ‘naturalistic intelligence’ carried over from the outdoors into classroom projects” (p. 26).

Evidence for Socio-Emotional Learning

The findings suggest that the PBE project supported children’s emotional development in multiple ways as well as developing a sense of belonging and connectedness among themselves and to nature. On the personal developmental level, being in nature gave students time and space to mindfully reflect on their surroundings and develop an appreciation for nature. The authors note that children could also be observed in wonderfully peaceful moments of solitude, just gazing at the water or at the view, or transfixed by some small creature. Feelings of peace arising from nature play were apparent long after returning to the classroom. As contact with nature increased, restless children demonstrated an increased attention capacity outside and inside the classroom [37] (p. 26).

This newly developed appreciation of nature was expressed in the students’ comments. For example: “Mia: I like looking for flowers (p. 27)”; and “Harry: I like looking up at the cliffs. I want to go in the caves one day” (p. 27). Furthermore, the researchers noted that the children demonstrated a sense of joy within nature, suggesting the development of new environmental values.

Personal confidence and physical capabilities were also improved, where children developed greater perseverance with their outdoor ventures. It was noted that “one child who was reluctant to even venture outdoors in first term, developed his confidence through nature play and was constantly on the move in Providence Valley Reserve, developing his balance and physical fitness” (p. 26).

The growth in personal emotional attributes was accompanied by overall improved relationships. The authors note that “child–environment relationships were strengthened as were child–child and child–adult relationships . . . A cornerstone of responsible global citizenship is respect for all human and non-human species and this quality certainly became evident in the class” (p. 26). In child–child relationships, the children demonstrated greater levels of empathy and supportive behaviour. The authors noted a “noticeable reduction in children coming to the adults telling minor tales on their classmates. At no time did any child report being ‘left out’, unlike in the school grounds” (p. 26). Furthermore, “adults working with the class observed children depending on each other more, engaging in more teamwork and supportive behaviours and being more inclined to interact with children outside their usual playground group” (p. 26).

Evidence for Behavioural Learning

The findings suggest that the PBE project had a behavioural learning effect in increasing the involvement of the kindergarten community in their natural environment. The authors report that “parents and children sometimes emailed photos taken in Providence Valley on the weekends to show something they’d found, something they’d played with or some changes they’d noticed. One little boy reported that on the weekend he’d gone into

one of the caves and ‘found dinosaur bones!’. A couple of families agreed that the highlight of the school year had been the nocturnal walk” [37] (p. 26).

The researchers suggested that students expressed care for flora and fauna and showed a disposition to strive for their preservation. For example, Mat stated “I like looking after the bugs Mat’s comment shows that he is beginning to acquire environmental values and dispositions” (p. 27). These young children seemed actively occupied in behaviours that aim to assist nature’s thriving. This led the researchers of the study to conclude that “all the comments show evidence of Wilson’s [42] biophilia, which according to researchers [43,44], is a strong indicator of later advocacy for sustainability” [37] (p. 27).

Summary

The analysis reveals that the implementation of PBE among children as young as kindergarten age was successful in obtaining learning outcomes in the cognitive, socio-emotional and behavioural domains. The authors affirm that “the expanded repertoires of unstructured nature play engaged all the developmental domains: cognitive, physical, emotional; as well as the academic domains: language, science, numeracy; and also the aesthetic and spiritual domains of the children” [37] (p. 26).

It appears that through direct contact with nature, the children developed a mindful reflection of nature and a heightened connection to and appreciation of their local natural environment. The authors suggest that the “focus on nearby nature for place-based education and play added to the sense of attachment to place” (p. 26). Furthermore, the project not only affected the children involved, but also spread to the wider community generating involvement amongst parents and local community members.

4.2. Project 2: “Place-Based Environmental Education to Promote Eco-Initiatives: The Case of Yokohama, Japan” by Ito & Igano (2020) [38]

This PBE study was situated in the city of Yokohama, Japan. It investigated the Eco-Picture Diaries project, where primary school students used drawing and writing to describe the ideal future of their city—Yokohama—for them as adults, including potential steps that could be taken from now on to achieve this goal. Teachers distributed the diary project as part of school holiday assignments and the students collaborated with family members to discuss the issues and come up with strategies. Over the course of the school break period, the diaries were submitted and subsequently evaluated by a number of stakeholders involved in the city’s project. A number of eco-picture diaries were given awards and publicly exhibited at spaces such as the Japan International Cooperation Agency and the United Nations Educational, Scientific and Cultural Organisations (UNESCO) school conferences, being viewed widely.

