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Analysis of Malay ethnoscience-based module development in integrated science learning: systematic literature review

Iffah Azzahro Aulia[1]*, Aldeva Ilhami[2], Niki Dian Permana Putra[3], Diniya[4], Muhammad Ilham Syarif[5]
Tadris IPA, Universitas Islam Negeri Sultan Syarif Kasim Riau, Pekanbaru, Indonesia
*Coressponding author email: *Aldeva.ilhami@uin_suska.ac.id*

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ABSTRACT

Ethnoscience-based learning content becomes a reference in developing new knowledge in the form of integrating community original science into scientific science. The purpose of this study was to describe the results of previous research related to the development of Malay ethnoscience-based modules in integrated science learning. This study used the systematic literature review method using the preferred reporting items for systematic reviews and meta-analyses method called PRISMA by analyzing 4 journal articles. The results of the study show that the distribution of Malay ethnoscience module development is found in three major provinces of Sumatra, namely Riau, Jambi, and Bengkulu Provinces, the development of this module uses the same model, namely Brog & Gall. The result shows that the ethnoscience-based module is feasible to use as well as the practical results of the development of ethnoscience-based modules.

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INTRODUCTION

Natural Sciences (IPA) is part of the curriculum in primary and secondary schools. Science equips students with knowledge, ideas, and concepts, an understanding of the natural environment that comes from various scientific processes, including investigation, preparation, and ideation. Learning science can also help someone develop habits of understanding, and thinking, and provide students with the opportunity to master many life skills. Science has a long history of creating new knowledge and applying it to human life at large, including technological advances.(Panggabean et al., 2021).

Apart from developing science and technology, new knowledge in science learning also continues to be put forward with various efforts, one of which is by integrating the original

scientific culture of society into scientific science as a vehicle for students to study the environment which of course influences further prospects in everyday life. Ethnoscience-based learning is an innovation integrated into the world of education, between culture and science. Long-term learning based on ethnoscience is certainly able to influence students' awareness of using science and technology in providing suggestions and solutions to environmental problems.(Putri et al., 2022). Referring to the 2013 curriculum, science learning was developed as an integrated science that supports and involves existing local culture and wisdom.

Local wisdom can be defined as a local cultural wealth that contains the virtues of life, a view of life that accommodates life policies and wisdom. In Indonesia, local wisdom does not only apply locally to certain cultures or ethnic groups but can be said to be cross-cultural or cross-ethnic, thus forming national cultural values. (Affandy, 2017). Based on this, local wisdom can be an alternative that can be allocated in the implementation of the learning process, because local cultural wisdom is certainly able to build participants' character values so that social values in culture are not difficult to recognize.(Pamungkas et al., 2017).

The depiction of the rich culture of the Indonesian nation gives birth to the beauty of remaining alive and developing towards national unity. Sumatra Island is one of the islands, which is generally inhabited by the Malay people who are divided into several large tribes. The large tribes in question include the Batak tribe, Palembang tribe, Minangkabau, and many other large tribes. "Earth Melayu" has become the most dominant icon in several large provinces in Sumatra, including Riau Province, Riau Islands, Jambi, North Sumatra, Bengkulu, and South Sumatra. This distribution of course also greatly influences the various cultures and local Malay wisdom from various regions so that further distribution mapping of culture is needed which has been integrated with science learning through Entosains-based science learning modules as a reference in implementing new knowledge that is studied scientifically.

The development of learning tools continues to develop, one of which is by integrating indigenous science into scientific science, through several studies that can be taken and included in learning modules such as physics studies in the car culture of the Kanum tribe in Merauke(Palittin et al., 2019), Ethnoscientific study in making Madurese shrimp paste (Hadi et al., 2019), ethnoscience study of the "Lambung" custom: Identification of chemical concepts in the traditions of the Lombok people (H Kara, 2022), and in the environmental field, such as ethnoscience analysis in the Bakaroh tradition, Sungai Intan village, Indragiri Hilir Regency as a learning medium (Aulia et al., 2023) and there are many other studies that have studied local wisdom to be integrated into scientific science and are ready to be applied through teaching materials in the form of science learning modules.

