

## Integration of Nature-Based Interdisciplinary Learning in Developing Students' Sociopreneurial Competencies at Nurul Furqon Nature Middle School

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### Abstract

Conventional educational models often create a gap between academic theory and the holistic skills needed in the era of disruption. Although previous studies have discussed nature schools and social entrepreneurship separately, there is still limited research specifically examining the integration of cross-disciplinary curricula at the junior high school level to shape social entrepreneurial character. This study aims to analyze the implementation of environment-based interdisciplinary learning at SMP Alam Nurul Furqon (Planet NUFO), Rembang, in developing sociopreneurial skills. Data were collected through a qualitative approach from ten participants through interviews, participant observation, and document analysis. The results show that the synergy of the formal curriculum, Islamic boarding school values, and open ecosystems is implemented through the primary production cycle, scientific innovation, and financial literacy. Specific findings revealed that contextual activities on livestock and agricultural land for 2–3 hours every day successfully transformed environmental problems into economic opportunities, such as the transformation of livestock waste into liquid organic fertilizer through simple biotechnology experiments. This practice proved effective in improving student competency, with approximately 83% of study subjects showing significant improvements in collaboration and problem-solving skills when managing projects at Nufo Mart. Students will gain technical skills in cultivation and internalize the values of empathy and independence through ethical business schemes. This research confirms that open spaces managed interdisciplinarily can be an effective stimulant for the emergence of young agents of change with strong social sensitivity and economic independence.

### Keywords:

Interdisciplinary learning,  
Nature-based education,  
Sociopreneurial competencies,  
Nature schools

## 1. Introduction

Conceptually, education is understood as a systematic process aimed at developing an individual's holistic potential. This process includes strengthening academic abilities, fostering social sensitivity, developing practical skills, and enhancing an individual's adaptive capacity to social dynamics and changing times. However, conventional educational models, which still focus on one-way knowledge transfer and the dominance of theoretical learning, are often inadequate in addressing these needs. This paradigm creates a gap between the competencies taught in schools and the holistic skills needed in real life, thus encouraging the need for a more innovative and contextual educational approach. This idea was expressed long ago by Dewey (1938), who emphasized that sociopreneurship skills are provided in theoretical learning as a foundation for understanding direct experience and real-world interactions (Vygotsky, 1978).

In line with today's changing times, education is required to prepare students for an era of technological disruption and increasingly complex social change. Ideally, education should shape students to be competitive and sustainable in the future. Every individual must possess the ability to be independent. This independence includes the ability to think critically, solve problems, and adapt quickly. Therefore, education needs to shift its focus from simply transferring knowledge to developing holistic skills. One relevant and needed approach is sociopreneurship, which combines entrepreneurial skills with social awareness.

Sociopreneurship is the ability to create innovative solutions to social problems through an entrepreneurial approach (Dees, 2001; Wibowo & Nulhaqim, 2015). Sociopreneurship skills are becoming a career trend among the younger generation due to their relevance in addressing various complex issues, such as poverty, inequality, and environmental damage (Suyatna & Nurhasanah, 2018). Unlike conventional entrepreneurship, which is solely oriented towards financial gain, sociopreneurship seeks to create sustainable social value for society (Pratiwi & Handayani, 2021). This skill is crucial because it enables individuals not only to create economic value but also to address social and environmental issues. They are trained to view problems as opportunities, combining business innovation with a strong social mission. Thus, they seek not only profit but also create a positive impact on society. Nature schools exist as a relevant learning ecosystem by making nature the primary classroom. This approach facilitates experiential learning, enabling students to gain a direct understanding of the environment and the social issues within it.

