



## ANALYSIS OF LOCAL WISDOM (ETHNOBIOLOGY) IN MULYOHARJO VILLAGE AS A SOURCE OF BIOLOGY LEARNING IN HIGH SCHOOL

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### Abstract

Biology education in the modern era demands a contextual and relevant approach to students' lives, yet it remains dominated by theoretical textbook usage. This study aims to analyze the forms of local wisdom (ethnobiology) in Mulyoharjo Village and examine its potential as a biology learning source for senior high schools. This research used a descriptive qualitative method with ethnobiological and ethnographic approaches. Data were collected through field observations, semi-structured interviews with community leaders and traditional medicine practitioners, and documentation. Data analysis followed the Miles and Huberman interactive model, including data reduction, data display, and conclusion drawing. The results showed that the community of Mulyoharjo Village possesses rich local wisdom in utilizing various flora as traditional medicine, such as turmeric (*Curcuma longa*), betel (*Piper betle*), bitter grape (*Tinospora crispa*), and cat's whiskers (*Orthosiphon aristatus*). These utilization practices reflect a harmonious and sustainable reciprocal relationship between humans and the environment. These ethnobiological findings have strong scientific relevance to the Phase E/F high school biology curriculum, particularly in the topics of Biodiversity, Classification of Living Things, and Ecosystems. The study concludes that the local wisdom of Mulyoharjo Village has significant potential to be integrated as a contextual biology learning source to enhance students' environmental literacy and cultural awareness.

**Keywords:** Biology Learning; Ethnobiology; Learning Resources; Local Wisdom.

### INTRODUCTION

Education in the 21st century era requires a fundamental transformation in the learning process, where learning activities are no longer only oriented to the transfer of knowledge, but also to the development of high-level thinking skills such as critical, creative, communicative, and collaborative thinking, as well as contextual and adaptive literacy skills to the development of science and technology (Əliyev, 2024; González Villavicencio & Estrella Flores, 2023; Todorova, 2024). This paradigm shift places students as active subjects who must be able to construct knowledge through meaningful learning experiences (Mijanović, 2023; Petrovschi & Sbîrciu, 2022). In line with these demands, the implementation of the Independent Curriculum provides a wider space for educators to design learning that is flexible, differentiated, and centered on the needs and characteristics of students (A. Hadi et al., 2023). This curriculum also emphasizes the importance of strengthening the Pancasila Student Profile, which not only focuses on cognitive aspects, but also on character development, cultural values, and concern for the environment (Kadir, 2023). Ideal learning is not enough to only convey concepts theoretically, but must be able to relate the material to the reality of students' lives so that the knowledge gained has meaning and can be applied in daily life (Sattorova, 2024). The connection between subject matter and the context of the social and natural environment is very important to create an authentic and relevant learning experience. Contextual learning is no longer an option, but an indispensable necessity in the modern education system (Srinivasa, 2022).

These ideal demands have not been fully implemented optimally in learning practices in the field, especially in biology subjects at the secondary education level (R. P. Silva et al., 2024).

Conceptually, biology is a science that is very close to daily life because it studies living things and their interactions with the environment, so biology learning should be presented contextually and based on real experiences. However, in reality, biology learning is still dominated by a theoretical, textual, and teacher-centered approach (SANTOS, 2023). The learning process often only focuses on delivering material from textbooks without providing enough opportunities for students to explore the surrounding objects or biological phenomena (Haryanto et al., 2024). The high dependence on textbooks as the main source of learning causes limitations in the variety of students' learning experiences, so that the concepts learned become abstract and difficult to understand in depth. (Lin & Ding, 2024) The lack of use of the surrounding environment as a learning resource also results in students being unable to relate the material learned to their real lives (Giyato & Sridiyatmiko, 2022). This condition ultimately has an impact on the low quality of students' conceptual understanding and the formation of a perception that biology is just a memorization subject that is less relevant to daily life. These problems show that there is a significant gap between the nature of biology learning that should be contextual and learning practices that are still conventional, so that innovative efforts are needed to bridge this gap (Montero & Geducos, 2022).

