

Critically evaluate the use of modern technologies and digital media in outdoor education to promote ecological understanding and pro-environmental behaviour.

Introduction

We live in an era where digital technologies are hailed for their enormous potential. Morozov (2014) coined the term “technological solutionism” to describe a mindset where every social problem is seen to have a digital solution. In education, there is massive pressure to employ digital systems for teaching and learning (see, for example, EEA, 2018). Technology is also increasingly important in outdoor education (Reed, 2021; van Kraalingen, 2021). Teachers are encouraged to use apps and software to stimulate engagement with nature (Hodges, undated; Prins, 2016). However, digital apps and platforms are not necessarily aligned with pedagogical objectives and may, in fact, distract from the experience (Altrudi, 2020; Beames et al., 2019; Cuthbertson et al., 2004; Godley et al., 2019; Smith et al., 2018). In this essay, I argue that digital technology is not only a solution but also a problem in outdoor education.

A similar duality exists in the relationship between technology and the environment. Digitalisation and the quest for greener solutions are often addressed as “the twin transformations” in political and business lingo. EU reports such as *Towards a green & digital future* (Muench et al., 2022) identify technological solutions to the climate crisis but also note that sustainability and digitalisation are not always aligned; indeed, digital technologies “might bring additional environmental burdens with them” (p. v). Hence, a parallel argument to the above is that digital technologies are both part of the solution and a part of the problem for achieving a greener future.

In the first part of this essay, I discuss the role of technology in outdoor education and adventure. The concept of the post-digital (Humayun & Belk, 2020; Reed, 2021, 2022) is valuable for exploring pervasive digitality but also ambivalence towards digital objects and practices. In the second part, I discuss how outdoor education can promote ecological literacy and show how action-oriented approaches are criticised from the perspective of deep ecology (Naess, 2005). In the third part, this leads to a discussion of three types of digital services that I use in my educational and outdoor practice: Navigation apps, sharing platforms and AI-based recognition and science apps. I argue that while these can stimulate engagement with nature, they may also have negative educational and environmental consequences. In conclusion, I argue that digital technologies cannot be ignored in outdoor education, that tensions will continue to exist between education, technology and sustainability, and that interdisciplinary efforts are necessary to promote ecological consciousness.

I. Technology and outdoor education

Technology is increasingly a part of outdoor education, reflecting the digitalisation of both education and outdoor experiences. Digital platforms are increasingly used to plan, enhance, review and represent adventures (Romero Dexeus, 2019). Technology has often been discussed in binary terms, as something one can be “for” or “against” (Cuthbertson et al., 2004; van Kraalingen, 2021). Reed argues that the term post-digital is valuable for outdoor education to reach a more advanced understanding (Reed, 2021, 2022). The term does not mean that we are beyond the digital age but rather that we have reached a point where the digital is inseparable from the physical or analogue. For educators, the post-digital condition means that ignoring or permanently removing the digital from outdoor practices is not an option. In his examples, Reed describes how a technological presence is pervasive and how students use digital devices for many different purposes related to the outdoors.

The pervasive digitalisation has led many to take a pragmatic approach to technology in the outdoors. In a review of studies in outdoor education, van Kraalingen (2021) argues that it is time to get away from binary approaches and evaluate each application on its merits instead. She shows how studies advocate different levels of technological engagement; while some recommend mitigation of technology, others advocate a reflective assessment or seek to integrate platforms and tools. In her view, teachers should assume responsibility for making good choices concerning which platforms to use based on pedagogical aims (van Kraalingen, 2021). The advantage of this position is that it recommends teachers to avoid alienating students with restrictive policies and instead invite them to experiment with gadgets and apps such as those recommended by Hodges (undated) and Prins (2016).

