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An exploration of children's experiences of the use of digital technology in forest schools

Angela Garden

School of Education, Liverpool John Moores University, Liverpool, UK

ABSTRACT

Forest schools are distinctive outdoor spaces that are often regarded as an alternative to mainstream education. Their increasing popularity in the United Kingdom is often attributed to a perceived decrease in children's outdoor play, due to a concomitant increase in children's use of digital technologies in the home; further compounded by the Covid-19 pandemic. This study explores how iPads can enhance outdoor learning activities. Semi-structured interviews were conducted with 32 Key Stage 2 children selected from two UK primary schools. The interviews explored the experiences and opinions of the children about the role of iPads in the forest school space using Interpretive Phenomenological Analysis (IPA). Findings suggest that Forest School spaces can accommodate new technologies through accommodation of the outdoor environment and technology. Suggestions for future research include the meaningful integration of iPads into Forest School practice while considering the relative influences of space and place.

KEYWORDS

Forest school; iPads; digital technology; outdoors; children; space

Introduction

Forest schools in the UK have grown in popularity over the past 25 years as part of a wider interest in outdoor learning (Cudworth & Lumber, 2021). Key to their growing popularity is concern over the lack of exposure of children to outdoor experiences and a decrease in their engagement with nature. Children are increasingly adapting to an 'indoor' lifestyle, including an increase in the use of digital technology in the home. According to Coates and Pimlott-Wilson (2018), children's increased use of digital technology has played a crucial role in a decline in their engagement with outdoor activities. Furthermore, the Covid-19 pandemic, which affected the UK from March 2020, contributed to children staying indoors and restricting contact with their peers. It is often argued that the decrease in outdoor activity is, in part, due to a concomitant increase in young people's exposure to digital technologies. However, little is understood about the potential of such technologies to enhance outdoor spaces. Often technology and outdoor activities are viewed as existing within an 'either/or' relationship, but this may well be a false dichotomy. It has been argued that children's engagement with nature and the outdoor environment has been compromised by digital technology which provides a quicker, easier, and less demanding form of interaction and intellectual development (Louv, 2005).

The Forest School Association (FSA) highlights the increased detachment of UK children from nature (Forest School Association, 2021). The FSA promotes a learning process that develops children's knowledge and social skills through experiential learning in the outdoor environment.

CONTACT Angela Garden a.s.garden@ljmu.ac.uk Liverpool John Moores University, Education Building, Maryland Street, Liverpool L1 9DE, UK

*wellbeingmattersljmu @wellbeingljmu

Forest schools play a crucial role in promoting curiosity and creativity and enhance the ability of children to use all five senses (Dabaja, 2021). Dabaja explains that Forest Schools are underpinned by the philosophy of child-initiated, child-led and intrinsically self-motivated learning activities. With their focus on play-pedagogy they are often viewed as an alternative learning experience to the more structured classroom environment. Play-pedagogy can also complement traditional classroom teaching, particularly for Key Stage 2 children, the phase of education of the children in this study. I challenge a dualism prevalent in relation to the field of outdoor education between perspectives that argue for excluding digital technology, a component of traditional education, and those that are open to including it. Although forest schools (and other forms of outdoor education) aim to provide an alternative setting to the traditional classroom, there is increasing interest in the use of iPads in outdoor learning. Drawing on relevant literature and 32 semi-structured interviews, this study examines the benefits of blending digital technology with traditional forest school activities, utilising iPads as a tool to enhance children's connection with nature (Holloway & Mahan, 2012).

Forest schools in the UK

Forest schools were first introduced in the UK following an expedition to Denmark by staff and students from the early years' education department at Bridgwater College in Somerset (Knight, 2016). The outdoor learning system of the Danes (*Udeskole*) was adapted and applied to nursery-age children. The children involved were found to be highly motivated and their self-confidence and concentration increased over time, leading to improved learning outcomes. The UK has seen a steady increase in the number of forest schools established in recent years. They are viewed as enabling children to simultaneously learn, play, and connect with nature (Barrable & Arvanitis, 2019). The outdoor learning environment is seen to enhance a pedagogical approach that includes children's physical and mental wellbeing.

The value of forest schools has gradually gained in popularity since 2016, prompting the widespread adoption of outdoor learning in many parts of the UK.

Forest school in the UK has been inspired by a Scandinavian approach to early years' education, which has a strong focus on the importance of 'place' for learning. The Forest School concept was brought to England by the staff of Bridgwater College, Somerset after an exchange visit to Denmark in 1993. The current UK Forest School approach is underpinned by the Forest School Association (FSA), set up in 2011 to support those involved. In contrast, the Danish udeskole approach is deeply ingrained in decades of practice within a very established early years' ethos (Williams-Siegfredsen, 2017). There is a significant level of heterogeneity within the activities undertaken under the forest school banner. This is problematic when attempting to unravel what makes forest schools unique from other outdoor learning experiences (Garden & Downes, 2021). Forest schools provide children with regular opportunities to engage in outdoor activities, ideally in a woodland setting (Forest School Association, 2021).

