

Ethnoscience-Based Module: Biodiversity Materials in Lembak Tribe

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Received: 31 October 2022; Accepted: 29 December 2022; Published: 31 December 2022

Abstract

Efforts to conserve plants and documentation of related local knowledge in the Dendam Tak Sudah Lake, Dusun Besar Village, Bengkulu City area are important to carry out and introduce to students. The study aims to synthesize the biodiversity material modules developed to identify the types of medicinal plants found in Dusun Besar Village. Thiagarajan's development model section is define, design, develop, and disseminate. Identification, synthesis, feasibility, response, and analysis data were obtained as research data. The module was piloted in five elementary schools in Bengkulu City. The study found 20 types of medicinal plants, including the most commonly used hereditary species in the Lembak community. The validation results show that the criteria are very valid, with an expert validator value of 85%. The module also received an excellent response rate of 82%. Therefore, the biodiversity material modules are very attractive, feasible, and effective for learning biodiversity materials in elementary schools.

Keywords: biodiversity, ethnoscience, learning, lembak tribe, medicinal plants

DOI: <http://dx.doi.org/10.15575/jtk.v7i2.19955>

1. Introduction

Learning in the 21st century demands a textual understanding with high-level thinking patterns and problem solving at every line in the learning process, the learning process is implemented with a guide called the curriculum (Aldowah et al., 2019). To date, the curriculum has been implemented in nearly all school levels, including the elementary school level. As a new curriculum, the curriculum requires teachers to be more creative in teaching (Muhammedi, 2016). One of the major transformations in the 2013 curriculum is in science learning. In elementary schools, science learning is integrated into a theme. Thus, it needs special attention (Ahmadi et al., 2019). Science is a scientific product, process, and attitude. Science learning can be a means for students to learn about themselves and the natural environment and apply it in their daily

lives (Cuc, 2014). However, several reports discovered a number of weaknesses of Indonesian students when studying science, as exemplified by the results of the Trends in International Mathematics and Science Study (Grønmo et al., 2015).

Ethnoscience is one of the breakthroughs in the curriculum and characteristics of students. The word "ethnoscience" comes from the word *ethnos* (Greek), which means nation, and *scientia* (Latin), which means knowledge (Lightner et al., 2021). Therefore, ethnoscience can be defined as the knowledge possessed by a cultural community. This sort of science examines knowledge systems and specific cultural cognitive types. It emphasizes indigenous and distinctive knowledge of a cultural community (Sapri et al., 2021). Ethnoscience is usually used to identify the uniqueness of an area from generation to

generation, which has elements of science in it and has a great effect on society (Vikagustanti et al., 2014). Then, this science studies knowledge systems and cognitive types of certain cultures. It focuses on the authenticity of a community's culture.

Ethnoscience is a study of community culture and phenomena related to nature contained in society (Yangdon et al., 2022). It is a branch of cultural study that seeks to understand how natives understand their nature. Natives usually have an ideology and philosophy of life that influences them as a new form of ethnography (the new ethnography) (Hu, 2015). Through ethnoscience, cultural research will, in fact, be able to filter theories of western culture that are not necessarily relevant (Jung & Choi, 2016). It upholds local excellence of a regional characteristic that covers multi aspects of economy, culture, information and communication technology, and ecology developed from potential regional (Eldeen et al., 2016). Potential aspects of developing local excellence include natural resources, human resources, geography, culture, and history (Atmojo, 2012).

The wealth of tropical forests in Indonesia is a gift where in these ecosystems a wide variety of plant species grows both in the lowlands and highlands (Taek et al., 2018). Around 30.000 plant species are estimated to live in Indonesia's wet tropical forests, such as vines, shrubs, herbs, shrubs, and trees. Interestingly, most of these plants can be used as medicinal ingredients (Guo et al., 2022). People in Indonesia have used them as herbal or traditional medicine for a long time and continue to grow until now. In particular, the awareness of health makes Indonesian people prefer traditional medicine to modern medicine (Salim & Munadi, 2017).