The module is an effort to introduce original scientific knowledge that exists within society in the form of symbols, cultural customs, and religious and social ceremonies which contain scientific concepts that have been used for generations but are not yet scientifically formal. (Wadij, 2011). A module is a form of teaching material that is packaged completely and systematically, containing a set of planned learning experiences and designed to help students master specific learning objectives. (Rahdiyanti, 2008). The ethnoscience-based learning module was developed to introduce the local wisdom culture that exists in Indonesia (Afliansyah, 2022; Lubis et al., 2021; Mardianti et al., 2020; Nailiyah et al., 2016).

The development of modules in ethnoscience-based science learning has advantages in its implementation, namely strengthening motivation in science learning based on environmental and cultural literacy, evaluating the lack of material that has not been conveyed by educators, and ethnoscience-based modules are also used as teaching materials to support the learning process (Mardianti et al., 2020). Teaching staff and educational institutions have a responsibility for the success of the learning process, so it is necessary to develop ethnoscience-based modules as a medium to make it easier for students to understand existing cultures from a scientific perspective and become more effective because they are assisted by module development.

Based on the needs that have been explained and the progress of the times which makes it difficult for culture to be recognized by the next generation, it can be used to help facilitate the teaching and learning process by including ethnoscience through the development of science learning modules. Analysis is needed regarding the influence of developing ethnoscience-based modules on science learning. In the background of this problem, researchers want to examine the extent to which the development of Malay ethnoscience-based modules can help the learning process in the field of natural sciences. Consists of the background of module development, development models, and the level of validity and effectiveness of ethnoscience-based modules for science learning.

METHOD

Types of research

This research is an SLR (Systematic Literature Review) review using preferred reporting items for systematic reviews and meta-analyses or called PRISMA.

Research time

This research was carried out starting from a literature search carried out from March to April 2022. Continued with the data processing process until the results seminar process in June 2022.

Population and Sample

Population is a generalization domain consisting of objects that have certain qualities and characteristics determined by the researcher to be studied and then conclusions drawn. Population does not only consist of people but also objects and other natural objects. Population is not just the number of objects or subjects but contains all the properties that objects or subjects have (Garaika & Darmanah, 2019). The population in this research are journals related to the development of Malay ethnoscience-based science learning modules. The articles used in this SLR are articles obtained using publish or perish by obtaining articles on Crossref and Google Scholar. Search for research literature relevant to the keyword topic: module, ethnoscience, local wisdom, science, Malay, SMP. The articles were then sorted according to the research topic so that 4 research articles were collected which were considered to represent all research articles regarding analysis of the development of Malay ethnoscience-based modules in integrated science learning.

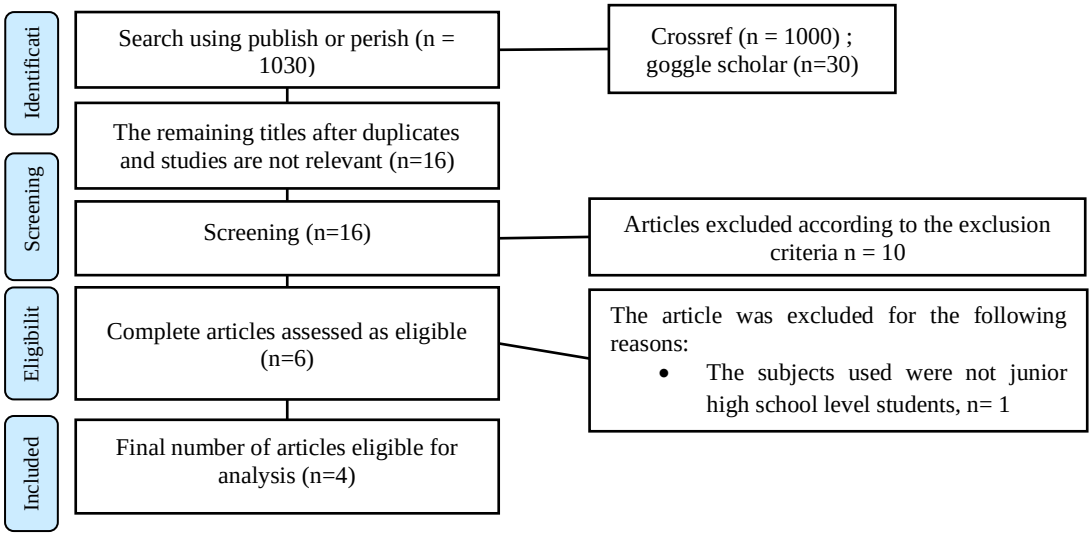
Research Procedure

The research procedure stage used is articles published within the last 5 years. In selecting articles used in writing literature, inclusion and exclusion criteria are needed to select the main research. The results of the data search using these criteria will be used by the author to review the article.