The eco-picture diaries were based on the themes of the 3Rs (Recycle, Reduce and Reuse) as well as greenhouse gas emission reduction. Over 250,000 students from just under 300 different schools participated in the project from the years 2001 to 2018. The PBE aspects of the project were described as follows:

“Eco-picture diaries involve various stakeholders at different levels who play a proactive role: students as creators of eco-picture diaries; family members as their co-creators; and teachers, local governments and companies as coordinators. This is how community social capital becomes widespread and pervasive through the use of eco-picture diaries” [38] (p. 304)

To evaluate the project’s impacts, the researchers analysed 529 awarded eco-picture diaries and conducted interviews and focus groups with relevant stakeholders.

4.2.1. Alignment between PBE Learning Outcomes and the Cognitive Socio-Emotional and Behaviour Dimensions of Sustainability Education Evidence for Cognitive Learning

The authors suggested that the “eco-picture diary includes images as well as texts, which help activate and develop a variety of cognitive abilities for reflective learning” [38]

(p. 296). The findings affirm that cognitive learning was attained in relation to knowledge acquisition, critical thinking and problem-solving skills. The PBE project allowed for the creation of knowledge around interconnectedness and the opportunity to position the city of Yokohama within a global context. In one example, a child was able to understand their local environment as part of a global problem through imagining how the city would look to extra-terrestrial beings, stating that “Yokohama is clean but does not have enough green spaces. What if aliens observe the city from the universe? They would not like to come visit us” (p. 302).

The acquisition of critical thinking skills and future thinking are important goals in sustainable education [3]. From the testimonies of both the staff and children, it became evident that through this PBE initiative, the students were given space to think critically about the way their society works and to envision a future which could be different. For example, “a Recycle Design staff member conveyed a child’s concern that current world trends, including SDGs, prioritize economic aspects of development over ecological and social ones” [38] (p. 301).

Equally, through the observation of their city, the students applied problem-solving skills to address problems within their area. In one case, a *fourth-grade student* suggested to solve the littering problem in a creative way. The student explained:

“I went to a city centre today. I found a lot of garbage between the buildings, and the place smelled worse than where I live. Some elderly people with green numbers were cleaning up the trash there. I wish there were an AI robot that looks like the Asura statue that I saw in a book the other day. Instead of the elderly, it would pick up garbage from morning until night. I also think it would be nice if there were such an AI robot that would use a lot of hands to quickly collect the trash to clean the city and impart a pleasant fragrance. The most important thing, however, is that each of us keeps the roadside clean and litter free” (p. 300)

Overall, the authors suggest that the diaries are a form of journalism that encourages reflection as a cognitive learning tool.

Evidence for Socio-Emotional Learning

The analysis found evidence for socio-emotional learning across sectors, including companies and school communities. A president of a local company explained the impact of the eco-picture diaries on their staff, as follows:

“I feel that the diaries have a ripple effect. In my company, for example, in evaluating the eco-picture diaries, all employees write comments, explaining why they selected the ones they did. Our employees, including me, create our own eco-picture diaries as well. The process helps us understand how we should address local socio-environmental issues” [38] (p. 301)

Furthermore, students’ families also became involved. A member of the Recycle Design staff reported that one of the benefits of the eco-picture diary is that it enabled students to discuss local and global socio-environmental issues with their family members, stating that “students reported a sense of empowerment at having been given the opportunity to make their voices heard about their local area and their unique ideas for its future” (p. 301).

The students taking part in the eco-picture diaries garnered a sense of belonging to a common humanity and understood the power of working together on a global scale for sustainability. One third-grade student wrote the following:

“To encourage eco-activities, it would be nice if we could record them on a smart-phone and view the health meter of the earth at a glance. If it evolved into a game wherein we could raise a character called ‘Little Earth’ by feeding on eco-activities, we could enjoy them even more” (p. 300)

Overall, the authors claimed that the students gained a “personal sense of competence and perceived self-efficacy in their collective competence” (p. 304).

Evidence for Behavioural Learning

Students seemed to have developed intentions to act both at the private sphere and the public sphere. The authors explained the following:

“The eco-picture diaries reflect on the clear action plans of what children and other stakeholders do towards an ideal future. These action plans are elaborated on by family members and thus become a stronger and more sustainable driving force than individual action plans. After all, what children discuss with their family members, including socio-environmental issues and strategies to address these issues, becomes a family commitment” [38] (p. 302)

When contemplating ways to expand action from the private sphere to the public sphere, a student stated: “I would like to expand the circle of these kinds of small eco-activities from Yokohama to the rest of the world and make the earth even healthier by leveraging people’s power” (p. 301). Another third-grade student wrote the following: “If we act together, our power will be amazing” (p. 300).

Overall, the authors suggest that the “eco-picture diaries help students and stakeholders proactively participate in SDG-related activities” (p. 304).

Summary

Evidence was found within this PBE initiative for cognitive, socio-emotional and behavioural learning elements for sustainability education. Importantly, children were given the agency to have a voice in their local area and in issues of concern. They were given the opportunity to envision a different future for themselves and their community, creating a connection with the global issue. The project also spread from its original audience of school children to becoming a larger conversation between the adults of the city’s community.

