AlphaMath
Journal of Mathematics Education, 10(2) November 2024
p-ISSN 2477-409X, e-ISSN: 2549-9084
Available online: https://jurnalnasional.ump.ac.id/index.php/alphamath/

Analysis of the Need for the Development of Ethnomathematics-Based Teaching Materials for Junior High School Students

Aprilia Nurul Chasanah*[1], Arief Budi Wicaksono[2], Fadhilah Rahmawati[3], Megita Dwi Pamungkas[4], Yesi Franita[5], Zuida Ratih Hendrastuti[6], Gunawan[7]
[1,2,3,4,5,6]Mathematics Education, Universitas Tidar, Indonesia
[7]Mathematics Education, Universitas Negeri Yogyakarta, Indonesia
aprilianurul@untidar.ac.id*[1], ariefbudiw@untidar.ac.id[2], fadhilahrahmawati@untidar.ac.id[3], megitadwip@untidar.ac.id[4], yesi.franita@untidar.ac.id[5], zuidaratihh@untidar.ac.id[6], gunawan.2023@student.uny.ac.id[7]
http://dx.doi.org/10.30595/alphamath.v10i2.23414

ABSTRACT

This research aims to analyze the ethnomathematics-based mathematics teaching materials for junior high school students. This analytical research uses a descriptive qualitative method. The subjects are junior high school mathematics teachers and students in Magelang. The objects include teachers' and students' responses to teaching materials and the learning process. The data are collected using a questionnaire sheet, observations, and interviews. The data are analyzed using the Miles-Huberman Interactive Analysis, which consists of data reduction, presentation, and conclusion. The results show that (1) teaching materials are available for the learning process; (2) teaching materials often used are textbooks and videos; (3) all teaching materials follow core (KI) and essential competencies (KD); (4) the students find it challenging to understand the materials contained in the available teaching materials; (5)the teaching materials need to be improved by providing concrete examples; (6) ethnomathematics-based learning models have not been implemented optimally, and; (7) the students agree to the development of ethnomathematics-based textbooks as the learning resources which makes them easier to understand the materials. The results of literature and field studies show that students need ethnomathematical-based teaching materials to improve their understanding. The cultural products that will be used in this research are the products of Magelang culture.
Keywords: Anaylsis of need, ethnomathematics, mathematics, teaching materials.

ABSTRAK

Penelitian ini bertujuan untuk menganalisis kebutuhan bahan ajar matematika berbasis etnomatematika pada siswa SMP. Penelitian ini merupakan penelitian analisis dengan jenis penelitian yaitu deskriptif kualitatif. Subjek penelitian adalah guru matematika SMP dan siswa SMP di Magelang. Objek penelitian meliputi respon guru terhadap bahan ajar, respon guru terhadap proses pembelajaran, respon siswa terhadap bahan ajar, dan respon siswa terhadap proses pembelajaran. Instrumen pengumpulan data menggunakan angket, pedoman observasi, dan pedoman wawancara. Analisis data penelitian ini menggunakan Analysis Interactive Miles-Huberman yang terdiri dari reduksi data, penyajian data, dan penarikan kesimpulan. Hasil penelitian menunjukkan bahwa: (1)Telah tersedia bahan ajar untuk proses pembelajaran, (2)Bahan ajar yang sering digunakan berupa buku paket dan video, (3) keseluruhan materi bahan ajar yang ada telah sesuai dengan KI dan KD,(4) Siswa masih kesulitan memahami materi yang ada pada bahan ajar yang tersedia, (5) Bahan ajar masih perlu ditingkatkan dengan memberikan contoh yang bersifat konkret, (6) Model pembelajaran berbasis etnomatematika belum diterapkan, (7) Siswa menyetujui pengembangan buku ajar berbasis etnomatematika sebagai sumber belajar yang memudahkan siswa dalam memahami materi. Hasil studi literatur dan studi lapangan menunjukkan bahwa siswa membutuhkan bahan ajar berbasis etnomatematika. Budaya yang akan digunakan dalam penelitian ini adalah produk budaya Magelang.
Kata kunci: Analisis kebutuhan, bahan ajar, etnomatematika, matematika

