

Outdoor Learning in Early Childhood Education

A Narrative Review

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Outdoor learning environments can be beneficial in enhancing children's engagement and motivation in different activities. Outdoor learning environments have the potential to enable transforming and meaningful experiences with imagination and play as well as to evoke ideas for craft, design, and technology education. This study aims to describe outdoor learning implementation in early childhood education based on previous studies. For this, the following research question is addressed: What are the typical opportunities and challenges in implementing outdoor learning in early childhood education? The answer is discussed in accordance with craft, design, and technology education in early childhood. The methodological approach of this study is a narrative review. The data includes 10 peer-reviewed journal articles and book chapters, which were categorized into six categories: All-around development of children, Well-being, Multimodal hands-on learning possibilities, Nature as a resource, Teachers as mediators, and Organization. From the basis of the results, it seems obvious that carrying out CDT projects as outdoor learning would benefit children's all-around development and well-being as well as enhance their multimodal hands-on learning opportunities. The results can be taken as a basis for researchers to plan an empirical study in outdoor contexts. They can also serve teachers as they plan a technology learning project in an outdoor environment with their younger students and teacher training in outdoor environments.

Keywords: outdoor learning environment, early childhood education, craft design and technology education, narrative review

Introduction

It has been noticed that people stay inside too much and lose their connection to nature. This is problematic since there is a strong connection between nature and human well-being. For children, handling natural materials and having a connection to their micro-organisms is also important from the immunity viewpoint (Roslund et al., 2020). Outdoor learning has undisputed benefits for physical and mental well-being (Humberstone & Stan, 2011). Traditionally, learning in craft, design, and technology (CDT) education has been organized in indoor settings since materials, tools, machines, and other equipment are usually stored and used inside. Furthermore, safety culture and rules in inside working stations and with tools are important in preventing incidents and accidents. The influence of a learning environment on children's technology projects is crucial since it is one precondition for creativity (Bodrova & Leong, 2015) and is an intrinsic factor that enhances innovative work (Sheridan et al., 2014).

One of the main objectives in the Finnish curriculum for early childhood education (FNBE, 2016) is to promote children's interest in society, especially the local community, and to strengthen their involvement with their own environment. The curriculum emphasises enhancing children's interest in science and technology and in creative designing and making. Technology education for young children can be seen as a wide-ranging and practical hands-on activity that shares common goals with other learning areas (FNBE, 2016), especially with crafts. The learning areas include designing, creative problem solving, examining and experimenting with structures and materials, constructing (making), and reflection on the process and products. Children in early childhood education are encouraged to figure out and build various solutions to their own, self-found technological problems using versatile

materials (FNBE, 2016; Turja, 2011; Yliverronen, 2019). In these learning processes children create personal and unique outputs. These processes enable them to use their own experiences, knowledge, and observations while completing assignments (Aerila, et. al., 2019). Thinking processes, designing, and hands-on making form a new perception of technology via self-made solutions for learning assignments and tasks.

Young children's learning is holistic, and they learn by playing, moving, exploring, working on different assignments, expressing themselves, and through versatile activities (FNBE, 2016). Children learn about the world around them best through what they experience, not through what they are told (Rönkkö et. al., 2016). They are typically interested in small-scale observations and investigations such as nature phenomenon (e.g., animals and water), observing real-world technological solutions and their functionality, examining phenomenon related to nature and technology, and making artefacts because of their experiences (Rönkkö et al., 2021). Playful exploration is inherent in all young children's activities (Stylianidou et al., 2018). Through play and exploratory activities the child seeks information about him/herself and the phenomena of the world around him or her (Bodrova & Leong, 2015). Teachers promote children's ability and understanding of technological phenomena to find solutions to various problems of interest (Sundqvist & Nilsson, 2018).

