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Development of an Experiential Learning Model for Exploring the Natural Surroundings (EJAS) by Utilizing Forests as a Learning Resource at the Leuser Nature School

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ABSTRACT

The research objectives are: (1) To produce a learning model product for exploring the surrounding natural environment using the forest as a learning resource for students at Leuser Nature School. (2) To find out the practicality level of the EJAS learning model by utilizing the Forest as a learning resource (3) The effectiveness of the E JAS model *by* utilizing the Forest as a learning resource on improving learning outcomes and environmentally conscious behavior. *Research and development Borg and Gall* is a study used in developing the EJAS learning model by utilizing the Forest as a learning resource for Leuser Nature School students. Expert validation of the EJAS learning model shows an average value of 91.7% with a very valid category. The results of the trials in all three stages are in the very practical category with an average value of 92.3%. Learning outcomes appear significant with an average learning completion score of 60.92 and an average N-Gain value of 0.609 (moderate to quite high category). Students' environmental behavior has an average of 4.15. So the EJAS model can be an alternative learning strategy that is not only effective in improving cognitive learning outcomes, but also in forming attitudes and character values of Leuser Nature School students.

Key Word *Development of Learning Models, Experiential Exploration of the Surrounding Nature, Forests, Learning Resources*

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INTRODUCTION

21st-century education requires students to master various important skills, such as critical, creative, collaborative thinking, and effective communication skills (Hidayah & Nugraheni, 2024; Avdiu et al., 2025; Suciati, 2022). These skills are crucial to support learning success and readiness to face the ever-growing global challenges (Liyev, 2024 ; Thornhill-Miller et al., 2023; González - pérez & Ramírez - montoya, 2022). Among the various higher-order thinking skills, metacognitive skills occupy an important position in the world

of modern education. These skills reflect students' awareness in understanding their own learning process, including the ability to evaluate the way of thinking and strategies used in solving problems (González - pérez & Ramírez - montoya, 2022; Wrahatnolo & Munoto, 2018). The application of learning models that encourage metacognitive development has been proven effective in improving learning outcomes and strengthening students' readiness to face the dynamics of real life (Alali, 2024; Mudinillah et al., 2024).

In the context of Natural Sciences (IPA) learning, particularly biology, the traditional approach that still dominates is the lecture method and individual assignments. This approach often makes students passive, because it positions the teacher as the sole source of information. In fact, science learning actually emphasizes the importance of direct student interaction with real objects in the surrounding environment (Herlinawati et al., 2024). This condition results in low student engagement in authentic learning and limited understanding of abstract and theoretical biological concepts. Given the characteristics of science that prioritize observation of living things and natural phenomena, students should be actively involved through exploration, observation, experimentation, and reflection on various natural phenomena around them (Rifai et al., 2020). Unfortunately, learning practices still tend to be limited to the classroom and rarely utilize the environment as a learning medium (Atmojo et al., 2025; Jayawardana & Gita, 2020). Teachers are required to provide innovative and creative learning that is tailored to students' needs and potential (Oktavia, 2022).

Access to a variety of learning resources is now increasingly open thanks to advances in digital technology. However, excessive use of technology presents new challenges. Reliance on digital media in learning minimizes student interaction with the real world. Students spend more time interacting with screens than with the natural world around them. This results in reduced environmental awareness, poor direct observation skills, and a lack of contextual understanding of biological materials such as ecosystems, biodiversity, and interactions between living things (González - pérez & Ramírez - montoya, 2022 ; Silber-Varod et al., 2019 ; Van Laar et al., 2017).

Through a learning process that integrates educational content with environmental stewardship, students can be guided and encouraged to utilize the school grounds as a beautiful and comfortable environment. Adequate school facilities also play a crucial role in fostering student awareness of the importance of environmental ethics . invite student Study while interact direct with nature and environment around , it is hoped that there will be a feeling of love as well as concern to environment can embedded strong in self As a

solution to this problem, teachers must be able to develop a variety of learning models. In biology (science) learning, natural environments such as parks, school gardens, and forests can be utilized as learning resources rich in real objects (Alali, 2024; Əliyev, 2024).