The effects resulting from herbal medicine are not in the long term with the growth of other diseases because the ingredients are like those in modern medicine, besides that the raw materials for herbal medicine which we know as herbal medicine can be found around managed garden plots (Calixto, 2000). The yard has been long used for growing

decorative and herbal plants. The variety of medicinal plants in the yard is not only beneficial for traditional medicine but also for science, especially as teaching materials (Diliarosta et al., 2021). In medicinal plants, information about the chemical content that exists so far has been widely studied, showing significant things when the medicinal plants are tested for their content in the laboratory. Medicinal plants contain chemical compounds such as flavonoids, alkaloids, and phenols. All of these compounds are antioxidants that can significantly affect the health of the body, including the risk of developing chronic diseases such as cancer (Cahyaningrum et al., 2017).

In the Dendam Tak Sudah Lake, It is not common for local residents to use a number of plants that grow around the lake and recently it is known from research results that they contain antioxidant compounds that can help stabilize the body's health (Kosasi, 2005). Teaching materials based on the diversity of medicinal plants can play a role in developing and increasing participants' understanding of the learning material (Suryani, 2016). The material is usually delivered in the form of modules. Modules are learning tools or media that contain material that allows students to learn independently or with teacher guidance in teaching and learning activities. They are also considered as a way to evaluate systematically and achieve goals (Vebrianto & Osman, 2011). Thus this corroborating explanation is a renewal form of this research in addition to material from medicinal plants as a form of ethnoscience which so far has only been in the form of a concept (Almendingen et al., 2021).

2. Research Method

2.1. Retrieval of Ethnoscience Data

This study uses a Research and Development (R&D) method based on Thiagarajan's development. Parts of the Thiagarajan's development model are defining, designing, developing, and deploying. Identification, synthesis, feasibility, response, and analysis data were obtained as research data

(Thiagarajan, 1974). The researchers developed a product based on these findings

and then conducted field trials in product settings.

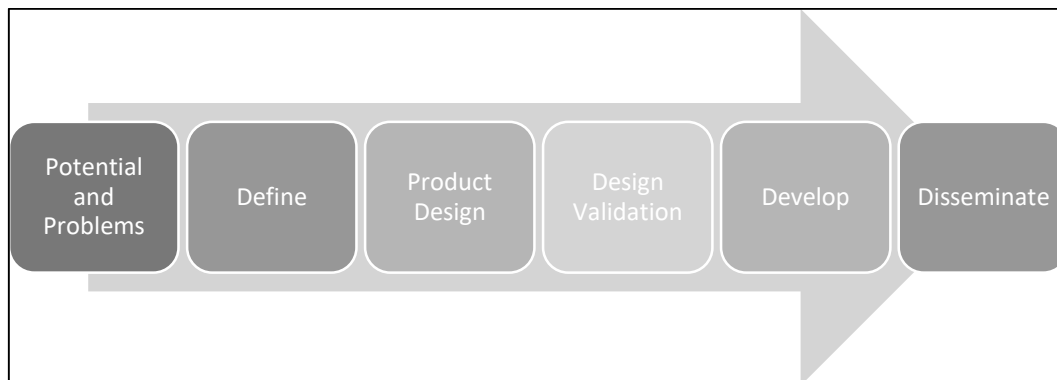


Figure 1. Research Steps Adopted from Thiagarajan

2.2. Research Instruments

The instrument used in this research was a module-eligibility questionnaire to get validation data from three validators. First, the researchers used the language validation questionnaire, comprising 15 statement components with a score of 1-5. Then, it used the material validation questionnaire, which consisted of 16 statement components with a score of 1-5. Finally, the media validation questionnaire comprised 16 items with a score of 1-5.

2.3. Data analysis technique

After collecting the data, the researchers made a validation sheet that contained the statements. Then, the validator fills out the questionnaire by giving a checkmark to the category provided by the researchers. The category was based on a Likert scale of five rating scores, as shown in Table 1.