The Forest School Association (2021) oversees the training of qualified practitioners to guide the children through outdoor learning activities. The training programme equips practitioners with the relevant knowledge and skills to ensure safety and offer pedagogical value to the children. Practitioners expose the children to the natural environment, guiding them through supported play-based learning activities that transcend the academic development attainable in the conventional classroom setting. The informal nature of forest schools also plays a crucial role in enhancing the mobility of the children and equipping them with the freedom to engage in multiple outdoor learning activities (Harris, 2017). Forest schools allow the children to enter and exit a range of learning environments, engaging with different learning activities, and developing the confidence to navigate and learn from them. As outdoor learning environments do not have the restrictions on movement and sound that characterise conventional UK classrooms, the children have more space and autonomy to develop their imaginations and enhance their learning skills (Dabaja, 2021).

Outdoor learning overcomes the confines of the indoors, supporting children's holistic development. Reduced contact with nature was a significant theme identified in the forest school literature (Garden & Downes, 2021). This is characterised by conceptualisations that emphasise a contemporary disconnect between society and nature and is often contrasted with a previous golden age of outdoor activity. In the UK, the 'Learning Outside the Classroom Manifesto' (DfES, 2006) encouraged a move towards more diverse learning sites, including the outdoors. The provision of outdoor learning through the Early Years Foundation Stage (EYFS) became mandatory in 2007.

The theory of social constructivism can be applied to outdoor learning. Social constructivism proposes that knowledge develops because of social interaction and language use, and is therefore a shared, rather than an individual, experience. The learner is not an observer but an active participant in the acquisition of knowledge. Social constructivist learning also acknowledges the role of adults in the interactive learning process as facilitators of learning. Teachers and parents provide support during learning activities as the child develops and matures, gradually removing 'scaffolding' to encourage greater independence (Bruner, 1983) and to make connections between concepts (Vygotsky, 1978). The modelling of the whittling of wood with a knife by a trained forest school leader, for example, affords the children the opportunity to safely test out the skills required. Using effective 'scaffolding' of the use of iPads within a forest school context contributes to an increase in independent learning using digital technology.

Teachers provide opportunities for learning through social interaction between the children and between the children and their environment. An example of a collaborative forest school task is that two children build a 'bug den' to attract insects. Learning how to build with structural integrity is one aspect of the task. Another is how to attract insects to the den. A third is the classification of bugs that visit the den. This leads to an exploration of the range of insects in the area and their similarities and differences.

The use of digital technology in outdoor learning: affordance theory

Key concerns around the integration of technology into forest school practice centre around technology as a form of distraction. Instead of engaging in the usual outdoor experiential activities and with nature generally, the child is seen to become distracted and lose interest quickly. Distraction is the most cited negative consequence of using iPads in outdoor experiential learning (Hills & Thomas, 2019). Distraction caused by new digital technology is also viewed to impact negatively on children's face-to-face communication, as an unintended consequence (Thomas & Munge, 2017). Alternatively, Hills and Thomas (2019) argue that, while digital technology can undermine the aim of being outdoors, it also provides opportunities to add to children's learning experience. Rogers (2019) describes how a range of technology has been used in the outdoors for many years and includes clothing, walking boots, compasses and even fire in his review. Rogers argues, therefore, that that there is no outdoor learning without it.

The focus on using digital technology in learning is usually on mobile devices, especially mobile phones, tablets and game consoles. Whenever there is detrimental reporting on children's behaviour or health issues in the UK, blame is often attributed to children's over-reliance on available technology. For example, Bergen (2017) argues that active outdoor motor play embodying cognition and real-world experiences as necessary for children's developing brain processes and that advances in digital technology, such as the use of video games or tablets, contribute to children spending less time engaging in outdoor nature play.

Affordance theory, first proposed by Gibson (1977), proposes that our perception of the environment leads us to take some form of action. 'Affordances,' or clues, suggest possibilities of what that action might be. In the outdoor environment, for example, a rock in the middle of a stream might suggest to the children that they add more rocks to create a 'path' across it. A digital technology 'affordance' might be the realisation by the children that they can capture their learning digitally. For example, when building a bug den in pairs, the children used an iPad to audio record themselves

discussing how the den should be built or made a series of videos over time, showing how they built the den and how the bugs gradually occupied it. In using iPads in this way, the children are doing much more than making a record of their activities; they are learning and creating meaning by interacting with the iPads both individually and as a collaborative pair of learners. Constructing meaning within the collaborative and social context of forest schools can therefore be powerfully combined with digital technology, reinforcing learning.

Louv (2005) suggests that children are spending less time outdoors, arguing that interaction with nature is essential for their physical, emotional and mental development, as well as enhancing learning and creativity. Louv's coining of the term 'nature-deficit disorder' describes children's disconnection from nature, underpinning the argument that a lack of children's engagement with nature leads to an epidemic of inactivity, contributing to diminished use of the senses, attention difficulties, obesity and higher rates of emotional and physical illnesses.