Received : August 3, 2024
Accepted : November 20, 2024
Published : November 23, 2024

Introduction

To welcome the 4.0 Industrial Revolution era, people must own or master 21st-century abilities or skills, including critical thinking and problem solving, creativity and innovation, communication, and collaboration. The educational world is required to provide the students with such skills to compete or survive in the middle of current tight competition. Also, skills in finding, managing, conveying information, and using information and technological devices are strongly needed by everyone, particularly high school students. Cheng (2017) stated that 21st-century skills and literacy include basic and advanced skills. It is in line with the demands of 21st-century learning which requires all people to have and master technological skills and information management, learn and innovate, have a good career and global awareness, and have noble characters to meet the high market demands for science and technological products. Education must be able to answer all of those challenges. Therefore, the improvement of the quality of education requires many efforts through the improvement of the learning process.

Teaching materials are the most important part of the learning process because, during the learning process, problems are often related to the materials and resources (Yuliana, 2016). Chalkiadaki (2018) explained that the use of electronic media is the main demand and characteristic in the 21st-century learning steps. Apart from being a strength, the use of electronic media should also be a special concern. In this advanced era, most students are prone to forgetting traditional culture due to information and technology development. They do not tend to be close to the cultural elements around them. They should be taught, delivered, and given examples of virtuous attitudes, respect, and incorporation of cultural knowledge into daily life activities so that they will not forget and separate the original Indonesian culture which is full of noble values from their learning process at schools. Taylor, P. (2016) defined culture as the totality of human activities, including knowledge, belief, art, morals, law, customs, and other habits.

One way to teach culture to the students is through learning mathematics. Ethnomathematics is a form of learning approach that links local culture in learning mathematics. According to the NCTM (National Council of Teachers of Mathematics) in Sochima & Unodiaku (2013), ethnomathematics is defined as the study of the relationship between mathematics and culture, or mathematics practiced among identifiable cultural groups. Ethnomathematics is explained as a form of the implementation of mathematical skills, ideas, procedures, and practices performed by

a cultural group through a context that is close to the surrounding cultural environment as a source of learning mathematics at schools which makes learning mathematics getting more interesting and meaningful (Rosa & Orey, 2016). Barton (2016) stated that ethnomathematics means describing mathematics through culture by understanding, articulating, and using cultural concepts and practices.

With the existence of ethnomathematical-based teaching materials, it is expected that it can help the students in the learning process, and the teachers can manage learning activities effectively and efficiently, and involve the students actively in the learning process. According to Rahmawati (2017), developing innovative and fun teaching materials is needed to improve students' abilities in learning. Situmorang (2013) explained that the development of innovative teaching materials can improve the students' character and learning outcomes. According to François (2012), the use of ethnomathematics in learning will make the learning getting more meaningful, relevant, and interesting because it brings mathematics close to the real environment. This is in line with the view of Knijnik (2017) that mathematics is a cultural knowledge that grows and develops to connect human needs.

Some research has focused on the integration of ethnomathematics in mathematics learning. For example, Malay culture in the Riau Islands is used as the basis for the development of e-modules that help students understand the concept of geometry through local cultural objects, such as traditional musical instruments and rattan weaving (Afriliziana, 2021). In addition, the use of local cultural context improves students' understanding, as was done with Batik Pamiluto in Gresik, where the concept of geometric transformation is used to teach art-based mathematics (Wurdani & Budiarto, 2021). Based on this, in this study by analyzing the needs related to ethnomathematics which will be linked to the local wisdom of Magelang and the peculiarities of the school, in this case there are four schools that have their own characteristics. These four things consist of environmental, religious, Chinese and ethnic Chinese peculiarities. The continuation of this needs analysis will later be developed ethnomathematics teaching materials based on school peculiarities.