Table 1. Expert Validation Rating Score

Explanation	Score
Very good	5
Good	4
Enough	3
Less	2
Very less	1

Furthermore, the percentage of eligibility obtained is then interpreted Module-based teaching materials are declared theoretically feasible if they are into categories based on Table 2.

Table 2. Eligibility Criteria

Assessment	Interpretation Criteria
$81 \leq P \leq 100\%$	Very Decent
$61 \leq P < 81\%$	Worthy
$41 \leq P < 61\%$	Enough
$21 \leq P < 41\%$	Not Feasible
$0 \leq P < 21\%$	Very Unworthy

3. Result and Discussion

This section describes the types and uses of medicinal plants in Dendam Tak Lagi Lake, Bengkulu City. Data collection was carried out by interviewing customary leaders and traditional shamans. The results revealed 20 species from nine families. Five families were found that were most widely used as medicinal plants in Dusun Besar Village, including *Lamiaceae*, *Asteraceae*, *Acanthaceae*, *Euphorbiaceae*, and *Zingiberaceae*. Among them, *Zingiberaceae* is the most diverse family with seven species. This study also found interesting findings because five out of 20 plants growing around the lake were not intentionally planted but were also used as medicinal ingredients, which are pudding, betel leaf, lily leaf, lemongrass leaf, *jambau jung*, *dawen salem*, *lajo*, *kunik*, and pepper.

Other plants commonly used in medicine were also found such as leaves, seeds, fruit, roots, tubers, rhizomes, stems, and flowers. Roots, leaves and rhizomes were the parts most used for treatment, respectively as many as 23 types, 18 types and nine types. Medicinal plants found in Dendam Tak Sudah Lake,

Bengkulu City can treat various internal and external diseases. One type of disease can be treated with several types of plants. The four most common diseases using medicinal plants for treatment are high blood pressure, cough, stomach ache, and colds.

The results of identifying those medicinal plants were then developed into teaching materials in the form of a learning module. The module was designed for Science Diversity materials taught in grade 5th at the State Elementary School 71. Prior to launch, the module was validated by selected validators to see the module eligibility. In general, the module design was considered very valid by the validator. It means that the module was feasibly used in learning with an average percentage value of 85%.

Table 3. Results of Validation Module for Medicinal Plant Identification in Kali Village, North Bengkulu Regency by the validators.

No	Validator	Persentase	Criteria
1.	Validator I (Design lecturer)	84%	Very Valid
2.	Validator II (Material Expert Lecturer)	88%	Very Valid
3.	Validator III (Lecturer in Linguistics)	83%	Very Valid
Percentage average		85%	Very Valid

Based on the suggestions and directions from the two validators, a revision was made before the module proceeded to the student's response test. Some suggestions and improvements of the two validators are summarized as follows: use image pointer sentences; present preservation-related materials; the table is too long to show in landscape; provide image source; and do not stack on the cover image of the plant.

Many plants in Dendam Tak Sudah Lake, Bengkulu City, are used as medicinal ingredients. Local people use all parts of the plant or certain parts only. As argued earlier, the most used part of the plant for medical

purposes are the leaves and tubers, with 23 types, 18 types and nine types respectively. Medicinal plants can be used to treat various types of diseases, both external and internal diseases. One type of disease can be treated using several different types of plants. For example, high blood pressure can be cured by nine types of plants. Setiawati and Handayani, (2018) exemplified one disease that 13 joint plants can cure. The high type of plant used for the treatment of a disease is believed to be influenced by many things, one of which is work. It was found that respondents' work in Handayani's research was farmers, and diseases that attacked were joint diseases such as gout, aches, and rheumatism.