Louv's discourse about the nature of human relationships is, however, culturally and contextually specific. Dickinson (2013) examines Louv's nature-deficit disorder theory and points out that it is confined to one forest conservation education programme. Implicit in Louv's narrative is that children are separated from nature and must return through scientific inquiry to reconnect. Dickinson (2013) argues that nature deficit disorder is a misdiagnosis, as it fails to consider deeper cultural influences and non-traditional communication practices, such as emotional expression. The technologically deterministic viewpoint illustrated by Louv is that technology shapes the development of the social structure and creates its cultural values.

The use of iPads for learning in the outdoors is, therefore, not without controversy. Key concerns around the integration of digital technology within forest school focus on its potential to be a form of distraction. Instead of engaging in active outdoor experiential activities and with nature generally, the child is seen to become distracted and to quickly lose interest. Distraction is the most cited negative consequence of using digital technology in outdoor experiential learning (Hills & Thomas, 2019; Thomas & Munge, 2017), based on the argument that it detracts from the overall experience. Digital technology is also regarded as impacting negatively on children's face-to-face communication (Thomas & Munge, 2017). Another concern is that it creates a barrier between the learner and the outdoor environment (Coates & Pimlott-Wilson, 2018; French, 2016). Alternatively, Hills and Thomas (2019) argue that, while digital technology can undermine outdoor learning, it also provides opportunities to enhance children's learning experience. These arguments confirm the debate found in the literature that digital technology can create both opportunities and threats in the outdoor learning environment.

A study by Van Kraalingen (2021) of 33 reviewed articles on the use of mobile technology in outdoor learning reflect a dualism of views and contradictory evidence as to its effectiveness. Some articles in Van Kraalingen's review emphasise that the portability and accessibility of mobile devices offer new learning opportunities. On the other hand, others point to the complexity of their use, online safety and a diminishing of the quality of experiential learning.

The inclusion of iPads in forest schools can be regarded as adding unique learning benefits and layers of complexity to a more general understanding of the use of technology in learning. In the future, it is likely that the use of digital technology in outdoor education will become as accepted as wearing walking boots and using compasses (Rogers, 2019). It is therefore important to consider how iPads may play a part in encouraging children to engage with learning in outdoor spaces.

This study, therefore, contributes to an understanding of the influence of iPads on outdoor learning activities. Despite the increased number of forest schools, learning activities in the programme focus primarily on playful hands-on experiences in the outdoors (Children & Nature Network, 2021). There is a lack of understanding of how integrating digital technology into forest schools will lead to improved learning. This study explores whether integrating iPads with learning activities provided in forest schools will improve children's engagement or compromise their interaction with outdoor spaces.

Methodology

Research design: phenomenological research

Phenomenological research is a form of qualitative research that focuses on the study of an individual's lived experiences in the world (Neubauer, Witkop, & Varpio, 2019). It aims to describe the essence of a phenomenon by exploring it from the standpoint of those experiencing it. Phenomenological research describes both *what* was experienced and *how* it was experienced. Within this broad definition, there are several philosophical approaches, ranging from transcendental phenomenology, which focuses on consciousness and intentionality of experience, to hermeneutic phenomenological approaches, which explore subjects' lived experiences and their interpretation of experiences to create meaning.

I adopted the hermeneutic phenomenological research method an approach which is oriented to the description and interpretation of the fundamental structures of the lived experience, and to the recognition of the meaning of the pedagogical value of this experience (Fuster, 2019). The focus of the study was, therefore, the experiences of the children when using iPads to describe and interpret the outdoor environment and to evaluate the pedagogical value of their experiences. By combining the reported experience of the pupils, including their understanding of the role iPads played in that experience and interpreting it through Interpretive Phenomenological Analysis (IPA), the study sought to reach an understanding of how iPads can influence and shape children's learning in forest schools.

According to Rajasinghe (2020), IPA is based on phenomenological, hermeneutic, and idiographic research philosophies and is effective in assessing the experiences and feelings of individuals exposed to various phenomena. There are several advantages of hermeneutic phenomenological research. There is value in focusing on how people perceive an event or experience. This is how we make sense of the world and enrich our understanding of how we do so in particular contexts, leading to increased appreciation of how we might develop that understanding in future and there are the benefits of gathering what has been called 'rich data.' This includes feedback from participants that reveals the complexities of the topic being studied as opposed to, for example, collecting frequencies of responses restricted to a 'Yes,' 'No' or 'Don't know' format, often found in structured survey or interviewing methodology.