Although the term post-digital acknowledges that the digital cannot be ignored, it does not imply a shared positive attitude towards datafication. Digitalisation is not seen as a neutral process; instead, it is seen as a pervasive sociotechnical system structuring all aspects of society (Reed, 2021, 2022). Several writers on the post-digital argue that the condition is simultaneously characterised by “a contemporary disenchantment with digital information systems and media gadgets” (Cramer, 2015, p. 13). Humayun and Belk (2020) identifies the renewed interest in objects such as typewriters, paper notebooks and fountain pens as defining qualities of the post-digital condition, and points to increased search for “avenues of escape from our digital world” (p. 634).

Many perceive the outdoors as one such “avenue of escape” and see outdoor adventures as an arena to facilitate temporary disconnection. Solo experiences often invite students to be gadget-free (Campbell, 2010). Williams (2012) reports from expeditions where students camped alone without

communication devices to enhance a sense of solitude and distance from everyday consumer products. A recent study by Smith et al. (2018) explores how a group of US students experienced digital disconnection on a trip abroad. The study concludes that disconnecting positively influenced experiential learning, the ability to focus on the present, social relations, and self-reflection. Another recent study by Godley et al. (2019) argues that the outdoors represents a positive alternative to negative aspects of excessive social media use and recommends digital detox breaks.

Furthermore, temporary disconnection is often part of a slow travel experience. Varley et al. (2020) point out that escapism is a core motive in outdoor tourism and that digital disconnection is a selling point for those who seek solitude and silence (see also Beames, 2017). Erling Kagge, a Norwegian adventurer who has conducted several long expeditions, including solo, advocates disconnection in his bestselling *Silence in the Age of Noise* (2017, p. 17):

Being accessible can be a good thing. We are unable to function alone. Yet it's important to be able to turn off your phone, sit down, not say anything, shut your eyes, breathe deeply a couple of times and attempt to think about something other than what you are normally thinking about. The alternative is to not think anything at all. You may call this meditation, yoga, mindfulness or merely common sense.

To summarise, the term post-digital illuminates that it is impossible to ignore the existence of digital technology. This has led many outdoor practitioners to argue for increased use. However, assigning teachers the responsibility for assessing the usefulness of applications does not remove tensions. Social media, games, apps and digital media are not primarily designed to offer exciting content but to capture and monetise attention, encourage consumption and produce saleable data (Naughton, 2018). Temporary disconnection as part of an outdoor experience speaks to the ambivalence and disenchantment with digital technologies and can provide a space for reflection. Due to the otherwise pervasive presence of communication technologies, however, a disconnected adventure may be perceived as an experiment in being off-the-grid rather than a way to get closer to nature. Either way, present or absent, technology will be a factor in how the outdoors and nature are experienced.

II. Ecology and outdoor education

Climate change and sustainability represent critical challenges of our era. Although transnational policy frameworks have been adopted, including the New York Agreement on Sustainable Development and the Paris Agreement on Climate Change (UN, 2015), the situation is rapidly worsening, and the changes already underway “are irreversible over hundreds to thousands of years” (IPCC, 2021). While nature appreciation and concern about biodiversity loss is high among the population, few are willing to make lifestyle changes to protect the environment (gov.uk, 2019).

Hence, educational efforts are deemed essential to foster environmental consciousness (Dasgupta, 2021).

Many claim a unique role for *outdoor* education in this context (Hill & Brown, 2014; Martin, 2008; Nicol, 2002; Orr, 1992). However, there is insecurity about practices and outcomes. Authors are cautious when they discuss which type of experiences may lead to meaningful environmental learning; it does not boil down to one specific approach or programme (Hill & Brown, 2014; Place, 2016). As Prince (2017, p. 161) points out: “Positive outdoor teaching and learning experiences and sound pedagogical approaches undoubtedly have contributed towards an understanding of environmental sustainability but it is not always clear how, and to what extent, education can translate into action.”