Learning resources should not be limited to textbooks or formal teaching materials, but can come from various sources around students, including the natural environment and social life of the community (Rusnawati, 2022). The surrounding environment is basically an open laboratory that provides a variety of biological phenomena that can be observed, analyzed, and used as a direct learning object (Fleischner et al., 2017). Through the use of the environment as a learning resource, students not only play the role of recipients of information, but also as small researchers who are active in discovering and building their own understanding. (Herman et al., 2023) This approach is in line with the principles of constructivistic learning which emphasizes that knowledge is built through direct experience and interaction with the environment (GHORAI, 2025). The use of the environment as a learning resource also allows for more meaningful learning because students can see the real connection between the concepts learned and the phenomena that occur around them (Bamrara & Bamrara, 2024). Environment-based learning is able to develop science process skills such as observing, classifying, interpreting data, and drawing logical conclusions (Hasmawaty et al., 2023). Students' direct involvement with the environment also has the potential to foster ecological awareness and a responsible attitude towards nature conservation. Environmental integration in biology learning not only serves as a variety of methods, but is a fundamental need in improving the quality of holistic and sustainable learning (Nanti & Asmendri, 2022).

One of the approaches that is considered to be able to bridge the use of the environment as a learning resource with strengthening the cultural context is through the study of Ethnobiology (Suhartati et al., 2025). Ethnobiology not only studies the relationship between humans and flora and fauna in general, but also examines how local communities understand, utilize, and manage biological resources based on the cultural values they embrace (Albuquerque et al., 2024). Traditional knowledge of society is the result of a long process of human interaction with its environment that is inherited from generation to generation and tested in the practice of daily life (Botokanova, 2022). This knowledge covers various aspects, ranging from the use of plants as traditional medicine, natural product processing techniques, to sustainable environmental management systems (Kumar et al., 2021). Scientifically, many of these practices actually have a strong foundation in biological concepts, even though they have not yet been formally formulated in the language of modern science (Akhondzadeh, 2025). The local wisdom contained in ethnobiology practice has great potential to be used as a contextual and meaningful learning resource in biology learning (Adinugraha, 2022). The integration of ethnobiology in learning not only helps students understand concepts more concretely, but also strengthens cultural identity and a sense of belonging to the surrounding environment (RADASSA & CESAR GEGLIO, 2022). Biology learning not only serves as a means of science transfer, but also as a medium to preserve local values and build culturally based ecological awareness (Nurlia et al.,

2025).

Mulyoharjo Village is one of the areas that has great potential in the development of biology learning resources based on local wisdom. The people of this village coexist with the natural environment that is rich in biodiversity, thus indirectly forming a pattern of close interaction between humans and the environment. This interaction gives birth to various forms of traditional knowledge that are inherited from generation to generation, especially in terms of the use of biological resources such as medicinal plants, the selection of plant species for certain needs, and adaptive and sustainable environmental management practices. This local knowledge not only has practical value in daily life, but also contains biological concepts that are relevant to learning materials at the high school level, such as biodiversity, classification of living things, and the relationship between organisms and their environment (Karmadi et al., 2023). However, until now this knowledge is still implicit, spread in the practice of community life, and has not been scientifically or systematically documented. The absence of this documentation causes the great potential possessed by the people of Mulyoharjo Village to not be optimally utilized in the world of formal education. The lack of integration between local knowledge and the school curriculum also results in students not getting learning experiences that link science with the reality of life in their own environment (C. da Silva et al., 2024).

Although studies on ethnobiology have developed quite rapidly and are widely carried out in various regions, most of the existing research still focuses on the inventory aspect, namely the collection of data on types of flora and fauna and their use by the community. This approach tends to stop at the descriptive stage without further linking it to the needs of learning in schools. As a result, the results of these studies have not made a significant contribution to the development of applicable and integrated learning resources in the educational process. On the other hand, studies that specifically relate the results of ethnobiology research to biology learning, especially in the context of the development of learning resources based on local wisdom, are still very limited. Moreover, until now there has been no research that specifically examines the potential of local wisdom of the people of Mulyoharjo Village from an ethnobiological perspective and connects it with the needs of biology learning in high school. This condition shows that there is a significant research gap, both in terms of location and the approach used. Thus, this research is strategically positioned to fill this gap, not only by documenting local knowledge, but also by analyzing its relevance as a source of biology learning that can be integrated into the learning process systematically and sustainably.

Based on the background that has been described, this study aims to examine and optimize the potential of local wisdom as a source of contextual biology learning. In particular, the purpose of this research is to analyze various forms of local wisdom owned by the people of Mulyoharjo Village, as well as to examine the local wisdom through the perspective of Ethnobiology to reveal the scientific values contained in it. In addition, this research also aims to identify and map the potential results of the ethnobiology study so that it can be used as a source of biology learning at the high school level that is relevant, contextual, and in accordance with learning needs. Thus, the results of this research are expected not only to contribute to the development of science, but also to be implemented in learning practices to improve the quality and meaningfulness of the student learning process..

