



Reconnecting Students with Nature: The Role of Nature-Based Education in Enhancing Academic Engagement

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Abstract

Nature-Based Education (NBE) has gained increasing attention as an innovative educational approach that promotes meaningful and learner-centred learning experiences. By integrating natural environments into the teaching-learning process, it provides students with opportunities to explore, observe, and learn through direct experiences. At the same time, academic engagement has become an important educational goal because actively engaged students are more likely to achieve better learning outcomes, develop positive attitudes towards learning, and participate meaningfully in academic activities. This conceptual paper examines the role of Nature-Based Education in enhancing academic engagement by reviewing relevant theories and recent research. The paper explains how nature-based learning experiences improve students' curiosity, intrinsic motivation, attention, critical thinking, and emotional well-being, which together contribute to higher levels of behavioral, emotional, and cognitive engagement. The discussion is supported by four theoretical perspectives: the Biophilia Hypothesis, Attention Restoration Theory, Experiential Learning Theory, and Self-Determination Theory. The paper further discusses the educational implications of integrating nature-based learning into school education through outdoor learning, school gardens, environmental projects, and place-based learning activities. It argues that Nature-Based Education not only strengthens academic engagement but also promotes creativity, collaboration, environmental awareness, and holistic student development. The paper concludes that integrating nature into teaching and learning can create more engaging, meaningful, and sustainable educational experiences. It also highlights the need for future empirical research to examine the effectiveness of Nature-Based Education in different educational settings and among diverse groups of learners.

Keywords: *Nature-Based Education, Academic Engagement, Outdoor Learning, Experiential Learning, Student Engagement, Sustainable Education.*



1. Introduction

Education plays an important role in developing students' knowledge, skills, values, and overall personality. In addition to academic achievement, modern education focuses on creating meaningful learning experiences that encourage students to participate actively in the learning process. As a result, academic engagement has become an important indicator of educational quality. Students who are academically engaged show greater interest in learning, participate actively in classroom activities, think critically, and perform better in their studies (Fredricks et al., 2004).

However, many schools today face challenges in maintaining students' academic engagement. Rapid technological advancement, increased screen time, academic pressure, and limited opportunities for experiential learning have reduced students' interaction with the natural environment. These factors often affect students' attention, motivation, and interest in learning. Consequently, educators are searching for innovative teaching approaches that can make learning more meaningful, enjoyable, and learner-centred (Chawla, 2020).

Nature-Based Education (NBE) has emerged as one such educational approach. It refers to teaching and learning experiences that intentionally use natural environments as learning spaces. Nature-Based Education encourages students to learn through direct interaction with nature by observing, exploring, investigating, and reflecting on real-life experiences. Learning activities such as outdoor classes, school gardening, environmental projects, field visits, and place-based learning enable students to connect classroom knowledge with the real world. These experiences make learning active, relevant, and enjoyable (Kuo et al., 2019).

In recent years, Nature-Based Education has received increasing attention because of its positive influence on students' academic, social, emotional, and psychological development. Research has shown that spending time in natural environments improves attention,

reduces stress, promotes creativity, strengthens problem-solving skills, and increases students' motivation to learn (Chawla, 2020; Kuo et al., 2019). Nature-based learning also provides opportunities for collaboration, communication, inquiry, and experiential learning, all of which contribute to students' active participation in education.

Academic engagement is a multidimensional concept that describes students' active involvement in learning. It includes behavioral engagement, which refers to participation in learning activities; emotional engagement, which reflects students' interest, enjoyment, and sense of belonging; and cognitive engagement, which refers to students' mental effort, critical thinking, and use of effective learning strategies (Fredricks et al., 2004). These three dimensions work together to influence students' learning outcomes and educational success.

Although Nature-Based Education and academic engagement have been widely discussed in educational research, the conceptual relationship between these two concepts has received comparatively less attention. Most previous studies have focused either on the educational benefits of nature-based learning or on the factors influencing academic engagement. There is a need to integrate these concepts within a single conceptual framework to explain how Nature-Based Education can enhance students' academic engagement through different educational and psychological mechanisms.