Local potential around the school needs to be utilized as part of the learning process so that students can explore, develop, and understand it in a real-world context. By linking learning materials to the surrounding environment, students not only gain theoretical understanding but also are able to integrate it practically with existing local potential. push more learning applicable and growing concern to environment school (Hamidah et al., 2020).

Forests are ecosystems with extraordinary biodiversity and great potential as natural laboratories. Through forest learning activities, students can directly observe various flora and fauna, study the interactions between abiotic and biotic components, and understand environmental issues such as deforestation, pollution, and habitat loss. This approach makes the learning process more contextual and meaningful, and fosters a strong ecological awareness in students (Alali, 2024; Əliyev, 2024; Mudinillah et al., 2024).

In reality, the use of forests as a learning resource in schools is still very limited. Teaching and learning activities generally still take place in classrooms without involving exploration of the surrounding environment. Even in nature-based schools like the Leuser Nature School, environmental integration into learning is not yet fully optimal. This school actually upholds the principle of education rooted in nature, making the environment the primary learning resource and instilling values of love and concern for the environment from an early age (Tarigan, Lola Zeramenda & Anggi Wulansari, 2024). As essential ecosystems, forests contribute significantly to human survival; their absence can cause serious damage to the cycle of life on earth (Efendi, 2024).

The forest near the Leuser Nature School, located on the border of Gunung Leuser National Park (TNGL), is crucial for the survival of various flora and fauna, and plays a role in maintaining ecosystem balance and environmental sustainability. The forest area in TNGL holds extraordinary potential as a contextual learning resource for science subjects (Tarigan, Lola Zeramenda & Anggi Wulansari, 2024). By using the forest as an open laboratory, students not only enrich their knowledge of ecosystems and biodiversity but also foster a sense of environmental stewardship. Various studies have shown that experiential learning in nature, such as field trips to forest areas, can improve students' understanding of science concepts, process skills, and awareness of environmental and sustainability issues (Hamidah, L., & Suryadarma, 2021; Septiarini et al., 2021).

Approaches such as *outdoor learning* Forest *education* has been shown to strengthen students' emotional connection with nature, foster a sense of belonging, and encourage pro-environmental behavior (Hamidah, L., & Suryadarma, 2021; Harris, 2021; Kowasch et al., 2022). A positive attitude toward the environment is also a determining factor in learning success and long-term knowledge retention regarding forest ecosystems (Baierl & Bogner, 2025) . However, implementing forest-based learning in the formal curriculum still faces challenges, such as limited budgets and a lack of synergy in educational policies (Kowasch et al., 2022).

Therefore, utilizing forests in the TNGL area as a science learning resource is a strategic step that not only improves students' scientific understanding but also forms a love for the environment, which is much needed amidst the current global ecological crisis (Baierl & Bogner, 2025; Hamidah, L., & Suryadarma, 2021; Harris, 2021; Kowasch et al., 2022). Unfortunately, most teachers are still fixated on conventional learning methods and do not yet have a structured learning model to integrate forests as a learning medium (Tarigan, Lola Zeramenda & Anggi Wulansari, 2024). As a result, students lose the opportunity to gain authentic learning experiences that can deepen their understanding of biological concepts (Herlinawati et al., 2024; Kain et al., 2024).