4.3. Project 3: “Place-Based STEM Education for Sustainability: A Path towards Socioecological Resilience” by Bascope and Reiss (2021) [39]

This study combines inquiry-based learning (IBL), outdoor exploration and PBE strategies in solving local sustainability challenges and developing students’ personal capacities and attitudes, as well as strengthening both personal and community resilience. IBL is an instructional approach that places an emphasis on active learning, critical thinking and problem-solving skills. According to the American National Research Council, IBL involves five essential features, including the following:

“Learners are engaged by scientifically oriented questions.

Learners give priority to evidence, which allows them to develop and evaluate explanations that address scientifically oriented questions.

Learners formulate explanations from evidence to address scientifically oriented questions.

Learners evaluate their explanations in light of alternative explanations, particularly those reflecting scientific understanding.

Learners communicate and justify their proposed explanations” [45] (p. 25)

In each of the eight participating schools, 4 to 10 year old students and their teachers planned and implemented research projects in collaboration with university scholars, organisations around the schools, and the school community. Each project aimed to create a solution or a product addressing a local socioecological challenge. The projects aligned with one of five domains, stemming from a research-based framework, which connected local knowledge with the school curriculum, including health and the human body, traditional foods and culinary processes, craft and tool manufacture, ecosystems and agriculture,

and worldviews and spatial–temporal notions. The projects’ topics included bird and tree networks; local seed projects; traditional medicine; edible green gardens; the history of wetlands; mammal monitoring; local water pollution; forests and reforestation; and local food exploration. Data were collected through interviews with teachers and field observations [39].

4.3.1. Alignment between PBE Learning Outcomes and the Cognitive, Socio-Emotional and Behaviour Dimensions of Sustainability Education

Evidence for Cognitive Learning

The findings suggest that cognitive learning was a prominent learning outcome across all the projects. Students obtained scientific content knowledge through minds-on and hands-on experiences involving direct instruction by scientists. The students learned “the importance of biodiversity and increased their awareness of the importance of forests and local ecosystems in preserving species and associated knowledge” [39] (p. 12). Practical applicable knowledge was gained by planning the visits of different local and scientific experts on the topic, making practical workshops on seedbeds, cutting techniques, harvesting, ensuring greenhouse maintenance and efficient watering, and understanding timing for the different activities depending on the moon phase and season of the year.

The interviewed teachers particularly highlighted the cognitive benefits for students who normally struggled within the regular classroom environment, explaining that “field-work and learning with a tangible purpose gave space for development to those children with difficulties with learning in traditional school settings, giving space to . . . make a valuable contribution to the projects” (p. 11).

Evidence for Socio-Emotional Learning

The evidence suggests that the project involved a range of socio-emotional gains. At the personal emotional level, there was increased motivation, self-esteem and enjoyment, as well as a development of values and attitudes. At the social level, the findings revealed increased inter-cultural awareness, community connectedness and a sense of common humanity and responsibility for maintaining sustainability into the future. Teachers reported a boost in motivation among their students and “an increase in the students’ levels of self-esteem, enjoyment of learning, and teamwork capabilities” [39] (p. 11). The teachers also reported attitudinal changes among students in relation to learning science, stating that students “now feel more confident about sciences, they understand the role of the scientist and now they don’t see science as something strange or distant” (p. 11). The researchers inferred that science became more enjoyable for the students, having “a clear sense of purpose, giving space to develop scientific competencies to act for a better future” (p. 11).

Another aspect of social-emotional learning is evidenced in students’ growing inter-cultural awareness. By being given access to other forms of knowledge, such as traditional medicine expertise, the students learnt about the interconnectedness between different cultures through acquiring knowledge from different worldviews and from cultures which may differ from their own. In one project that involved the preparation of local recipes for the community, students came to realise the value and importance of maintaining local knowledge into the future, gaining a sense of personal responsibility to do so. One teacher described this special moment as “a very emotional and unforgettable experience, it helped us to understand what we are losing, and how important it is to create value based on our roots and local traditions, for new generations to contribute to the sustainable development of our town” (p. 13).

Additionally, students formed a sense of connection with their local communities, expressed as follows: “The connection with local actors, the school’s extended community, and local organizations were completely beyond leading teachers’ expectations, enhancing local resilience by increasing the community’s social capital” (p. 12). These connections were effective in forging new community relationships that had not been established

previously. The authors noted that “even though the projects were conducted by children under the age of 10, they were very effective in creating new bonds with local actors and organizations that never had the opportunity to interact with schools before” (p. 12).

Evidence for Behavioural Learning

The project’s findings highlighted various aspects of the behavioural domain, including active participation, and a growing responsibility to act for the future.