Table 1. Inclusion and exclusion criteria

Inclusion Criteria	1. In the form of papers, articles, journals, theses, proceedings, or scientific works published from 2017-2022 2. Research subjects are limited to junior high school level only. 3. Learning topics include science material 4. The method used in research must be RND 5. Focusing on the Malay region includes the provinces: Riau, Jambi, and Bengkulu.
Exclusion Criteria	1. Papers, articles, journals, theses, proceedings, or scientific works other than Google Scholar and crossref publications. 2. Papers that cannot be accessed in full-text

After determining the inclusion and exclusion criteria, the articles will be reviewed, including the article selection process



Data Instruments and Data Collection Techniques

To obtain maximum results in this literature research, it is based on a research question (RQ). The purpose of this research question is to prepare a more focused review of the literature and make it easier for researchers to find related data.

Table 2. Research Question (RQ)

RQ1	RQ2
What are the models for developing Malay ethnoscience-based modules that are applied to Integrated Science learning, along with	What is the distribution of science learning material topics that have integrated local wisdom, and what are the results of the

the regional distribution of Malay ethnoscience-based modules?	level of validity and effectiveness of the development of Malay ethnoscience-based modules in integrated science learning?

Data analysis technique

The data analysis technique used is the narrative method. The narrative method aims to describe the analysis of Systematic Literature Review: Analysis of Malay Ethnoscience-Based Module Development in Integrated Science Learning.

RESULTS AND DISCUSSION

The Systematic Literature Review in this study refers to the development of a Malay ethnoscience module where the module is a practical, interesting, and interactive learning medium. Apart from that, it refers to the lack of adequate learning media.

Malay ethnoscience is of course based on cultures resulting from the existing culture in the region itself. The Malay tribe is widely spread in various regions on the island of Sumatra. Riau is one of the provinces with the Malay motto Bumi Betuah, a traditional country that has integrated community science studies into scientific studies, including the local wisdom of the Maauwo tradition on Lake Bakuok as a source of biology learning.(Ilhami et al., 2020), Then there is the tradition of shellfish analysis of the local wisdom of the Atat Rumbio Prohibited Forest as a natural science learning resource (Matsna, 2022) and various other types of local wisdom that can be found and contained in Malay ethnoscience-based science learning. Currently, the new conscience-based module in Riau Province contains a learning theme regarding environmental pollution(Ukhti Maisarah, 2021).

Jambi Province, which is a province with a strong Malay culture and distinctiveness, certainly does not miss out on contributing to the development of new knowledge resulting from the integration of cultural knowledge into scientific knowledge, as evidenced by several studies they have carried out, namely Ethnoscientific Studies on the Application and Procession of Transmission of Customs. Jambi Malay is a Natural Science Learning Resource(Fadilah et al., 2019), Apart from that, there are also developments in the form of science books based on local wisdom on pressure, vibrations, and waves (Jufrida et al., 2019), Prohibition of the development of other devices such as e-modules that are enabled for Ethnophysics-based high school science learning, namely the Development of E-Modules for Class XI High School Temperature and Heat Materials Based on Ethnophysics (R. I. Sari et al., 2021)

Furthermore, Bengkulu province, which is part of the Malay tribe in Sumatra, with various crocodiles that exist there, makes this province have several local knowledge-based learning modules that include science material, global warming, and environmental pollution to increase students' scientific literacy. (Lubis et al., 2021; Mardianti et al., 2020).