This paper attempts to address this gap by examining the relationship between Nature-Based Education and academic engagement. The discussion is supported by four important theoretical perspectives: the Biophilia Hypothesis, Attention Restoration Theory, Experiential Learning Theory, and Self-Determination Theory. These theories explain how natural environments influence students' curiosity, attention, motivation, and learning experiences, which ultimately contribute to greater academic engagement.

The paper also discusses the importance of learner-centred and experiential teaching approaches that encourage students to become active participants in their own learning. By connecting education with nature, schools can create learning environments that promote not only academic engagement but also student well-being, environmental responsibility, creativity, and lifelong learning.

Overall, this paper argues that Nature-Based Education offers a meaningful approach to improving academic engagement in contemporary education. By bringing together theoretical perspectives and recent research findings, the paper provides a conceptual understanding of how learning in and through nature can contribute to students' holistic development and create more engaging, sustainable, and effective educational experiences.

2. Theoretical Foundations

The relationship between Nature-Based Education and academic engagement can be explained through several educational and psychological theories. These theories provide a conceptual foundation for understanding how learning in natural environments influences students' participation, motivation, attention, and learning experiences. This paper is guided by four major theories: Biophilia Hypothesis, Attention Restoration Theory, Experiential Learning Theory, and Self-Determination Theory.

2.1. Biophilia Hypothesis

The Biophilia Hypothesis was proposed by [Edward O. Wilson \(1984\)](#). The theory states that human beings have an innate tendency to connect with nature and other living organisms. According to Wilson, this connection developed through human evolution and continues to influence people's physical, emotional, and psychological well-being.

In education, the Biophilia Hypothesis suggests that students naturally respond positively to learning experiences that involve nature. When students spend time in natural environments, they often feel more relaxed, curious, and interested in exploring their surroundings. These positive experiences create

favourable conditions for learning and encourage active participation in educational activities.

[Kellert and Wilson \(1993\)](#) argued that humans have an innate tendency to connect with nature. Later, [Barbiero et al. \(2025\)](#) found that students who learned biophilic learning environments showed better attentional performance, perceived restorativeness, and stronger connectedness to nature than those in conventional classrooms. These findings support the Biophilia Hypothesis and suggest that nature-based learning environments can enhance students' engagement and learning.

Nature-Based Education applies this principle by providing opportunities for students to interact directly with natural environments through activities such as outdoor learning, school gardening, biodiversity observation, and environmental projects. Such activities stimulate students' curiosity and make learning enjoyable and meaningful. As students develop a stronger connection with nature, they also develop a more positive attitude towards learning.

Therefore, the Biophilia Hypothesis explains that students' natural affinity for nature can increase their interest in learning, strengthen their emotional connection with school, and contribute to higher levels of academic engagement.

2.2. Attention Restoration Theory

The Attention Restoration Theory (ART) was developed by [Stephen Kaplan and Rachel Kaplan \(1989\)](#). This theory explains that natural environments help people recover from mental fatigue and improve their ability to concentrate. Students often experience mental tiredness because of continuous classroom instruction, examinations, homework, and prolonged screen exposure. Mental fatigue reduces concentration, affects learning, and decreases academic engagement. According to Attention Restoration Theory, spending time in natural environments restores directed attention because nature captures attention gently without creating mental stress.

Nature-Based Education creates opportunities for students to learn in green and natural surroundings where they can relax while

remaining mentally active. Outdoor learning experiences help students improve concentration, observation, memory, and problem-solving ability. Students who return to the classroom after nature-based activities often demonstrate better attention and greater readiness to learn.

Kuo et al. (2019) reviewed evidence from multiple studies and concluded that learning in natural environments improves students' attention, concentration, and cognitive functioning. The authors explained that exposure to nature restores directed attention, enabling students to participate more actively in learning. This finding strongly supports Attention Restoration Theory.