The framework of ecological literacy is vital in a discussion of education and environmentalism. US academic and activist David Orr (1992) has published on this concept from the 1990s, criticising education for producing a generation of “ecological illiterates” (85-86). Following Orr, Martin defines ecological literacy as “to be literate in our practices and knowledge of the interconnectedness of life on earth” (2008, p. 35). While this understanding corresponds with Orr and others, it is contested to what degree ecological literacy can be narrowed down to specific outcomes. Martin adopts an action-oriented approach; he proposes outcomes ranging from being comfortable outdoors and using nature for recreation, to having a sense of place and a love for all living things (p. 37). Others also identify different levels, from specific actions to deeper understanding. Among the specific actions described by Prince (2017) is that students can sort rubbish or be encouraged to walk or cycle to learn pro-environmental behaviour.

The action-oriented approach to ecological literacy resembles the action-oriented approach to technology in outdoor education (above). Both cases emphasise concrete adaptations and a belief in technological solutions such as using apps or participating in recycling or cycling. However, in the educational as well as the environmental domain, the action-oriented approach is criticised for ignoring systemic aspects, in the latter case, how the prevailing socio-economic conditions cause the ecological crisis.

The systemic position is often inspired by deep ecology, a philosophy originating with Arne Næss in the 1970s (Madsen, 2023). With the environmentalist George Sessions, Næss formulated eight principles, of which the first establishes the intrinsic value of nature: “The well-being and flourishing of human and non-human life on Earth have value in themselves”. Further principles point to a moral obligation on citizens to reflect on human-nature interconnectedness and contribute to systemic change (Naess, 2005, pp. 4-6).

The deep ecology critique is visible in many writings on outdoor education. It is a source of inspiration for Nicol (2003) in his critique of the dualistic thinking that dominates Western philosophy. In his view, the primary educational challenge is to enable humans to “recognise their utter dependence on the natural world for their own survival and take action towards sustainable living” (p. 13). Place (2016) is also inspired by deep ecology; he explores factors fostering a commitment to nature through the biographical study of five famous conservationists with similar ideologies to Næss. He shows that these historical figures were subject to multiple influences, including exposure to nature in early life, spending much time outdoors alone and with others, exploring birds and wildlife, and having role models among family members. Hill and Brown (2014) explore how to facilitate transformative learning experiences that can educate students about sustainability. Their aim aligns with deep ecology, “to move beyond objectified or instrumental approaches to the environment”, which they find in many OED programmes (p. 218). They argue that pedagogies of place are essential to achieve a transformative experience, and an unhurried approach is necessary if students are to develop an affective relationship with nature and an ethics of care.

The deep ecology principles are voiced in a somewhat condescending tone and express little respect for democratic processes and diversity of opinion. In his 2005 essay, Næss speaks with contempt about an influential ecologist who has changed his position on a contested issue; in Næss’ view, this is done for purely opportunistic reasons. Næss labels the action-oriented approach “shallow ecology”; exemplified by measures such as fighting pollution with purifying technology and setting legal limits for emissions. In education, the shallow approach prioritises the “hard” sciences and technological solutions, while the deep approach, he argues, prioritises “soft” sciences to “counteract the excessive valuation of things with a price tag” (p. 8-9). However, Næss appears more pragmatic when he discusses environmental education campaigns and observes that combining anthropocentric arguments with an underlying deep ecology ethics is possible. Such combinations are also present in current policy frameworks (Dasgupta, 2021; UN, 2015; "Well-being of Future Generations Act," 2015) and are helpful for outdoor educators who cannot limit themselves to systemic learning outcomes.

In this part, I have discussed ecological literacy in outdoor education. An action-oriented approach helpfully identifies concrete outcomes, but research is inconclusive as to whether this approach contributes to a deeper understanding. A deep ecology approach implies a systemic critique which is challenging to translate into practice, although many practitioners try. Importantly, as argued by Orr (1992), interdisciplinary efforts are necessary to raise the level of ecological literacy; the efforts of one field are not enough. I will return to this point in the conclusion after the assessment of specific platforms purporting to stimulate educational and environmental interest in the outdoors.

