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NATURE-BASED LEARNING AND DIGITAL COMPETENCIES IN EARLY YEARS EDUCATION

OKUL ÖNCESİ EĞİTİMDE DOĞA TEMELLİ ÖĞRENME VE DİJİTAL YETERLİLİKLER

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ABSTRACT

The activities, approaches, and classroom instructions in which technology is at the center gradually increase as a necessity of our world. Through classroom practice, it is aimed that children develop competence and skills from an early age. On the other hand, substantial research has been undertaken on nature-based approaches to children's learning. However, integrating the benefits of nature-based learning and digital competencies has yet to be understood. The present study seeks to understand and explain this integration and relationship between nature and technology in the early years of education. For this purpose, this study used previous literature as a supporting resource. This review found evidence that the practice of integrating nature-based learning with technology is effective in children's understanding and development. Therefore, this study can contribute to a better understanding of why and how to integrate these different approaches and should be valuable to practitioners wishing to support children with a well-rounded approach.

ÖZ

Teknolojinin merkezde olduğu etkinlikler, yaklaşımlar ve sınıf içi uygulamalar dünyamızın bir gereği olarak giderek artmaktadır. Sınıf içi uygulamalarla çocukların erken yaşlardan itibaren yetkinlik ve becerilerini geliştirmeleri amaçlanmaktadır. Öte yandan, çocukların öğrenmesine yönelik doğa temelli yaklaşımlar üzerine önemli araştırmalar yapılmıştır. Ancak, doğa temelli öğrenme ve dijital yeterliliklerin faydalarının entegre edilmesi henüz yeterince anlaşılmamıştır. Bu çalışma, eğitimin ilk yıllarında doğa ve teknoloji arasındaki bu bütünleşmeyi anlamaya ve açıklamaya çalışmaktadır. Bu amaçla, bu çalışma, destekleyici bir kaynak olarak mevcut literatürü kullanmıştır. Bu çalışmanın sonucunda, doğa temelli öğrenmeyi teknolojiyle bütünleştirme uygulamasının çocukların anlama ve gelişmesinde etkili olduğuna dair kanıtlar bulmuştur. Bu nedenle, bu çalışma, bu farklı yaklaşımların neden ve nasıl entegre edileceğinin daha iyi anlaşılmasına katkıda bulunabilir ve çocukları çok yönlü bir yaklaşımla desteklemek isteyen uygulayıcılar için önemli bir yere sahiptir.

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Introduction

Many scholars believe that each child learns differently. For example, some learn through play, some learn through nature, and others learn through digital materials (Beck, 2010). While it is evident that multiple ways of learning should be provided to children to support multiple intelligence, teachers still have limited knowledge of combining two different approaches (Almeida, Prieto, Ferreira, Bermejo, Ferrando, and Ferrandiz, 2010). In addition, while teachers use nature-based education, they often underestimate the role of digital media. However, combining nature-based activities with digital activities will bolster learning opportunities for all children who learn differently.

Providing different learning opportunities for children will help them look at themselves from multiple perspectives, but it will also help them be global citizens who gain multiple and complex skills (Pashler, McDaniel, Rohrer, and Bjork, 2009). To be a world citizen, children should perform multiple skills, including learning from nature and digital competencies. Thus, a combination of both is needed to support the development of multiple skills. Yet, often teachers have limited knowledge about this combination. Thus, there is a gap in literature focusing on the combination of nature and the digital world in classroom learning activities.

Considering the gap in the literature and teachers' limited knowledge, the researchers in this study aim to develop a contemporary education model by combining nature and the digital world for teaching young children. This study will also help teachers reconsider their classroom activities and the multiple learning methods to support their students. Echoing teachers' limited knowledge about combining coexisting methods that have traditionally been considered conflicting, researchers aim to develop an advanced learning method by combining nature and the digital world through an extensive literature review. Thus, through an analytic perspective, literature about nature, digitalism, and both were reviewed to reach the findings. In short, this paper highlights the importance of bridging together nature-based learning and digital competencies and explores the ways in which classroom practice can be designed for a more comprehensive teaching and learning process.

Nature-based Learning for Young Children

Nature-based education, including a wide range of approaches such as forest schools, nature kindergartens, outdoor education, environmental education, and sustainability education, has attracted considerable attention, both scholarly. This kind of education has overarching aims to support children through individual experiences (Beery & Jørgensen, 2016), cooperation (Gruno & Gibbons, 2020), collaboration (Spiteri, 2020), communication (Collado et al., 2020), exploration (Silverman & Corneau, 2017), construction (Dennis et al., 2014), and imagination (Cordiano et al., 2019). In addition, there are a variety of activities that can take place in nature-based education, such as using outdoor spaces as learning places (Leea & Bailie, 2019) and including nature as a resource or concept in the regular program (Harwood et al., 2020) in order to raise environmental awareness (Bonnett, 2021), create a bond between nature and children (Gull et al., 2019), protect the environment (Güler Yıldız et al., 2021), or learn with nature even during Covid-19 pandemic (Burke et al., 2021). While aiming for these, children's motor skills, cognitive skills, socio-emotional skills, and language and literacy skills are also supported through a play-based learning approach (Ebbeck et al., 2019).