Thus, Attention Restoration Theory provides a strong explanation for how Nature-Based Education supports cognitive engagement by improving students' concentration, mental clarity, and learning efficiency.

2.3. Experiential Learning Theory

The Experiential Learning Theory (ELT) was proposed by **David A. Kolb (1984)**. According to this theory, learning is most effective when students gain knowledge through direct experience. Learning is viewed as a continuous process in which experience becomes the foundation for understanding and personal growth.

Kolb (1984) described learning as a cycle consisting of four stages: Concrete Experience, Reflective Observation, Abstract Conceptualisation, and Active Experimentation. Students first experience an activity, reflect on what they observed, develop new ideas based on those experiences, and finally apply their learning in new situations.

Nature-Based Education strongly reflects the principles of Experiential Learning Theory. Students learn by observing plants and animals, conducting field investigations, maintaining school gardens, collecting environmental data, and participating in conservation activities. These real-life experiences help students understand concepts more effectively than learning through memorisation alone.

Patwardhan and Abrol (2023) reported that experiential learning strategies aligned with the National Education Policy (NEP

2020) improved student participation, active learning, collaboration, and classroom engagement. Their findings demonstrate the importance of learning through direct experience, which is the central idea of Experiential Learning Theory.

Experiential learning encourages inquiry, creativity, reflection, and problem-solving. Consequently, students become active participants in the learning process, making this theory highly relevant for explaining the relationship between Nature-Based Education and academic engagement.

2.4. Self-Determination Theory

The Self-Determination Theory (SDT) was developed by **Edward L. Deci and Richard M. Ryan (1985)**. This theory explains that students become more motivated and engaged when their three basic psychological needs are satisfied. These needs are autonomy, competence, and relatedness.

Autonomy refers to students' freedom to make choices and take responsibility for their learning. Competence refers to students' confidence in their ability to complete learning tasks successfully. Relatedness refers to the sense of belonging and positive relationships with teachers, classmates, and the learning environment.

Nature-Based Education naturally supports these psychological needs. Outdoor learning activities allow students to explore independently, make observations, and solve problems, thereby promoting autonomy. Successfully completing nature-based tasks increases students' confidence and sense of competence. Collaborative activities such as gardening, environmental projects, and field investigations strengthen relationships among students and teachers, thereby supporting relatedness.

When these three psychological needs are fulfilled, students develop stronger intrinsic motivation. Motivated students are more willing to participate in learning activities, remain focused, and persist even when learning becomes challenging. Therefore, Self-Determination Theory explains how Nature-Based Education promotes sustained academic

engagement through increased intrinsic motivation.

Patwardhan and Abrol (2023) reported that experiential learning strategies aligned with the National Education Policy (**NEP 2020**) improved student participation, active learning, collaboration, and classroom engagement. Their findings demonstrate the importance of learning through direct experience, which is the central idea of Experiential Learning Theory.

3. Concept of Nature-Based Education

Nature-Based Education (NBE) is an educational approach that uses nature as an important context for teaching and learning. It encourages students to learn through direct interaction with natural environments rather than depending only on classroom instruction. In Nature-Based Education, learning takes place in settings such as school gardens, parks, forests, rivers, farms, and other natural spaces where students can observe, explore, investigate, and reflect on real-life experiences. This approach makes learning more active, meaningful, and relevant to students' everyday lives (**Sobel, 2013**). Instead of receiving information passively, students construct knowledge through observation, exploration, discussion, experimentation, and reflection. Such learning experiences encourage students to ask questions, solve problems, and connect theoretical knowledge with practical situations. As a result, students develop a deeper understanding of concepts and become more confident learners (**Kolb, 1984**).

Nature-Based Education is a broad concept that includes several educational approaches such as outdoor learning, environmental education, place-based education, forest school education, school gardening, and experiential learning. Although these approaches have different characteristics, they all share a common objective of connecting students with nature and providing authentic learning experiences. Therefore, Nature-Based Education should not be viewed as a single teaching method but as a holistic educational approach that integrates natural environments into the teaching-learning process.