The researcher was also aware of the potential dangers inherent in the hermeneutic phenomenological approach. Two pitfalls can be broadly viewed under the heading of 'subjectivity.' Achieving validity whether the research methods lead to data that support the conclusions the research draws from it is a challenge, not least because I as the researcher was working on my own and therefore unable to test validity by comparing data and conclusions with a fellow researcher. Reliability whether similar data and results would have been achieved at a different time, or with a different set of pupils or in another location is impossible to guarantee, as this study was not replicated with different subjects and in another forest school. In addition, there is a danger of bias when researching alone and, particularly with hermeneutic phenomenological research, tailoring conclusions to fit a predetermined opinion. There is also the challenge of presenting the data in a format which both makes sense and illustrates key findings.

Methods of data collection

Semi-structured interviews were conducted as the main research method to collect personal experiences in their own words from the children about their use of iPads. The questions were open-ended to enable the researcher to ask an unplanned question to follow-up their answers. The duration of the interviews was on average 10/15 minutes and conducted within the forest school sessions; the interviews were audio-recorded and later transcribed.

Participants

The participants of the research were 32 children from two local primary schools in the UK who attended forest school sessions on a university campus in a designated woodland area. Sessions took place one afternoon per week over a period of one year prior to the introduction of iPads outdoors and were run by an experienced Forest School Leader and Lecturer, along with school staff and student volunteers. The forest school programme consisted of activities such as fire lighting, den building, digging, planting, cooking, arts and crafts and skills-based activities such as whittling.

Children were recruited via emails sent to the parents of the selected children. The parents issued their informed consent, and the children confirmed their agreement to participate in the interview process. The interview data used only the first letter of each child's name which was converted to a pseudonym to protect their identities (Data Protection Act, 1998). The British Research Association's Ethical Guidelines for Research (BERA, 2018) note that participants have the right to withdraw from research without explanation (3.1). The participant information sheet, consent form and the letter made the children aware of this right to withdraw without providing a reason.

School 1

School 1 was a smaller than an average sized UK primary School, consisting of mainly pupils aged between 4 to 10 years from a white, British background of lower-than-average socio-economic status. 16 pupils (10 girls and 6 boys) from School 1 agreed to participate in the interviews, with their parents providing written consent. The researcher interviewed the children in-person within the forest school sessions, with responses gathered via audio-recording.

School 2

School 2 was a larger than average primary school, consisting of mainly pupils aged between 4 to 8 years from a white, British background. School 2 had a wealthier catchment area than School 1. 16 children (8 girls and 8 boys) agreed to participate in the interviews, with their parents providing written consent.

The notable difference in the demographic composition of the participants was crucial in enhancing the diversity of the data collected. This enabled the study to accommodate the experiences of participants from diverse socio-economic backgrounds, thus expanding the range and representativeness of the data collected.

Data analysis

The study employed IPA in evaluating the data collected from the semi-structured interviews. Smith and Osborn (2015) describe IPA as a qualitative approach which aims to provide detailed examinations of personal lived experience. It produces an account of lived experience in its own terms rather than one prescribed by pre-existing theoretical preconceptions and it recognises that this is an interpretative endeavour, as humans are sense-making organisms. It is explicitly idiographic in its commitment to examining the detailed experience of each case in turn, prior to the move to more general claims (Smith & Osborn, 2015).

IPA was, therefore, ideally suited as a method of analysing the data collected. It enabled the researcher to explore the findings with an open mind and to focus attention on the subjective experience of each child, as well as reporting their collective experience.

Data analysis consisted of five crucial steps (Groenewald, 2004):

(1) Bracketing and Phenomenological Reduction

'Bracketing' is the suspension of judgment so that the researcher can focus on analysing the participants' experiences. Its inception began with Kant who argued that the only reality that one can know is the one each individual experiences in their mind. Husserl built on Kant's idea, first proposing bracketing in 1913 to help better understand another's phenomena (Groenewald, 2004).

'Phenomenological Reduction' describes the process of experiencing an unfamiliar phenomenon without being prepared in advance for that experience through the acquisition of knowledge about it. An example of being prepared for an unfamiliar experience is children being taught about the habits and behaviour of worms before observing them in their natural environment. If the children knew nothing about worms and their teacher asked them to observe worms and record their experiences digitally on their iPads, this would be an example of phenomenological reduction. The knowledge and learning that the children acquired about worms would be directly attributable to their experience, as they would have no preconceptions about what they would find.

This stage entailed the researcher becoming familiar with the language and terms used by the children in their responses to the interview questions. The researcher listened several times to the recording of each interview to identify the unique factors that characterised the experience of each child. The researcher maintained an objective mindset when analysing the recordings. This was essential in eliminating the influence of the researcher's interpretations on interviewees' responses.

(2) Defining the Units of Meaning in the Data

The second step was crucial in elucidating the data collected. The researcher identified and isolated interviews that referred specifically to the impact of digital technology on learning in outdoor spaces. Coding was essential to establish the credibility of the study and to eliminate statements which were redundant because they did not relate to the link between the use of digital technology and learning. Responses that recurred in interviews were attributed with the same code.

