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Systematic Literature Review: Design of Mathematics Modules Based on Ethnomathematics

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ABSTRACT

Amidst the onslaught of globalization in the 21st century, education must innovate in learning to develop problem-solving skills and foster a love of local culture. One way to do this is through the implementation of ethnomathematics in learning. The purpose of this study is to describe the implementation of ethnomathematics in learning to develop mathematical problem-solving skills and a love of local culture. The study used the Systematic Literature Review (SLR) method for articles published between 2018 and 2023 on the impact of ethnomathematics on mathematical problem-solving skills and a love of local culture. Fourteen national and international articles were obtained from the Google Scholar and Scopus databases. The results indicate that ethnomathematics learning can effectively help develop students' problem-solving skills and a love of local culture. Its implementation is used as an integrated approach in learning models and learning media. Therefore, the design of ethnomathematics-based mathematics modules has greater potential to improve students' understanding of mathematical concepts and learning motivation from various cultural backgrounds.

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1. INTRODUCTION

The rapid development of technology and information today cannot be stopped; it is a crucial element of education and learning. In the era of the industrial revolution 4.0, there are no longer limitations of space and time in learning. Learning can take place anywhere, anytime, and regardless of distance. Educators, as the vanguard of the world of education, must be able to master technology, keep up with the times, and be able to adapt it in learning. It is important to consider that learning that

develops today will inevitably use technology. Therefore, renewal in learning is essential to meet the challenges of the times (Liko Noor Rafianto et al., 2022).

Ethnomathematics was coined by D'Amrosio (1989) to describe the mathematical practices of identifiable cultural groups and is considered the study of mathematical ideas found in each culture. Ethnomathematics is defined as the specific methods used by a particular cultural group or society in mathematical activities. Mathematical activities are activities in which the process of abstracting real experiences in everyday life into mathematics occurs (Sarwoedi et al., 2018).

Developing mathematics modules can facilitate students' understanding of mathematics, particularly triangles and quadrilaterals, and increase student learning engagement. This is supported by research by Binofasia et al. (2023) that found valid and practical mathematics learning modules can be used in mathematics learning at school. Learning modules help students achieve their learning objectives (Vitaloka, 2020), indicating that valid and practical modules are suitable for use in mathematics learning.

According to Ani (2020), students' level of understanding is also influenced by their prior knowledge or abilities related to the new knowledge they will acquire. Students' understanding is not just about remembering or understanding concepts, but also about explaining the interrelationships between these concepts. However, students' conceptual understanding is still relatively low. Therefore, to address these issues, it is necessary to develop modules that can construct students' knowledge in understanding mathematical concepts. To enhance student activity, teaching materials are needed to assist the learning process. According to Saefudin and Setyadi (2019), one factor influencing the learning process is the availability of adequate teaching materials. One of the teaching materials that can be developed by teachers is modules.

The purpose of this study is to describe the application of ethnomathematics in learning to develop mathematical problem-solving skills and a love of local culture. It is hoped that this research will serve as a reference source that ethnomathematics learning can effectively help develop students' problem-solving skills and love of local culture. Therefore, the design of ethnomathematics-based mathematics modules has greater potential to improve students' understanding of mathematical concepts and motivation to learn from various cultural backgrounds.

2. METHODS

This research was conducted using the Systematic Literature Review (SLR) method. Research is a process that aims to identify, review, evaluate, and interpret all existing research. In this study, the researcher conducted a series of review processes and identified articles in a structured manner following the steps of Triandini et al., (2019), including the following. First, Research Question (RQ). Research questions are created by adjusting to the needs of the selected topic. The RQ in this study includes (RQ) What are the objectives, types, and research designs used in articles about ethnomathematics learning regarding procedures in SLR research.

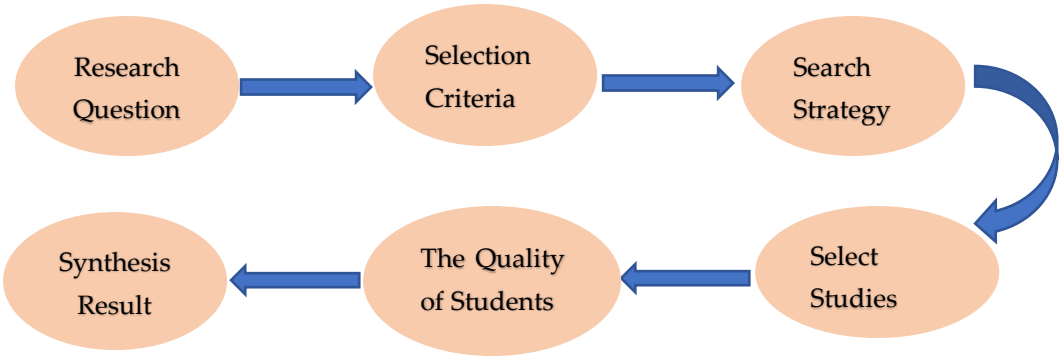

Figure 1.SLR research procedure (Modification, Zawacki-ricter, et al., 2020)

*Literature Review System*has the steps of Research Question, Selection Criteria, Search Strategy, Synthesis Result, The Quality of Student, Select Studies, Structured following the steps (Triandini et al, 2019).

