International Journal of Education and Practice
2025 Vol. 13, No. 1, pp. 98-113
ISSN(e): 2310-3868
ISSN(p): 2311-6897
DOI: 10.18488/61.v13i1.3963

Teachers' perceptions of ethnomathematics learning in the independent curriculum program in Indonesia

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Article History
Received: 5 June 2024
Revised: 2 October 2024
Accepted: 18 October 2024
Published: 28 October 2024

Keywords
Culture
Ethnomathematics
Ethnomathematics learning
Independent curriculum program
Junior high school
Learning mathematics
Teacher perceptions.

ABSTRACT

This research aims to determine mathematics teachers' perceptions of ethnomathematics learning in the independent curriculum program for the 2022/2023 academic year using a qualitative descriptive method. The results of the study were strengthened by quantitative methods to determine the relationship between the variables and the problems that influenced the study. The research sample comprised 60 mathematics teachers in Kudus Regency, Indonesia. The research instrument had a Cronbach's alpha coefficient value of 0.826 through the expert judgment method, indicating its reliability. The results showed that the mathematics teachers' perceptions of ethnomathematics learning in the independent curriculum program varied. One teacher (1.67%) saw it as very good, 25 teachers (41.67%) saw it as good, 27 teachers (45%) saw it as adequate, and seven teachers (11.67%) saw it as fair. The conclusion is that mathematics teachers in Kudus Regency, Central Java, have moderate perceptions of ethnomathematics learning in the independent curriculum program implemented in the 2022/2023 academic year. This research has benefits for teachers and school policies related to training, empowerment, and the development of independent curriculum ethnomathematics learning to obtain quality outcomes.

Contribution/Originality: This research contributes to knowledge on the independent curriculum currently being developed in Indonesia. Ethnomathematics collaboration with an independent curriculum reveals several factors that influence the mathematics learning process. As a result, this research provides new knowledge about the results of collaboration between independent curriculum and middle school ethnomathematics and offers solutions to the challenges faced.

1. INTRODUCTION

Education has an important role in producing quality and competent human resources to adapt to scientific developments. Efforts to preserve culture can be done through the scope of education and learning through the values in the teacher–student environment (Rosa, 2018). Indonesia is an archipelagic country consisting of five large islands and 38 provinces. Therefore, there are differences in characteristics, behavior and human nature in

each province (Hidayati, Waluyo, & Winarni, 2020). Each region, including Kudus Regency, Central Java province, Indonesia, has its own characteristics, cultural conditions, customs, lifestyle, everyday language, and traditions (Suhartini, Sekarningrum, Sulaeman, & Gunawan, 2019). The location of Kudus Regency is strategic because Kudus was a trade route during the kingdom era, which is why there are historical relics such as towers, traditional *Joglo* houses, typical food, and traditional Kudus clothing, which has distinctive motifs. Previous research has found that the cultural form manifested through mathematics in Central Java society, especially Kudus Regency, contains various mathematical concepts that can be used by teachers in secondary school mathematics learning (Zaenuri & Dwidayati, 2018). As a result, ethnomathematics will make it easier to meet Central Java's educational goal to establish a culture-based learning process to promote education implementation and national welfare.

Mathematics learning in Indonesia at all levels starting in the 2022/2023 academic year uses an independent curriculum design (Merdeka Curriculum) that focuses on intra-curricular learning to optimize the development of real concepts and strengthen competencies. The application of ethnomathematics by teachers in the independent curriculum program is a form of implementing real learning in mathematics. Research on ethnomathematics is divided into three types, the first of which is concerned with the mathematical idea of cultural habituation (Dasaprawira & Susanti, 2019; Supriadi, 2022; Surip, Dalimunte, & Sumarsono, 2023). The second type relates to teaching mathematics using ethnomathematics (Ogunkunle, Harcourt, Harcourt, George, & Ed, 2015), especially in teaching geometry (Abiam, Abonyi, Ugama, & Okafor, 2016; Farokhah, Arisetyawan, & Jupri, 2017). The third type highlights the application of ethnomathematics at schools (Chahine, 2020; Johnson, Smail, Corey, & Jarrah, 2022; Payadnya, Suwija, & Wibawa, 2021; Sunzuma & Maharaj, 2020). Existing research focuses on student teaching activities and ethnomathematics but does not examine the situation of teachers and the independent curriculum used in Indonesia.