One of the major characteristics of Nature-Based Education is experiential learning.

Students learn by doing rather than only by reading or listening. Activities such as observing biodiversity, identifying plant species, measuring tree height, testing water quality, maintaining school gardens, and participating in environmental conservation programmes help students gain knowledge through direct experience. These activities encourage inquiry, creativity, collaboration, and critical thinking, making learning more meaningful and enjoyable (**Kolb, 1984**).

Nature-Based Education also promotes interdisciplinary learning. A single nature-based activity can support learning across different subjects. For example, students can study biodiversity in science, calculate plant growth in mathematics, write observation reports in language classes, and examine environmental conservation in social science. Such integration helps students understand the relationship between different areas of knowledge and apply their learning to real-life situations.

Another important feature of Nature-Based Education is that it supports students' holistic development. Besides improving academic learning, it contributes to students' physical, emotional, social, and environmental development. Spending time in natural environments has been associated with reduced stress, improved attention, better emotional well-being, and increased self-confidence (**Chawla, 2020**). Nature-based activities also encourage teamwork, communication, leadership, and responsibility, which are essential skills for lifelong learning.

Nature-Based Education is also closely related to Education for Sustainable Development (ESD). It helps students understand the importance of protecting natural resources, conserving biodiversity, and promoting sustainable lifestyles. Through activities such as tree planting, waste management, recycling, composting, and water conservation, students develop environmental awareness and a sense of responsibility towards society and the environment (**UNESCO, 2020**). Thus, Nature-Based Education contributes not only to academic development but also to the development of environmentally responsible citizens.

Teachers play a central role in the successful implementation of Nature-Based Education. They act as facilitators who create opportunities for students to observe, explore, ask questions, and reflect on their experiences. Effective Nature-Based Education does not always require expensive infrastructure or large natural spaces. Even a small school garden, playground, nearby park, or local community environment can become an effective learning space when activities are carefully planned and connected to curriculum objectives.

In the present educational context, Nature-Based Education has become increasingly important because children are spending more time indoors and interacting less with the natural environment. Increased screen time, urbanisation, and academic pressure have reduced opportunities for outdoor learning. Nature-Based Education offers an alternative approach that reconnects students with nature while making learning more engaging, meaningful, and enjoyable.

In summary, Nature-Based Education is a learner-centred and experiential educational approach that integrates natural environments into teaching and learning. By encouraging exploration, observation, reflection, and real-life experiences, it promotes meaningful learning and supports students' academic, social, emotional, and environmental development. These characteristics make Nature-Based Education an important educational approach for enhancing academic engagement and fostering holistic student development.

4. Concept of Academic Engagement

Academic engagement is one of the most important concepts in education because it reflects how actively students participate in the learning process. It refers to the degree of students' involvement, interest, commitment, and effort in academic activities. Students who are academically engaged attend classes regularly, participate actively in learning activities, complete academic tasks responsibly, and show a genuine interest in understanding what they learn. Academic engagement is widely recognised as a strong predictor of academic achievement, student well-being, and overall educational success ([Fredricks et al., 2004](#)).

The concept of academic engagement has received increasing attention over the past two decades because engaged students are more likely to enjoy learning, remain motivated, and perform better academically. Rather than focusing only on examination scores, academic engagement emphasises students' active participation in the learning process. It highlights the importance of students' thoughts, emotions, and behaviours during learning. Therefore, academic engagement is considered an important indicator of effective teaching and quality education ([Appleton et al., 2008](#)).

Most researchers describe academic engagement as a multidimensional construct consisting of behavioral, emotional, and cognitive engagement. These three dimensions are closely related and together influence students' learning experiences.

5. Behavioral Engagement

Behavioral engagement refers to students' active participation in academic activities. It includes attending classes regularly, completing assignments, following classroom rules, participating in discussions, asking questions, and taking part in group activities. Behaviorally engaged students are attentive during lessons and show responsibility towards their learning. They actively participate in both classroom and co-curricular activities, demonstrating a willingness to learn and contribute.