The roots of nature-based education are based on different theories which have significant influences on early years education: the views of Comenius on the relationship between nature and sensory experiences; the opinions of Froebel on nature and collaboration; the ideas of Piaget on nature and first-hand experiences; the views of Montessori on nature and intrinsic motivation; the opinions of Steiner on nature and experiential learning; and the statements of Rousseau on nature and healthy development (Ahi & Kahriman-Pamuk, 2021; Blackwell, 2015). While Bronfenbrenner (1979) discussed the importance of mutual interaction between the child and nature, Dewey (1986) highlighted that nature and natural resources should be in children's lives to support their development. In these philosophical tenets, nature creates spaces for children to play, transform, and become independent learners (Duhn, 2012).

However, the emergence of nature-based schools was not found until the 1950s, primarily in Scandinavia and Germany, and then spread globally, such as in the UK and the US (Cree & McCree, 2012). Recent years have witnessed a growing academic interest in nature-based or environmental education. The arguments of those who defend that nature should be part of regular education gather around the severe consequences of climate change on Earth, the increasing contribution of people to these results, and the necessity of producing solutions

quickly (Ajaps & Forh Mbah, 2022). There is a further claim that to contribute to environmental conservation, training and education should be critical and relatable (Kayira, 2013). Therefore, when educating young learners, a critical and place-based pedagogy (Freire, 1974; Sobel, 2005), often defined as critical pedagogy of place (Ajaps & Forh Mbah, 2022), should be referred to make the process meaningful, consistent, and context-driven.

Place-based pedagogy focuses on people-nature connection and bond. By integrating various elements such as experiential and deeper learning, children-centered pedagogy, project-based and work-based learning, and civic and informal learning, early years educators support children in developing physical, social, emotional, and academic skills (Cutter-Mackenzie-Knowles et al., 2020). It is often associated with integrating multidimensional concepts through creating connections to places with meaningful experiences and memories (Jørgensen, 2015). Thus, children learn how to respect, protect, and care for the place they are attached to through a place-based pedagogy. However, traditional schools are held responsible for reproducing oppression as children are seen as separate from nature and eventually become alienated (Gruenewald, 2003). Sobel (2005) discusses a need for school reform to (re)connect the classroom practice with nature. Schools should focus on sustainability and systems thinking by beginning right here-right now as a curriculum guideline and shifting to emergent diversity instead of mandated monoculture (Sobel, 2005).

Critical place-based pedagogy should reflect a transformation model. Through this model and re-connecting children with nature, it is highly possible to support children on the way to becoming active learners through being a part of knowledge creation (Ajaps & Forh Mbah, 2022). Children in nature-based education question, research, search for answers, criticize, cooperate, and be part of understanding (Malone et al., 2017). With a program suitable for evaluating emerging opportunities encountered in nature, teaching, and learning, instead, become flexible and open to individual development (Bradley & Male, 2017). Multi-perspectives and different voices are regarded in preference to authoritarian perspectives or teacher-centered instructions (Davies & Hamilton, 2016). Instead of planning all learning and teaching processes around standardized content, interaction with nature is allowed to guide the program (Dean, 2019). Children can experience environmental concepts or issues by themselves in nature, such as seasonal changes or life cycles; so, education based on nature is mainly related to knowledge about evolving issues (Harwood et al., 2020).

These benefits, as mentioned earlier for children, should be part of the regular curriculum in the early years of education rather than acknowledging nature-based education as an alternative to mainstream education. The 'regular' curriculum needs to be also organized regarding digital competencies for children during the early years. Previous studies have suffered from a lack of a solid theoretical framework; therefore, we will discuss these competencies before arguing how to combine these skills into a curriculum theoretically and through practical examples.

Digital competencies for Young Children

Recent years have witnessed a growing academic interest in technology, spreading to all areas of human life. Technological and digital practices have replaced a variety of practical subjects through this popularization (Çelik, 2020). In today's world dominated by digitalization, we can argue that the results immediately emerged in the rapid spread of information so that the practice has diversified, its functions have increased, and innovations have become parts of our lives (Öztürk, 2013; Pala & Başıbüyük, 2020). Therefore, in the 21st century – the information age -scientific and technological developments lead to different required skills from individuals. The upcoming generation needs to use technology consciously and effectively as information producers see value in society, not pure consumers (Koltay, 2011). Many digital tools serve this goal, such as online platforms, computers, and mobile sources. However, it is important to reach the information from suitable sources and make the obtained information functional by interpreting and transferring the knowledge as practical skills in daily life (Fraillon, Ainley, Schulz, Friedman & Gebhardt, 2014). Children, then, need to understand, use, and manage technology through proper resources for their needs, abilities, and development (Ekmen & Bakar, 2019).

Technological and scientific developments influence educational environments and their contents in many ways. For example, virtual environments and digital platforms are commonly used in education (Şirin, 2016). In this digital century, the roles of students and teachers have changed, and learner-teacher roles are challenged as well. Learning is an active agent in children's lives, and teachers are seen as supporting parts of this learning process in developing digital competencies (Bilgic, Duman & Seferoğlu, 2011). The concept of digital competence is

one of the newest emerging concepts regarding technological skills. Digital competence is acknowledged in this paper as the ability to understand and use the information presented by technological resources in various forms (Ilomäki et al., 2016; Lankshear & Knobel, 2008).