Research on developing student competencies through innovative learning models has been extensively conducted with various complementary focuses. Sidiq (2019), in his study at the School of Universe high school, emphasized that nature schools excel in implementing an integrated curriculum that holistically combines the pillars of logic, leadership, and entrepreneurship. This interdisciplinary integration enables students to understand the connection between academic theory and practical application. Similarly, Wahyuningsih et al. (2021) highlighted that project-based learning models utilizing the natural environment have proven effective in enhancing students' soft skills and creativity through direct interaction with the surrounding ecosystem. Furthermore, the urgency of developing an entrepreneurial spirit with social impact is reinforced by the findings of Putri and Salsebela (2025), who demonstrated that sociopreneurship training programs can enhance students' empathy and ability to design business solutions to social problems in their environment. The synthesis of these three studies confirms that the integration of nature-based interdisciplinary learning has great potential as a strategic tool in developing sociopreneurial competencies in students who are economically skilled and possess a high level of social sensitivity.

While previous research has addressed nature school curricula (Sidiq, 2019), environment-based learning (Wahyuningsih et al., 2021), and social entrepreneurship training (Putri & Salsebela, 2025), this study differs significantly in its focus on interdisciplinary integration at the junior high school level, a distinction that has not been explored in depth. The novelty of this research lies in the development of the Nature-Based Interdisciplinary Learning model as a specific stimulus for developing students' sociopreneurial competencies. In this study, nature becomes an interdisciplinary laboratory for integrating spiritual, scientific, and economic values into one, providing concrete solutions to social problems in the school environment.

In this context, SMP Alam Nurul Furqon (Planet NUFO) in Rembang, Central Java, is a relevant research object. This school implements a unique curriculum that combines formal education, Islamic boarding schools (pesantren), and nature-based learning. Although the nature school model is increasingly popular, there is still limited research specifically examining how this nature-based interdisciplinary curriculum integration concretely influences the development of students' sociopreneurial competencies. Therefore, this study is crucial because it will deeply analyze these learning practices and examine their contribution to developing social skills, environmental awareness, and a sociopreneurial spirit in students. The research questions are as follows:

1. How is the concept of nature-based interdisciplinary learning implemented at SMP Alam Nurul Furqon (Planet NUFO)?
2. What forms of nature-based activities contribute to developing students' social skills, environmental awareness, and entrepreneurial spirit?

3. How does nature-based interdisciplinary learning contribute to the development of students' sociopreneurial competencies?

This research aims to:

1. Describe the concept and implementation of nature-based interdisciplinary learning at Nurul Furqon Nature Middle School.
2. Identify forms of nature-based learning activities that develop students' social skills, environmental awareness, and entrepreneurial spirit.
3. Evaluate the contribution of this learning to the development of students' sociopreneurial competencies, which include aspects of creativity, independence, leadership, social empathy, and environmental awareness.

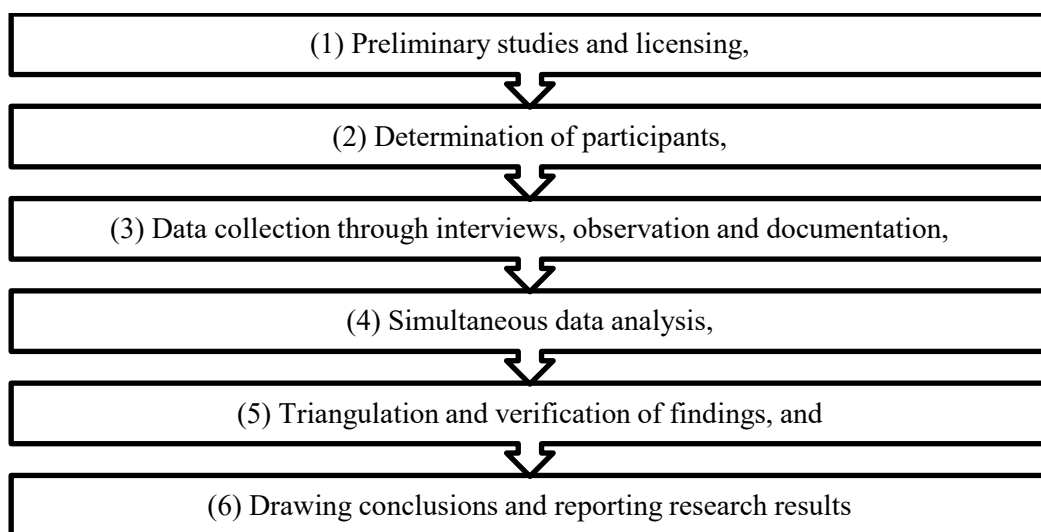
Theoretically, this research is expected to enrich the study of nature-based education and sociopreneurship development in the context of formal education, particularly at the junior high school level. This research can also serve as a reference in developing interdisciplinary learning models relevant to the challenges of the 21st century. Practically, the results of this research are expected to contribute to educators, school administrators, and educational policymakers in designing and implementing effective nature-based learning to foster students' sociopreneurial competencies. Furthermore, this research can inspire other schools in developing education that is oriented not only toward academic achievement but also toward character development, social awareness, and environmental sustainability.