## METHODS

This study uses a qualitative approach with a descriptive research type, which aims to explore, understand, and describe phenomena in depth based on the perspective of the research subject (Supriyono, 2024). The selection of a qualitative approach is based on research objectives that are not oriented to quantitative measurement, but rather on the disclosure of meaning, perception, and local knowledge of the community naturally in the context of daily life (Draper, 2004). The approach used is Ethnobiology combined with an ethnographic approach, thus allowing researchers to examine the mutual relationship between the people of Mulyoharjo Village and the biodiversity in their environment more comprehensively. Through this approach,

the research not only describes the forms of local wisdom, but also analyzes how this knowledge is practiced, interpreted, and inherited as part of the community's cultural system.

This research was carried out in Mulyoharjo Village which was chosen purposively with the consideration that the area has a wealth of local wisdom that is still preserved, especially in the use of flora and fauna for traditional needs. In addition, the absence of scientific research that specifically examines ethnobiology in this area makes Mulyoharjo Village a potential location for research, both in terms of originality and scientific contributions. This research was carried out from January to March 2026 which includes the preparation stage, data collection in the field, to analysis and preparation of research reports.

The sample in this study is an informant who was selected using the purposive sampling technique, which is the selection of samples based on certain criteria that are relevant to the purpose of the research. The selected sample includes community leaders, elders or traditional medicine practitioners who have in-depth knowledge about the use of medicinal plants, as well as the general public such as farmers who interact directly with the natural environment. The selection of informants is based on their level of knowledge, experience, and involvement in local wisdom practices, so that the data obtained is expected to be in-depth, authentic, and representative of the socio-cultural conditions of the people of Mulyoharjo Village.

Data collection in this study was carried out through three main complementary techniques, namely observation, interviews, and documentation. Observations were carried out directly in the field to observe environmental conditions, the types of organisms used, and traditional practices of the community in interacting with nature. Interviews were conducted in a semi-structured manner to explore in-depth information related to local knowledge, how to utilize biological resources, and the cultural values behind them. Meanwhile, documentation was used as supporting data in the form of photographs, field notes, and other relevant documents to strengthen the research results. These three techniques were used in an integrated manner to obtain comprehensive and complementary data.

The data analysis in this study uses an interactive model from Miles and Huberman which includes three main stages, namely data reduction, data presentation, and conclusion drawn. In the reduction stage, the data obtained from the field is selected, summarized, and focused on aspects relevant to ethnobiological studies. Furthermore, the data is presented in the form of a systematic descriptive narrative to describe the relationship between humans and the environment in the context of local wisdom. The last stage is the drawing of conclusions that are carried out gradually and continuously during the research process. This analysis is combined with an ethnobiological perspective to identify the pattern of relationships between people and flora, fauna, and the environment as a unit of systems that interact with each other (Albuquerque et al., 2024). To ensure the validity of the data, this study uses triangulation techniques which include source triangulation and triangulation techniques. Source triangulation is carried out by comparing information obtained from various different samples, while technical triangulation is carried out by comparing data from observations, interviews, and documentation. In addition, member checks are also carried out, which is the process of verifying data by reconfirming the results of the researcher's findings and interpretation to informants. This step aims to ensure that the data obtained is truly accurate and in accordance with real conditions in the field.

The final stage in this study is to relate the results of the study of local wisdom to the needs of biology learning at the high school level. The data obtained is analyzed to identify its relationship with relevant biological materials, such as biodiversity, classification of living things, and ecosystems. This process aims to map the potential of local wisdom as a learning resource that is not only scientifically valid, but also pedagogically appropriate. Thus, the results of this research not only contribute to the documentation and preservation of local culture, but can also be implemented as a contextual learning resource that is able to improve the quality of biology learning in schools.