'Digital competence' is often used in education and emphasized in the curriculum to describe children and their development (MEB, 2018). Hence, it is expected that teachers should be able to use digital teaching materials competently in educational environments (Çelik, 2020). Collins and Halverson (2010) stated that integrating technology in learning environments would benefit both teachers and learners based on the constructivist approach. In addition, the fact that digital competence has an important place in education requires this competence to be carefully considered in the preparation of the programs. While creating aims and achievements in the program, digital competencies need to be provided to children and included in the content of the program (Kurudayıoğlu & Soysal, 2020).

In this direction, the clause of effective use of information and communication technologies in the learning and teaching process has been included among the General Competencies for the Teaching Profession updated in 2017 by the Ministry of National Education General Directorate of Teacher Training and Development (Toker et al., 2021). Other countries also define strategies for the concept of digital competence and revise their education systems to involve this competence (Eurydice Network Report, 2012). In the report published by the OECD (2019), there is a proposal to systematically integrate sustainable support mechanisms into education in order to provide digital competence to the new generation. In this regard, the European Union Commission also states that teachers will be role models in developing digital competence, even in early childhood education (Redecker, 2017). Furthermore, DigCompEdu (Redecker, 2017), suggested by the European Commission, has prepared a "Digital Competencies Framework for Trainers" for educators (Figure 1).

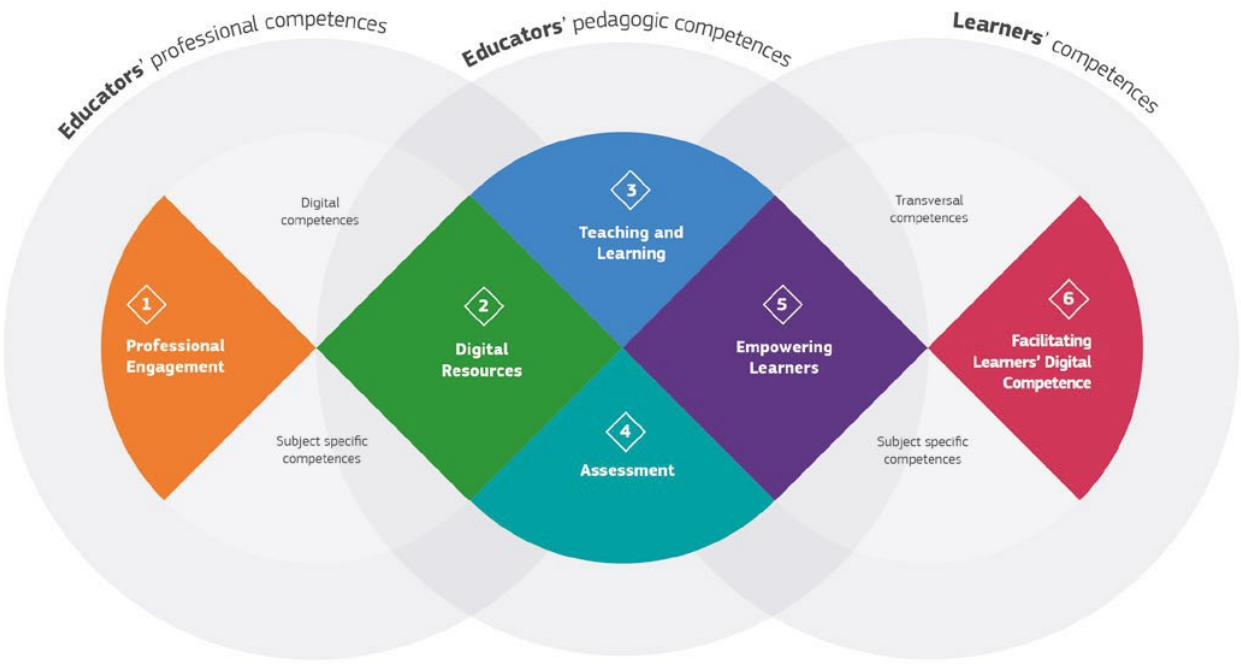

Figure 1. 6 Fundamental Digital Competence Areas (Redecker, 2017).

Arpa (2017) stated that education policy and programs will not effectively respond to today's individual and social needs if they do not benefit from technological opportunities. Therefore, innovation, productivity, and digital skills should be included in education programs. In addition, Ekmen and Bakar (2019) stated that digital competence occurs more in the updated curriculum, with a 28% increase in the dimension of acquisitions and explanations compared to the previous programs. In another study, Geçgel, Kana, and Eren (2020) also emphasized that teachers, students, and programs should re-evaluate digital competence during the Covid-19

epidemic. The advancement of technology has provided children with many new opportunities and led them to different ways of producing knowledge (Hicks et al., 2014). Therefore, children need to acquire digital competencies for the right and appropriate use of digital tools (Özerbaş & Kuralbayeva, 2018). Supporting children who can use information technologies well will significantly contribute to the education of children who can develop products using the information at hand (Özdener & Öztok, 2005). Instead of verbally explaining the Internet and computers to children, it is necessary to create environments where they can actively use technology (Öztok, 2007).