Therefore, it is necessary to develop an innovative learning model that combines direct exploration in nature with reinforcement of biology material in the classroom. One relevant approach is the Experiential Learning Model of Exploring the Environment (EJAS). This model is designed to combine environmental observation and exploration activities with reflection activities and systematic communication of learning outcomes (Alali, 2024; Mudinillah et al., 2024) . The implementation of this learning model encourages students to acquire knowledge through direct experience, active interaction with the environment, and reflection on what they observe and experience (Alali, 2024; González - pérez & Ramírez - montoya , 2022). The EJAS model is a learning approach that provides students with direct experience through interaction with the surrounding environment (Wanabuliandari & Ardianti, 2018). This model integrates the Experiential Learning Model of Exploring the Environment (JAS) with exploration and discussion methods as its main strategies (Alimah, 2014). The implementation of the EJAS model consists of several stages: exploration, interaction, communication, reflection, and evaluation of learning outcomes. Each stage is implemented through a learning syntax that involves active interaction between teachers and students, as illustrated in Figure 1 (Muharrami et al., 2022).

The development of the EJAS learning model provides students with the opportunity to develop various important skills, both personal and social, including rational thinking and metacognitive skills. During fieldwork in the forest, students learn to identify plant and animal species, solve environmental problems, work in teams, and make decisions based on data and reflection. Thus, EJAS focuses not only on cognitive aspects but also fosters character, values, and a caring attitude toward nature.

Based on initial observations and literature review, it appears that environmental-based learning, particularly that directly utilizes forests, is still minimally implemented (Tarigan, Lola Zeramenda & Anggi Wulansari, 2024). Therefore, the development of an EJAS Model tailored to local characteristics and student needs at the Leuser Nature School is crucial . This school is expected to be a pioneer in integrating education with environmental conservation, as well as participating in maintaining the sustainability of the Leuser ecosystem. This model is believed to be an innovation in biology education that not only addresses the challenges of 21st-century learning but also strengthens the environmental conservation movement (Liyev, 2024 ; Alali, 2024; Mudinillah et al., 2024).

RESEARCH METHODE

This study used the *Research and Development* (R&D) method, referring to the *Borg & Gall model* , to develop an Experiential Nature Exploration (EJAS) learning model utilizing forests as a learning resource. This method was chosen because it can produce effective products and can be tested for feasibility before widespread implementation (Setyani et al., 2024).

The population in this study were students of SMP Sekolah Alam Leuser. The sampling technique used random sampling. The research data collection was carried out as follows: (1) needs analysis through literature studies, observations, and interviews with teachers and students of SMP Sekolah Alam Leuser; (2) EJAS model design; (3) expert validation; (4) limited trials at SMP Alam Leuser to evaluate the implementation of the model; (5) revisions based on the trial results; and (6) implementation with effectiveness evaluation through tests, questionnaires, and observations. The data analysis technique was carried out through the use of learning model validation and the practicality of the learning model which was arranged based on an index. The effectiveness of the learning model used descriptive statistics, the Sapphiro-Wilk normality test, the paired samples t-test and the n-Gain test.

RESULTS AND DISCUSSION

RESULT

The feasibility of the *Experiential Nature Exploration* (EJAS) learning model, which utilizes forests as a learning resource, was assessed using a validation sheet prepared by expert lecturers. Validation of the learning tools covered aspects of the model's feasibility, practicality, and effectiveness.

Study This succeed developing learning models *Experiential Exploration of the Environment* (EJAS) which is stated worthy based on results validation expert. Average value validation obtained , as seen in Table 1, shows that learning model This including in category very valid and ready used in learning.

Table 1.
Expert Validation Results for the Development of the EJAS Learning Model by Utilizing Forests as a Study Source

Aspect Study	Average Score (100%)	Category
Conformity with Curriculum	90%	Very Valid
Clarity and Completeness EJAS Syntax	92.3%	Very Valid
Suitability of Material with Source Learning the Forest	92.3%	Very Valid
Convenience Implementation	91.3%	Very Valid
Media and Resource Support Study	90%	Very Valid
Mean Validity	**91.7%**	**Very valid**

Overall, based on the assessment of the curriculum aspects, learning syntax, learning resource materials, ease of practice, and effective media support, the overall average was 91.7%. The aspect of suitability with the curriculum received a score of 90%, indicating relevance and suitability with curriculum standards, thus supporting the achievement of learning objectives. Spelling syntax received a score of 92.3%, indicating a clear and complete sequence of steps, facilitating understanding and implementation. The suitability of the material with forest learning resources was also 92.3%, strengthening the context of authentic forest-based learning. Ease of implementation with 91.3% confirms that this model is practical and easy to apply in various conditions. Media and learning resources with a score of 90% indicate adequate media and sources to support the learning process. This

indicates that the developed EJAS model has a high level of feasibility that can be used in research and learning practice.