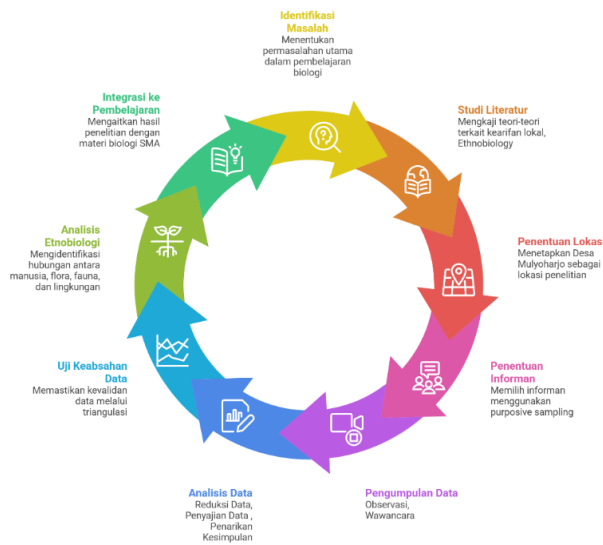


Figure 1. Research Flow Diagram

**RESULT AND DISCUSSION**

**Overview of Research Locations**

The research location is a rural area that is geographically dominated by an agricultural landscape with relatively preserved natural vegetation. The environmental conditions in this area include rice fields, yard gardens, and the rest of local forest vegetation which serves as the main support for the availability of biological resources for the community. The diversity of these types of ecosystems not only reflects the high potential for biodiversity, but also shows a strong link between environmental conditions and the socio-economic activities of the local community. In daily life, people use natural resources not only to meet economic needs, but also as part of cultural practices that have been passed down from generation to generation. This interaction reflects a harmonious reciprocal relationship between humans and the environment, where communities not only play the role of users, but also as guardians of ecosystem balance through various traditional management practices that are adaptive to natural conditions. The environmental characteristics in this research area are an important foundation in understanding the emergence of various forms of local wisdom related to the use of biodiversity.

**Forms of Local Community Wisdom**

The main data of the study shows that there are various types of flora that are used for generations by the community at the research site. This knowledge includes local names, properties, and parts of the plants used. The following is a summary of the data on the use of plants in the local wisdom of the local community:

Table 1. Utilization of Plants in Local Wisdom of the Local Community

Yes	Local Name	Scientific Name	Benefits	How to Use
1	Kunir/Kunyit	<i>Curcuma longa</i>	Wound & Digestive Medicine	Grated and squeezed
2	Betel	<i>Piper betle</i>	Antiseptics & nosebleeds	Rolled or boiled leaves
3	They were brotating	<i>Tinospora crispa</i>	Itching and diabetes medications	Batang direbus
4	Cat Whiskers	<i>Orthosiphon aristatus</i>	Urine decay	Leaves are dried and brewed

Based on the results of the interviews, generally the surrounding people do not immediately seek treatment at modern health facilities when they experience minor complaints such as stomach pain or itching, but rather take advantage of plants available in 'living pharmacies' around the house. Knowledge about the types of plants and how to process them

has been taught for generations by parents.

The practice of utilizing local wisdom in the region shows the dominance of the use of simple but effective traditional processing techniques. The process of processing medicinal plants is generally carried out through boiling, clumping, and direct use methods topically, depending on the type of plant and the purpose of use (Maldonado Miranda, 2021). The time of utilization is usually adjusted to the appearance of symptoms of the disease experienced, although some types of herbs are also consumed regularly as a preventive and health maintenance measure. Interestingly, knowledge of these processing techniques is not only possessed by certain individuals such as traditional medicine practitioners, but has been widespread among the community. Most adults, especially women and farmers, have an adequate basic understanding of the independent processing and utilization of natural resources, which suggests that this knowledge has been internalized as part of the culture and practices of daily life (de Santana et al., 2022)

### The Relationship between Humans and the Environment (Ethnobiology)

Based on the results of community observations at the research site, it shows a pattern of biological resource utilization that tends to be sustainable and adaptive to environmental conditions. This pattern is reflected in the existence of a balanced form of dependence between humans and nature, where the use of resources is not carried out exploitatively, but is accompanied by awareness to maintain its sustainability (S. Hadi et al., 2024). One of the tangible forms of this practice is the habit of people to replant plants that have been used, both in the yard and in the surrounding land, as an effort to maintain the availability of resources in the future. In addition, there are also unwritten norms that govern the way natural products are taken, such as limiting the amount taken and choosing the right time, so as not to interfere with the regeneration of organisms. Such interactions reflect the existence of a local knowledge system that is not only oriented towards meeting short-term needs, but also considering the long-term balance of the ecosystem. The belief that nature will continue to provide the necessities of life if managed properly is the main foundation in this practice, which at the same time shows that traditional knowledge inherited between generations has an important role in shaping the ecological behavior of the community. Thus, the reciprocal relationship between humans and the environment in this context is not only functional, but also reflects the values of local wisdom that support environmental sustainability (Kamakaula et al., 2024).