Education and technology show a strong appearance together. In the literature, it is seen that many studies have been carried out in schools for the development of education and technology (Boyraz, 2008). In the 1960s, "Educational Technology" was established in the USA to efficiently use technological resources in education (Numanoğlu, 1995). The "Literate Individuals of the Digital Age" project was carried out within the scope of the TÜBİTAK 4004 Nature Education and Science Schools Support Program under the direction of the Konya Provincial Directorate of National Education for the development of digital competence in Turkey, in Konya and Ankara on 21-28 June 2019 (Sayın et al, 2020). With the digitalization of education, digital competence projects have also become popular. One of the examples of these projects can be seen in schools in Sweden. One of these projects' aims is for teachers and students to use digital technology and understand how digitalization changes society and the individual (Lindfors et al, 2021).

Educational technology provides many benefits. However, criteria such as ease of use, usefulness, and effectiveness should be considered for quality purposes in education in using the environment and resources, the target, the subject, and the child (Alkan, 1990). A range of materials such as computers, tablets, smartboards, printers, Internet, video recordings, educational video cassettes, and display tools (Elmo, overhead projector, data show, and LCD panel) are used in the educational environment to support the digital competence of children. Lifelong learning can be achieved through integrating these resources into the learning environments, especially for young children. It is also essential to use digital materials in order for children to be motivated and enjoy the subjects, eventually becoming self-learners (Yalın, 2020).

Bringing Together Competencies From Two (Different) Edges

Although technology is so widely used today and is now an indispensable part of education, educational approaches and classroom practices in which nature and technology coexist are rare. In general, this is due to the assumption that these two pedagogies are pretty different and imply contradictory approaches. For instance, researchers who discuss the importance of nature-based education often argue that children no longer spend time in nature because of increasing screen time (Merritt et al., 2022). However, on the other hand, a number of published studies (Koyuncu, 2019) that describe technology-driven education underestimate or neglect the benefits of nature for children's development. Therefore, there is an urgent need to address the disconnection problems due to the scarcity of works that combine these two understandings.

Especially today, with the spread of Covid-19, we can see that digital platforms related to environmental/nature-based education have become widespread, with schools being kept closed and a shift from physical education environments to online platforms. Thus, while it aimed to protect children from the adverse outcomes of the pandemic, it was also possible to develop distance learning methods and benefit from technology in education with hybrid methods even after the danger was taken under control. Here we do not support the notion that children should be kept inside to become safe; however, we value the place of outdoor play in young children's lives, which became a refuge for many families during the pandemic (Burke et al., 2021). However, the improvements in distance learning and digital environments open or reveal the way for new experiences that children cannot get solely by being outside.

The digital competencies, which are directly related to nature and environment, develop the child's contact with nature, their knowledge, understanding, competencies, skills, interest, and critical thinking, and can be supported by using one or more technological tools such as computers, personal devices, and Internet (Merritt et al., 2022). The nature-based digital activities can range from online environmental courses to online field trips, virtual environments, and the use of 3D printers (Table 2). These activities might be in real-time (synchronous), available at any time, regardless of time (asynchronous), or hybrid/blended (Merritt et al., 2022).

Table 1. Technology- driven and Nature-based Activities in the Early Years

Activity	Fields of usage samples
Online environmental education	To cover the topics in regular environmental education through online platforms
Online field trip	To visit scientists from different fields, to visit interesting places such as active volcanoes, to experience natural phenomena such as the northern lights
Virtual Environment	Three-dimensional representations of a place
Web-based activities	Virtual laboratory experiments, carbon footprint calculators, virtual beehive
A/Synchronous Experience	
The use of digital representations	Digital images, 3D printers, videos

The following section reviews the evidence for integrating nature-based education with digital competencies in early years education in detail. These: online environmental education, online field trip, virtual environment, web-based activities, a/synchronous experience, the use of digital representations.

Online Environmental Education

More recent attention has focused on the provision of online environmental education, especially with the Covid-19 pandemic worldwide. Awareness of this kind of education is not current, having possibly first been described with the spreading of the Internet. However, the study of online environmental education has gained momentum with distance learning, which offers a safe space and spreads rapidly as an alternative to traditional education due to the restrictions of the pandemic. Since environmental problems are usually caused by human beings and do not end by themselves, the spread of online environmental education also has positive effects in terms of environmental awareness.

Online environmental education, then, can be designed to be related to the environment, raise children's sensitivity and connection to nature, develop problem-solving skills, and increase their knowledge. There can be a variety of examples of such kinds of education. For instance, one study by Yeh et al. (2017) suggested that technology can be used in the classroom during geographic science through a computer-based concept mapping strategy. Also, a hybrid and multifaceted environmental program can be planned for increased human-nature connections, such as observations of wildlife, creative arts, virtual nature hike, or any other special events (Bruni et al., 2015). Young children can visit a natural place first, and then they can use their experiences for school projects through digital resources. For Dale et al. (2020), this natural setting is necessary for environmental education outcomes. Edstrand (2015) offered that a carbon footprint calculator can be used as a supporting resource in environmental education so that children can understand climate change thoroughly with a digital tool for measuring how people influence the environment.