The practicality of the learning model was assessed by field practitioners, carried out by science teachers at Leuser Nature School. Based on criteria implementation learning so can concluded, implementation EJAS learning model syntax with utilization forest as source learning. Implementation teacher learning of the EJAS learning model in the trial can seen in Table 2.

Table 2.
Results of the Practicality Trial of the EJAS (Experiential Exploration of the Surrounding Nature) Learning Model

No	Types of Trials	Trial Results (%)	Practicality Category
1	Individual	90%	Very Practical
2	small group	92%	Very Practical
3	Field	95%	Very Practical
	Average	**92.33%**	**Very Practical**

The EJAS learning model, utilizing forests as a learning resource, demonstrated a very high level of practicality. Based on the results of the three phases of the trial, all were categorized as very practical, with an average score of 92.3%. The five main phases of the EJAS model are structured around conditions that support the provision of experiences during the student learning process, ensuring a successful implementation. This demonstrates that the EJAS model is easy to implement, adapts to field conditions, and actively engages students in environment-based learning. This demonstrates that this model is highly practical for use in environmental exploration-based learning in forests.

The results of the data analysis of the effectiveness of the learning model show that the percentage of students' learning mastery level of the EJAS learning model by utilizing forests as a learning resource based on descriptive statistics has an average score of 60.92, with a positive category. The *Shapiro-Wilk normality test* shows that the distribution of *pre-test* and *post-test data* is normal with *p-values* of 0.170 and 0.420, respectively (greater than 0.05). The Paired Samples T-Test test revealed that there was a significant increase in student learning outcomes after the implementation of the EJAS model, with an average difference of 13.62, a t-value of -11.227, and a p-value of 0.000 (<0.05). In addition, the N-Gain test shows an average value of 0.6089, included in the category of moderate to quite high improvement according to the N-Gain interpretation standard (0.3-0.7 for moderate).

The recapitulation of students' environmental behavior scores after learning the EJAS model showed that students demonstrated good environmental awareness, with an average total score of 4.15. The highest score (4.4) was for understanding the importance of preserving forests, indicating the learning's success in increasing environmental awareness. Scores for other aspects, such as reducing plastic and disposing of waste properly, also fell into the good category. Although the motivation to save electricity was slightly lower (3.9), overall, this learning model was effective in shaping students' environmental awareness.

Discussion

Expert validation results indicate that the EJAS learning model, utilizing forests as a learning resource, has a very high level of feasibility, with an average validation score of 91.7%. This score confirms that the curriculum, learning syntax, learning resource materials, ease of practice, and media support as learning resources meet good standards for application in environment-based learning. These findings align with Bunch and Roberts (2021), who emphasized the importance of a structured and contextually appropriate model design for optimal teaching. Forest activities, with various learning objectives as interdisciplinary learning spaces, integrating science, art, technology, and character education, strongly support the development of 21st-century skills (Coupland et al., 2021; Baneva, 2024). This high validation score indicates that the EJAS model is not only theoretically relevant but also feasible for implementation in school learning practices. The validation results and the model's contribution to environment-based learning indicate that the EJAS model is highly feasible for application in science learning and other contextual education based on local potential.