Students actively took part in sustainability actions, for example, by assisting in monitoring ecosystems. The authors described that “the monitoring process of flora, fauna, and local pollution sites was a very entertaining and direct way to make a rather small but serious contribution to the local surroundings” [39] (p. 12). The authors also described students’ active contributions to recovering the biocultural heritage of the elders as follows:

“The memory about traditional methods, the characteristics of the different plants, usages, and properties is found in grandparents and local elders. Compiling stories, interviews, and videos of these testimonies can be a productive way of socioecological resilience, to transform and adapt to the degradation of local ecosystems, by recovering the biocultural heritage of the elders, and also a way to contribute to more sustainable practices and personal know-how to achieve partial food provision or complete food sovereignty” (p. 11)

Additionally, the teachers noted that they themselves had been motivated to become actors of change for sustainability within their own communities. The authors described how the great majority of teachers revealed a surprising personal effect of the projects on their perceived role in the community and what they can achieve. Even though they were expecting this to happen to the children, they did not expect that the experience could also change them and were very willing to continue the following year, find new partners, and convince new colleagues to take part.

Summary

Taken together, the project reveals strong evidence for learning outcomes across the three domains. Interestingly, PBE has impacted both the students and the teachers, where the teachers themselves developed a capacity for action. The project particularly highlighted the contribution of PBE to the development of inter-cultural sensitivity and the role of Indigenous knowledge in SE.

4.4. Project 4: “Student Perspectives on Climate Change through Place-Based Filmmaking” by Littrell et al. (2022) [40]

This study explored the perspectives of a group of high school students concerning climate change following their participation in a place-based film-making project called Lens on Climate Change (LOCC). The film-making project occurred over one week in 2016 and in 2017 in Colorado, USA, with 34 students aged between 14 and 18 taking part during their summer holidays. The LOCC program included a day of activities aimed to boost climate science knowledge and vocabulary and to create a connection with the students’ own lives. This was followed by the students creating a short film about the impact of climate change on their local communities over the course of the week. The students led the film project themselves but were guided by a university science graduate as well as a film-making mentor. Upon completion, the students presented their short films at a public event. This exploratory study aimed to characterise the impacts of the program on students’ perspectives about the severity and impact of climate change on their communities, globally, and their sense of agency [40]. Data were collected from the students through the administration of pre- and post-surveys “assessing students’ perspectives on and confidence in their understanding of global warming and climate change” [40] (p. 597).

4.4.1. Alignment between PBE Learning Outcomes and the Cognitive, Socio-Emotional and Behaviour Dimensions of Sustainability Education

Evidence for Cognitive Learning

The participants in this project all had pre-existing knowledge about climate change. However, the program did include a knowledge-building part that covered the following topics:

“(a) Earth’s climate system; (b) greenhouse gases and the carbon cycle; (c) human impacts on climate; (d) models and data to understand climate; (e) resilience in natural and built systems; and (f) exploring the role of youth in mitigating and adapting to climate change” [40] (p. 596)

Considering the background of these relatively highly informed participants, the study was still able to identify gains in the cognitive domains. The findings revealed cognitive gains in understanding the severity of climate change and understanding its impacts on local communities. The study reported that students’ self-reported confidence in their knowledge about climate change/global warming increased across multiple items... “Students indicated they felt somewhat more confident in their understanding of the climate system, the causes and consequences of global warming, and what could be done to address global warming” [40] (p. 603). This cognitive increase was particularly apparent in relation to evaluating the severity of climate change, where “four students indicated that after the program they considered climate change to be even more of a challenge than they had previously thought” (p. 600).

Importantly, the students gained critical thinking skills with respect to the changing climate and how it affects their local environment. Their understanding of climate change shifted from an abstract, global problem which negatively affects ‘the environment’ to one which is also locally specific and applies to them in their everyday lives. This is exemplified in the differences in student responses between the pre- and post- surveys. While climate change as a local issue was absent from students’ responses in the pre-survey, this aspect of climate change emerged in the post-survey. In the post-program survey, one student wrote “I now know that due to global warming there is less snow in [my home state]” (p. 602). Another student stated “I now have a more stronger belief that the water in [my home state] will run out instead of returning” (p. 602). The authors concluded that “after participating in LOCC, students focused on the local impact of climate change and emphasized that it is an immediate problem requiring action” (p. 605). Finally, the study revealed that students who had participated in the place-based LOCC program “gained confidence in their understanding of the mechanisms, causes, and consequences of climate change, as well as ways in which it can be addressed” (p. 604).

Evidence for Socio-Emotional Learning

A range of socio-emotional learning gains were expressed in this study through students developing a personal connection and care about climate change. Emotionally, while they were concerned about the severity of the problem, they also developed a sense of hopefulness and communal responsibility in relation to climate change. The authors suggested that LOCC’s place-based focus, specifically having students think about how climate change impacted their community, likely helped students to connect personal meaning and experiences with their chosen topic. The students reported that “climate change was more important to them personally after participating” [40] (p. 605). For example, one student stated that “I learned that climate change is affecting everybody and how my country will turn out to be if I do nothing to help” (p. 601).