The challenge for mathematics teachers is to provide students with solutions that make mathematics interesting and easy to understand (Verner, Massarwe, & Bshouty, 2019). The reason for this is that mathematics learning has a connection between concepts, application and teachers' positive perceptions of mathematics. According to the PISA (Programme for International Student Assessment) scores, which declined in 2018, Indonesia remained in 73rd place with a score of 379 (OECD, 2018). Low learning achievement is influenced by students' environmental conditions, which are not thoroughly investigated by teachers, and can be used to solve mathematical problems (Ayele et al., 2019). Teachers in Indonesia, particularly in Kudus Regency, need to improve their ability to provide theoretical learning knowledge to students as well as provide real-world examples (Purwanto, Waluya, Rochmad, & Wardono, 2020). Based on these facts, low student learning achievement is caused by inadequate education quality which originates from teachers' negative perceptions. It is possible that some teachers are less prepared to face the rapid transition to an independent curriculum program in the delivery of learning. Teachers' perceptions of good teaching will influence the learning system used in independent curriculum programs.

The quality of teachers needs to be improved; teachers can adopt culture and combine it with the independent curriculum to get broad insight, thereby improving the teaching and learning process. Good quality learning can result from teachers' positive perceptions of independent curriculum development implemented in Indonesia. Previous research has shown that learning is qualified if teachers have good perceptions and have extensive knowledge and teaching experience (Nabaho, Aguti, & Oonyu, 2019). Perception is an academic activity related to conveying an overview of environmental phenomena to be included in the learning process. Academic activities carried out by teachers in homogeneous groups must be able to demonstrate scientific discipline through good learning perceptions. In addition, research has shown that gender influences perception (Kuzminykh and Enikolopov, 2015; Brandmiller, Dumont, and Becker, 2020), thus influencing teachers' delivery of good teaching. Learning will be achieved optimally through integrated socio-cultural learning included in the curriculum (Parsons et al., 2019). Based on previous research, there is a perception gap that has never been studied regarding teachers'

perceptions of ethnomathematics learning in the independent curriculum program, Indonesia's newest curriculum. It is hoped that teachers will have positive perceptions and achieve the expected learning objectives.

To fill the gap regarding ethnomathematics teaching in the independent curriculum, the main question in this research is: What is the level of teachers' perceptions of ethnomathematics learning in the independent curriculum program? This research is important as it provides insight into the level of teachers' perceptions of ethnomathematics learning in the independent curriculum program and the problems they face.

2. LITERATURE REVIEW

2.1. Independent Curriculum Program

Improving the curriculum is necessary to produce quality education. To improve the quality of education in Indonesia, the government has a curriculum for innovation and renewal called the Independent Curriculum Program (Azmi, Hadiyanto, & Rusdinal, 2023). This program aims to ensure superior learning between teachers and students (Hadi et al., 2023). It also aims to improve the quality of education in Indonesia (Maipita, Dalimunthe, & Sagala, 2021). Furthermore, the independent curriculum allows teachers to provide a learning process according to the students' needs (Fitriyah & Wardani, 2022). Therefore, teachers have a very important task to implement this curriculum in the learning process by emphasizing cultural, social, and relevant understanding to achieve the goal of improving the quality of education. However, there are still problems in implementing the independent curriculum (Ndari & Mahmudah, 2023) including teachers' readiness to accept the independent curriculum not being optimal. This happens because the teachers' view of implementing the independent curriculum is not entirely positive.

The challenges that teachers must overcome in implementing an independent curriculum include how teachers can incorporate learning related to students' daily practices in the school environment (Kurniawan, Sugianor, & Pandiangan, 2024; Rohimah & Sholikha, 2023). Teachers must be able to provide a more focused and planned learning atmosphere that is dynamic by adapting to realistic conditions experienced by students. Learning conditions are more flexible in relation to life experiences at the educational level according to the abilities of students. Teachers must be able to adapt in implementing the independent curriculum to develop individuals with moral integrity and good social skills.

The independent curriculum program is a learning activity that is more related to real experience (Rahayu, Rosita, Rahayuningsih, Hernawan, & Prihantini, 2022), allowing teachers to make adjustments to its application based on the social and cultural context of the students' learning environment. The teachers' views greatly influence the understanding of learning, especially in intra-curricular activities when teachers and students explore material or topics to create a superior learning process and achieve better results. Teachers must have the ability to adapt to the implementation of this curriculum to be successful; therefore, it is necessary to examine teachers' perceptions of classroom learning.

2.2. Ethnomathematics Learning

The independent curriculum program for mathematical subjects has changed and states that subjects should be developed with an orientation toward students' local culture. One way to improve the quality of mathematics education is to study the relationship between mathematics and local culture, which is called ethnomathematics. Learning with local culture is one of the main needs (Jumriani, Mutiani, Putra, Syaharuddin, & Abbas, 2021). Therefore, it is expected that the teaching process will improve if ethnomathematics is used in the curriculum.