Behavioral engagement involves students' active participation in academic and school-related activities. [Fredricks, Blumenfeld, and Paris \(2004\)](#) found that students who regularly attend classes, complete assignments, follow classroom rules, and participate actively in learning activities demonstrate higher levels of academic achievement and are less likely to drop out of school.

6. Emotional Engagement

Emotional engagement refers to students' feelings, attitudes, and emotional responses towards learning, teachers, classmates, and school. Students who enjoy learning, feel connected to their school, and maintain positive relationships with teachers and peers are more

likely to remain engaged. Positive emotions such as curiosity, interest, enjoyment, and enthusiasm encourage students to participate actively in academic activities, whereas negative emotions such as boredom, anxiety, or frustration may reduce engagement.

Emotional engagement reflects students' positive feelings toward learning, teachers, classmates, and school. **Wang and Eccles (2013)** reported that students who experience a strong sense of school belonging and positive teacher-student relationships exhibit higher emotional engagement, which contributes to improved academic achievement and lower dropout rates.

7. Cognitive Engagement

Cognitive engagement refers to the mental effort students invest in understanding, analysing, and applying knowledge. **Greene (2015)** emphasized that students who use self-regulated learning strategies, critical thinking, and deep learning approaches demonstrate higher cognitive engagement, leading to better academic performance. They ask meaningful questions, connect new knowledge with previous experiences, and apply what they have learned in different situations.

These three dimensions of academic engagement are interconnected. Students who enjoy learning are more likely to participate actively, and active participation often encourages deeper thinking and understanding. Therefore, behavioral, emotional, and cognitive engagement work together to improve students' learning experiences and academic performance.

Several factors influence students' academic engagement. These include the classroom environment, teaching methods, teacher support, peer relationships, family support, learning resources, motivation, and school climate. Among these factors, teaching approaches play a particularly important role. Learner-centred and experiential teaching methods are generally more effective in promoting academic engagement than traditional lecture-based instruction because they encourage active participation, collaboration, and meaningful learning.

Nature-Based Education has the potential to strengthen all three dimensions of academic

engagement. By providing opportunities for outdoor learning, observation, inquiry, collaboration, and hands-on experiences, it encourages students to become active participants in the learning process. Learning in natural environments also creates positive emotions, improves attention, and promotes critical thinking, all of which contribute to higher levels of academic engagement (**Kuo et al., 2019; Chawla, 2020**).

Academic engagement is important not only because it improves academic achievement but also because it contributes to students' overall development. Engaged students are more likely to develop confidence, creativity, communication skills, collaboration skills, and lifelong learning habits. They are also better prepared to face academic challenges and adapt to changing educational environments.

In recent years, approaches such as project-based learning, experiential learning, collaborative learning, and Nature-Based Education have gained increasing importance because they provide meaningful learning experiences that motivate students to participate actively in education.

In summary, academic engagement is a multidimensional concept that reflects students' behavioral participation, emotional involvement, and cognitive investment in learning. It is influenced by teaching methods, learning environments, and students' motivation. Since Nature-Based Education promotes active, meaningful, and experiential learning, it provides a strong foundation for enhancing students' academic engagement and improving the overall quality of education.

8. Nature-Based Education and Academic Engagement: A Conceptual Analysis

Nature-Based Education has the potential to enhance academic engagement by creating learning experiences that are meaningful, active, and connected to real life. Unlike traditional classroom instruction, which often depends on lectures and textbooks, Nature-Based Education encourages students to observe, explore, investigate, and reflect. These experiences make students active participants in the learning process and help them develop a stronger interest in learning. Based on the theories

discussed in the previous section, this paper proposes that Nature-Based Education enhances academic engagement through several interconnected pathways.

8.1. Nature-Based Education and Curiosity

Curiosity is an important factor that motivates students to learn. Natural environments provide rich learning opportunities that encourage students to ask questions, make observations, and explore new ideas. For example, while observing plants, insects, or water bodies, students naturally become interested in understanding how natural systems function. This curiosity motivates them to search for answers and participate actively in learning activities.