Another sample can be seen in Hartley et al. (2018) study, which suggests that online training courses effectively teach and learn negative ecological influences on coastal environments, such as marine litter education. They found that children were more concerned, increased their understanding of the problems, developed cause and effect relationships, and performed more waste-reduction behaviors at the end of the course. Indeed, children's critical knowledge about how ecological systems survive and how people can affect them can be acquired through observation-based ecology (Merritt & Bowers, 2020). In their early years, young children can develop ecological knowledge, skills, and awareness of living creatures and natural processes with the opportunities to observe systematically, eventually supporting their bonds with nature. Schönfelder and Bogner (2017) emphasized two ways of acquiring environmental knowledge in this manner: first, encountering living animals

where they actually live, and second, observing them through digital resources. As a result, they discussed that both approaches support children in acquiring conservational knowledge.

Online Field Trip

Virtual or online field trips are acknowledged as ways to open doors for children to meet scientists from various fields and visit laboratories or other otherwise unavailable places for children (Adedokun et al., 2014). Children can develop a sense and understanding of science and broaden their experiences through various subjects such as water quality monitoring, avian diversity, turtle ecology, and fish migration. This kind of experience is found to positively impact children's attitudes and motivation toward the environment and lead children to understand the culture-physical geography relationship (Jacobson et al., 2009). Rundgren et al. (2015) discussed virtual field trips as they can be used to teach about natural disasters such as floods, tsunamis, or earthquakes. In addition, Lee et al. (2020) suggested that virtual field trips can be approached as pre-visit and post-visit activities for an actual field trip for follow-up purposes.

Virtual field trips also play an important role in raising a global citizen by enabling children to contact and connect with different cultures by promoting greater classroom engagement, a deeper understanding of environmental subjects from multicultural perspectives, eventually supporting ecological literacy, and increasing sensitivity to multicultural differences (Delacruz, 2018). Children from different places such as Latin America can easily access various areas such as Africa and its endemic plants, local animals, or natural phenomena through virtual trips. In addition, this kind of experience makes the learning process engaging and enjoyable so that children can be motivated to learn (Bursztyn & Campbell, 2015). Han (2019) makes a similar point in his study of immersive virtual trips on the presence and perceived learning – in this case, reef sharks, and found overall enhancement.

To compare virtual field trips with real field trips in a nature preserve, Puhek et al. (2012) conducted a case study. They discussed that children increased their knowledge in biology and ecology as there were few differences between the levels of knowledge acquisition effectiveness. On the other hand, Quay et al. (2020) discussed what has been changed in outdoor and environmental educators' teaching approaches and experiences when shifting actual field works to virtual ones with the Covid-19 pandemic. One of the most noticeable is expressed as the opportunity to explore "the nooks and crannies of their local terrain" (p. 2). However, they found virtual learning to lack the enjoyment which comes with learning in nature, "light bulb moments, witnessing of awakening, constant dialogue, chatter, the jousting of ideas, the growth, support, and care… could not penetrate the firewalls of our online worlds" (p.2). In this paper, we also believe that field trips are and should be at the center of nature-based education, and virtual field trips should be valued as supportive and rich resources without excluding any of them and embracing the positive sides of both.

Virtual Environment

Previous studies primarily defined a virtual environment as a digital resource offering a simulation of a 3D environment (Chang et al., 2019). Such a resource can provide realistic stimulation through high interactivity between the learner and the subject in several ways, such as wearable technology. It is practical to create experiences for children to stimulate or operate risky activities. For instance, in a study with elementary students investigating if including VR can help their learning performance in a Geology class, researchers found that this VR guidance system improved students' learning achievement and increased their learning motivation (Chang et al., 2019).

The virtual environment has been proposed to explain how ecosystems work or the dynamics in ecosystems (Grotzer et al., 2013), or the causes and results of environmental problems, aiming to cultivate the desired environmental behaviors and attitudes. For instance, virtual environments can be beneficial for creating real-life scenarios such as teaching the importance of water resources with a natural ecosystem of a lake (Barbalios et al., 2013) which also develops children's problem-solving skills. In addition, virtual labs have a high potential for teaching and learning environmental science (Petersson et al., 2013). Interactive virtual explorations such as a Pacific Island Volcanoes Site (Bruch et al., 2011), a virtual island with Mediterranean monk seals that are amongst endangered species (Fokides & Chachlaki, 2019), the environmental influence of a natural disaster on a wetlands ecosystem (Pedersen & Irby, 2014) and a virtual ecological pond for children to observe aquatic

plants and animals for learning about marine ecology (Tarng et al., 2010) can be seen as examples of how to use the virtual environment in nature-based education.

In education with virtual environments, children are often given or come up with a question or task to research. Then, they need to design the investigation, engage in the data collection and analysis process, test their hypothesis, and discuss their findings (Pedersen & Irby, 2014). Therefore, it is more likely a scientific inquiry, helping children develop cognitive skills and understand the importance of ecological conservation through rich and realistic experiences that motivate children to become self-learners. When real and virtual environments are compared in the literature, it is generally stated that real environments are highly effective in learning. In contrast, virtual environments support in-curriculum resources or become a good option when there is no possibility of accessing the natural environment (Harrington, 2011). Virtual environments also reinforce children's motivation to visit natural sites. To illustrate, in a study by Grotzer et al. (2013), this kind of virtual environment was offered to children for content knowledge and as creating prior visits to a national park.