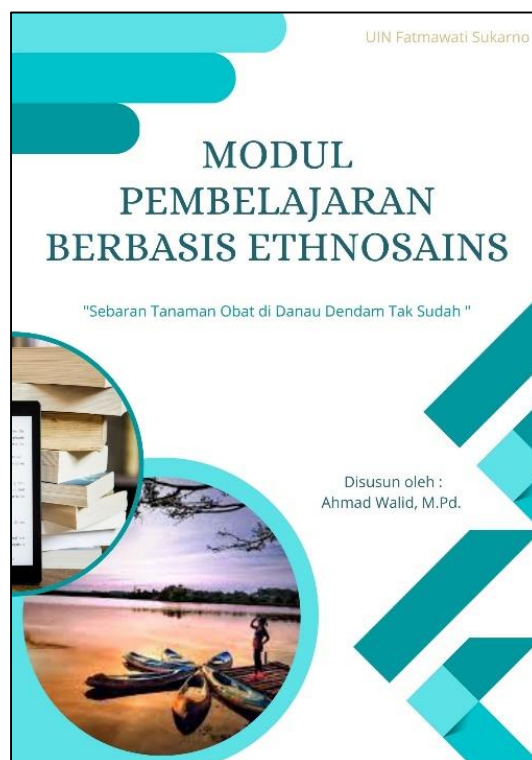


Figure 2. Ethnoscience Learning Module Cover

The development of modules from the results of research on the identification of medicinal plants in Dendam Tak Sudah Lake, Bengkulu City can be used as teaching materials for Grade V natural sciences because they have passed the validation and students' response tests. The developed module already meets the criteria and is suitable for teaching material in the learning process. The results of validation by three validators yielded an average percentage of 85%. The module was

validated before it was declared feasible to have gone through several improvements. Improvements were made based on suggestions and input from the validator. The suggestions given by the validator include the pointer sentences in the picture, exposure to material about preservation, the layout of tables, and sources in the picture. Modifications are made to the module and then declared valid by the validator.



Figure 3. Ethnoscience Learning Module Material

In the ethnoscience-based medicinal plant learning module there are many aspects that explain the content that is adapted to real data in the research location (Siregar et al., 2022). some aspects in the module are based on several module development model templates that are adapted to contextual aspects (Homburger et al., 2019). Indicators of competence achievement, learning objectives, and material description (Yulva, 2016). Response tests were carried out in five schools in the city of Bengkulu. The results indicated that students' responses to the module fell into the "Very Good" category, where the average percentage score is 82%, as shown in Table 4.

Table 4. Student responses

No.	Score	Category
1	80%	Good
2	81%	Good
3	81 %	Good
4	82 %	Good
5	83 %	Good
6	83%	Good
7	83 %	Good
8	80 %	Good
9	81 %	Good

No.	Score	Category
10	81 %	Good
11	82 %	Good
12	84 %	Good
13	82 %	Good
14	85 %	Good
15	82 %	Good
Average	82%	Good

This is in accordance with the criteria table for the percentage of the ideality of the response test. If a score of > 80% is obtained, it is included in the "Very Good" category. The student's questionnaire responses consisted of 13 aspects. Of the 13 aspects, two aspects have a low percentage score but are still in a good category. The first aspect is the use of the language in the module, with a score of 80%. Meanwhile, the second aspect is related to the questions contained in the module, with a score of 71%, as shown in Table 5.

Table 5. Result of Student Questionnaire Validation

No	Aspects	Score	Category
1	Language	80%	Good
2	Content	71%	Good
3	Materials	81 %	Good

The questionnaire responses did not indicate which parts of the language and questions that are difficult to understand. The low score for this aspect is likely due to differences in the students' level of understanding. It is necessary to note that even though they scored low, they are still placed in the good category. It means that the number of students who understand the use of language and also the questions in the module is still more than this module gets a very good response with an average percentage of 82%. However, two aspects get a low score. This is supported by other aspects, which in other aspects score above 80%. Some of the medicinal plants found in Kali Village, North Bengkulu Regency, are shown in Figures 4, 5, and 6. The people of Kali Village often use medicinal plants to treat diseases such as high blood pressure, wound medicine, and diabetes.