Research by [Chawla \(2015\)](#) showed that regular exposure to natural environments stimulates children's curiosity, exploration, and inquiry. Students participating in nature-based activities asked more questions, observed their surroundings more carefully, and demonstrated greater interest in learning than those in traditional classroom settings. These experiences promoted independent learning and sustained academic interest.

[Collado et al. \(2020\)](#) found that participation in a nature-based environmental education programme significantly improved children's environmental attitudes and pro-environmental behaviours. The study suggests that direct experiences in natural environments strengthen children's connection with nature and promote meaningful environmental learning.

Curiosity also encourages independent learning. Students become more willing to read, discuss, investigate, and share their ideas with others. As their interest in learning increases, they participate more actively in classroom and outdoor learning activities. Therefore, curiosity acts as an important link between Nature-Based Education and academic engagement.

8.2. Nature-Based Education and Attention

Students cannot learn effectively without attention and concentration. Long classroom sessions, continuous examinations, and excessive screen time often reduce students' ability to concentrate. Nature-Based Education

provides a learning environment where students can refresh their minds and improve their attention.

According to the Attention Restoration Theory, natural environments reduce mental fatigue and restore directed attention ([Kaplan & Kaplan, 1989](#)). When students participate in outdoor learning activities, they often return to classroom learning with better concentration and greater mental readiness. Improved attention enables students to understand concepts more effectively, complete academic tasks successfully, and remain actively involved in learning.

8.3. Nature-Based Education and Experiential Learning

One of the major strengths of Nature-Based Education is that it promotes learning through direct experience. Instead of simply reading about environmental concepts, students observe, investigate, and experience them in real-life situations. Such experiences help students understand concepts more clearly and remember them for a longer period.

[Monroe \(2004\)](#) found that environmental education programmes based on direct experiences in nature significantly enhanced students' critical thinking, problem-solving, observation skills, and active participation. Learning through firsthand experiences enabled students to understand concepts more deeply and retain knowledge more effectively than traditional classroom instruction. Students become active constructors of knowledge rather than passive recipients of information. As a result, they participate more confidently in classroom discussions and academic activities, leading to higher levels of academic engagement.

8.4. Nature-Based Education and Intrinsic Motivation

Students learn more effectively when they are internally motivated. Nature-Based Education creates enjoyable and meaningful learning experiences that increase students' intrinsic motivation. Outdoor learning allows students to explore independently, make decisions, and solve problems. These opportunities increase their confidence and create a sense of achievement.

Self-Determination Theory explains that students become more motivated when their needs for autonomy, competence, and relatedness are fulfilled (Deci & Ryan, 1985). Nature-based activities provide opportunities to satisfy these needs through independent exploration, successful learning experiences, and collaborative learning. Consequently, students become more interested in learning and participate more actively in academic activities.

8.5. Nature-Based Education and Emotional Well-being

Students' emotional well-being is closely related to their academic engagement. Learners who feel happy, relaxed, and emotionally secure are more likely to participate actively in the learning process. Nature-Based Education provides a peaceful and supportive learning environment that reduces stress and creates positive learning experiences.

Research suggests that spending time in natural environments improves mood, reduces anxiety, and promotes emotional well-being (Chawla, 2020). Students who enjoy learning in natural settings develop positive attitudes towards school and learning. These positive emotions increase their willingness to attend classes, complete learning tasks, and interact positively with teachers and classmates.

8.6. Nature-Based Education and Academic Engagement

The discussion above suggests that Nature-Based Education does not improve academic engagement through a single factor. Instead, it influences several educational and psychological processes simultaneously. Nature-based learning increases curiosity, improves attention, strengthens experiential learning, promotes intrinsic motivation, and supports emotional well-being. Together, these factors create meaningful learning experiences that encourage students to participate actively, think critically, and remain committed to their learning.