Web-based Activities

Web-based activities integrated into nature-based education can be defined as a combination of innovative technologies and location-based interactive learning that children can access at any time from anywhere (Brown et al., 2011). These activities often unite outdoor learning requiring leaving the buildings and exploring nature while interacting with each other and the environment. For example, in their study, Barak and Ziv (2013) designed a web-based platform for children first to visit a natural site, then complete the learning activity related to that place, provide information, and share it on the online platforms to interact. They discussed this kind of activity as innovative and beneficial for children as it promotes accessibility, reusability, personalization, and social interactivity. In other studies, computer games to distinguish migratory birds (Chang et al., 2019) and web application models for watersheds (Gill et al., 2014) are common for web-based activities in education. Digital earth program is also valuable for teaching and learning about geosciences such as weather, climate, hydrology, physical geography, and geology developing children's sense of place and the increasing interconnectedness of the global multicultural community (Cohn et al., 2014).

A/Synchronous Experience

While synchronous activities provide instant discovery and access to children, asynchronous experiences are also practical for continuous and lasting communication. These discussions and experiences can motivate children to become explorers themselves, provide the motivation and skills to overcome environmental issues, and understand the basics of scientific inquiry. In addition to that, they offer opportunities for more reflection, support equality in the process of participation, and make learning an active process by facilitating feedback from both teachers and peers in digital projects so that children can share their powerful insights with increased flexibility (Lowenthal et al., 2020). An example of this kind of experience can be seen in Fauville's (2017) study, in which they used online asynchronous discussion with a marine scientist about ocean literacy.

The Use of Digital Representations

Digital representations involve visual sources such as images and videos, which increase attention and motivation, support children's problem-solving skills, and value prior knowledge in nature-based education (Cook, 2006). Amongst them, we can mention videos about scientists as young as 2-year-olds (Chen & Cowie, 2013), endangered species and nature documentaries (Kleinhenz & Parker, 2017), about controversies such as the pros and cons of bottled water (Salmerón et al., 2020), educational films about living animals (Sammet et al., 2015), and video cases related to a socio-scientific problem. Although some studies suggest that these visualizations about learning objects are not as compelling as direct contact (Klingenberg, 2013), the benefits of using them, such as increased content understanding, improved student attitudes, and allowing children to understand the natural world, are widely acknowledged (Kleinhenz & Parker, 2017).

Conclusion

Teachers often focus on one learning strategy and implement it in their classrooms, only focusing on nature-based education or digital learning. However, the best teaching practices come from a combination of different approaches to education. Even though nature and digitalism seem conflicting, they coexist, and teachers'

education strategy will be better if they continue it. As stated previously, these two approaches have a commonality and can be used together for better learning outcomes. Based on the extensive literature review for this study, teachers can engage in many activities to combine nature with the digital world. These are; online environmental education, online field trip, virtual environment, web-based activities, a/synchronous experiences, and digital representations. By combining nature-based education with digitalism, these activities can easily be used in the classroom. In addition, children can benefit from multiple learning strategies since these activities stimulate multiple intelligence. Online environmental education can be planned in a way that will be related to the environment and increase children's problem-solving skills. These can be creative art, trekking, and children's visits to a natural place and their burdens can be used in projects with digital resources. With the online field trip, children develop their understanding and sense of science. The virtual environment offers the simulation of the 3D environment. Virtual environments are useful for teaching the natural ecosystem of a lake and the importance of water resources. Children can access web-based activities from anywhere at any time and interactive learning is provided. A/synchronous experiences give kids instant access and discovery. Digital representations include images and videos for prior knowledge acquisition that increase attention and motivation.

Although teachers agree that all children learn differently, they still have difficulties finding the best strategies for some students. In this situation, they should consider combining strategies. Yet, considering the dearth of studies focusing on the combination of multiple strategies, teachers have limited knowledge about the combination o strategies. Further, teachers should be informed that one strategy cannot be best for all children. Thus, instead of following only one strategy, they should learn to combine different strategies that even may appear conflicting.

Not many studies investigate the effectiveness of combining multiple strategies on children. While this study sheds light on combining two different strategies (nature-based education and digital competencies), more studies are needed to investigate the combination of various strategies. Technological and scientific developments influence educational environments and their contents in many ways. For example, virtual environments and digital platforms are commonly used in education (Şirin, 2016). The nature-based digital activities can range from online environmental courses to online field trips, virtual environments, and the use of 3D printers. These activities might be in real-time (synchronous), available at any time, regardless of time (asynchronous), or hybrid/blended (Merritt et al., 2022). Further, the activities stated in this study should be used in a real classroom to measure their effect on children. More empirical studies are needed to learn about children's responses to these joint activities. As a result, the combination of these two methods (nature-based education and digital competencies) is relatively new, and more researchers should focus on this area.