Teaching materials play an important role in achieving good learning outcomes. However, the development of teaching materials must pay attention to the students' specific and follow the current curriculum, especially in the mathematics subject. Therefore, there must be appropriate teaching materials for guiding the students in understanding the concepts of mathematics well and correctly. The students' learning sources may be in the form of teaching materials that can integrate local culture into mathematics. The purpose of this research is to determine and analyze the students'

Department of Mathematics Education, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia
p-ISSN 2477-409X, e-ISSN: 2549-9084

needs before the preparation of ethnomathematics teaching materials by integrating Magelang cultural products for junior high school students.

Research Methods

This research design uses a qualitative approach. According to Sukestiyarno (2020) qualitative research aims to examine or understand specific social phenomena from the point of view or the perspective of the participants about what is experienced by students, such as perception behavior, motivation, action, and others holistically through describing verbally in words in a natural and special context and utilizing various natural methods. The qualitative descriptive is intended to obtain information about the level of need for ethnomathematical-based mathematics teaching materials for junior high school students. The subjects in this study are teachers and students from several junior high schools in Magelang. There are 4 teachers. There are 180 students.

This research is divided into three stages; the preparation stage, the implementation stage, and the final stages. The data are collected using a non-test technique with research instruments in the form of questionnaires, observation, and interview sheets. Questionnaires are given to teachers and students. The questionnaire given to students is used to obtain data about the learning resources that have been used by students and the needs of teaching materials desired by students. Meanwhile, the observation sheet is used to record the results of observations in mathematics learning.

The data are analyzed using the technical analysis method that refers to the opinion of Miles and Huberman (1994). The data analysis is carried out through data reduction, data presentation, and concluding. After the data have been completely collected, the next step is to make a transcript of all the recordings. The results of the transcript are reduced, where all things that are not relevant to the research objectives are removed from the transcript. The reduced data are then tested for credibility and analyzed for further conclusions drawn.

Result and Discussions

The needs analysis refers to the existing conditions in schools, namely at SMP Negeri 1 Magelang, SMP Negeri 2 Magelang, Bhakti Tunas Harapan, and SMPIT Ihsanul Fikri. This analysis is to find out whether the teaching materials need to be developed or not. The needs analysis is based on observations at the schools during interviews with the teachers and the students. The needs analysis is carried out within three stages, namely interviews with four mathematics teachers, observations, and distributing questionnaires to the students to find out whether students want to learn

to use the teaching materials or not. The following are the results of observation and interviews with four junior high school mathematics teachers and the responses to the teaching materials.

Table 1. Teachers' Responses to The Teaching Materials

Number of Teachers	Responses
4	Teaching materials used for learning have been provided by the Government.
4	The most frequently used teaching materials are textbooks and videos (during a pandemic).
4	The teaching materials used in the teaching and learning process have been following KI and KD along with their achievement indicators.
4	The teachers agree to develop ethnomathematical-based teaching materials.

Based on Table 1, it can be seen that the teaching materials that are often used at schools are textbooks as much as 86.7% and videos by 78.3%. The teaching materials used in the teaching and learning process have been following KI and KD along with their achievement indicators, and every material in the teaching materials has performed its KI, KD, and learning indicators. After being given an example of ethnomathematics during the interview, the teachers agree that ethnomathematical-based teaching materials should be further developed because it would strengthen their knowledge and instill cultural values in the students. This is in line with the results found by Dahlan and Permatasari (2018) who stated that there is a need for recommendations to develop mathematics teaching materials based on the potential of each region. Innovatively developed teaching materials can encourage effective and independent learning and help the students to acquire specific skills. Good teaching materials can also support blended learning, where teaching materials will be more easily accessible and learned by the students (Afifuloh M & Cahyanto B, 2021).

Figure 1. Observation Process at SMP Negeri 1 Magelang (Students are Introduced to The Cultural Elements of "Pendopo Pengabdian Walikota" in Mathematics Learning)

Department of Mathematics Education, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia
p-ISSN 2477-409X, e-ISSN: 2549-9084

Based on Figure 1, one of the student activities related to ethnomathematics is to design the shape of the mayor's pavilion which is illustrated with wood that is arranged accordingly and analyzed using the concept of building space in mathematics. Of the four teachers interviewed regarding the lack of ethnomatmatic implementation in learning, it turns out that there are only two teachers, one of school is like the student activity in Figure 1.