Based on this conceptual analysis, Nature-Based Education is expected to strengthen the three dimensions of academic engagement. Students become more actively involved in learning activities (behavioral

engagement), develop greater interest and positive attitudes towards learning (emotional engagement), and invest more mental effort in understanding concepts (cognitive engagement). Thus, Nature-Based Education provides a comprehensive learning approach that supports both academic success and holistic student development.

9. Educational Implications

The conceptual relationship between Nature-Based Education and academic engagement has important implications for educational practice. The discussion in this paper suggests that learning in natural environments can improve students' participation, motivation, and overall learning experiences. Therefore, Nature-Based Education should not be viewed as an additional activity but as an effective teaching approach that can be integrated into regular school education.

9.1. Implications for Teachers

Teachers play a vital role in promoting Nature-Based Education. They can design learning activities that encourage students to observe, explore, investigate, and reflect on their experiences. Instead of depending only on classroom lectures, teachers can organise outdoor lessons, nature walks, school gardening activities, biodiversity observations, environmental surveys, and project-based learning. Such activities encourage students to participate actively and connect classroom concepts with real-life situations.

Teachers should also create learner-centred classrooms where students are encouraged to ask questions, solve problems, and work collaboratively. By acting as facilitators rather than information providers, teachers can help students become active learners and improve their academic engagement.

9.2. Implications for Schools

Schools should provide learning environments that encourage students to interact regularly with nature. Even schools with limited space can develop small gardens, green corners, herbal gardens, or outdoor learning areas. These spaces can be used for teaching

different subjects through observation, exploration, and practical activities.

Schools can also organise environmental awareness programmes, eco-club activities, tree-planting campaigns, field visits, and community-based environmental projects. Such initiatives not only improve academic engagement but also help students develop environmental responsibility, teamwork, leadership, and social skills.

9.3. Implications for Curriculum and Classroom Practice

Nature-Based Education can be integrated into different school subjects without changing the existing curriculum. Teachers can connect nature-based activities with learning objectives in science, social science, mathematics, languages, and art. For example, students can learn scientific concepts through field observation, develop mathematical skills by measuring plants or gardens, and improve language skills through nature journals and reflective writing. Curriculum planners should encourage experiential, inquiry-based, and place-based learning so that students can apply classroom knowledge to real-life situations. Such integration makes learning more meaningful and increases students' academic engagement.

9.4. Implications for Educational Policy

Educational policymakers should recognise Nature-Based Education as an effective strategy for improving the quality of school education. Policies can encourage schools to develop green learning spaces, organise outdoor learning programmes, and provide professional development opportunities for teachers.

Nature-Based Education also supports the goals of the National Education Policy (NEP 2020) by promoting experiential learning, critical thinking, environmental awareness, and holistic development. Similarly, it contributes to the objectives of Education for Sustainable Development (ESD) by helping students understand environmental issues and adopt sustainable practices.

9.5. Implications for Future Research

Although previous studies have reported several benefits of Nature-Based Education, further empirical research is needed to examine its impact on academic engagement in different educational contexts. Future studies may investigate how different nature-based learning approaches influence behavioral, emotional, and cognitive engagement among students of different age groups.

Researchers may also examine the relationship between Nature-Based Education and other educational variables such as academic achievement, learning motivation, student well-being, resilience, creativity, environmental literacy, and social-emotional learning. Longitudinal studies and intervention-based research can provide stronger evidence regarding the long-term educational benefits of Nature-Based Education.

10. Challenges and Future Directions

Although Nature-Based Education offers several educational benefits, its successful implementation in schools is associated with certain challenges.

Addressing these challenges is essential for integrating nature-based learning into regular educational practice and ensuring its long-term effectiveness.

One of the major challenges is the limited availability of natural learning environments. Many schools, particularly those located in urban areas, have limited access to green spaces, gardens, forests, or other natural settings. As a result, teachers may find it difficult to organise regular outdoor learning activities. However, this challenge can be addressed by using available resources such as school gardens, nearby parks, community spaces, or local ecosystems as learning environments.