### The Potential of Local Wisdom as a Learning Resource

Based on the results of interviews and observations that have been conducted, the local wisdom found at the research site shows a very strong level of relevance to various biological materials at the high school level. The various practices of the use of biological resources carried out by the community not only reflect cultural activities, but also contain scientific concepts that are in harmony with the knowledge structure in the formal curriculum. Findings in the field can be interpreted and mapped into biological concepts such as biodiversity, classification of living things, and interactions between organisms and their environment. Thus, the local wisdom possessed by the community has great potential to be used as a contextual and meaningful learning resource for students. To clarify this relationship, the results of the research are presented in the form of concept mapping as shown in the following table:

Table 2. The Potential of Local Wisdom as a Learning Resource

Field Findings	Biology Concepts	High School Materials (E Phase)
Diversity of medicinal plant types	Biodiversity at the Species Level	Biodiversity
Grouping by benefit	Taxonomy/Classification	Classification of Living Beings
Citizens' interaction with the environment	Symbiosis & Energy Flow	Ecosystem

Table 2 shows that the local wisdom of the local community has significant potential to be implemented in the learning process in the classroom through the Contextual Teaching and Learning (CTL) approach. This approach allows students to relate biological concepts to real experiences they encounter in the surrounding environment, so that learning becomes more meaningful (Kurniasih, 2021). For example, in biodiversity material, students not only learn the theories contained in textbooks, but are also invited to make direct observations of various types of local plants in their environment, then identify their characteristics and classify them based on biological principles. This activity can be developed through various forms of assignments, such as the creation of a herbarium, a project to identify and document the benefits of local plants, and simple environment-based exploration activities. Through this application, biology learning not only becomes more concrete and applicative, but also contributes to improving students' environmental literacy and fostering awareness and appreciation of local wisdom as part of cultural identity that needs to be preserved.

## Discussion

The findings in this study provide significant insights when compared to various previous studies in the fields of Ethnobiology and biology education. First, confirmation that local wisdom in the use of biodiversity is still actively practiced by the community strengthens the findings of Henri and Erpandi (2021) which affirms that traditional knowledge remains the main pillar in the management of natural resources in rural areas (Henri & Erpandi, 2021). This shows that modernization does not completely shift local practices, but rather goes hand in hand with knowledge systems that have been developed for a long time. Second, the high dependence of the community on medicinal plants as an independent health solution is in line with Arjona et al. (2021), who places ethnobiology as a form of adaptive and sustainable community-based health resilience (Arjona-García et al., 2021). Third, the integration of ethnobiological data into the educational context expands on the findings of Rinto (2023), which shows that place-based education is able to increase students' ecological involvement and concern more really (Rinto et al., 2023). Fourth, the results of this study also strengthen the Indonesian national literature on the use of local potential in the implementation of the Independent Curriculum, thereby providing a bridge between the concept of global science and a more contextual local reality. In the end, this study also presents a comparative perspective that, although international studies often focus on conservation aspects, in the context of the local communities studied, local wisdom actually functions simultaneously in the ecological, health, and educational dimensions to shape the science literacy and character of students, a dimension that is still relatively rarely studied in depth. Analysis of the main findings shows that the ethnobiological practice of local communities is a form of deep understanding of the laws of nature that take place empirically in daily life. The use of medicinal plants is not only oriented towards fulfilling physical needs, but also reflects a form of harmonious coexistence between humans and their environment. The practice is driven by a collective belief in the effectiveness of natural resources that have been tested through cross-generational experiences, thus forming a knowledge system that is adaptive and contextual. The human-environment relationship built in this practice reflects the main principle of ethnobiology, where the biological classification of communities (folk taxonomy) often has a strong connection with modern scientific classification. This condition shows that local knowledge is not inferior, but can be the initial foundation in building students' scientific understanding, especially in biology learning that emphasizes the observation, classification, and analysis of relationships between living things. The novelty of this research lies in the integrative approach that combines ethnobiological inventory with its systematic mapping as a formal learning resource at the high school level. In contrast to previous research that generally only focused on the documentation or inventory aspect of local wisdom, this study goes further by directly linking the field findings to the material structure in the biology curriculum. This approach results in a new contribution in the form of a conceptual framework that connects traditional practices of society with the needs of modern learning. Thus, this