(3) Grouping of Themes

The researcher grouped the responses identified in Step 2 to create discernible themes. Grouping the themes was based on the similarities and connections between them (Pietkiewicz & Smith, 2012). The researcher classified units of meaning from individual responses under each theme by listening to the recording of each interview several times and cross-checking it with the factors identified in Step 1. This process highlighted the key or primary themes that emerged from the interviews and their recurring content.

(4) Revision of the Themes

The researcher reviewed the themes by summarising the information obtained from the interviews. This step increased the accuracy of the data collected. Some of the themes were renamed to ensure precise identification of their content, and the sub-themes were revised to ensure that they were accurately represented in the children's responses.

(5) Development of a Summary

After completing Steps 1 to 4, the researcher checked the themes again to ensure that they reflected the views of the children. The content was then summarised, and the themes developed. This step allowed the researcher to explain how the experiences and opinions of the children shaped an

understanding of the role of digital technology in outdoor learning and to develop theories that underpinned and illuminated the research topic.

Adopting an IPA approach to analysis enabled the researcher to achieve consistency when developing the themes and to confirm that the central ideas generated from the data analysis process were relevant to the aims and objectives of the research. The researcher was thus able to produce results that accurately reflected the researcher's annotations on ideas and themes made during data analysis on the transcripts of the interviews with the children.

Results

A qualitative analysis was carried out on the impact of participation of the children in outdoor learning activities in forest schools and how integrating iPads influenced their learning experiences.

Affiliation with the outdoors

Forest schools provide an alternative learning environment to the mainly indoor and relatively confined classroom setting. The children engaged in the study reflected a high level of interest in participating in outdoor activities. Most of the children stated that they enjoyed outdoor activities due to the flexibility and autonomy allowed during the sessions. The children found that the conventional classroom setting limited the opportunities for socialising and having fun:

'I enjoy playing in the forest with my friends. We get to run and chase butterflies while the teacher leads us in fun activities like hill slides and building simple traps for small animals' (Jack, School 1).

'I like the wild because it contains a variety of animals and insects. We get to play with mud and watch how interesting insects such as spiders spin their webs' (Jessica, School 2).

The children enjoyed playing with the forest school practitioners, as they taught them about harmful insects and plants, and activities such as lighting fire pits, removing the fear often associated with the outdoors. Analysis of the children's responses showed that the forest school environment enhanced the children's development by establishing their attachment to nature.

Role of digital technology in the home and in learning and development at school

Digital technology formed an integral part of the children's lives, both at school and at home. The children from School 2 exhibited a higher dependence on digital technologies. They confidently used digital devices such as computers and tablets, both accessing and enhancing curriculum content at home. They also used their devices to socialise with their peers, take photos, find information, and engage in leisure activities, such as online gaming. Their enthusiasm for using digital technology at home was replicated in school:

'I love using the computers and tablets in school. They enable me to do my classwork faster and make my work clearer' (Chloe, School 2).

'My mum bought me a tablet. I use it for facetime with my classmates and friends. I also love playing video games with my friends on the computer after I have finished my homework' (Fred, School 2).

One of the children, Ruth, felt that digital devices were a necessity at home. She described digital technology as essential in enabling her to connect with her friends and family, for example, through her mobile phone. She emphasised the freedom it gave her to keep in touch with her friends and interact with the outside world. Ruth related that she rarely felt the need to leave her bedroom if she had her phone, as she was free to contact friends and family whenever she wanted. She also used her phone to log on to online school platforms and access vital information. One of the other children from School 2 felt that digital technology was essential in enabling them to connect with the outside world, since it provided a fast, effective, and diverse channel for communication and learning.

The children from School 1 broadly agreed with their counterparts from School 2 on the place of digital technology in learning. However, they reported that digital technology was not as influential

as School 2 in their educational and social development. Most of the children in School 1 focused on their knowledge of operating and using digital devices such as computers and tablets. Several of the children said that they owned at least one computer or tablet at home; others stated that they only had access to digital devices in school.

'Computers are good. My dad bought a laptop for use at home, but I mostly get to use it when talking to our Grandparents who live far away' (Beth, School 1).

'The school provided us with tablets. I often get the chance to use them, but I can survive without them' (Leah, School 1).

When asked whether they relied on digital devices to contact and communicate with their friends, most of the children from School 1 explained that they occasionally played and talked with their friends through digital devices. However, the majority of the School 1 children enjoyed interacting physically when playing, socialising, and even discussing schoolwork. They preferred physical contact with other children, as they had limited access to digital devices. All the children, however, would have liked unrestricted access to a computer.

The analysis highlighted the difference in children's responses between the two schools regarding their competence in using digital technology, their dependence on it and the significance of their devices in promoting their ability to learn and connect with their communities.