In educational settings an outdoor environment is usually considered an outside (non-inside, out of classroom) environment like a forest, a park or a playground (see e.g., Finn et al., 2018), a special outdoor learning centre (Humberstone & Stan, 2011), as well as a field trip (Mellvig & Nilsson, 2015) or rural environment (Duron-Ramos, et al., 2021). The studies on outdoor learning can also deal with nature schools or forest schools where students stay one day or longer and learn with teachers that are nature experts (Sjöblom & Svens, 2019). The outdoor learning environment is an informal environment that is based on authentic experiences. It increases children's opportunities to feel, smell, see, hear and taste (Wilson, 2012). In this study, we define outdoor learning as authentic learning implemented in natural outdoor environment, e.g., a forest, a park, a school yard or a playground where children can move, play, design and investigate actively and craft and construct to express their ideas in a form of practical solutions. We ask if the CDT education projects in early childhood education could be carried out as outdoor learning.

The latest research indicates that nature may increase general human well-being and health. Natural environments have a calming effect, reduce stress, and promote vitality, creativity, and positivity. Even short-term visits to nature have positive effects on stress relief compared to urban environments. (Tyrväinen et al., 2014). In addition, visiting nature can lower pulse rate and blood pressure, reduce cortisol levels and enhance parasympathetic nervous activity (Lee et al., 2012). The biodiversity hypothesis states, that contact with natural environments enriches the human microbiome, protects from allergy and inflammatory disorders, and promotes immune balance. It encourages people to be in the nature, to touch, eat, breathe, experience, and enjoy it for health and well-being reasons (Haahtela, 2019) The related research shows an example of a biodiversity intervention where enrichment from day care centre yards for microbial biodiversity enhanced children's immune regulation and was associated with changes in the skin and gut microbiota in a month (Roslund et al., 2020). Nedovic and Morrissey (2013) also found that children's physical activity increased in the mulched area that replaced the concrete path.

Many raw materials that can be used in early childhood CDT education come from nature, e.g., pieces of wood, sticks, stones, leaves, ice, and sand. A technology learning project topic and theme could be, for example, how to help animals reach their nests safely after food seeking. By inventing a solution, a child experiences a technology creation process through ideation, problem definition and solving it by hands-on work that integrates technical details and parts of a systemic solution (Grönman & Lindfors, in press). To allow children authentic learning experiences where they can investigate, for example, ants' routes to their nests, the learning project must be carried out in nature as child-centered, situated learning that is based on and emphasizes social interaction between learners and their environment (Lave & Wenger, 1991). Then, knowledge is presented in an authentic environment instead of a classroom and the learning is embedded within activity, context, and culture. Situated learning contains the idea of

moving learning closer to real life’s phenomena (Lave & Wenger, 1991; Lombardy, 2007; Vartiainen, 2014). This appears in learning by doing and experiential learning, which is considered one of the most effective ways to learn (Kolb & Kolb, 2018; Lombardy, 2007).

This study is part of the InnoPlay 2018–2021 research and development project that aims to enhance CDT education in early childhood education. In the project there is an ongoing sub-project aiming to advance early childhood education CDT projects outdoors (InnoPlay). This study aims to identify and describe the typical challenges and opportunities of outdoor learning implementation in early childhood education, based on the previous studies. For this, the following research question is addressed: What are the typical opportunities and challenges in implementing outdoor learning in early childhood education? The findings are discussed in accordance with craft, design and technology education in early childhood.

Method

The methodological approach of this study is a narrative literature review (see e.g., Grant & Booth, 2009; Snyder, 2019). This approach was chosen to provide a pilot synthesis of the previous studies and outline the connections, synergies, and dissonances across the different perspectives of outdoor learning and CDT education. The data, 10 peer-reviewed journal articles, were gathered via Volter, the electronic library database of the University of Turku. The keywords used to identify the articles were “outdoor learning”, “technology education” and “early childhood education”. Through the keyword search and a careful sorting process, the ten most relevant articles for this study were chosen. Due to the pilot nature of the study, the number of articles meeting the keyword criteria were moderate and the search did not include limitations by language or publishing years. The rarity of the context of early childhood education helped the sorting process for identifying the most relevant sources for this study. Most of the selected articles studied teachers’ views on outdoor learning (1, 2, 4, 5, 7, and 8) and in some (1, 2, 3, 5, 9 and 10) children’s view was also included. In this study, we do not distinguish between early childhood education and pre-primary education.