The following are the results of observation and interviews with four junior high school mathematics teachers and the responses to the learning process.

Table 2. Teachers' Responses to The Learning Process

Number of teachers	Responses
2	The teachers have not yet introduced and implemented ethnomathematical learning in the classroom
4	Innovation is needed in learning mathematics

Based on the responses provided by the four junior high school mathematics teachers, it can be seen in Table 2 that 50% of them have not introduced or applied ethnomathematics learning in their classrooms. This indicates that the application of ethnomathematics as a pedagogical approach remains limited, even though this approach has the potential to enhance students' understanding of mathematical concepts through cultural contexts. This observation highlights a gap in integrating innovative learning strategies that connect mathematics with real-world or cultural practices, which could make learning more relevant and engaging for students.

Additionally, all the teachers stated that innovation is necessary in mathematics learning. This response reflects the teachers' awareness of the importance of exploring new and creative learning strategies to enhance mathematics education. This can be seen in the following interview transcription:

Q: Did you know about ethnomathematics before?
A: Not yet, but usually I often give examples of questions related to surrounding objects. I am not yet familiar with ethnomathematics.
Q: After knowing about ethnomathematics, would you be interested in developing the Ethnomathematics-based teaching materials?
A: Sure, I would. I'm also still learning many things and hopefully, my students will also get better outcomes and get to know more about local culture.
Q: What local wisdom in Magelang do you know?
A: Apart from the buildings, I think it could also be a tradition. In Magelang, there is dance called tari ireng and sambatan tradition.

The interviews conducted with mathematics teachers at SMP Negeri 1 Magelang, SMP Negeri 2 Magelang, Sekolah Bhakti Tunas Harapan, and SMP IT Ihsanul Fikri Kota Magelang were followed by a Focus Group Discussion (FGD) involving the ethnomathematics association. The documentation of the FGD activity can be seen in Figure 2 below.

Figure 2. Focus Group Discussion (FGD) Involving Ethnomathematics Associations and Partner Schools (SMP Negeri 1 Magelang, SMP Negeri 2 Magelang, Sekolah Bhakti Tunas Harapan, and SMP IT Ihsanul Fikri Kota Magelang)

Based on Figure 2, this FGD aims to provide teachers with knowledge related to the concept of ethnomathematics. During the discussion, participants had the opportunity to explore how cultural aspects can be integrated into mathematics education. By involving various schools, this FGD serves as a platform to broaden perspectives and introduce more contextual and culturally relevant teaching methods.

Throughout the FGD, teachers showed a strong interest in exploring various local cultures that could be used as sources of ideas for teaching. They were eager to utilize the rich cultural heritage of Magelang to uncover mathematical concepts related to it. This discussion provided teachers with an understanding of the importance of integrating culture into teaching, which can strengthen the connection between learning and students' everyday lives. This is in line with the findings of Osterberg & De Lara (2019) who stated that learning by involving culture makes mathematics less rigid and more flexible. This makes ethnomathematics is strongly recommended as an approach to learning (Katsap, et all, 2016). During mathematics learning, the teachers

need to be innovative, and one of which is by introducing culture. Besides, based on interviews conducted, there are no multimedia-based mathematics teaching materials available at schools.

The material analysis is done by reviewing the main materials to be taught to the students. It is also based on the results of interviews with some mathematics teachers at SMP Negeri 1 Magelang, SMP Negeri 2 Magelang, Bhakti Tunas Harapan, and SMPIT Ihsanul Fikri in Magelang city. The materials are adjusted to the syllabus, lesson plans (RPP), and textbooks so that learning objectives can be achieved well. The analysis results show that the materials to be delivered for the even semester of class VII is rectangular shapes, while for class VIII, it is flat side shapes. The quadrilaterals and flat-sided shapes can be delivered by applying ethnomathematics. Following are the results of the questionnaire data on 180 students from junior high schools in Magelang and the responses to mathematics teaching materials.