III. Using technology to achieve nature appreciation and ecological literacy

As noted in the introduction, digitalisation is often posed as the solution to both educational and environmental challenges. Many applications are available for learning about nature and promoting sustainable lifestyles. As van Kraalingen (2021) observes, gamification apps are often studied, but an outdoor experience today implies engagement with a wide range of digital services. In this section, I discuss three platforms I use in my outdoor and educational practice: Navigation and planning services, sharing platforms, and AI-based recognition apps. Based on the above contributions, I explore to what degree these can support educational and environmental objectives.

A prime example of navigation and planning services is UT.no, Norway's extensive app for all types of friluftsliv. The site contains maps, routes and cabin information, is heavily supported by state and friluftsliv organisations, and is used by a majority of the population (DNT, 2020). UT.no is highly useful from an educational perspective as it lowers the bar for getting outdoors; you are guided along the way, can practice GPS skills, learn about places, and add routes and comments (c.f. the framework presented by van Kraalingen, 2021). The disadvantage from an educational perspective is the reinforcement of the idea that you need a digital device constantly turned on if in an unfamiliar area, with all its potential distractions, as well as the risk pointed out by Cuthbertson et al. (2004) of depending on technology in areas with an unstable connection.

UT.no aims to teach ecological literacy; it contains articles written from a deep ecology perspective about human threats to wildlife (DNT, 2021b), as well as action-oriented recommendations to take the train to the mountains (DNT, 2021a) or choose routes that can handle more hikers (DNT, 2020). However, UT.no also directs people to iconic and vulnerable sites previously protected due to a lack of information. For example, UT.no details the route to Arne Næss's secluded cabin in a nature-protected area (UT.no, undated), where the philosopher spent twelve years more than 1500 meters above sea level (Drevon, 2011). In his lifetime, the philosopher expressly forbade visitors to tread a path to the cabin, choosing different routes each time (Hoff-Elimari, 2017), but, ironically, the path now becomes well-trodden thanks to the (ecologically-minded) friluftsliv-app.

The second type of service is sharing platforms, where individuals offer experiences, accommodation, and equipment to be used outdoors. The sharing platform Airbnb, for example, offers educational experiences in nature and claims to support sustainable travel "by providing eco-minded guests with a growing range of places to stay and things to do" (Airbnb, 2018):

Guests can spend an afternoon in a jungle nursery with the Free Tree Society in Kuala Lumpur, kayak with penguins in Cape Town, tour an urban farm in Sydney, search for wild

dolphins off the coast of Maui, explore the lush forests outside Havana, help restore coral reefs in Bali, or support the London Wildlife Trust at intimate concerts in London.

Many nature experiences run by local hosts through Airbnb are highly educational and organised as “slow” (Varley et al., 2020) or “sense-of-place” adventures (Wattchow & Brown, 2011). Such experiences fulfil the criteria of motivating people to be outdoors and learning about a particular location (van Kraalingen, 2021). Knowledgeable guides imply that you do not need a phone for navigation, and hosts simultaneously act as role models for environmentally conscious behaviour (Prince, 2017). Clearly, however, there are limits to the degree to which a large digital logistics platform facilitating holidays in far-away places can be labelled “sustainable”. The carbon footprint of Airbnb travel is high (Cheng et al., 2021), and local nature experiences are commercialised and offered as adventure packages on the global market (Cater & Dash, 2013).

The third type of service is recognition apps to identify birds, animals, and wildlife. I have used earlier versions of mushroom and bird apps but found them slow, unreliable, and often distracting, which is a risk when depending on technology outdoors (Beames, 2017; Cuthbertson et al., 2004). Services have improved significantly with artificial intelligence and more reliable algorithms. Recently, I have tried an app called Seek by iNaturalist which helpfully identifies the type of species present in a particular area. The simplest version of the app does not require registration and does not collect user data. If you want to contribute, however, you need to create a profile. Registered users become part of a social network sharing information with other users and participate in a citizen science project to map natural life (iNaturalist, undated).