## 2. Method

This research employed a qualitative approach. This approach was chosen because it allows researchers to gain a deep and holistic understanding of social phenomena in their natural context (Creswell & Creswell, 2022). This study explores in depth how and why the school's nature-based education model influences the development of students' sociopreneurial competencies (Yin, 2021). An intrinsic case study design was used to explore in detail the uniqueness and complexity of a single case: Nurul Furqon Nature Middle School (Planet NUFO) in Rembang, Central Java.

This school was purposively selected due to its unique characteristics, combining formal curriculum, Islamic boarding school education, and nature-based learning. The study was conducted over four months, from February to May 2025, encompassing preparation, data collection, initial analysis, and verification of findings. Overall, the research flow ensured a systematic and transparent process (Figure 1).

**Figure 1**  
*Research Flow*



Participant selection was conducted using purposive sampling (Patton, 2020) with the following main criteria: (1) direct involvement in the planning and implementation of nature-based learning, (2)

experience in school sociopreneurship activities, and (3) ability to provide relevant and in-depth information in line with the research focus. This research was conducted in accordance with the ethical principles of qualitative research. All participants were given an explanation of the research objectives and procedures and signed a consent form. Participants' identities were kept confidential using initials or a code. Participation was voluntary, and participants had the right to withdraw from the study at any time without consequence.

The study involved ten participants: one principal, selected because of his role as a policymaker and guardian of the school's educational vision; three teachers, who are actively involved in curriculum planning, facilitating nature-based learning, and mentoring sociopreneurship projects; and six eighth- and ninth-grade students, selected based on their active involvement in sociopreneurship activities, such as managing school gardens, animal husbandry, and environmentally-based entrepreneurial activities. The diversity of participant roles allows for a comprehensive perspective on policy, implementation, and student learning experiences. Data validity was maintained through triangulation, which included source triangulation (principal, teachers, and students), technical triangulation (interviews, observation, and documentation), and temporal triangulation (data collection at different points in time). Furthermore, researchers conducted member checking by confirming preliminary findings with several key informants to ensure the accuracy of data interpretation.

Data collection was conducted using three main techniques: in-depth interviews, participant observation, and document analysis (Denzin & Lincoln, 2021).

1. In-depth interviews were conducted semi-structured using an interview guide developed based on the research focus. This guide covered themes such as the concept of nature-based learning, the implementation of sociopreneurship activities, students' learning experiences, and participants' perceptions of the impact of this learning. Interviews lasted 45–90 minutes for each participant and were recorded with the informant's consent.
2. Participant observation was conducted using an observation sheet or checklist, which included indicators of learning activities, student interactions with teachers, student involvement in nature activities, and sociopreneurship practices. Researchers were directly involved in school activities during approximately 12 visits, both in and outside the classroom, such as gardening, animal husbandry, and group projects. All observation findings were recorded in field notes.
3. Document analysis included the school curriculum, syllabus, learning modules, sociopreneurship project reports, student portfolios, and photo documentation of activities. Document analysis was conducted using a documentation guide to ensure consistency between planning, implementation, and learning outcomes.