Another challenge is the lack of teacher training in Nature-Based Education. Many teachers are experienced in classroom teaching but have limited knowledge of planning and implementing outdoor or nature-based learning activities. They may also face difficulties in connecting these activities with curriculum objectives and learning outcomes. Therefore, teacher education programmes and professional development workshops should include training

on Nature-Based Education and experiential teaching methods.

Time constraints and examination-oriented education also limit the implementation of Nature-Based Education. Teachers often give priority to completing the prescribed syllabus and preparing students for examinations. Consequently, outdoor learning activities are sometimes viewed as additional tasks rather than meaningful learning opportunities. Integrating nature-based activities into the existing curriculum can help overcome this challenge without increasing teachers' workload.

Safety and risk management are additional concerns. Outdoor learning requires proper planning, supervision, and safety measures to ensure students' well-being during field visits, nature walks, and environmental activities. Schools should develop appropriate safety guidelines and obtain the necessary support from parents and local communities when organising such programmes.

Limited financial resources may also affect the implementation of Nature-Based Education. Some schools may not have sufficient funds to develop outdoor learning spaces or organise field-based activities. Educational authorities and local communities can support schools by providing financial assistance, developing green school environments, and encouraging community participation in nature-based programmes.

Despite these challenges, the future of Nature-Based Education is promising. Increasing global attention to sustainable development, environmental education, student well-being, and experiential learning has strengthened the importance of nature-based approaches in education. Educational reforms such as the National Education Policy (NEP) 2020 also emphasise experiential, multidisciplinary, and learner-centred education, creating favourable opportunities for integrating Nature-Based Education into school curricula.

Future research should move beyond conceptual discussions and examine the effectiveness of Nature-Based Education through empirical studies. Researchers may investigate its impact on different dimensions of academic engagement among students from various

educational levels and socio-cultural backgrounds. Comparative studies between traditional and nature-based teaching approaches can provide stronger evidence regarding their educational effectiveness.

Future studies may also explore the relationship between Nature-Based Education and other educational variables such as academic achievement, student well-being, learning motivation, creativity, resilience, environmental literacy, critical thinking, and social-emotional learning. Longitudinal studies and intervention-based research are particularly important for understanding the long-term impact of Nature-Based Education on students' learning and development.

Overall, overcoming the existing challenges through effective planning, teacher preparation, supportive educational policies, and continued research will strengthen the implementation of Nature-Based Education. Such efforts will help create more engaging, meaningful, and sustainable learning environments that support students' academic engagement and holistic development.

11. Conclusion

Nature-Based Education has emerged as an important educational approach that supports meaningful, learner-centred, and experiential learning. This conceptual paper examined the relationship between Nature-Based Education and academic engagement by integrating relevant theories and recent educational literature. The review suggests that learning in natural environments creates rich educational experiences that encourage students to become active participants in the teaching-learning process.

The paper explained that Nature-Based Education enhances academic engagement by improving students' curiosity, attention, intrinsic motivation, experiential learning, and emotional well-being. These psychological and educational processes strengthen the three dimensions of academic engagement—behavioral, emotional, and cognitive engagement. The Biophilia Hypothesis, Attention Restoration Theory, Experiential Learning Theory, and Self-Determination Theory provide

a strong theoretical foundation for understanding this relationship.

Although the implementation of Nature-Based Education may face challenges such as limited natural spaces, lack of teacher training, curriculum constraints, and resource limitations, these barriers can be addressed through careful planning, institutional support, and effective educational policies. Schools, teachers, curriculum developers, and policymakers have a shared responsibility to create learning environments that encourage regular interaction with nature.

This conceptual paper proposes that Nature-Based Education is an effective educational approach for enhancing academic engagement and supporting students' holistic development. Integrating nature into everyday teaching and learning can make education more engaging, relevant, and sustainable. Future empirical studies are recommended to test the conceptual framework proposed in this paper and to examine the relationship between Nature-Based Education and academic engagement across different educational contexts. Such research will contribute to a deeper understanding of the educational value of Nature-Based Education and provide evidence for its wider adoption in schools.

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