research not only enriches the study of ethnobiology, but also bridges the gap between local knowledge and formal education systems, particularly in the development of contextual, relevant, and environment-based learning resources. The implications of the findings of this study include complementary theoretical and practical aspects. Theoretically, this study strengthens the position of ethnobiology as a field of study that is not only relevant in the context of conservation, but also in the development of science education. This study shows that local knowledge can be validated and integrated into formal learning materials without losing its scientific value. Practically, the results of the study provide recommendations to biology teachers to start developing more contextual learning strategies by utilizing the surrounding environment as a learning resource. This is in line with the spirit of the Independent Curriculum which emphasizes real-life experience-based learning. In addition, for policy makers, the integration of local wisdom in learning can be one of the strategic efforts in strengthening the profile of Pancasila students, especially in the aspects of environmental concern and cultural preservation. By making optimal use of local learning resources, the learning process is expected to not only improve understanding of concepts, but also form the character of students who are more adaptive and ecologically insightful. However, this study has several limitations that need to be considered. First, this study uses a qualitative approach with limited location coverage to one region, so the generalization of findings to a wider context needs to be done carefully. Second, the number and characteristics of relatively specific informants have the potential to affect the variation of data obtained, especially related to the type and utilization of flora and fauna. Third, this study has not examined in depth other factors that can affect the effectiveness of the use of local wisdom as a learning resource, such as the readiness of school infrastructure, teacher competence, and education policy support. Therefore, further research is recommended to use a mixed-methods approach, including implementation trials in the classroom and expansion of the research area, in order to obtain a more comprehensive picture of the integration of local wisdom in biology learning

## CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that the local community has a very rich local wisdom in the perspective of Ethnobiology, especially in the use of various types of flora as traditional medicine, food sources, and in the practice of ecosystem conservation. This knowledge is not only inherited from generation to generation as part of culture, but also contains relevant scientific values when viewed from the perspective of modern biology, especially in the aspects of biodiversity, classification of organisms, and the interaction of living things with their environment. The results of the identification and mapping of local wisdom show that there is great potential to be developed as a source of biology learning at the high school level that is contextual and environment-based. The integration of local wisdom into learning materials, such as biodiversity and ecosystems, is not only able to bridge abstract concepts with the reality of students' lives, but also encourages the creation of a more meaningful, active, and applicable learning process. In addition, the use of local wisdom in learning contributes to increasing students' environmental literacy while fostering awareness and pride in local cultural identity as part of a heritage that needs to be preserved sustainably.

## REFERENCE

- Adinugraha, F. (2022). An approach to local wisdom and cultural in biology learning. <https://doi.org/10.4108/eai.17-11-2021.2318660>
- Akhondzadeh, S. (2025). Beyond myths: Understanding the efficacy and safety of traditional medicinal practices. *Case Reports in Clinical Practice*. <https://doi.org/10.18502/crcp.v9i6.18941>
- Albuquerque, U. P., de Moura, J. M. B., da Silva, R. H., & Soldati, G. T. (2024). Ethnobiology and ethnoecology. In *Encyclopedia of Biodiversity* (3rd ed., Vols. 1–7, pp. V3-112–V3-123). <https://doi.org/10.1016/B978-0-12-822562-2.00370-4>
- Arjona-García, C., Blancas, J., Beltrán-Rodríguez, L., López Binnqüist, C., Colín Bahena, H., Moreno-Calles, A. I., Sierra-Huelsz, J. A., & López-Medellín, X. (2021). How does urbanization affect perceptions and