The collected data were analyzed using the interactive model of Miles, Huberman, and Saldana (2020). The analysis process was carried out simultaneously with data collection through three main stages: data reduction, data presentation, and conclusion drawing and verification. Data reduction was carried out by selecting, simplifying, and grouping data into themes or categories relevant to the research focus. The reduced data was then presented in the form of descriptive narratives, thematic matrices, or charts for easier understanding. Conclusions were drawn inductively based on patterns of findings in the field and verified through triangulation of sources, techniques, and time to maintain the validity and reliability of the research findings.

### **3. Results and Discussion**

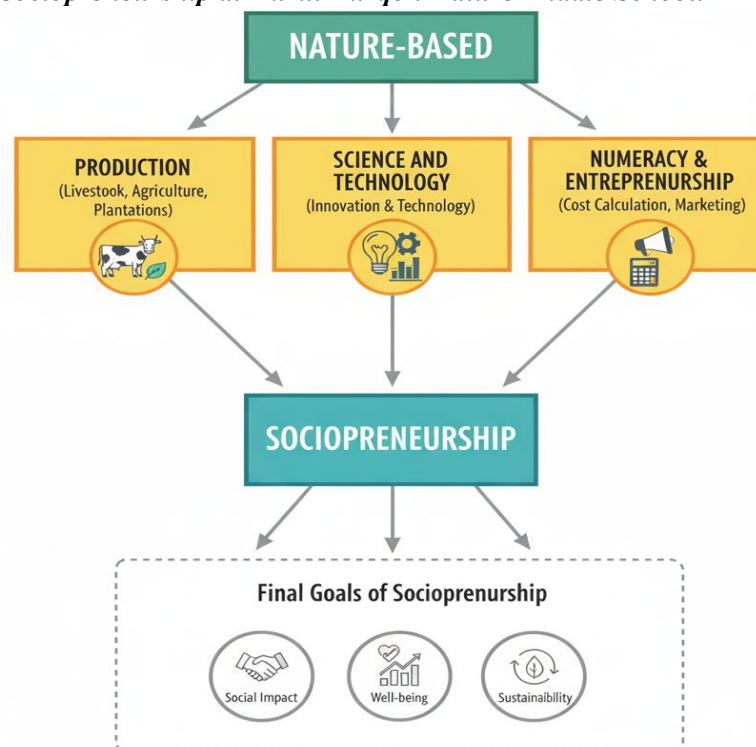
#### **Concepts and Practices of Nature-Based Interdisciplinary Learning**

The research results show that nature-based interdisciplinary learning at SMP Alam Nurul Furqon is built through the integration of three main pillars: the formal curriculum, Islamic boarding school values, and nature-based learning. This integration is not symbolic, but rather implemented operationally in all learning activities. The school's vision, "To produce a generation of professional intellectual Muslims with Qur'anic morals," serves as a normative framework translated into a mission of nature, Qur'anic values, and entrepreneurship. Planet Nufu's motto, "Different and The Best. Smart, Rich, and Powerful!", reinforces this vision and mission. The phrase "Different and The Best" emphasizes the institution's desire to provide a different and innovative education, while also being of superior quality. Meanwhile, the three keywords "Smart, Rich, and Powerful" represent the direction of education: smart in intellect, knowledge, and morals; rich in knowledge, skills, and economic independence; and powerful in the sense of being empowered, influential, and able to lead in society. Thus, the Planet Nufu

motto is not merely a motivational slogan, but rather a concrete reflection of the values to be realized through the institution's vision, mission, and goals.

The natural environment is used as the primary learning space and living laboratory. Observational findings indicate that approximately 70–80% of contextual learning activities take place outside the classroom, particularly in agriculture, animal husbandry, and entrepreneurship. Learning directly in nature, or experiencing it, supports the implementation of a curriculum oriented toward active, experiential students. This reinforces the argument that experiential learning fosters deeper conceptual understanding (Dewey, 1938). Nature serves not merely as a setting but as a primary resource and living laboratory, providing raw materials for transformative learning processes (Cenić et al., 2023). This approach provides authentic learning experiences, establishing direct connections between students, the environment, and the science concepts they are learning.