Based on the results of searching for supporting journals by referring to keywords and selecting journals, this resulted in 2 theses to be reviewed and 2 types of journal articles. The 4 descriptions will be presented with the author's name and background in the table below:

Table 3. List of Journals and Theses with Problem Background

Author	Title	Background

[1]Ukhti Maisyarah	Malay Ethnoscience Based Science Module on Environmental Pollution and Impact on Ecosystems in Class VII of Pekanbaru Telecommunication Middle School (2021)	There is a lack of teaching materials in the science learning process and the unavailability of teaching materials based on Malay ethnoscience at Pekanbaru Telecommunication Middle School.
[2]Penggi Rangga Nata	Development of a Science Module Based on the Local Wisdom of the Sumatran Community on the Diversity of Living Things (Identification and Utilization of the Tighau Mato Kerbau Plant) at SMPN 1 Ulu Musi (2021)	The method often used by teachers to teach is the nature exploration method and there has also been no development of science modules at SMPN 1 Ulu Musi, Ulu Musi District, Empat Lawang Regency.
[3] Mahdiya Futri libis, Andang sunarto dan Ahamd Walid	Development of an Ethnoscience-Based Science Learning Module on Global Warming Material to Train Junior High School Students' Science Literacy Skills (2021)	The package books used by teachers in teaching are package books provided by the school that were purchased from publishers, not the result of innovation from the teachers themselves. This situation makes the learning process unbalanced because it tends to ignore the skills and affective domains.
[4]Lis Mardianti, Kasmantoni, Ahmad Walid	Development of an Ethnoscience-Based Science Learning Module on Environmental Pollution Material to Train the Scientific Literacy of Class VII Students in Middle Schools (2020)	In the learning process, teachers only use books that are limited to thick textbooks provided by the school. This situation makes the learning process unbalanced because it tends to ignore the skills and affective domains.

Based on the results of 2 theses and 2 journals collected in Table 1, it can be concluded that the background for developing modules in Integrated Science learning based on science or local wisdom is because there are still many inadequate learning media, educators apply learning through nature exploration so the use of learning media is very necessary. by utilizing local culture and wisdom that exists around the Malay ethnic environment.

The Malay tribe is an ethnic group native to Indonesia that is widely spread in the eastern region of Sumatra which includes the provinces of Jambi, Riau, North Sumatra, Bengkulu, and the Riau Islands. If you pay attention, the inland and coastal areas are connected by rivers, where the upstream of the river is the inland area, and the downstream empties into the East coast of Sumatra, which is where Malay rule is located.(Sumarno et al., 2019).

Learning media in the form of modules is certainly able to help and simplify the teaching and learning process because it can contain various facts and phenomena that develop in the Malay community spread across the eastern region of Sumatra.

RQ1: What are the models for developing Malay ethnoscience-based modules that are applied to Integrated Science learning, along with the regional distribution of Malay ethnoscience-based modules?

Each research course has a development model that is used according to needs. The development model is a research method used to develop and test products that will later be developed in the world of education (Maydiantoro, 2021). In the following table there are models used in developing the Malay ethnoscience module in Integrated Science Learning.

Table 4. List of journals and theses regarding the development models used.

No	Author	Development Models
1	Ukhti Maisyarah	**Borg & Gall modifikasi Sugiyono**
2	Mahdiya Futri libis, Andang sunarto dan Ahamd Walid	
3	Penggi Rangga Nata	
4	Lis Mardianti, Kasmantoni, Ahmad Walid	