It seemed that the LOCC program was also effective in cultivating emotions, where students “more often chose to give responses on the post-survey that indicated a sense of possibility and hope” (p. 601). Furthermore, the program seemed successful in developing students’ sense of shared responsibility.

Evidence for Behavioural Learning

The evidence suggested that students' increased sense of responsibility was action-oriented. This was expressed in relation to action in both the individual and the public spheres. Furthermore, they developed a new awareness for their own capacity to influence change and a sense of agency.

The authors reported that "the LOCC program encouraged students to think about the topic from a different perspective as they considered how their own communities were being affected and the personal and collective need to take action" [40] (p. 605). When considering personal action, a student noted "I knew before the program about climate change. However, I did learn about the drought problem down in [my home state] and it made me realize that I should be using water more carefully" (p. 601). Another participant reflected on collective action by stating that "it would [take] a combined human effort from many people, even if small changes by everyone, to slow it down or stop it" (p. 601).

Additionally, students realised their own ability to make a difference, and to develop "a greater sense of responsibility and agency with regard to climate change . . . sense of empowerment" (p. 606). The authors noted that students felt that not only they had "a responsibility to address climate change, but that they were capable and possessed the knowledge to do so, following their film-making experience" (p. 601). One student expressed this newfound sense of their own ability to mitigate climate change by saying that, "I thought there was no way I could help climate change but now I know I could in little ways." (p. 601). Overall, the findings suggest that following students' participation in the PBE program, "they saw themselves as a potential part of the solution to this challenge" (p. 605), and not just passive recipients of the problem.

Summary

The LOCC program provided secondary students with the opportunity to participate in place-based film making about climate change impacts in their communities. The findings suggest that there were learning gains across the three domains: cognitive, socio-emotional and behavioural. By capitalising on the learning which occurred across the three domains, the program seemed successful in transitioning students from being simply passive observers of climate change to becoming active change-makers. Such behavioural change forms a primary goal of SE [46]. These outcomes align well with UNESCO's [3] assertion that "to create a more sustainable world . . . individuals must become sustainability change-makers" (p. 7).

5. Discussion

The present study contributes important insights into the diverse ways by which PBE contributes to cognitive, socio-emotional and behavioural learning in SE. These learning dimensions are perceived as the cornerstones of SE and are essential for achieving its learning goals [3]. The close examination of the learning outcomes obtained through the application of the four diverse PBE programs revealed important commonalities in relation to PBE affordances for SE. It was found that regardless of the vastly different case studies, common to all of them was the focus on providing students with a holistic learning experience of a *place*. The notion of the *place* and its affordances is central to PBE, where *place* across the four case-studies meant different things at different times: physical, spiritual, socio-emotional, behavioural and cognitive. It is suggested here that PBE's holistic sense of *place* is the key to understanding its contribution to the achievement of the SE goals.

UNESCO [3,22] in its various publications emphasised the importance of applying the three learning dimensions in a balanced way across the educational process, cautioning that unbalanced application may undermine efforts to advance sustainability, for example, by explaining that "less balanced ESD . . . approaches—such as a disproportionate focus on cognitive learning . . . may foster learners who will be less likely to alter their everyday actions and actively contribute to living in and building a more inclusive, just, peaceful and sustainable society" [26] (p. 7).

The findings of the present study provide strong evidence for the balanced application of the three dimensions. This was demonstrated in each of the case studies. Furthermore, when students were immersed in inquiring about their local environments, the distinctions between the three domains seemed to have merged in a highly holistic experience. This to the extent that they became inseparable. A close examination of the excerpts provided in this study demonstrates this entanglement:

“Eco-picture diaries involve various stakeholders at different levels who play a proactive role: students as creators of eco-picture diaries; family members as their co-creators; and teachers, local governments and companies as coordinators. This is how community social capital becomes widespread and pervasive through the use of eco-picture diaries” [38] (p. 304)

In this excerpt, it can be seen that the cognitive dimension of “students as creators of eco-picture diaries” is intertwined with the socio-emotional dimension of “community social capital becomes widespread”, while at the same time reflecting the behavioural dimension of promoting the sustainability message across the community. This holistic aspect is apparent across the findings. Thus, this leads to the conclusion that PBE is well positioned to support the three learning dimensions in a balanced and holistic way. Additionally, the findings revealed that PBE’s contribution to supporting the three learning dimensions appeared as early as in kindergarten students, as demonstrated in the examination of Haas & Ashman’s [37] case study.