Comparing forest schools and the classroom setting

The children from School 1 had different opinions to children in School 2 regarding the integration of digital technology into forest school activities. Both groups attended the same forest school, but it is difficult to establish their prior exposure to technology. Although most of the children identified forest schools as learning environments, some believed that the sessions provided a platform for freely interacting and exploring their interests with friends under minimal supervision from the practitioners. School 1 children believed that forest schools offered a fun way of learning new things, while children from School 2 viewed forest school sessions as providing a break from the usual educational environment of the school setting:

'I love the woodlands because we do not have to do the boring and hard stuff such as maths, like in our schools' (Fiona, School 2).

'I always look forward to the forest school sessions since I can explore nature and practise my creativity. In class, we can only look through the window to interact with the outside world, unlike the forest school, where we can play with mud, model, and have fun' (James, School 1).

Ruth offered a contrasting opinion about the effectiveness of forest schools in enhancing her knowledge and contact with nature. She preferred staying at home to 'getting dirty in the wild.' She described how forest school sessions exposed the children to dirt and bugs, compromising her comfort and her ability to interact with her friends and peers.

'If it were up to me, I would not go to forest school. It is dirty and scary out there. So many bugs and germs, they can make you sick' (Ruth, School 2).

Digital technology and learning through play

The UK education system uses a range of digital devices that enhance the learning outcomes of children in forest school. Digital technology, as part of outdoor experiential learning, consists of a range of devices such as iPads, digital cameras, tablets, smartphones, and augmented reality. Use of a Global Positioning Signal (GPS) device, enabling the user to identify locations and track their own position, enhances, and creates additional opportunities for outdoor experiential learning by allowing a child to navigate with a map and compass, providing accurate location feedback (Thomas & Munge, 2017).

Pupils from both schools enjoyed using digital devices, both for learning and communication. Some of the older children had difficulties visualising how learning with digital devices and playing

in forest school would integrate, as digital technologies had only previously been used in the indoor environment.

The teachers in this study introduced iPads into the forest school programme so that the children could capture photographs of their favourite activities and the trees, flora, and fauna. Other forest schools have used digital technology such as tablets for reflective journaling but, as Dyment, O'Connell, and Boyle (2011) highlight, children can lose connection with the environment due to becoming distracted by the device. On the other hand, a tablet or smartphone eliminates the need to carry multiple guidebooks and maps. These devices also enable children to take pictures of specific plants and then identify, reflect upon and share images later with their peers (Bolliger & Shepherd, 2017). The use of digital technology outdoors has the potential, therefore, to engage children and connect them more with each other and the outdoor environment.

Most of the children revealed that they enjoyed discovering new skills, ideas, and knowledge through play-based activities. They confirmed that they had minimal access to digital technology in their forest school sessions. They stated that their teachers and forest school practitioners prohibited them from carrying digital devices to increase their concentration on physical outdoor learning activities. When asked about their perception of using digital devices in the outdoor learning activities, however, most of the children were optimistic that their use would enhance their developmental capacity.

'I love using iPads, and I love the outdoor space in the forest schools. Joining the two elements would be the best thing ever' (Macy, School 1).

Older participants from School 1 showed concern about the ability of the children to handle digital devices with care. The children described how they could get carried away by play-based activities, compromising their ability to take care of digital devices in the woodlands.

'I wonder how we can use digital devices in the woodlands with all the moisture and mud present in the environment. The outdoor environment could lead to damages' (Bianca, School 2).

The children also identified specific digital devices that would enhance their learning. Most of the children felt that iPads would be the most effective in supporting play-based learning activities, due to their versatility. Fiona (School 2) pointed out that tablets offered an array of features that would be beneficial in improving outdoor learning. For instance, she stated that she would like to have access to a tablet in the forest school sessions to search for information on how to carry out the various tasks set by her teachers and forest school practitioners.

'. . . I often find it to be challenging to participate in various activities in the woodlands. Having an iPad would come in handy since I can google and get quick access to tutorials' (Fiona, School 2).

The children talked positively about the importance of the space afforded by the forest schools in improving their capacity to learn through play. They explained that the outdoors provided more physical space to be creative and to explore, unlike the 'boring' and restrictive classroom setting. The pupils believed that integrating iPads in the forest school space would maximise the benefits of learning:

'Access to the internet will equip me with a variety of techniques and ideas on how to use the space provided in the outdoor learning activities effectively and improve my forest school experience' (Phil, School 2).

The children stated that using digital devices in forest schools would enhance their ability to carry the tasks given by their teachers effectively and safely. Children from School 2 revealed that their teachers often described the activities and learning programmes that would be delivered in forest school sessions in advance. The use of digital devices would, therefore, allow the children to research the activities and learn more about them in advance of the forest school sessions. Many children highlighted their reliance on digital devices to gather adequate information about play-based forest school activities:

'Our forest school teacher gives us a list of the activities to be done in the outdoor learning sessions. I use my mobile to learn about the things I may need for the activities' (Ethan, School 2).

'I love learning about insects and flowers during the forest school activities. Having a tablet will enable me to take photos and record the names of various species and use internet platforms to learn more about them' (Denzel, School 2).