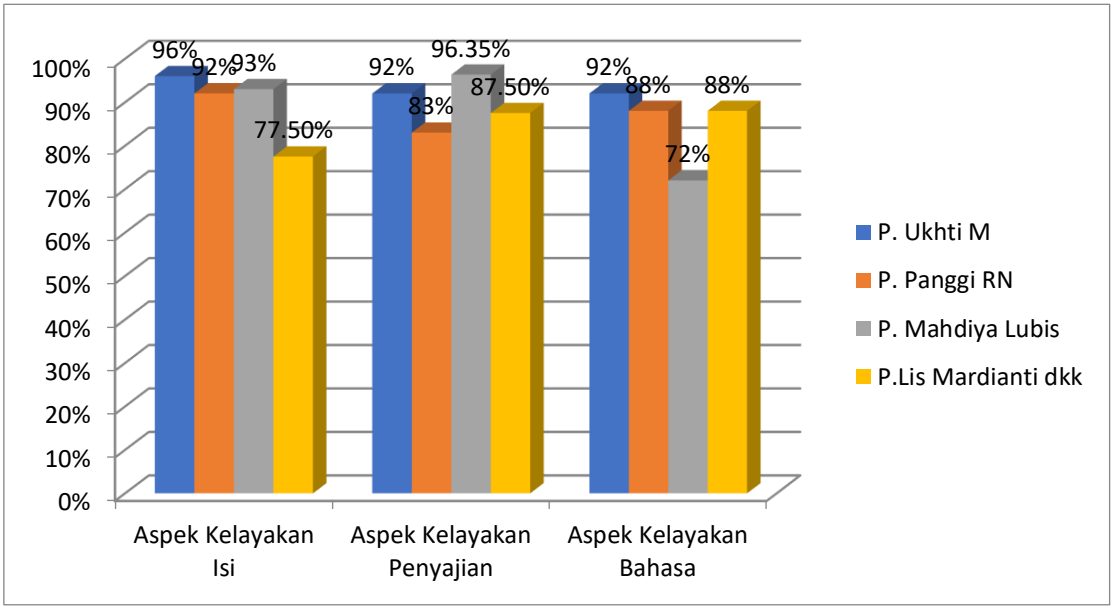
Based on the journal results that have been collected, there is a similar model used, namely Sugiyono's modified Brog & Gall which applies 10 stages, namely: potential and problems, data collection, product design, design validation, design revision, product trial, product revision, usage trial, product revision, and mass production(Alannawa & Hidayati, 2021). The Borg and Gall development model has its advantages and disadvantages. The advantage of this model is that it can produce a product with a high validation value and encourage a continuous product innovation process, while the weakness of this model is that it requires a relatively long time because the procedure is relatively complex and requires quite large financial resources. (Maydiantoro, 2021).

The distribution of the ethnoscience module is based on the results of analysis of journal articles and theses which have found that three provinces have integrated Malay science culture through learning tools, namely Riau, Jambi, and Bengkulu provinces. The integration of science learning that is raised is the diversity of living things and environmental pollution and its impact on the ecosystem.

RQ 2: What is the distribution of science learning material topics that have integrated local wisdom, and what are the results of the level of validity and effectiveness of the development of Malay ethnoscience-based modules in integrated science learning?

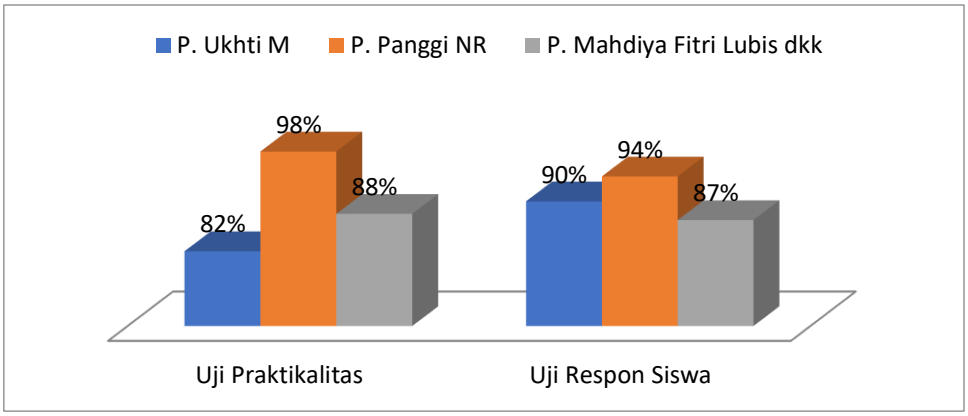
According to Sugiharto and Sitinjak (2006), validity is related to a variable measuring what should be measured. Validity in research states the degree of accuracy of research measuring instruments to the actual content being measured. Validity is a measure that shows that the variable being measured is truly the variable that the researcher wants to study(Cooper dan Schindler, dalam Zulganef, 2006).

Diagram 1. Validity Level Results of the development of the Malay Ethnoscience Module in Integrated Science learning.