- traditional knowledge of medicinal plants? *Journal of Ethnobiology and Ethnomedicine*, 17(1). <https://doi.org/10.1186/s13002-021-00473-w>
- Bamrara, A., & Bamrara, P. (2024). Environment education through experiential learning: A case of Pauri Garhwal, Uttarakhand. In *Teaching and learning for a sustainable future: Innovative strategies and best practices* (pp. 129–141). <https://doi.org/10.4018/978-1-6684-9859-0.ch007>
- Botokanova, G. T. (2022). To the history of studying traditional knowledge. *The Herald of KSUCTA n a N Isanov*, 2(2), 918–925. <https://doi.org/10.35803/1694-5298.2022.2.918-925>
- da Silva, C., Pereira, F., & Amorim, J. P. (2024). The integration of indigenous knowledge in school: A systematic review. *Compare*, 54(7), 1210–1228. <https://doi.org/10.1080/03057925.2023.2184200>
- de Santana, B. F., Voeks, R. A., & Funch, L. S. (2022). Quilombola ethnomedicine: The role of age, gender, and culture change. *Acta Botanica Brasilica*, 36. <https://doi.org/10.1590/0102-33062020abb0500>
- Draper, A. K. (2004). The principles and application of qualitative research. *Proceedings of the Nutrition Society*, 63(4), 641–646. <https://doi.org/10.1079/PNS2004397>
- Əliyev, R. (2024). 21st century skills in education: Our yesterday, today. *Scientific Works*, 91(3), 31–36. [https://doi.org/10.69682/azrt.2024.91\(3\).31-36](https://doi.org/10.69682/azrt.2024.91(3).31-36)
- Fleischner, T. L., Espinoza, R. E., Gerrish, G. A., Greene, H. W., Kimmerer, R. W., Lacey, E. A., Pace, S., Parrish, J. K., Swain, H. M., Trombulak, S. C., Weisberg, S., Winkler, D. W., & Zander, L. (2017). Teaching biology in the field: Importance, challenges, and solutions. *BioScience*, 67(6), 558–567. <https://doi.org/10.1093/biosci/bix036>
- Ghorai, B. (2025). Learning through experience: A practical approach. *International Journal for Multidisciplinary Research*, 7(5). <https://doi.org/10.36948/ijfmr.2025.v07i05.58675>
- Giyato, G., & Sridiyatniko, G. (2022). Pemanfaatan lingkungan sekitar untuk meningkatkan motivasi dan hasil belajar peserta didik pada muatan pelajaran IPS. *Proceedings Series on Social Sciences & Humanities*, 3, 58–63. <https://doi.org/10.30595/pssh.v3i.338>
- González Villavicencio, J. L., & Estrella Flores, J. P. (2023). Educación del siglo XXI, competencias, metodologías y estrategias. *Esprint Investigación*, 2(1), 5–15. <https://doi.org/10.61347/ei.v2i1.50>
- Hadi, A., Marniati, M., Ngindana, R., Kurdi, M. S., Kurdi, M. S., & Fauziah, F. (2023). New paradigm of Merdeka Belajar curriculum in schools. *AL-ISHLAH: Jurnal Pendidikan*, 15(2), 1497–1510. <https://doi.org/10.35445/alishlah.v15i2.3126>
- Hadi, S., Sjah, T., & Sarjan, M. (2024). Peran manusia dalam mempertahankan ketersediaan sumber daya alam melalui etika lingkungan. *LAMBDA: Jurnal Ilmiah Pendidikan MIPA dan Aplikasinya*, 4(2), 143–149. <https://doi.org/10.58218/lambda.v4i2.907>
- Haryanto, S., Marati, S. H., Darsinah, D., & Mansoor, H. S. (2024). Beyond the classroom walls: Unveiling teachers' and students' experiences in biology education. *Journal of Educational Management and Instruction*, 4(2), 361–372. <https://doi.org/10.22515/jemin.v4i2.9632>
- Hasmawaty, H., Usman, U., & Intisari, I. (2023). Improving children's science skills through play activities in outdoor play. *TEMATIK: Jurnal Pemikiran dan Penelitian Pendidikan Anak Usia Dini*, 9(1), 45. <https://doi.org/10.26858/tematik.v9i1.47953>
- Henri, H., & Erpandi, E. (2021). Local ethnic Malay community knowledge in traditional medicine utilization and its conservation strategy in East Belitung Regency, Indonesia. *Media Konservasi*, 26(1), 44–51. <https://doi.org/10.29244/medkon.26.1.44-51>
- Herman, H., Rusmaniah, R., Munandar, H., & Rozikin, A. Z. (2023). Utilization of the surrounding environment as a source of learning forum for social sciences. *The Innovation of Social Studies Journal*, 5(1), 18. <https://doi.org/10.20527/issj.v5i1.9603>
- Kadir, H. A. (2023). Application of the Pancasila student profile. *Indonesian Journal of Contemporary Multidisciplinary Research*, 2(3), 349–354. <https://doi.org/10.55927/modern.v2i3.4116>
- Kamakaula, Y., Amruddin, A., Demmanggasa, Y., Saprudin, S., & Nugroho, R. J. (2024). The role of local knowledge in natural resources conservation: An environmental anthropological perspective in traditional agriculture. *Global International Journal of Innovative Research*, 1(2), 97–106. <https://doi.org/10.59613/global.v1i2.13>
- Karmadi, R. M. D., Suhartini, S., & Sukri, A. A. M. (2023). The potential of folklore as biodiversity learning resources in high school. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, 9(1), 74–89. <https://doi.org/10.22219/jpbi.v9i1.22502>