**Figure 2**  
**Conceptual Flowchart: Integration of Nature-Based Interdisciplinary Learning towards Sociopreneurship at Nurul Furqon Nature Middle School.**



The learning process consists of three main stages. First, Primary Production, which involves the utilization of natural resources through livestock, agriculture, and plantation activities. Livestock includes cattle, goats (Figure 3), quail, free-range chickens, KUB chickens, ducks, and catfish cultivation. Vegetables include spinach, eggplant, water spinach, beans, chilies, tomatoes, shallots, saci beans, butterfly pea, and so on. Plantations include cassava, bananas, corn, and sugar cane.

**Figure 3**  
**One of the students is feeding his goat.**



This activity enables students to understand the production cycle from upstream to downstream and solve real-world problems. On average, students engage in natural production activities for 2–3 hours per day within a structured weekly schedule.

Second, Innovation and Science, where students use scientific knowledge to improve production quality and efficiency (Yasaroh et al., 2024), for example, processing waste into fertilizer (goat manure fermentation), making fermented tape, and hydroponics.

One teacher explained:

*"The children are not only told to plant or raise livestock, but they are also encouraged to think about why crops fail or why livestock get sick, and then find scientific solutions."*

(Science Teacher, Interview, 2025)

Third, Entrepreneurship and Numeracy, where students learn to calculate production costs, determine selling prices, and implement marketing strategies. Entrepreneurial practices integrated with hands-on learning can enhance the entrepreneurial readiness of the younger generation. The Entrepreneurship and Numeracy stage requires students to calculate production costs, determine selling prices, and market products through sales activities at bazaars and Nufo Mart. These findings align with Palmér et al. (2018) stated that integrating entrepreneurship into mathematics learning in elementary schools has the potential to create a win-win situation, as it can improve not only mathematical competence but also students' entrepreneurial skills. Leung (2020) emphasized the importance of integrating entrepreneurship into numeracy learning to build entrepreneurial readiness from an early age. Similar findings were also demonstrated by Sumbogo, Yunus, & Buchori (2023), who studied vocational schools with green teaching factories and found that this model can improve environmental awareness and students' entrepreneurial skills. Real-life activities such as selling produce at school bazaars strengthen a sense of ownership, improve mental well-being, and foster social leadership and risk-taking (Zavala, 2023).

Research findings indicate that effective entrepreneurship education emphasizes not only business knowledge but also the development of entrepreneurial attitudes, values, and intentions that support career independence and business sustainability. Therefore, entrepreneurship education is understood as a learning process that prepares students to face future uncertainties through the ability to create businesses (Leung, 2020). The primary goal of entrepreneurship education is to develop individuals with an entrepreneurial orientation by fostering attitudes, behaviors, values, and intentions that support career independence. Entrepreneurs are expected to transform ideas into concrete actions through creativity, innovation, risk-taking, and project planning and management skills. Therefore, entrepreneurship education can be viewed as an integrated process that develops knowledge, attitudes, skills, and professional competencies. Furthermore, this education also aims to develop students as independent business owners while building a learning environment that encourages creativity, independence, risk-taking, responsibility, and respect for diversity (Hasan et al., 2022).

### **Nature-Based Activities and Their Role in Developing Sociopreneurial Skills**

Interviews and observations indicate that nature-based activities significantly contribute to the development of students' sociopreneurial skills, particularly in collaboration, social empathy, critical thinking, and creativity. Approximately 5 out of 6 students interviewed stated that they learned to cooperate and resolve conflicts through gardening and livestock projects.