Students from School 1 described how having digital devices in the forest school would enhance their ability to interact with nature and their peers. The pupils stated that, although it would be 'weird' to include digital devices in the sessions, the spontaneous nature of using iPads to access information would expand fun activities in the woodlands. The children stated that features of digital devices, such as cameras, would broaden their affiliation with outdoor learning, since they provided a method of capturing and storing information and taking photos of scenes for future analysis.

'I love playing with Summer and chasing small animals in the forest. I also like telling my parents about all the fun stuff we do in the outdoor learning sessions. The iPads will enable us to record the activities and share them with Mum and Dad every weekend' (May, School 1).

The compact and mobile nature of digital technology means that children can utilise these tools almost anywhere, at any time and even in remote locations, while remaining active (Bolliger & Shepherd, 2017). Children using digital technology in the classroom are usually directed to remain seated at their desks whereas, in the forest school environment, they are encouraged to move around with their iPads or other devices as part of their learning. This contrasts with a view of digital technology as a sedentary activity, associated with lack of physical movement (Holloway & Mahan, 2012). This contrast was demonstrated through informal conversations with the children about their use of digital technology at home:

'It's fun using an iPad outdoors to take photographs, as I would usually just sit in my bedroom with mine' (Sophie, School 1).

'I love forest school, as I don't go out much at home. If I go on my iPad, I just sit in my room on my own and don't move' (Jack, School 2).

'When we use the iPads at school, we must remain at our desks' (Suzie, School 2).

It is worth comparing typical forest school activities with digital technologically assisted sessions. Harris (2017) highlights that forest school provides children with opportunities to improve their fine motor skills by using specific tools for threading, such as making jewellery or whittling, and developing their motor skills when performing activities, such as gathering and collecting wood to make a fire or to build dens.

Similarly, Coates and Pimlott-Wilson (2018) suggest that interactions with peers were the most frequent kind of learning opportunities for the children in their study, particularly for older children. Smith, Dunhill, and Scott (2018) investigated how forest schools provide children with opportunities to develop positive attitudes towards the environment. Additionally, Turtle, Convery, and Convery (2015) investigated the development of pro-environment attitudes following children's participation in forest schools proposing that, by taking part in forest school activities over a period of time, children would develop long-term pro-social environmental attitudes.

By comparison, in my study, children were observed to move physically less while taking photographs with iPads and were not afforded the same opportunities to develop physical skills. The photographs captured phenomena in nature that were important or interesting to them, highlighting their connectedness with nature:

'We've got to look after our forest school by making sure we don't pull up any flowers. It's ok to take photographs of them though' (Phoebe, School 1).

'I like to know which tree each leaf comes from. I'm taking a photograph so that I can remember to check later' (Ryan, School 1).

'I've taken a photograph of this worm, but I'll put him back in his home afterwards' (Rachel, School 2).

Similarly, Bolliger and Shepherd (2017) found that when children took pictures of specific plants, they subsequently reflected upon and shared these images with their peers. Forest School has the potential to cater to children's different learning styles (Harris, 2017) as underpinned by multiple intelligence theories (Davis, Christodoulou, Seider, & Gardner, 2011). The outdoor natural space of

forest school lends itself to children who have a dominant naturalistic, spatial, or bodily-kinaesthetic intelligence. In addition, working as a group towards interpreting a natural phenomenon, such as the formation of snow, or managing risk, such as climbing a tree or using a sharp knife, might be suited for children with interpersonal and logical-mathematical intelligence (Dabaja, 2021). The integration of iPads within Forest School practice merits further consideration.

Discussion

This article sought to consider the possibilities of taking technology outdoors and the opportunities it affords for children to fully explore pedagogical possibilities by conducting initial observations during a Forest School session. Forest School encourages children to adopt pro-environmental behaviours, as highlighted in our study. Engagement with nature is a key outcome (Harris, 2017). Forest School is in many ways constructed as an 'escape,' a space away from the classroom, away from technology, away from the pressures of everyday life and the outside world. Space and time were managed and constructed differently. While being a distraction from outdoor experiential learning experiences, digital technology also provides opportunities to enhance learning (Hills & Thomas, 2019). It is perhaps important to consider a move away from the narrative of 'demonisation' of technology and to view it instead as a tool which practitioners have a responsibility to manage appropriately within the Forest School setting.

Play-based pedagogy characterises most learning activities in forest schools. Children interact with nature and enhance their knowledge and skills through active engagement with the outdoors (Barrable & Arvanitis, 2019). The children involved in this study reflected a high attachment to, and preference for, learning programmes in forest schools compared to learning activities in their conventional classroom setting. The outdoor environment allowed them to have more freedom to play and develop their creativity and curiosity in the learning process by eliminating the physical and institutional restrictions of their usual classroom environment.