Table 3. Students' Responses to The Teaching Materials

Number of students	Percentage	Responses
93	51%	The students are less interested in using books provided by the government.
117	65%	The students demand the materials that are relevant to their everyday life
163	91%	The students do not know ethnomathematics yet
171	95%	The students agree that ethnomathematics-based textbooks should be further developed

Based on Table 3, it can be seen that 51% of them are less excited about using books that have been provided by the government. Most of them experience difficulties in understanding the textbook materials because of the sentence patterns or the structure of the discussion. Besides, the color display is one of the factors that make them not enthusiastic about reading the books. 65% of the students state that they want to learn the materials that are closely related to their routine activities. This is because the materials served in the textbooks have been yet linked to applicable (real) problems. Their knowledge of ethnomathematics is also low, only 9%.

This is then followed up by distributing questionnaires, interviews, and observations in a class by introducing ethnomathematics. Through this step, the students can gain initial knowledge about ethnomathematics. Ethnomathematics is analogous to a lens for viewing and understanding mathematics as a cultural product. Implicitly, it is a program or activity that delivers values in mathematics (Alangui, 2016). The values

can be actualized in the form of students' activities because mathematics is included as humanity and social activity (Schoenfeld; 1992, Gravemeijer; 1997). The implementation of ethnomathematics in learning should therefore involve and engage the students' activeness (Zhang and Zhang, 2010).

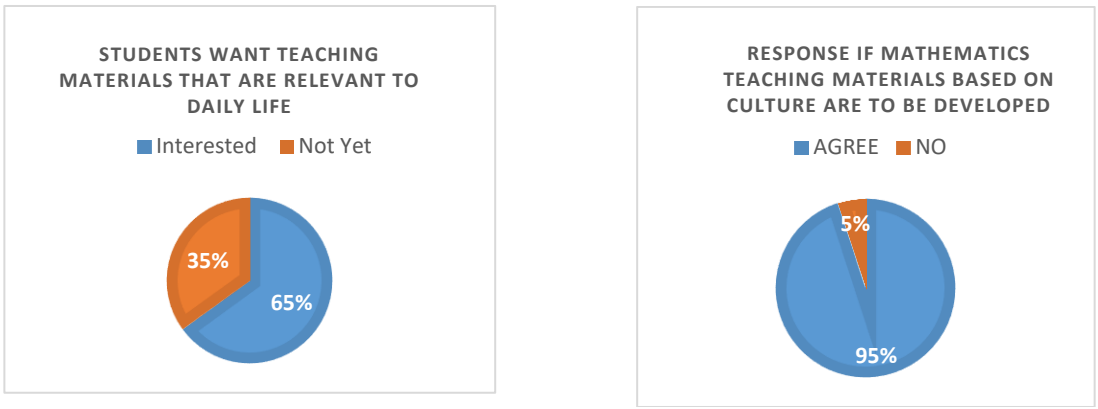

Figure 3. Student Responses in Developing Ethnomathematics-Based Mathematics Teaching Materials

The following are the interview results taken from twenty junior high schools students in Magelang and the responses to learning mathematics. Based on Figure 3, it can be seen that 65% of students are interested in learning materials that are relevant to everyday life. This indicates that students are more motivated to learn when the materials presented are directly connected to daily activities, making them easier to understand and apply. Additionally, 95% of students agree that culturally-based mathematics learning materials should be developed. This shows that students support a learning approach that integrates cultural values into mathematics education, or ethnomathematics. This approach can help students perceive mathematics not only as an abstract science but also as a part of life and cultural heritage that is close to them. It also indicates that students feel a culturally-based approach can enhance their understanding and interest in mathematics.