The clear indication concerning the intertwining relationships between cognition, emotions and behaviour in affecting learning outcomes was theoretically investigated by Brosch and Steg [47], who put forward the question as to whether we can “change the emotions that people experience toward climate change in order to promote climate action?” (p. 1697). The present analysis seems to suggest some insights concerning this question, particularly in relation to recent studies addressing the impact of negative emotions such as hopelessness and anxiety on behaviour related to climate change [48]. According to Brosch and Steg [47], the impact of emotions, such as the *fear of climate change* or *hope about climate change* on *climate action*, is mediated by the cognitive perception of the *value threat* and *mitigation potential*, where a *fear of climate change* is mediated by the perception of *value threat*, which results in *climate action*; and the *fear of climate change* mediated by the perception of *low mitigation potential* results in *no climate action*. Opposite effects on behaviour are expected when the elicited emotions are *hope about climate change*. The findings of this study seem to support these relationships. For example, Project 4, “Student perspectives on climate change through place-based filmmaking” by Littrell et al. [40] demonstrates two pathways by which *climate communication* (in which students were educated about climate change) may lead to *climate action*.

In the first pathway, the *fear of climate change* combined with the perception of *value threat* resulted in *climate action*. The following excerpt demonstrates a *fear of climate change*: “I learned . . . how my country will turn out to be if I do nothing to help” [40] (p. 601). The following excerpt demonstrates *value threat*: “four students indicated that after the program they considered climate change to be even more of a challenge than they had previously thought” (p. 600). Finally, the following excerpt demonstrates how the combined emotional–cognitive effects impacted *climate action*: “I did learn about the drought problem down in [my home state] and it made me realize that I should be using water more carefully” (p. 601).

In the second pathway, *hope about climate change* combined with *perception of high mitigation potential* resulted in *climate action*. The following excerpt demonstrates *hope about climate change*: students “more often chose to give responses . . . that indicated a sense of possibility and hope” [40] (p. 601). The following excerpt demonstrates a *perception of high mitigation potential*: “after participating in LOCC, students . . . emphasized that it is an immediate problem requiring action” (p. 605). Finally, the findings suggest that the combined emotional–cognitive effects impacted climate action, leading a student to claim that “now I know I could in little ways” (p. 601). Taken together, these findings suggest

that PBE not only plays an integrative role by combining the three learning dimensions in one holistic experience, but this approach may also be effective in eliciting the ‘right’ forms of combinations, leading to climate action.

The findings revealed two additional important insights in relation to the cognitive and behavioural dimensions of PBE. In relation to the cognitive dimension, interestingly, the case study by Bascopé and Reiss [39] brought to the forefront Indigenous knowledge as a way of knowing and promoting sustainability. Here, intercultural sensitivity was intertwined with the cognitive learning of traditional cooking and medicine, thus demonstrating the power of PBE to support future sustainability by drawing on deep-time knowledge accumulated over cultural-historical periods.

Interesting findings were also revealed in relation to PBE affordances in the behavioural dimension. Across the four case studies, it was found that students’ participation increased their sense of agency and action competence, giving students a voice. In turn, these learning outcomes had ripple effects across the communities, where the active participation of community members was noted in all four case studies, involving a broad range of community stakeholders. Overall, the findings of the study suggest that PBE may be a useful approach for advancing the educational goals set by SE, particularly through PBE’s ability to provide a balanced holistic educational experience of sustainability.

Limitations

While this study was able to make a strong case for utilising PBE as a leading educational approach in SE, it has its limitations. The first limitation is that this study relied on analysing published case studies. These case studies were not designed specifically for examining the application of the three learning dimensions within PBE framework. This evidently limited the ability to assess the full scope of affordances of PBE in relation to the learning dimensions. Further empirical studies need to be developed with a focus on examining the learning dimensions in PBE.

Another limitation is derived from searching texts only in the English language. This limitation is particularly apparent in the context of PBE research, where the local language forms an inherent part of *place*. Thus, the lack of access to non-English publications may have limited the scope of case-studies covered by this research.

6. Conclusions

Sustainability education is of ever-increasing importance at this point in time as the climate crisis is manifesting itself around the globe. These findings presented an understanding of how examples of PBE have the ability to contribute to developing sustainability awareness amongst students at varying age levels. Factors including connections with the community and environment, the development of cooperative approaches and community building, and the strengthening of relationships—peer to peer, child to adult, and child to nature—showed positive results in regard to both sustainability education practices and understanding. As such, PBE has demonstrated it has potential for enhancing deep and authentic learning in students, with respect to SE.

Further research would be beneficial to explore the long-existing Indigenous and ancestral forms of knowledge which have traditionally taught place-based and sustainability education in an effective way, proving to be of great benefit at this pivotal moment in history.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No data was created.

Acknowledgments: I would like to acknowledge the teaching staff of the Master of Teaching (Secondary) at Victoria University for their invaluable support and expertise during this research. In particular, I would like to express my sincere gratitude to Associate Professor Efrat Eilam for her ongoing guidance and mentorship throughout this project.