- Kumar, A., Kumar, S., Komal, Ramchiary, N., & Singh, P. (2021). Role of traditional ethnobotanical knowledge and indigenous communities in achieving sustainable development goals. *Sustainability*, 13(6). <https://doi.org/10.3390/su13063062>
- Kurniasih, D. (2021). Implementasi model pembelajaran contextual teaching and learning (CTL) dalam pelajaran IPA di sekolah dasar. *Social, Humanities, and Educational Studies (SHEs): Conference Series*, 3(4), 285. <https://doi.org/10.20961/shes.v3i4.53345>
- Lin, X., & Ding, H. (2024). Challenges and pathways of developing school-based textbooks in primary and secondary schools. *Education Reform and Development*, 6(8), 200–206. <https://doi.org/10.26689/erd.v6i8.8096>
- Maldonado Miranda, J. J. (2021). Medicinal plants and their traditional uses in different locations. In *Phytomedicine: A treasure of pharmacologically active products from plants* (pp. 207–223). <https://doi.org/10.1016/B978-0-12-824109-7.00014-5>
- Mijanović, N. (2023). Constructivism as a contemporary teaching paradigm. *Inovacije u Nastavi*, 36(1), 21–32. <https://doi.org/10.5937/inovacije2301021M>
- Montero, J. C., & Geducos, D. T. (2022). Improved conceptual understanding in learning biology through localized and contextualized learning activities. *International Journal of Multidisciplinary: Applied Business and Education Research*, 3(7), 1231–1238. <https://doi.org/10.11594/ijmaber.03.07.01>
- Nanti, S., & Asmendri, A. (2022). Desain pembelajaran biologi berbasis jelajah alam sekitar dalam menumbuhkan budaya peduli lingkungan. *Pendekar: Jurnal Pendidikan Berkarakter*, 5(2), 155. <https://doi.org/10.31764/pendekar.v5i2.8776>
- Nurlia, N., Nurhayati, B., Syamsiah, S., & Karim, H. (2025). Cultural literacy in biology education: Theoretical foundations and future directions. *Salud, Ciencia y Tecnologia*, 5. <https://doi.org/10.56294/saludcyt20252163>
- Petrovski, N., & Sbîrciu, C. (2022). Implications of constructivist theories in the reorientation of learning activities. *Univers Pedagogic*, 4(72), 8–11. <https://doi.org/10.52387/1811-5470.2021.4.01>
- Radassa, M., & Geglio, P. C. (2022). Mapeamento das produções acadêmicas sobre a influência da etnobiologia no ensino de biologia. *Ciência e Democracia: O Que Essa Relação Depende de Nós?* <https://doi.org/10.46943/VII.CONAPESC.2022.01.030>
- Rinto, R., Iswari, R. S., Mindyarto, B. N., & Saptono, S. (2023). Bridging the generational gap: Exploring youth understanding on ethnobotanical knowledge and its integration in higher education curricula. *Ethnobotany Research and Applications*, 26. <https://doi.org/10.32859/era.26.48.1-16>
- Rusnawati, R. (2022). Pemanfaatan lingkungan sebagai sumber belajar pada peserta didik. *JURNAL AZKIA: Jurnal Aktualisasi Pendidikan Islam*, 15(1). <https://doi.org/10.58645/jurnalazkia.v15i1.202>
- Santos, M. D. R. (2023). Ensino de biologia numa abordagem contextualizada: Perspectivas e desafios. *Ensino de Ciências*. <https://doi.org/10.46943/VIII.CONEDU.2022.GT16.031>
- Sattorova, Z. I. (2024). Comparison of practical learning and theoretical learning: A study to investigate benefits and challenges. *International Journal of Research in Arts and Science*, 10(1), 1–3. <https://doi.org/10.9756/IJRAS/V10I1/BIJ24003>
- Silva, R. P., Farias, C. R. de O., & Muhle, R. P. (2024). From the field practice of biology's naturalistic tradition to the field days at school: Distances and approximations. *Ciência & Educação (Bauru)*, 30. <https://doi.org/10.1590/1516-731320240003a>
- Srinivasa, S. (2022). Context-based learning. 87(15). [https://doi.org/10.1007/978-981-19-6734-4\\_5](https://doi.org/10.1007/978-981-19-6734-4_5)
- Suhartati, S., Genisa, M. U., & Saputri, W. (2025). Exploring the potential of biodiversity: An ethnobotany approach as a learning resource at SMA Negeri 1 Tempilang. *Gema Wiralodra*, 15(3). <https://doi.org/10.31943/gw.v15i3.728>
- Supriyono, S. (2024). *Research methodology: Qualitative approach*.
- Todorova, S. (2024). 21st century skills in the context of education. *Cultural and Historical Heritage: Preservation, Presentation, Digitalization*, 10(1), 101–110. <https://doi.org/10.55630/KINJ.2024.100109>