Table 4. Students' Responses to The Learning Process

Number of students	Responses
18	Mathematics is an interesting lesson and very important for everyday life.
20	The students want such kind of environmental (cultural) involvement in mathematics lessons

Based on the results of observations and interviews from the twenty junior high school students, it can be seen in Table 4 that 90% of them agree that learning mathematics is

p-ISSN 2477-409X, e-ISSN: 2549-9084

exciting and very important in supporting their daily activities life, but the materials described are not yet linked to applicable (everyday) problems. They demand environmental involvement (culture) in mathematics lessons so that it can be easily understood. Therefore, from the findings, ethnomathematics can affect mathematics learning. The following is an example of an interview with one of the students.

Q: Have you already known about ethnomathematics?
A: No I have not
Q: Where do your teachers usually get the materials for teaching?
A: They commonly bring textbooks, but sometimes they also perform the materials through PowerPoint slides and videos
Q: Which one is more interesting according to you?
A: I like videos because I don't have to write down the materials in my book.
Q: The materials are also taken from the textbooks, right?
A: Yes, but sometimes I don't understand them.
Q: Why?
A: Because I think the language is too complicated and there are too many things that I have to write

The learning model using the ethnomathematical-based approach has not been widely used at schools. D'Ambrosio (2016) illustrated that mathematics is very broad if it is connected in life that can be practiced among identifiable cultural groups, such as ethnic communities, working groups, children of a certain age, and the professional classes. Ethnomathematics is conceptually designed as practical mathematics that can be used or combined in the cultural practices of society (Vasquez, 2017). Furthermore, the idea of ethnomathematics emerges as a broader view of the relationship between mathematics and real-world activities.

Figure 4. Borobudur Temple

Figure 5. Water Torn

The culture used in this research is the cultural products of Central Java, especially those located in Magelang. The cultural products of Magelang are Borobudur Temple, Magelang City Square Water Torn, Mount Tidar, Kyai Langgeng Park, Mayor's Service *Jogjo* House, Gethuk Magelang, Topeng Ireng Dance, Sambatan Tradition, and Magelang Batik.

Figure 6. Batik with Nutmeg Motif

Figure 7. Batik with Gethuk Motif

Figure 8. Gethuk Magelang

Figure 9. Wajik Salaman

Figures 4 to 9 ilustrate several cultural products of Magelang, namely borobudur temple, water torn, batik with nutmeg motif, batik with gethuk motif, gethuk magelang, and wajik salaman. These images are closely related to geometric shapes. In the parts of the Magelang cultural products, there are elements of rectangular flat and spatial shapes. The knowledge about Magelang cultural products (Borobudur Temple, Magelang City Square Water Torn, Mount Tidar, Kyai Langgeng Park, Jogjo Mayor's House, Gethuk Magelang, Topeng Ireng Dance, Sambatan Tradition, and Magelang Batik) will be included in the teaching materials that contain history, philosophy, and cultural values. Some of the Magelang cultural product data are adapted to the materials in the syllabus used at schools. This is to ensure that what has been developed can provide benefits to help the students and teachers in the learning process and train them to be engaged in independent learning.

Department of Mathematics Education, Universitas Muhammadiyah Purwokerto, Purwokerto, Indonesia
p-ISSN 2477-409X, e-ISSN: 2549-9084

This study reflects the current educational standards and the gap in the availability of ethnomathematics-based learning resources. Since the learning materials focus on core competencies without incorporating local cultural integration, students feel less engaged. Additionally, the lack of awareness and knowledge among teachers regarding ethnomathematics is one of the reasons why this approach has not yet been established in the curriculum. The study's findings also suggest that raising awareness through activities such as Focus Group Discussions (FGDs) with ethnomathematics associations can help bridge this knowledge gap, sparking teachers' interest in culturally-based mathematics instruction.

This study has several advantages, such as highlighting the importance of culturally integrated learning materials. This approach emphasizes the relevance of local culture in enhancing student engagement and understanding. Additionally, the study opens up opportunities for developing innovative ethnomathematics-based learning resources. However, there are also limitations, including the study's restricted geographical and demographic scope, focusing only on junior high schools in Magelang. Moreover, the limited knowledge of teachers about ethnomathematics may require adequate training and resources to implement the proposed changes effectively.