Conflicts of Interest: The author declares no conflict of interest.

References

- Smith, G.; Sobel, D. *Place- and Community-Based Education in Schools*; Routledge: London, UK, 2010. [CrossRef]
- Sobel, D. *Place-Based Education: Connecting Classrooms and Communities*; The Orion Society: New York, NY, USA, 2004.
- UNESCO (United Nations Educational, Scientific and Cultural Organization). *Education for Sustainable Development Goals Learning Objectives*; UNESCO: London, UK, 2017. Available online: <https://unesdoc.unesco.org/ark:/48223/pf0000247444> (accessed on 22 February 2023).
- Woodhouse, J.; Knapp, C. *Place-Based Curriculum and Instruction: Outdoor and Environmental Education Approaches*; ERIC Digest: Washington, DC, USA, 2000.
- Green, M.; Somerville, M.; Potts, M. *Place-Based Education for Sustainability in Gippsland Schools: A Report for Participating Schools and the Wider School Communities in Australia about the Implementation of Place-Based Sustainability Curriculum*; University of Western Sydney: Penrith, Australia, 2013.
- Gruenewald, D.; Smith, G. *Place-Based Education in the Global Age, Local Diversity*; Routledge: London, UK, 2008.
- Theobald, P. *Teaching the Commons: Place, Price, and the Renewal of Community*; Routledge: London, UK, 1997.
- Theobald, P.; Curtiss, J. Communities as Curricula. *Forum Appl. Res. Public Policy* **2000**, *15*, 106–111.
- Haymes, S. *Race, Culture and the City: A Pedagogy for Black Urban Struggle*; State University of New York Press: New York, NY, USA, 1995.
- Burgess, C.; Thorpe, K.; Egan, S.; Harwood, V. Towards a conceptual framework for Country-centred teaching and learning. *Teach. Teach.* **2022**, *28*, 925–942. [CrossRef]
- Gruenewald, D.A. The Best of Both Worlds: A Critical Pedagogy of Place. *Educ. Res.* **2003**, *32*, 3–12. [CrossRef]
- Orr, D. *Ecological Literacy: Education and the Transition to a Post-Modern World*; State University of New York Press: New York, NY, USA, 1992.
- Dewey, J.; Dewey, E. *Schools of To-morrow*; E.P. Dutton & Company: Boston, MA, USA, 1915.
- Ross, A. *Curriculum: Construction and Critique*; Psychology Press: London, UK, 2000.
- Keniger, L.; Gaston, K.; Irvine, K.; Fuller, R. What are the benefits of interacting with nature? *Int. J. Environ. Res. Public Health* **2013**, *10*, 913–935. [CrossRef]
- Evans, G.W.; Otto, S.; Kaiser, F.G. Childhood Origins of Young Adult Environmental Behavior. *Psychol. Sci.* **2018**, *29*, 679–687. [CrossRef] [PubMed]
- Ives, C.D.; Abson, D.J.; Von Wehrden, H.; Dorninger, C.; Klaniecki, K.; Fischer, J. Reconnecting with nature for sustainability. *Sustain. Sci.* **2018**, *13*, 1389–1397. [CrossRef]
- Eilam, E.; Trop, T. Factors Influencing Adults' Environmental Attitudes and Behaviors and the Role of Environmental Schools in Influencing Their Communities. *Educ. Urban Soc.* **2014**, *46*, 234–263. [CrossRef]
- Rosa, C.; Collado, S. Experiences in nature and environmental attitudes and behaviors: Settling the ground for future research. *Front. Psychol.* **2019**, *10*, 763. [CrossRef] [PubMed]
- Biesta, G. *World-Centred Education: A View for the Present*; Routledge: London, UK, 2022.
- Orr, D. *Earth in Mind: On Education, Environment, and the Human Prospect*; Island Press: Washington, DC, USA, 1994.
- UNESCO (United Nations Educational, Scientific and Cultural Organization). *Implementation of Education for Sustainable Development in the Framework of the 2030 Agenda for Sustainable Development*; UNESCO: London, UK, 2019. Available online: <https://digitallibrary.un.org/record/3825420?ln=en> (accessed on 22 February 2023).
- Mulvik, I.; Pribuišis, K.; Siarova, H.; Vežikauskaitė, J.; Sabaliauskas, E.; Tasiopoulou, E.; Gras-Velazquez, A.; Bajorinaitė, M.; Billon, N.; Fronza, V.; et al. *Education for Environmental Sustainability: Policies and Approaches in European Union Member States Final Report*; Publications Office of the European Union: Maastricht, The Netherlands, 2021.
- UN (United Nations). *United Nations General Assembly Resolution 72/222*; UN: New York, NY, USA, 2018. Available online: <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N17/466/61/PDF/N1746661.pdf?OpenElement> (accessed on 22 February 2023).
- UNESCO (United Nations Educational, Scientific and Cultural Organization). *Education for Sustainable Development: A Roadmap*; UNESCO: London, UK, 2020. Available online: <https://unesdoc.unesco.org/ark:/48223/pf0000374802> (accessed on 22 February 2023).
- UNESCO (United Nations Educational, Scientific and Cultural Organization). *Education Content Up Close: Examining the Learning Dimensions of Education for Sustainable Development and Global Citizenship Education*; UNESCO: London, UK, 2019. Available online: <https://unesdoc.unesco.org/ark:/48223/pf0000372327> (accessed on 22 February 2023).
- Ontong, K.; Le Grange, L. The Role of Place-based Education in Developing Sustainability as a Frame of Mind. *S. Afr. J. Environ. Educ.* **2014**, *27*, 27–38.