Table 1. The research data.

	Authors	Title
1.	Boileau & Dabaja (2020)	Forest School practice in Canada: a survey study
2.	Dowdell, Gray & Malone (2021)	Nature and its influence on children’s outdoor play
3.	Harris (2017)	Outdoor learning spaces: The case of forest school
4.	McClintic & Petty (2015)	Exploring early childhood teachers’ beliefs and practices about preschool outdoor play: A qualitative study
5.	Nedovic & Morrissey (2013)	Calm active and focused: Children’s responses to an organic outdoor learning environment
6.	Sandven (2019)	Å kjenne seg i slekt med jorden. Natursløyd og økosofi i fremtidens tverrfaglige skole
7.	Tuuling, Õun & Ugaste (2019)	Teachers’ opinions on utilizing outdoor learning in the preschools of Estonia
8.	Vartiainen, Nissinen, Pöllänen & Vanninen (2018)	Teacher’s insights into connected learning networks: Emerging activities and forms of participation
9.	Yildirim & Akamca (2017)	The effect of outdoor learning activities on the development of preschool children
10.	Zamani (2016)	The woods is a more free space for children to be creative; their imagination kind of sparks out there: Exploring young children’s cognitive play opportunities in natural, manufactured and mixed outdoor preschool zones.

The selected articles (Table 1) were systematically reviewed and monitored. The challenges and opportunities of outdoor learning in early childhood education, presented in the selected articles, were identified and themed into a table by using a qualitative data-based content analysis (Krippendorff, 2019) and more detailed a document analysis (Bowen, 2009). The challenges and opportunities were divided into subcategories using an inductive categorization and named (Elo et. al., 2014). Finally, the subcategories were integrated into six categories that were identified to describe the challenges and opportunities of outdoor leaning implementation in early childhood education.

Results

The opportunities and challenges of implementing outdoor education in early childhood were categorized into six categories: All-around development of children, Well-being, Multimodal hands-on learning possibilities, Nature as a resource, Teachers as mediators, and Organization (Table 2). In Table 2 the categories are presented one by one and opportunities and challenges of each category are specified by subcategories.

Table 2. Opportunities and challenges of implementing outdoor education in early childhood education. Note that some categories were seen as both opportunities and challenges. The differences are clarified in the text below this table.

Sub-category: Opportunities of outdoor learning	Categories of outdoor learning implementation	Sub-category: Challenges of outdoor learning
Social and personal development of children	All-around development of children	Social and personal development of children
Holistic development		Holistic development
Enhancement of health and activity	Well-being	
Enhancement of joy and satisfaction		
Enhancement of creativity	Multimodal hands-on learning opportunities	
Use of senses		
Hands-on learning		
Learning about nature	Nature as a resource	Restrictions in use of materials
Materials in nature		
Teacher’s role in outdoor learning	Teachers as mediators	Teacher’s role in outdoor learning
		Lack of knowledge and motivation in use of outdoor environments
Space and equipment	Organization	Space and equipment
		Safety, prevention, and weather

All-around development of children in outdoor learning

All-around development of children in outdoor learning is made up of two subcategories of opportunities and challenges: Social and personal development, and Holistic development of children. In several studies (5, 7, 10) it was emphasized that outdoor learning provides access to the natural environment which enhances natural opportunities for social interactions and play. It was stated that natural environments encourage creating interaction during practical, hands-on activities and social competence can be developed in teams. This was recognised to relax the relationship between children of various age groups in early childhood education. In addition, it was stated that the natural environment stimulated children’s teamwork, sense of responsibility, competence and significantly enhanced children’s social-emotional skills.