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GENİŞLETİLMİŞ ÖZET

Araştırmacılar bu çalışmada küçük çocuklara öğretmek için doğa ve dijital dünyayı birleştirerek çağdaş bir eğitim modeli geliştirmeyi amaçlamaktadır. Bu çalışma aynı zamanda öğretmenlerin öğrencilerini desteklemek için sınıf içi etkinliklerini ve çoklu öğrenme yöntemlerini yeniden gözden geçirmelerine yardımcı olmayı hedeflemektedir. Öğretmenlerin, birbiri ile çelişkili kabul edilen yöntemleri bir araya getirme konusundaki sınırlı bilgilerini, kapsamlı bir literatür taraması yoluyla yansıtan araştırmacılar, doğayı ve dijital dünyayı birleştirerek bir öğrenme yöntemi geliştirmeyi amaçlamaktadır. Böylece, bulgulara ulaşmak için doğa, dijitalizm ve her ikisinin birleşimi hakkında analitik bir bakış açısıyla literatür gözden geçirilmiştir. Kısacası, bu çalışma doğa temelli öğrenme ile dijital yetkinlikleri bir araya getirmenin önemini vurgulamaktadır. Daha kapsamlı bir öğretme ve öğrenme süreci için sınıf uygulamalarının nasıl tasarlanabileceğini de araştırmaktadır.

Orman okulları, doğa anaokulları, açık hava eğitimi, çevre eğitimi ve sürdürülebilirlik eğitimi gibi çok çeşitli yaklaşımları içeren doğa temelli eğitim bilimsel olarak büyük ilgi görmüştür. Böyle bir eğitim, çocukları bireysel deneyimler (Beery & Jørgensen, 2016), işbirliği (Gruno & Gibbons, 2020; Spiteri, 2020), iletişim (Collado et. Al, 2020), keşif (Silverman & Corneau, 2017), inşa (Dennis ve diğerleri, 2014) ve hayal gücü (Cordiano ve diğerleri, 2019) yoluyla desteklemeyi kapsamaktadır. Buna ek olarak, açık alanların öğrenme yerleri olarak kullanılması (Leea & Bailie, 2019) ve düzenli bir program ile doğayı bir kaynak veya kavram olarak dahil etmek gibi doğa temelli eğitimde yer alabilecek çeşitli etkinlikler literatürde yer almaktadır (Harwood et al., 2020). Çevre bilincini artırmak (Bonnett, 2021), doğa ile çocuklar arasında bir bağ oluşturmak (Gull ve diğerleri, 2019), çevreyi korumak (Güler Yıldız ve diğerleri, 2021), ve doğayla öğrenmek için doğa temelli etkinliklere programda yer verilmektedir. Bunlar amaçlanırken çocukların motor becerileri, bilişsel becerileri, sosyo-duygusal becerileri, dil ve okuryazarlık becerileri de oyun temelli bir öğrenme yaklaşımıyla desteklenmektedir (Ebbeck vd., 2019).

Yer temelli pedagoji, insan-doğa bağlantısına odaklanır. Deneyimsel ve derin öğrenme, çocuk merkezli pedagoji, proje tabanlı ve iş temelli öğrenme ile yaygın öğrenme gibi çeşitli unsurları entegre ederek, erken çocukluk eğitimcileri çocukları fiziksel, sosyal, duygusal ve akademik becerileri geliştirmeleri konusunda destekler (Cutter -Mackenzie-Knowles ve diğerleri, 2020). Genellikle, yer temelli pedagoji, anlamlı deneyimler ve anılar içeren yerler ile bağlantılar oluşturarak çok boyutlu kavramların bütünleştirilmesiyle ilişkilendirilir (Jørgensen, 2015). Böylece çocuklar bağlı oldukları yere saygı duymayı, korumayı ve özen göstermeyi bu pedagoji ile öğrenirler. Bununla birlikte, çocuklar doğadan ayrı görüldükleri ve sonuç olarak doğaya yabancılaştıkları için geleneksel okullar doğadan kopukluğu sürdürmekten sorumlu tutulmaktadır (Gruenewald, 2003). Sobel (2005), sınıf uygulamalarını doğa ile (yeniden) ilişkilendirmek için okul reformuna olan ihtiyacı vurgular. Okullar, programın bir gerekliliği olarak olabilecek en kısa sürede başlayarak ve zorunlu tek bir müfredat yerine çeşitliliği göz önünde bulundurarak, sürdürülebilirlik ve çok kültürlü sistem düşüncesine odaklanmalıdır (Sobel, 2005).

Teknolojik ve bilimsel gelişmeler eğitim ortamlarını ve içeriklerini birçok yönden etkilemektedir. Örneğin sanal ortamlar ve dijital platformlar eğitimde yaygın olarak kullanılmaktadır (Şirin, 2016). Bu dijital yüzyılda, öğrencilerin ve öğretmenlerin rolleri değişmiştir ve öğrenen-öğretmen rollerine de meydan okunmaktadır. Öğrenme, çocukların hayatında aktif bir etmendir ve öğretmenler, dijital yeterliliklerin geliştirilmesinde bu öğrenme sürecinin destekleyici bir parçası olarak görülmektedir (Bilgic, Duman & Seferoğlu, 2011). Dijital yeterlilik kavramı, teknolojik becerilerle ilgili ortaya çıkan en güncel kavramlardan biridir. Bu çalışmada dijital yeterlilik, teknolojik kaynaklar tarafından çeşitli şekillerde sunulan bilgileri anlama ve kullanma yeteneği olarak kabul edilmektedir (Ilomäki vd., 2016; Lankshear & Knobel, 2008).