28. Baxter, P.; Jack, S. Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *Qual. Rep.* **2008**, *13*, 544–559. [[CrossRef](#)]
29. Yin, R. *Case Study Research and Applications: Design and Methods*, 6th ed.; Sage Publications: Thousand Oaks, CA, USA, 2018.
30. Hayes, R.; Kyer, B.; Weber, E. *The Patent Quality Cookbook: Identifying Perception Gaps at the USPTO*; Washing D.C. Project Center: Washington, DC, USA, 2015.
31. Saunders, M.; Lewis, P.; Thornhill, A. *Research Methods for Business Students*; Pearson: London, UK, 2018.
32. Cohen, L.; Manion, L.; Morrison, K. *Research Methods in Education*; Taylor & Francis Group: London, UK, 2011.
33. Teddlie, C.; Yu, F. Mixed Methods sampling: A typology with examples. *J. Mix. Methods Res.* **2007**, *1*, 77–100. [[CrossRef](#)]
34. Guest, G.; Namey, E.; Chen, M. A simple method to assess and report thematic saturation in qualitative research. *PLoS ONE* **2020**, *15*, e0232076. [[CrossRef](#)]
35. Merriam, S.; Tisdell, E. *Qualitative Research: A Guide to Design and Implementation*, 4th ed.; John Wiley & Sons: Hoboken, NJ, USA, 2016.
36. Lincoln, Y.; Guba, E. *Naturalistic Inquiry*; Sage: Thousand Oaks, CA, USA, 1985.
37. Haas, C.; Ashman, G. Kindergarten children's introduction to sustainability through transformative, experiential nature play. *Australas. J. Early Child.* **2014**, *39*, 21–29. [[CrossRef](#)]
38. Ito, H.; Igano, C. Place-based environmental education to promote eco-initiatives: The case of Yokohama, Japan. *Reg. Stud. Reg. Sci.* **2020**, *7*, 292–308. [[CrossRef](#)]
39. Bascopé, M.; Reiss, K. Place-Based STEM Education for Sustainability: A Path towards Socioecological Resilience. *Sustainability* **2021**, *13*, 8414. [[CrossRef](#)]
40. Littrell, M.K.; Tayne, K.; Okochi, C.; Leckey, E.; Gold, A.U.; Lynds, S. Student perspectives on climate change through place-based filmmaking. *Environ. Educ. Res.* **2020**, *26*, 594–610. [[CrossRef](#)]
41. Cincera, J.; Valesova, B.; Krepelkova, S.; Simonova, P.; Kroufek, R. Place-based education from three perspectives. *Environ. Educ. Res.* **2019**, *25*, 1510–1523. [[CrossRef](#)]
42. Wilson, E. *Biophilia: The Human Bond with Other Species*; Harcard College: Cambridge, MA, USA, 1984.
43. Bögeholz, S. Nature experience and its importance for environmental knowledge, values and action: Recent German empirical contributions. *Environ. Educ. Res.* **2006**, *12*, 65–84. [[CrossRef](#)]
44. Chawla, C. Learning to love the natural world enough to protect it. *Barn* **2006**, *2*, 57–78. [[CrossRef](#)]
45. National Research Council. *Inquiry and the National Science Education Standards: A Guide for Teaching and Learning*; The National Academies Press: Washington, DC, USA, 2000. [[CrossRef](#)]
46. Rousell, D.; Cutter-Mackenzie-Knowles, A. A systematic review of climate change education: Giving children and young people a 'voice' and a 'hand' in redressing climate change. *Child. Geogr.* **2020**, *18*, 191–208. [[CrossRef](#)]
47. Brosch, T.; Steg, L. Leveraging emotion for sustainable action. *One Earth* **2021**, *4*, 1693–1703. [[CrossRef](#)]
48. Baudon, P.; Jachens, L. A Scoping Review of Interventions for the Treatment of Eco-Anxiety. *Int. J. Environ. Res. Public Health* **2021**, *18*, 9636. [[CrossRef](#)] [[PubMed](#)]

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