Figure 4. Medicinal Plants from The Bark



Figure 5. Wild Leaf as a Medicinal Plant



Figure 6. Plants Widely Scattered on The Outskirts of The Lake



Figure 7. The Process of Boiling Medicinal Plants as A Teaching Medium for Elementary Schools

The plant parts that are often used are leaves and tubers. According to Shinwari (2010) the leaves have great potential for making medicine. Many chemical compounds can be extracted from the leaves and play an active role in medicine, such as flavonoids, alkaloids, and phenols. One of the processes to obtain chemical compounds is by boiling plants as shown in Figure 7. The chemical structure of these compounds can be seen in Figure 8.

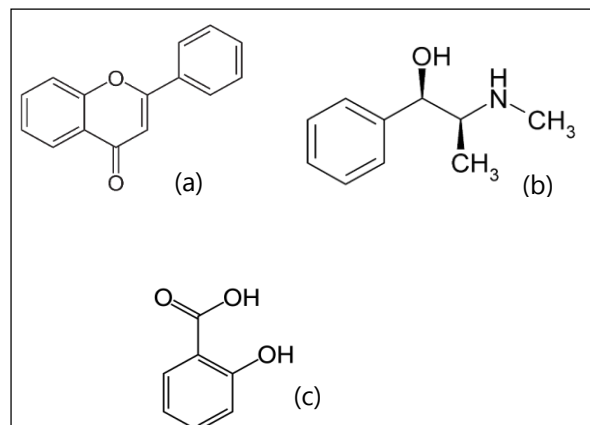


Figure 8. Chemical Structure of Flavonoid (a), an Alkaloid (b), and Phenolic (c)

Flavonoids are compounds that are widely found in medicinal plants because they can function as antioxidants, anti-cancer, hypertension, and diabetes. Alkaloid compounds function for hypertension, anti-microbial, anti-diarrhea, anti-diabetic, and anti-malarial. Phenolic compounds function as anti-inflammatory, anti-aging, and anti-oxidants (Ullah et al., 2022).

Many residents of Dusun Besar Village work as farmers and fisherman. According to Handayani's research (2015), medicinal plants that are often used by farmers are plants that can treat gout, aching rheumatic pain, and rheumatism health (Nikiphorou et al., 2021). Activities such as smoking, consuming sugary drinks, and salty foods can increase blood pressure levels. Therefore, many people grow plants that can be used to treat high blood pressure and other types of ailments. One medicinal plant can have two or more benefits. Thus, the community developed the types of plants that can cure diseases because they adapt to their needs (Alzubaidi et al., 2021). Other studies also reveal that medicinal plants are closely related to hereditary culture so that we can freely examine their cultural and scientific views side by side where the culture of making medicinal plants is hereditary, and the composition of the drug can be studied scientifically (Sudarmin et al., 2017).

The development of the research module on identifying medicinal plants in Dendam Tak Sudah Lake, Bengkulu City can be used as a grade 5th science teaching material because it has passed the validation test and student responses. This shows that the developed module has met the criteria and is suitable for teaching in classroom. The validation results by three validators yielded an average percentage of 85%. The module was validated before being declared eligible, having gone through several improvements. Improvements are made based on suggestions and input from the validator. The validators provide suggestions in the area of sentences in the image, presentation of material about preservation, table layout, and sources in the image. Modifications made to the module are then declared valid by the validator. Then the response test was carried out by fifth grade students at five Bengkulu City Elementary Schools. The student responses to the module were also included in the "Very Good" category, where the average score percentage was 82%. This is following the criteria table for the percentage ideality of the response test. If the obtained score is beyond 80%, it is included in the "Very Good" category.

4. Conclusion

Medicinal plants utilized by the people of the Dendam Tak Sudah Lake, Dusun Besar Village, Bengkulu City fell into 20 types, belonging to nine families. Module eligibility level based on validation by the validator obtains results with a percentage of 85% with a very valid category. Meanwhile, the response test by students showed an overall percentage of 82%, which means the module is rated very well.

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