A practicality test of the model by science teachers at the Leuser Nature School showed excellent results, with scores ranging from 90% to 95% across various trials (individual, small group, and field). The syntax of the EJAS learning model, utilizing the forest as a learning resource, was implemented. This demonstrates that the EJAS model is easy to apply and supports active student engagement in learning in a forest environment. Learning in the forest has been shown to enhance environmental stewardship, as evidenced by the increase in student awareness scores after engaging in planting, caring for, and maintaining plants in the learning forest (Muhfahroyin & Oka, 2021). Learning conducted outdoors or through a nature laboratory provides space for students to construct their own knowledge and learning experiences. Students are given the freedom to actively explore and discover concepts, which is carried out enthusiastically, while still prioritizing the quality of learning (Suanda, 2025).

Such learning activities are in line with the principles of contextual learning that link material to real situations and also support the strengthening of character values, which are an integral part of character education in schools (Dawis et al., 2023).

The improvement in learning outcomes was seen to be significant with an average learning completion score of 60.92 and an average N-Gain value of 0.609 (moderate to quite high category). Use of learning models *experiential* exploration natural around (EJAS) can increase results Study participant educate. This matter Because in learning with the source EJAS model learning used in the form of object real close with life students. These results align with Kolb's (1984) theory of experiential learning, which emphasizes the importance of the concrete experience-reflective observation cycle in building understanding. Statistical analysis showed a significant difference between students *pre-test* and *post-test scores* with a p-value of 0.000 (<0.05). This indicates that this learning model can significantly improve students understanding and competence. The improvement in learning outcomes was categorized as moderate N-gain, so this learning model is considered suitable for use in school learning activities (Ndia et al., 2021). A study by Juntunen and Lehtinen (2020) also confirmed that experiential learning is effective in increasing engagement and learning outcomes in science subjects through an active learning approach. Creating a learning environment that provides opportunities for students to think openly and flexibly impacts students thinking skills (Ilhamdi et al., 2022).

After implementing the EJAS model, students' environmental care behavior scores increased by an average of 4,15 on a 5-point Likert scale, especially in the aspect of understanding the importance of preserving forests (score 4,4). Baierl & Bogner (2024) on a positive correlation between direct interaction with nature and the formation of *environmental stewardship* . The behavior of reducing plastic waste and disposing of waste in its place was also observed to be positive. However, the motivation to save electricity needs more attention because it is still relatively low (3,9). Direct involvement with the natural environment increases *environmental stewardship* , namely a sense of responsibility and active behavior in protecting the environment. The findings in this study indicate that direct student involvement in the Experiential Nature Exploration (EJAS) learning model activities has a positive influence on strengthening environmental conservation values. These results are in line with (Wanabuliandari & Ardianti, 2018) who stated that JAS learning can foster various conservation *soft skills* , including environmental concern, a love of nature, responsibility, creativity, hard work, and an objective attitude.

Authentic learning experiences in the surrounding environment enable students not only to understand concepts theoretically but also to respond to environmental issues reflectively and responsibly (Williamson et al., 2023). Through exploration of their surroundings, students can develop critical thinking skills, curiosity, and environmental awareness. The EJAS model has the potential to be an alternative learning strategy that is not only effective in improving cognitive learning outcomes but also in shaping students attitudes and character values. Therefore, that , the EJAS model supports the creation of a holistic and meaningful learning process , which has the potential produce success academic at a time improvement attitudes and skills practical This is in line with recent research which states that experiential learning can significantly increase environmental awareness, motivation, and student engagement in environmental education (Shutaleva, 2023 ; Suparna & Vijayalatha, 2024).

CONCLUSION

Based on the results of the research and discussion, it can be concluded that: 1) the learning model of Exploring the Surrounding Nature with the use of forests as a learning resource for students at the Leuser Nature School, overall expert validation of the EJAS learning model shows an average value of 91.7% with a very valid category ; 2) the learning model of Exploring the Surrounding Nature with the use of forests as a learning resource for students at the Leuser Nature School is tested to be practical and obtained an average value of 92.3% (very practical), and (3) The percentage of students' learning completion level is 60.92 and the average N-Gain value is 0.609 (moderate to quite high category). So the learning model of Exploring the Surrounding Nature with the use of forests as a learning resource for students at the Leuser Nature School is proven to be effective.

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