Holistic development of children is the other subcategory of all-round development in outdoor learning implementation. The studies (9, 10) emphasized that children's cognitive skills, linguistic skills and motor skills were enhanced significantly after the several weeks of outdoor education since the natural environment was stimulating. Teachers mentioned (10) that the outdoor space created different educational opportunities for children, enabling them to learn about their bodies, their surroundings and science. Being in nature and doing collaborative craft outdoors was seen to help a child create their own "ecosophy" by experiencing and being conscious of the power of nature and its artefacts (6). This was seen as creating different educational opportunities for children, enabling them to learn about their bodies, their surroundings, and science (10).

The challenges of outdoor learning implementation were mostly considered by teachers' in relation to children's all-around development. Although studies showed that outdoor learning strengthens children's diverse growth, several teachers (7) did not emphasize its importance in supporting children's social and personal development and did not consider a broader influence of outdoor activities according to aspects of health and welfare.

Well-being in outdoor learning

This category was understood only from the side of opportunities: Promoting health and activity, and Promoting joy and satisfaction. It was emphasized that being outdoors increased a healthy lifestyle (7) and calmed and relaxed children (5). It was stated that learning in nature increased activeness of children. Children were more active in moving, playing and participating in learning tasks. They seemed to learn more easily outdoors (7). The sub-category of promoting joy and satisfaction was seen to strengthen self-confidence and self-esteem. It was stated that enhancing children's curiosity, sense of freedom and sense of wonder can be raised with inspiring materials from nature (10).

Multimodal hands-on learning opportunities in outdoor learning

The analysis of the category was formed on the basis of three opportunity subcategories: a) Enhancement of creativity, b) Use of senses, and c) Hands-on learning. Awaking an interest to enhance children's creativity in outdoor learning was recognized as a main goal of teachers. The experienced teachers believed that nature raises children's curiosity with seasonal change and the flexibility of natural features. They also gave credence to the power of observation and inquiry-based activities for provoking children's imagination and fantasy (2). Teachers considered the diversity of plants and creatures inspiring of children's curiosity and imagination (10).

According to the data, one emphasis of outdoor learning was to motivate children to use all of their senses in the immediate exploration, testing and observation of nature. At the same time natural materials were seen usable in integrating different functions, creating experiments, drawing, writing, calculating, and measuring (7). The main recommendation was for children to touch, do and move (10) and use their senses by studying, testing, and observing (7). Further, children were encouraged to experience their environment with their hands even if their hands would get dirty (2). Learning outdoors was seen to reduce children's risk behavior, which could develop children's risk awareness (10).

The hands-on learning sub-category emphasized making and doing in practice and getting authentic experiences in outdoor learning. Child-centred, inquiry-based activities and imagination were seen as benefitting children in problem-solving and creative thinking through practical actions and experiences and by directly interacting with what they learn about. (2, 7, 9).

Nature as a resource of learning

The category of Nature as a resource of learning included an opportunity of learning about nature and use of materials in nature. The diversity of natural environments was seen to provide a rich setting for exploration and discovery of nature, and it stimulated complex and exiting play opportunities for children (4, 7). Teacher's commented that seasonal changes did contribute to better knowledge about nature (10). Being in nature also increased children's respect towards nature and their environmental awareness (1, 6).

The use of natural materials such as trees, bushes, woodchips, plants, stones, water, ice, rocks and sand was seen as a rich opportunity (2, 7, 10). Natural materials inspired children's creativity and cognitive play. Playing with natural materials also slowed children's play down and led to more frequent, deeper and longer lasting play (5). Children themselves wanted to have more often plants, water, soil or mud instead of non-natural elements such as commercial toys in the garden (5). Teachers also preferred to have more organic materials and less synthetic materials in the garden including the replacement of a concrete path with tan bark mulch (5) Teachers also mentioned that the natural materials gave the possibility of direct contact with nature (7). As a challenge, there were some restrictions in use of the natural materials related to the season and permissions for taking them. Children could also destroy some plants and bushes (5, 6).