Digital technology arguably plays a crucial role in the lives of children in contemporary UK society. This study contributes to the debate on whether advances in digital technology have contributed to the increased decline in child engagement with nature. Digital technology has the capacity to sharpen critical thinking, develop problem-solving skills and increase the adaptability of children to their environment (Turnbull, 2019). On the other hand, it can be argued that some children enjoy connecting with their peers through online platforms, thus limiting their desire to interact with nature. According to Coyle (2017), children can spend up to 8 hours per day using various forms of electronic technology, usually indoors. It is unclear, however, if the avoidance of digital technology always leads to the positive outcomes it aims to achieve (Hills & Thomas, 2019). The findings suggest that integrating digital technology with outdoor learning can enhance the learning experience and improve children's physical, intellectual and social development, as well as expanding access to information about their environment. Further research is needed to expand our understanding of the impact of the use of digital devices on the experiential learning of children in forest schools.

Palmer's highly influential *Toxic Childhood* (Palmer, 2006) and *Detoxifying Childhood* (Palmer, 2007) considers the impact of the 'denial' of play, in particular outdoor play. Palmer argues that, because of technological advancement and a reduction in traditional forms of play, combined with exposure to consumerist messages, children's emotional, social, and cognitive development is being compromised. He suggests that the antidote is nature and therefore a move away from technology. Palmer proposes that children's lives should be 'free range,' rather than the sedentary, technologically mediated, nature-deprived 'battery' living they now experience (Garden, 2022).

Another key consideration is the view of Forest School as linked with the concept of belonging to a wider natural community (Cudworth & Lumber, 2021). A sense of belonging developed by being in nature is also a key factor in promoting attachment and a sense of place and space. The ways in which technology is involved in the promotion of health, wellbeing and pro-environmental

behaviours is worth further exploration. While this study did not afford opportunities for many social interactions with the available technology, the children might react differently now to the same technology in Forest School. Technology has become vital to maintaining social, physical, emotional, intellectual, and spiritual wellbeing for children in ways that were not evident before the outbreak of Covid-19. Technology now supports children's wellbeing, as opposed to socially isolating them. There is a need to better understand children's connection with nature and engagement with the spatiality of Forest School to frame the development of this connection within a socio-spatial analytic (Cudworth & Lumber, 2021).

A focus on space in future research would generate new complexities, allowing us to explore hybrid spaces constituted by both classrooms and Forest Schools. This would necessitate forest school interactions populating classroom spaces as well as outdoor spaces. The essential quality of Forest Schools is relatively ambiguous: they provide opportunities to negotiate interactions using processes garnered from a range of experiences, including the introduction of technology into the space. The use of technology would also benefit more formal learning environments and thus become fundamental, rather than peripheral, to shifts in both formal and outdoor practices. Indeed, there is a need for all primary schools to consider the outdoor space as lending itself to effective pedagogy. The primary schools in this study were committed to weekly forest school sessions in addition to an outdoor play-pedagogy in school. Reduced contact with nature in some school settings is often characterised by conceptualisations that emphasise a contemporary disconnect between society and nature and is contrasted with a previous golden age of outdoor activity.

Concluding remarks

This study considered the impact of using digital devices during forest school sessions and the opportunities they afforded to enhance children's learning. Forest school is, in some ways, constructed as an 'escape,' a space away from the classroom and the pressures of everyday life and the outside world. It may be the case that some types of outdoor learning are more suited to the use of digital technology than others. While iPads can be a distraction in outdoor experiential learning experiences, they may also provide opportunities to enhance learning (Hills & Thomas, 2019). It is important to view iPads as learning tools within the forest school setting, rather than iPads being seen only to distract children from their interaction with the outdoors. This may serve to continue to increase our understanding of the ways in which iPads can enhance children's learning experiences in forest school settings.

The homogeneity of the sample should also be highlighted, as the children were mainly White British. School 1 served areas with low levels of economic deprivation. Both schools had access to both advanced technology and opportunities to be in nature regularly. Further research could consider the impact of forest school and technology in a less open setting and with more diverse pupil populations.

Further training would also be useful for primary school teachers and forest school leaders on the more intuitive ways in which iPads could be used in the outdoor space. Future research might focus on the processes that forest school leaders use to make decisions about how they use digital technologies, particularly the ways in which iPads can be meaningfully integrated into outdoor learning practices. Further exploration is also needed on the positive impact of iPads on outdoor learning practices and learning outcomes in order that digital technology can be further integrated into UK forest schools.

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No potential conflict of interest was reported by the author(s).

Notes on contributor

Angela Garden is Head of Education Studies at LJMU, with responsibility for overseeing the Education and Early Childhood Studies suite of programmes. She is Programme Leader for BA (Hons) Education Studies and Early Years and BA (Hons) Education and Primary Studies awards. Angela has a particular interest in child psychology and therapeutic approaches, as well as the benefits of outdoor spaces for children's social and emotional development and students' wellbeing and mental health.

ORCID

Angela Garden http://orcid.org/0000-0001-8055-6962

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