In searching for articles, inclusion and exclusion selection criteria were created in this study;

No	Inclusion	Exclusion
1	The literature title contains mathematics and ethnomathematics modules.	Mathematics module literature that does not contain ethnomathematics
2	Literature published in the last 5 years	The research topic is not relevant to articles published in the last 5 years.
3	The ability to integrate local values and traditions in mathematics learning	Putting aside local values and traditions in the development of mathematics modules
4	Support the development of understanding of mathematical concepts by using examples from local cultures.	Not paying attention to the needs of students from various cultural backgrounds in mathematics learning

Table 1. Inclusion and Exclusion Criteria

Search Strategy; is the stage of searching and browsing articles about mathematics teaching material design using the Google Scholar engine and*Harzing`s Publiash or Perish.*Synthesis Result; is the formulation of the problem in the research article in answering the synthesis, The result of the synthesis in the research of the design of the mathematics module is the development of a new mathematics module that can be used in the learning process. The mathematics module is designed systematically and based on data and information obtained from the research so as to produce a more interactive, interesting and relevant mathematics module. The Quality of Studies; quality research results based on nationally or internationally accredited articles and highlighting topics related to this research. Select Studies; is an examination of language, title, abstract, year of publication, content and journal index to select articles that are relevant or not to the research.

3. FINDINGS AND DISCUSSION

Fourteen articles relevant to the keywords used were obtained. Next, the researcher reviewed the articles relevant to the mathematics module in ethnomathematics. The research data contained in this article is documented as shown in the following table:

Researchers, Year & Journal Identity	Researcher Title	Research result

Publication Category		
Cahyaningrum & Sukestiyarno, (2016) Unnes Journal of Mathematics Education Research, National S4	REACT Learning Assisted by Ethnomathematics Module Develops Character, Loves Local Culture and Improves Problem Solving Skills.	REACT learning assisted by ethnomathematics modules in class VII of junior high school is better than conventional learning, there is an increase in problem-solving skills assisted by the Ethnomathematics module.
Aulia et al. (2019) Journal of Mathematics and Natural Sciences Education, National S3	Efforts to increase student learning independence with a problem-based learning model assisted by Ethnomathematics media.	The application of contextual learning based on ethnomathematics obtained the results of the average value and the average value of the cultural love questionnaire. local is better than contextual learning
Supriyanti, Mastur, & Sugiman, (2015) Unnes Journal of Mathematics Education, National S3	The Effectiveness of the Ethnomathematics-Based ARIAS Learning Model on the Problem-Solving Abilities of Grade VII Students	Implementation of the ARIAS learning model (Assurance, Relevance, Interest, Assessment, Satisfaction) is a learning model that instills confidence in students and increases student motivation and learning outcomes. attitude of love for local culture towards problem solving skills.
Hidayati Restapaty, (2019) SENPIKA II: National Seminar on Mathematics Education, National Proceedings	The effectiveness of the ethnomathematics-based learning model of sasirangan cloth motifs on problem-solving abilities and love of local culture.	Ethnomathematics-based learning of sasirangan cloth motifs in class VII of junior high school.
Geni & Hidayah, (2017) Unnes Journal of Mathematics Education Research, *National S4*	Students' Problem-Solving Ability in Problem-Based Learning with Ethnomathematics Nuances Reviewed from the Cognitive Style	Ethnomathematics-based learning in grade XI of high school is more effective in increasing KPMM (Mathematical Problem Solving Ability) and love for local culture than conventional learning.
Nofitasari et al., (2016) Unnes Journal of Mathematics Education, National S3	The influence of interactive multimedia on students' mathematical concept understanding abilities	The application of the ethnomathematics-based peer tutoring learning model in class VII of junior high school obtained a higher average KPMM (Mathematical Problem Solving Ability) test score than the direct learning model, as well as students' attitudes towards local culture.
Suryapuspitarini & Dewi, (2018) Unnes Journal of Mathematics Education	Problem Solving Ability Viewed From The Adversity Quotient on Mathematics Connected Mathematics Project Learning (Cmp)	Connected mathematics project learning (CMP) with ethnomathematics nuances in class VII of junior high school obtained a higher average KPMM score.