Conclusion

Based on the results of questionnaires, observations, and interviews conducted at SMP Negeri 1 Magelang, SMP Negeri 2 Magelang, SMP Bhakti Tunas Harapan, and SMPIT Ihsanul Fikri in Magelang City, it can be concluded that: (1) there have been teaching materials available for the learning process; (2) the teaching materials that are often used are textbooks and videos; (3) all of the existing teaching materials have been following KI and KD; (4) the students still experience difficulties in understanding the materials; (5) the teaching materials still need to be improved by providing concrete examples; (6) ethnomathematics-based learning model has not been implemented optimally, and; (7) the students agree to the development of ethnomathematical-based textbooks as the learning resources that make it easier for them to understand the materials. Literature and field studies indicate a need for ethnomathematical-based teaching materials, particularly creative modules, as students often struggle with traditional resources. Engaging materials like e-modules or book creators could make mathematics more enjoyable. This research will incorporate cultural elements from Central Java, especially Magelang, including Borobudur Temple, Magelang City Square Water Tower, Mount Tidar, Kyai Langgeng Park, Mayor's Joglo House, Gethuk Magelang, Topeng Ireng Dance, Sambatan Tradition, and Magelang Batik. The developed materials aim to support innovative teaching and foster independent learning while introducing Magelang's cultural heritage. This study specifically

analyzes the need for ethnomathematical resources based on Magelang's cultural products for junior high school students. Based on the study's findings, future research should focus on implementing and evaluating ethnomathematics-based materials in classrooms to measure their impact on student engagement and comprehension. Additionally, developing standardized guidelines and expanding research to other regions and educational levels would help assess the adaptability of ethnomathematics across diverse contexts. Further studies could also explore teacher training programs to enhance educators' cultural awareness and skills in applying this approach effectively.

Acknowledgement
The author extends gratitude to SMP Negeri 1 Magelang, SMP Negeri 2 Magelang, SMP IT Ihsanul Fikri, and Sekolah Bhakti Tunas Harapan (SBTH) for their cooperation in conducting the research.

References

Afifuloh, M & Cahyanto B. (2021). Analisis Kebutuhan Pengembangan Bahan Ajar Elektronik di Era Pandemi Covid-19. *Jurnal Pendidikan Dasar Indonesia*, *6*(2), 31 – 36.

Afriliziana, L. A., Maimunah, M., & Roza, Y. (2021). Analisis kebutuhan pengembangan e-modul etnomatematika berbasis budaya melayu Kepulauan Riau. *Jurnal Analisa, 7*(2), 135-145.

Alangui, W. V., & Rosa, M. (2016). Role of ethnomathematics in mathematics education. In M. Rosa, U. D'Ambrosio, D. C. Orey, L. Shirley, W. V. Alangui, P. Palhares, & M. E. Gavarrete (Eds.), *Current and future perspectives of ethnomathematics as a program* (pp. 31–37). ICME13 Topical Surveys. London, England: SpringerOpen.

Barton, B. (2016). Mathematics, Education & Culture: A Contemporary Moral Imperative. Proceedings of 13th International Congress on Mathematical Education. Hamburg, Germany.

Chalkiadaki, A. (2018). A Systematic Literature Review of 21st Century Skill and Competencies in Primary Education. *International Journal of Instruction*, *11*(3), 1-13.

Cheng, K. (2017). *Advancing 21st Century Competencies in East Asian Education Systems*, Hong Kong: Asia Society Center for Global Education.

D'Ambrosio, U. (2016). An overview of the history of ethnomathematics. In M. Rosa, U. D'Ambrosio, D. C. Orey, L. Shirley, W. V. Alangui, P. Palhares, & M. E. Gavarrete (Eds.), *Current and future perspectives of ethnomathematics as a program* (pp. 5–10). ICME13 Topical Surveys. London, England: SpringerOpen.