One student stated:

*"In the garden, you can't work alone. If one doesn't work, everyone is affected. Sometimes there are differences in how we work or carry out activities, but with the desire to complete them on time with good results, we understand and help each other."* (Grade 9 student, Interview, 2025)

Nature-based activities at SMP Alam Nurul Furqon are specifically designed to develop sociopreneurial skills. Projects such as gardening and livestock management require students to collaborate, communicate, and resolve conflicts. This fosters collaboration and empathy, which are essential foundations for sociopreneurship (Bassachs et al., 2020). Real-world practical activities foster

critical and reflective thinking skills, particularly when crop yields decline or products are not selling well in the market. Students are asked to analyze the causes and formulate solutions. This process fosters a problem-solving mindset relevant to sociopreneurship. According to Stark (2024), this process helps develop creative and analytical thinking relevant to solving social problems sustainably. Findings from nature-based activities that develop sociopreneurial competencies are summarized in Table 1 below.

**Table 1**

***Matrix of Nature-Based Activities and Sociopreneurial Competencies***

<b>Activity</b>	<b>Form Activity</b>	<b>Developing Competencies</b>
Agriculture & livestock	Planting, giving feed, harvest	Not quite enough answer, collaboration
Innovation science	Fermentation fertilizer, hydroponics	Think critical, creativity
Entrepreneurship	Bazaar, Nufo Mart	Independence, literacy economy
Discussion & reflection	Evaluation results project	Empathy, taking decision

Analytical, this experiential learning creates a learning environment that supports the development of the 4C skills. Real-world problem-based learning in nature facilitates the development of the "4C skills," as found by Ye & Xu (2023): critical thinking, communication, collaboration, and creativity. A learning environment that emphasizes real-world challenges encourages students to think creatively, communicate, and collaborate effectively, and hone critical thinking skills through discussion and reflection. Learning objectives and the impact of activities can be seen in discussions and students' ability to communicate and lobby for mutual cooperation in completing assignments and learning targets. The perspective and mindset of independence, often referred to as "kaya" (independent), is deeply ingrained in their minds. Nature-based socio-practitioner learning, coupled with the infrastructure provided at Nufo Middle School, can encourage students to practice and experience the process of becoming socio-practitioners. Students can practice and discuss challenges with their supervisors or those in charge of the entrepreneurship branch when they encounter them.

Guidance and direction from the tutors foster a sense of togetherness, despite the students' cultural diversity across Indonesia. They are united by the various rules and policies implemented by the tutors. At the same time, the emphasis is on synergy and the ability to compete to become the best winner, as their slogan suggests, "different in the best." Education and experience foster self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Through this active interaction, according to Gimbert et al. (2021), students are able to cognitively internalize concepts, naturally building empathy and social awareness. This approach also fosters independence and collaboration skills, which are at the heart of sociopreneurship.

In the context of learning, an interdisciplinary approach based on the natural environment that combines physical activity and nature exploration encourages students to gain in-depth understanding, reflective thinking, and the development of collaboration skills and strategic action. This model aligns with the findings of Bassachs et al., (2020) who stated that students who can demonstrate improvements in systems thinking, critical analysis, interpersonal relationships, and the ability to take strategic action are important foundations for sociopreneurship. This is supported by the findings of Widodo, Fahmi, & Widiastuti (2024) who showed that holistic environment-based education can improve students' cognitive, affective, and psychomotor abilities, while strengthening supportive parental involvement in the educational process. These findings confirm that experiential learning can create meaningful learning and be oriented towards social impact. Reflection and self-assessment in interdisciplinary projects help students recognize and develop professional competencies, such as project management, decision-making, and debate skills that are relevant for young sociopreneurs (Adinda & Denami, 2025).

**Supporting and Inhibiting Factors in Implementation**

The research identified several key supporting factors in the implementation of nature-based learning. The first factor is the school's consistent vision and leadership instilling holistic educational values. The school leadership's commitment is reflected in policies that encourage contextual learning and strengthen student character.

The principal emphasized:

"From the beginning, we wanted children to be not only intelligent, but also to have vitality and social awareness" (Principal, Interview, 2025).

The second supporting factor is the availability of natural areas utilized as direct learning resources, so that the learning process is not merely theoretical but based on real-life experiences. Furthermore, the integration of religious values into learning activities helps strengthen student character development, particularly in aspects of responsibility, social awareness, and environmental awareness.