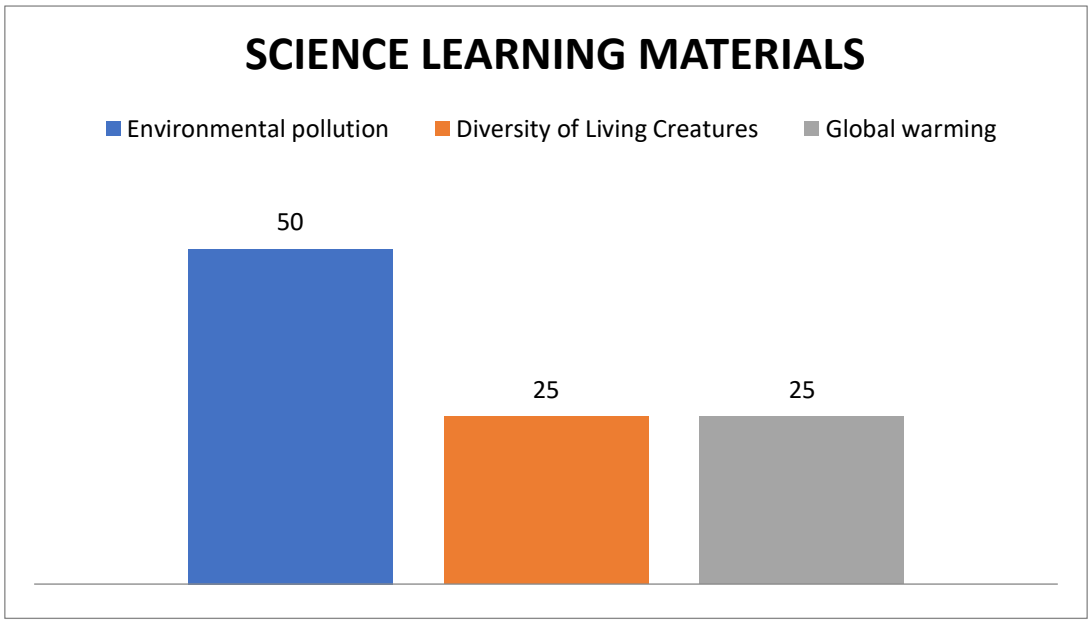
Based on the results obtained from the validity of the module development experts based on the 2 journal articles and 2 journal scripts above, it was declared very feasible and practical for use in Integrated Science teaching.

Diagram 2. Results of the Practicality Level of Development of the Malay Ethnoscience Module in Integrated Science Learning



In the second diagram, it can be seen that the effectiveness of developing the Malay ethnoscience module in integrated science learning helps students understand science learning with an average that can be seen in the table above. Utilizing facts and phenomena that occur in the Malay community through modules is expected to improve student learning outcomes as the nation's successors so that culture does not become extinct.

In the ethnoscience-based integrated science learning orientation based on the analysis of journals and theses that have been carried out, several sub-themes of material developed are found, these materials are summarized in the following diagram:



Based on this diagram, it can be seen that a high percentage of material is found in the environmental pollution material studied by (Ukhti Maisarah, 2021; Mardianti et al., 2020) with a percentage of 50%.

CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the SLR results and discussion, it can be concluded that the ethnoscience-based science module development model that has been analyzed only focuses on the Borg & Gall model. The results of the analysis of the findings of the Malay ethnoscience-based science module have only just been integrated into three large provinces in Sumatra, namely Riau Bengkulu and Jambi. Based on the level of validity and practicality of the development of ethnoscience-based modules, it is stated that they are very practical and help students understand science learning, especially in increasing scientific literacy. It is hoped that this ethnoscience-based module will stimulate students to become more familiar with the culture and traditions in the surrounding environment and study them scientifically.

Suggestion

Through a literature study on the development of the Malay ethnoscience-based module above, there are tartans, namely:

1. Researchers need an analysis of module development by utilizing other models apart from Borg & Gall or modifications from Sugiono such as Plomp, 4-D, Assure, Hannafin & Peck, and Gagne & Briggs as an effort to enrich the literature.
2. Future researchers can examine the application of the results of the analysis of the development of Malay ethnoscience-based modules so that they can be applied and enrich the literature on Mealyu ethnoscience-based science learning modules.

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