Research, National S4	With Etnomathematics Nuanced	
Herawaty D, Widada W, Khathibul Nugroho, Abdurrobbil Falaq Dwi Anggoro (2018)	Improving Understanding of Mathematical Concepts Through the Implementation of Realistic and Practical Mathematics Learning Ethnomathematics	Ease of learning can be felt if the content and context Learning is linked to students' daily activities. One approach is a realistic learning approach based on ethnomathematics.
Abdullah et al., (2015) Unnes Journal of Mathematics Education, National S3	Systematic Literature Review: Implementation of Ethnomathematics Learning on Mathematical Problem-Solving Ability and Character of Love for Local Culture	Application of PBL learning model with ethnomathematics nuances to KPMM in class students VIII SMP obtained a higher average problem-solving ability score than with PBL learning. There was a difference in attitudes after the implementation of PBL with an ethnomathematics nuance, and this process and student attitudes influenced students' KPMM.
Zaenuri et al., (2020) Journal of Physics: Conference Series, International Conferences	Ethnomathematics Exploration of Sasak Tribe Culture, Traditional Food Studies	The application of a cooperative learning model with ethnomathematics nuances to eighth grade junior high school students is effective in increasing students' love of local culture and KPMM.
Zaenuri et al., (2019) Journal of Physics: Conference Series, International *Conferences*	Systematic Literature Review: Implementation of Ethnomathematics Learning on Mathematical Problem-Solving Ability and Character of Love for Local Culture	Learning with CMP ethnomathematics in grade VII students can improve KPMM and significantly increase appreciation and love towards local culture
Astari, Kesumawat, & Misdalina, (2021)	Development of Social Arithmetic Teaching Materials Using	The design stage consists of three steps. One is to compile a textbook map, addressing needs by considering core competencies and competency achievement indicators. The second is to design the specified textbook structure (student book), which is divided into three parts: introduction, discussion and conclusion. Third, make the core of the quality assessment of the teaching material components, and evaluate the appropriateness of the content, structure, language, and student response questionnaires, which are inseparable tools for evaluating teaching materials. musical instruments. One of the results of designing a social arithmetic textbook.

		 Overall, valid and practical teaching materials provide applications for improving student learning to provide results in social arithmetic teaching materials.
Anjani P, Lokaria E, Purwasi LA (2023)	Contextual Based Module Development In Science Learning for Grade V Elementary School .	The results of the study show that the contextual-based module in learning Science for grade V has valid, practical values and potential effects. It can be seen that the results validity analysis has a value of 0.825 so it is categorized as very valid, and has practical value can be seen from Just get a score of 93.13% categorized as very practical, and has a potential effect value on 16 students which was tested, namely getting a score of 87%, categorized as complete in contextual science lessons
Anjani P, Lokaria E, Purwasi LA (2023)	Contextual Based Module Development In Science Learning for Grade V Elementary School .	The results of the study show that the contextual-based module in learning Science for grade V has valid, practical values and potential effects. It can be seen that the results validity analysis has a value of 0.825 so it is categorized as very valid, and has practical value can be seen from Just get a score of 93.13% categorized as very practical, and has a potential effect value on 16 students which was tested, namely getting a score of 87%, categorized as complete in contextual science lessons
Lestari & Handayani, (2018)	Development of Mathematics-Based Mathematics Modules Realistic for Class VII SMP Semester I	The results of this research design a realistic concept to be applied directly so that students can learn mathematics better by trying to design a module.

Of the 14 reviewed articles, all authors are from Indonesian national journals and international seminars. Ethnomathematics research in Indonesia can be developed through learning approaches or embedded in learning media. Based on journals, research conducted between 2019 and 2023 on ethnomathematics in module design showed differences in research focus. The focus of this research

was to determine the effectiveness of applying ethnomathematics to modules that present images of environmental problems, which will provide alternative solutions to a problem. This is supported by research by Indriani & Mercuriani (2019) who found that modules equipped with concept maps and images were considered effective and able to improve students' science process skills aimed at solving a problem.

4. CONCLUSION

Based on the results and discussion of the Literature Review System of 14 articles published in 2018-2021, it can be concluded that. First, research on ethnomathematics in module design tends to test the effectiveness of applying ethnomathematics to learning media, while the effectiveness of ethnomathematics in the use of modules combined with ethnomathematics can be an alternative research focus that can be developed further. Then the next trend is the use of quantitative research types, as well as the tendency to choose research designs. Supporting learning tools are expected to be a link to understanding the material, so that students and teachers understand from the unreal to the real. This method is one answer to the learning process with the implementation of highly effective teaching of mathematics studies. often provide explanations about realistic things, so that they are easily digested by students. The articles reviewed come from reputable journals and are indexed by Sinta.

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