On the other hand, the research also identified several inhibiting factors that impact optimal implementation. Limited facilities and infrastructure supporting science learning innovations are a major obstacle, particularly in the provision of adequate experimental tools and learning media. Furthermore, there are disparities in student motivation levels, with not all students demonstrating the same readiness to participate in nature-based project learning. The workload of teachers managing interdisciplinary learning also presents challenges, particularly in the planning, implementation, and evaluation of learning. Another obstacle is the inconsistency in implementation that arises when formal academic schedules clash with nature project activities, preventing some activities from being implemented optimally and sustainably.

### **Sociopreneurship as a Future Education Goal**

The results of nature-based interdisciplinary learning indicate the development of sociopreneurial competencies in students, as seen in Table 2 below.

**Table 2**  
*Aspects of sociopreneurial competency developed in students*

No	Aspect	Development
1	Creativity	Students are able to develop new product ideas from natural ingredients, such as making locally available food using a dedicated production kitchen.
2	Independence	Students are accustomed to planning activities, assigning roles within groups, and completing projects without always relying on teachers. Nufo Junior High School is a boarding school, making it easier for students to collaborate with fellow students and teachers.
3	Social Awareness	Students are more sensitive to environmental issues and seek solutions to address these issues, including environmental needs that can become opportunities for entrepreneurship.
4	Entrepreneurship	Students begin to learn about the added value of a product, how to market it, and the importance of ethical trading practices through a shared shop called Nufo Mart.

Overall, the integration of nature-based interdisciplinary learning has proven effective in instilling the fundamentals of sociopreneurial competencies, although obstacles remain, such as limited infrastructure and differences in motivation among students. The learning elements at SMP Alam Nurul Furqon are focused on fostering a sociopreneurial spirit. Sociopreneurship is an educational achievement and even a flagship program, integrating natural resources, science, numeracy, and entrepreneurship to develop skills needed for the future. The findings of this model are supported by research by Khobir et al. (2024), who explained that the integration of religious and entrepreneurial values in Islamic boarding schools shapes the social identity and innovation capabilities of students. The "Be The Change" program from Sociopreneur Indonesia (2024) also demonstrates the success of social entrepreneurship education applied to students and teachers, which is necessary to create agents of change in schools. Therefore, a model like that at SMP Alam Nurul Furqon can serve as a reference for other educational institutions to create relevant, transformative, and sustainability-oriented learning.

### **4. Conclusion**

This study concludes that nature-based interdisciplinary learning at Nurul Furqon Nature Middle School (SMP Alam Nurul Furqon) is able to integrate the formal curriculum, Islamic boarding school values, and the holistic use of nature. This integration creates a contextual and transformative learning

experience and contributes to the development of students' sociopreneurial competencies. Students are directly involved in natural production activities, scientific innovation, and entrepreneurship, thus developing independence, environmental awareness, social skills, creativity, and problem-solving abilities. Thus, nature-based learning not only strengthens cognitive competencies but also shapes character and social capacities relevant to future needs.

Practically, these findings demonstrate that nature-based learning can be an effective alternative educational model for developing sociopreneurial competencies at the secondary school level. For teachers, cross-subject learning linked to real-world problems in students' environments needs to be developed sustainably. For schools, more systematic curriculum planning is needed to ensure consistent integration of nature-based learning and academic achievement. For policymakers, the results of this study can serve as a basis for strengthening policies on contextual education, social entrepreneurship, and sustainability. Further research is recommended to examine the effectiveness of this model in different school contexts and assess its long-term impact on students' social and economic behavior.

This research has limitations due to its single-site, case study design, and relatively short duration, so the findings are not intended to be generalizable. Theoretically, this research contributes to expanding the study of nature-based learning by demonstrating that the integration of nature, religious values, and entrepreneurship is effective in developing sociopreneurial competencies, a goal of 21st-century education.

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