'Dijital yeterlilik' eğitimde sıklıkla kullanılmakta ve programda çocukları ve gelişimlerini tanımlamak için vurgulanmaktadır (MEB, 2018). Bu nedenle öğretmenlerin dijital öğretim materyallerini eğitim ortamlarında yetkin bir şekilde kullanabilmeleri beklenmektedir (Çelik, 2020). Collins ve Halverson (2010), teknolojiyi öğrenme ortamlarına entegre etmenin yapılandırmacı yaklaşıma dayalı olarak hem öğretmenlere hem de öğrenenlere fayda sağlayacağını belirtmişlerdir. Ayrıca dijital yetkinliğin eğitimde önemli bir yere sahip olması, programların hazırlanmasında bu yetkinliğin dikkatle ele alınmasını gerektirmektedir. Programda amaç ve kazanımlar oluşturulurken çocuklara dijital yeterliklerin kazandırılması ve programın içeriğine dahil edilmesi gerekmektedir (Kurudayıoğlu ve Soysal, 2020).

Teknoloji günümüzde bu kadar yaygın olarak kullanılmasına ve eğitimin vazgeçilmez bir parçası olmasına rağmen, doğa ile teknolojinin bir arada olduğu eğitim yaklaşımları ve sınıf uygulamaları azdır. Genel olarak bu, iki pedagojinin oldukça farklı olduğu ve karşıt yaklaşımlar içerdiği görüşünden kaynaklanmaktadır. Örneğin, doğa temelli eğitimin önemini tartışan araştırmacılar, sıklıkla artan ekran süresi nedeniyle çocukların artık doğada vakit geçirmediğini savunmaktadır (Merritt ve diğerleri, 2022). Ancak diğer yandan, teknoloji odaklı eğitimi tanımlayan çalışmalar (Koyuncu, 2019), doğanın çocukların gelişimi için faydalarını küçümsemekte veya ihmal etmektedir. Bu nedenle, bu iki anlayışı birleştiren çalışmaların azlığından kaynaklanan kopukluk sorunlarının acilen ele alınması gerekmektedir.

Özellikle günümüzde Covid-19'un yaygınlaşmasıyla birlikte okulların kapalı tutulması ve fiziksel olarak aktif ortamlardan çevrimiçi platformlara geçişle birlikte doğa temelli eğitim ile ilgili dijital platformların yaygınlaştığı görülebilmektedir. Böylece çocukların pandeminin olumsuz sonuçlarından korunması amaçlanırken, salgın kontrol altına alındıktan sonra dahi uzaktan eğitim yöntemlerinin geliştirilmesi ve hibrit yöntemlerle eğitimde teknolojiden faydalanılması da mümkün olmaktadır. Burada çocukların güvende olmaları için içeride tutulması gerekliliği göz önünde bulundurulmakta; ancak pandemi sırasında birçok ailenin sığınağı haline gelen açık hava oyunlarının küçük çocukların hayatındaki yerine de önem verilmektedir (Burke ve ark., 2021). Bununla birlikte, uzaktan eğitim ve dijital ortamlardaki gelişmeler, çocukların sadece dışarıda olmakla elde edemeyecekleri yeni deneyimlerin önünü açmaktadır.

Doğa ile doğrudan ilişkili olan, çocuğun doğa ile temasını, bilgisini, anlayışını, yeterliklerini, becerilerini, ilgisini ve eleştirel düşünmesini geliştirerek bilgisayar ve internet gibi bir veya birden fazla teknolojik araç kullanılarak, dijital yeterlikler desteklenebilir (Merritt ve diğerleri, 2022). Doğaya dayalı dijital etkinlikler, çevrimiçi çevre kurslarından çevrimiçi saha gezilerine, sanal ortamlardan 3D yazıcıların kullanımına kadar geniş bir çerçevede ele alınabilir. Bu faaliyetler gerçek zamanlı (senkron), gerçek zamandan bağımsız olarak (eşzamansız) herhangi bir zamanda gerçekleştirilebilir veya hibrit olarak tasarlanabilir (Merritt ve diğerleri, 2022).

Öğretmenler genellikle tek bir öğrenme stratejisine odaklanır ve bunu sınıflarında yalnızca doğa temelli eğitime veya dijital öğrenme ile uygulayabilir. Bununla birlikte, en iyi öğretim uygulamaları, eğitime yönelik farklı yaklaşımların birleşiminden meydana gelir. Doğa ve dijitalizm çelişkili gibi görünse de aslında bir arada varlıklarını sürdürür. Daha önce belirtildiği gibi, bu iki yaklaşımın birçok ortak noktası vardır ve daha iyi öğrenme sonuçları için birlikte kullanılabilir. Bu çalışma için yapılan kapsamlı literatür taramasına dayanarak, öğretmenler doğayı dijital dünya ile birleştirmek için birçok aktivitede bulunabilirler. Bunlar; çevrimiçi çevre eğitimi, çevrimiçi alan gezisi, sanal ortam, web tabanlı etkinlikler, eş zamanlı deneyim ve dijital temsillerin kullanımı olarak çeşitlendirilebilir. Doğa temelli eğitim ile dijital yetkinlikler bir araya getirilerek bu etkinlikler sınıfta rahatlıkla kullanılabilir. Bu aktiviteler çoklu zekayı teşvik ettiği için çocuklar çoklu öğrenme stratejilerinden de faydalanabilirler.