Relating to the criteria stipulated by van Kraalingen (2021), the app can increase motivation for being outdoors, stimulate learning, support science and works as a device for visual note-taking. In a case study of the app, Altrudi (2020) cites students saying that it made their studies meaningful and helped them get closer to nature. Nevertheless, for the more active users, Altrudi notes tensions. In interviews, users described an intense competition to find rare specimens, as common ones would already be mapped. An accompanying blog and Instagram account feature visually spectacular photography, and awards are given to those mapping the most species. Although such apps “have the potential to ignite interest in the natural environment”, Altrudi argues that they also reinforce “the constructed human/nature divide that characterizes Western thought.” (p 125).

In general, gamification elements like the ones found in iNaturalist may strengthen motivation to be outdoors. They can add a sense of conquest, competition, and challenge to an experience without the risk traditionally associated with such endeavours (Bell, 2017; Brown & Fraser, 2009). Yet, gamification often strengthens external rather than internal motivation (Xu et al., 2013). Also, on the negative side is the high environmental footprint of artificial intelligence algorithms (OECD, 2022).

In this section, I have discussed digital platforms that help participants get out, navigate, learn, and engage with nature to an unprecedented degree. However, as I have argued, digital services also represent educational and environmental problems, such as being a distraction in natural settings, leading hikers to vulnerable sites, commercialising local experiences and having high carbon footprint. While digital platforms are often portrayed as “clean and green” through metaphors such as “virtual” and “the cloud”, they are, in fact, energy-demanding with sizeable emissions, exploit limited resources, and create waste problems (Cubitt, 2017; Starosielski & Walker, 2016).

Summary

In this essay, I have discussed technology and ecology in outdoor education. In the first and second parts, I showed how positions on technology and ecology were divided between action-oriented and systemic perspectives. While the first advocated a pragmatic approach where educational and environmental tools were assessed on their merits, the second implied a critique of the underlying socio-economic structures of datafication and ecological destruction. In the third part, I assessed three digital platforms purporting to stimulate outdoor learning and environmental understanding. I showed that all three had educational and environmental advantages and could potentially teach human-nature interconnectedness and practical skills. However, they also had potential and real educational and environmental drawbacks.

Conclusion

This essay has addressed the contested role of digital technology in outdoor education. The concept of the post-digital was used to illustrate the dual nature of the current condition; while we are beyond the point where it is useful to argue “for” and “against” digital technologies, outdoor experiences can speak to the current ambivalence and disenchantment with enforced datafication. Furthermore, the essay has discussed the contested role of ecological literacy as a goal of outdoor education. Outdoor adventures serve many purposes, and a love of nature and the outdoors does not necessarily translate into ecological consciousness. A high level of nature appreciation in a population does not correlated with lifestyle changes necessary to save the earth (gov.uk, 2019).

The issues discussed in this essay are complex, and tensions will continue to exist between the domains of education, ecology, and technology. While there are high expectations that digital technologies can be used to overcome educational and environmental challenges, particularly through stimulating engagement with nature and teaching ecological literacy, such technologies can also distract from nature experiences and contribute to the ecological crisis.

In line with several contributions discussed in this essay, it is perhaps best to think of outdoor education as a practice which can stimulate behaviour and reflections on several levels. On the most basic level, outdoor education can encourage nature experiences, teach action-oriented environmental skills, and invite participants to test digital applications to enhance engagement. On an intermediary level, outdoor education can invite participants to reflect on the pervasive role of technology, provide a temporary escape from 24/7 connectivity, and stimulate reflection on environmental problems. To go beyond these levels and promote deeper understanding and lifestyle changes, however, outdoor education must be part of an interdisciplinary endeavour. Ecology and technology are topics where other disciplines – from philosophy to biology to communication studies – have substantial knowledge and pedagogical experience. Hence, studies should investigate how outdoor education can cooperate with others to achieve more substantial results.

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