Teachers as mediators of outdoor learning

This category highlighted Teacher's roles in outdoor learning. According to studies (2, 8) teachers play an essential role in supporting children's motivation and interest in outdoor environment. A stimulating teacher with good teaching strategies was seen to be capable of awakening children's love and excitement towards nature and the outdoor environment. In particular, children with disabilities or those who were usually uninterested in studying participated with enthusiasm in an outdoor project (8). The teacher's role in outdoor learning was recognized to be as a mediator or facilitator that enables learning with the child by acquiring knowledge together with the children. Working outdoors challenged teachers to develop their way of being in relationships with children (7). A teacher had to be supportive, available and rely on a child's own decisions when children were actively engaged with the space and elements. The teacher's role was seen as being to encourage, stimulate and provide feedback.

Teachers' lack of knowledge and motivation in use of outdoor environments hindered outdoor activities. It was acknowledged that teachers were used to teaching indoors, and this method of working was hard to change (4, 7). Teachers identified their own childhood outdoor play memories: virtues of freedom, creativity, and imagination. However, a lack of knowledge and experience appeared in many ways: teachers' indolence, inconvenience, and their lack of will and motivation. Some teachers mentioned that it was more difficult to organize group work outdoors, and that preparation and planning takes too much time. Although teachers valued the outdoors for the opportunities it provides for interaction, exploration and hands-on learning, their understanding was quite narrow.

Organization of outdoor learning

The category was formed of sub-categories of Space and equipment, and Safety, prevention and weather. It was emphasized that the natural environment offers various spaces where different learning styles and activities, and also calming atmospheres, are permitted without need for special learning equipment (3, 7). It was stated that children concentrated better outdoors and were more receptive to learning. Learning space and equipment allowed learning with open-ended tasks and inquiry-based activities.

Challenges in the organization of outdoor learning seemed to be the lack of separate areas for activities, study aids for all children and outdoor environments as learning spaces (3, 4, 7). In addition, noise and traffic could make it difficult to implement outdoor learning activities effectively (7). It was stated that

safety and risk prevention meant a need for increased awareness by teachers, for example during risky outdoor activities, such as using tools (e.g., knives), building fires, and climbing trees. Sometimes teaching was disturbed because children's attention was easily distracted. One teacher's point of view was that going outside into nature took too much time and it was hard to organize teaching outdoors (1). It seemed that bad weather is a factor that hinders the use of outdoor learning, and that outdoor learning depended on the seasons.

Conclusions

The aim of the study was to identify and describe the typical challenges and opportunities of outdoor learning implementation in early childhood education. The categories formed in the analysis (Table 2) describe the opportunities and challenges in relation to children's all-around development and well-being. It was found that outdoor learning environments provide a space for multimodal hands-on learning where children can use their senses and enhance their creativity (e.g., Tuuling et. al., 2019). Nature as a resource for learning was seen as offering a possibility to learn about nature and use natural materials (e.g., Zamani, 2016; Tuuling et. al., 2019). When teachers acted as mediators, they facilitated children's curiosity, experimentation and investigation in problem solving (e.g., Dowdell et. al., 2011; Vartiainen et. al., 2018). However, teachers did not always promote outdoor learning since they lacked knowledge and motivation and did not consider outdoor learning benefits from the children's all-around development point of view (e.g., McClintic & Petty, 2015; Tuuling et. al., 2019). Safety issues were considered as challenges as well as the suitability of natural spaces, and use of equipment and materials (Boileau & Dabaja, 2020). From the basis of the results, it seems obvious that carrying out CDT projects as outdoor learning would benefit children's all-around development and wellbeing as well as enhance their multimodal hands-on learning opportunities.

This pilot study was based on a narrative review of ten peer-review research articles as document data and involved the categorisation of authentic phrases from the research results of the studies. Evidently, CDT education organized as outdoor learning would help with reaching the goals of curriculum (FNBE, 2016). However, there is a need for more studies to increase the current level of understanding of outdoor learning especially from CDT education point of view. Some teachers seem to lack the motivation and knowledge of how to implement outdoor learning and they are concerned about spaces and equipment as challenges (Table 2). In CDT education there is a need for tools and materials to be used together with natural materials in outdoor learning. It seems that there is need for including outdoor learning as a content area for teachers' pre-service and in-service training.

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