Dahlan, J. A., & Permatasari, R. (2018). Pengembangan Bahan Ajar Berbasis Etnomatematika Dalam Pembelajaran Matematika Sekolah Menengah Pertama. *Jurnal Nasional Pendidikan Matematika, 2*(1), 136.

François, K. (2012). Ethnomathematics in a European Context: Towards an Enrichedmeaning of Ethnomathematics. *Journal of Mathematics and Culture*, *6*(1), 191-208.

Gravemeijer, K. (1997). Commentary Solving Word Problems: A Case of Modelling. *Learning and Instruction, 7*(4), 389-397.

Katsap, A., Silverman, F. L., Katsap, A., & Silverman, F. L. (2016). Ethnomathematics in Mathematics Curriculum via Ethnomathematical Word Problems. Ethnomathematics of Negev Bedouins' Existence in Forms, Symbols and Geometric Patterns, 289–304. https://doi.org/10.1007/978-94- 6209-950-0_13

Knijnik, G. (2017). The Effects of Mathematics Education Discourse: A Dialogue With Mendick's Work. In *Proceedings of the 9th Mathematics Education and Society Conference. Volos: University of Thessaly Press*, 106-111.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative Data Analysis: An Expanded Sourcebook.* London: SAGE Publications Ltd.

Osterberg, L. T., & De Lara, I. C. M. (2019). The Wittgensteinian perspective and ethnomathematics: An analysis of language games and the rules governing their uses in Certain work activities. *Acta Scientiae, 21*(5), 28–43. https://doi.org/10.17648/acta.scient iae.4743

Rakhmawati, R. (2016). Aktivitas Matematika Berbasis Budaya pada Masyarakat Lampung. *Al-Jabar: Jurnal Pendidikan Matematika*, 7(2), 221-230.

Rosa, M., & Gavarrete, M. E. (2016). Polysemic interactions between ethnomathematics and culturally relevant pedagogy. In M. Rosa, U. D'Ambrosio, D. C. Orey, L. Shirley, W. V. Alangui, P. Palhares, & M. E. Gavarrete (Eds.), *Current and future perspectives of ethnomathematics as a program* (pp. 23–30). ICME13 Topical Surveys. London, England: SpringerOpen.

Schoenfeld, A. H. (1992). On Paradigms and Methods: What Do You Do When The Ones You Know Don't Do What You Want Them To? Issues In The Analysis Of Data In The Form Of Videotapes. *The Journal of the Learning Sciences*, *2*(2), 179-214.

Situmorang. (2013). *Pengembangan Buku Ajar Kimia SMA Melalui Inovasi Pembelajaran dan Integrasi Pendidikan Karakter untuk Meningkatkan Hasil Belajar Siswa*. Universitas Negeri Medan.

Sochima & Unodiku .(2013). Effect of ethnomathematics teaching matheriakls on students arcievement in mathematics in aeanugo State. *Journal of Education and Practice, 1*(2), 23-31.

Sukestiyarno. (2020). *Metode Penelitian Pendidikan*. Semarang: Unnes Press.

Taylor, P. (2016). Teaching Mathematics: Ethnomathematics. *the Voice of Sociocultural Groups*, *65*(3), 134–135.

Vasquez, E. L. (2017). Ethnomathematics as an Epistemological Booster for investigating Culture and Pedagogical Experience with the Young Offender or Prison School Communities. *Journal of Education and Human Development*, *6*(2), 117-127.

Wurdani, W. P. A. K. & Budiarto, M. T. (2021). Etnomatematika usaha kerajinan anyaman rotan masyarakat Gresik dalam perspektif literasi matematis. *Jurnal Pendidikan Matematika, 12*(1), 94-105.

Yuliana, R. (2016). Pengembangan Bahan Ajar Matematika untuk Siswa SMP Berdasarkan Teori Belajar Ausubel. *Jurnal Pendidikan Matematik*a, *11*(2).

Zhang, W. & Zhang, Q. (2010). Ethnomathematics and Its Integration within the Mathematics Curriculum. *Journal of Mathematics Education, 3*(1).