Research on ethnomathematics in Indonesia dominates (Hendriyanto et al., 2023) because it is a link between culture and mathematics and has been shown to provide effective and meaningful learning (Weldeana, 2016). Ethno- is a prefix used to describe the numerous sociocultural factors that contribute to culture, as shown through language, beliefs, food, and habits. Mathematics is part of culture, reflected in its use in arithmetic, modeling, and

spatial construction. For example, the Kudus Tower in Kudus Regency is an icon of the Kudus city and can be included in ethnomathematics as an example of spatial structures. Ethnomathematics is a science that is not only related to culture and mathematics, but also ways of thinking and social values (Gavarrete, 2015). Other research states that ethnomathematics integrates students' cultural scope (Brandt & Chernoff, 2015). As a result, it is an innovation for formal teaching, especially in mathematics (Machaba & Dhlamini, 2021).

This suggests that ethnomathematics should ideally be combined with an independent curriculum that emphasizes intra-curricular activities. Learning activities will be fun and meaningful so that students gain concrete thinking through daily activities in the form of traditional games, food and buildings. Furthermore, ethnomathematics can be included in the mathematics curriculum (Fouze & Amit, 2017) and can be used as practice in learning mathematics in a cultural context (Haryanto & Subanji, 2017).

The application of ethnomathematics by teachers in independent curriculum programs is a form of real learning. Thus, it is necessary to understand teachers' perceptions in order to improve its implementation.

2.3. Teacher Perceptions

Perception is related to an individual's view and response to new circumstances. According to Mahdum, Hadriana, and Safriyanti (2019) perception is a condition that determines, categorizes and interprets information based on the knowledge held. If interpreted differently, perception is a person's process of organizing and interpreting sensory messages to allocate a purpose to their environment. When viewed from the process perspective, perception is a series of information received from the influence of environmental stimuli and categorized in an appropriate scientific framework. The perception process includes interactions in complex activities and interpretations that depend on a person's sensing process.

Perception is important to understand because it is a substantial contributor to the learning process (Chan & Luo, 2022), and teachers play the main role in learning (Chandra Handa, 2020). A teacher's positive perception greatly influences the activities in the classroom; with a positive perception, a teacher can process knowledge and interpret it in learning (Abel, Tondeur, & Sang, 2022). In classroom activities, teachers must be able to control and adjust their teaching according to the curriculum as well as adopt learning activities and apply new ideas. Therefore, it is important to determine teachers' perceptions to maximize the quality of education. As the main drivers in the learning process, teachers must have the ability to deliver learning according to the objectives of the independent curriculum. Perception in this research refers to how teachers convey ethnomathematics learning through collecting ideas related to culture and implementing them in the independent curriculum program.

3. METHODS

3.1. Participant

The respondents for this research were 60 junior high school mathematics teachers who were selected using the purposive sampling technique (Aningsih, Neolaka, Iasha, & Setiawan, 2022). The study population comprised all junior high school mathematics teachers in both state and private schools in Kudus Regency who are members of the mathematics teacher deliberation forum.

Table 1 presents the demographic information of the research sample grouped by gender, educational qualifications, and type of school, had at least 15 years of teaching experience and were willing to follow the research rules. Females made up the majority of the study sample at 58.3%, and 41.7% were male. Regarding educational qualifications, 75% held a bachelor's degree, and 25% held a master's degree. For school type, 83.3% taught in state schools and 16.7% taught in private schools.

Table 1. Research sample demographics.

Sample		Frequency	Percentage (%)
Gender	Male	25	41.7
	Female	35	58.3
Educational qualification	Bachelor's	45	75
	Masters	15	25
School type	Public school	50	83.3
	Private school	10	16.7

3.2. Procedure

This research uses descriptive qualitative research methods to obtain information related to human perception (Gök, 2020) which consists of data collection, data analysis and drawing conclusions. This research is focused on empirical studies using quantitative methods. The quantitative method aims to determine the relationship between variables by detailing the problem to determine its influence. Quantitative methods provide a comprehensive picture of events, and the quantitative research results are used to generalize from samples to populations (Newman & Ridenour, 1998). This research aims to determine mathematics teachers' perceptions of ethnomathematics learning in independent curriculum programs in junior high schools in Kudus Regency, Central Java, Indonesia, and the obstacles faced during the learning process.

3.3. Measurement

Before conducting the research, an assessment was carried out by ethnomathematics experts and linguists, who held doctoral degrees, to ensure a quality questionnaire instrument. After receiving validation from the experts, further validation was carried out using judgment expert techniques to determine the content validity and level of reliability. A statistical test was done to measure reliability using Cronbach's alpha vias SPSS software, and the instrument is said to be reliable if the coefficient is > 0.60. The instrument obtained a coefficient of 0.826 (see Table 2), which confirms that the questionnaire is suitable for use.

Table 2. Total reliability statistics results.

Cronbach's alpha	Number of items
0.826	14

Data collection was carried out by administering a closed questionnaire followed by interviews involving six teachers. The questions and interviews related to teachers' perceptions of ethnomathematics learning in the independent curriculum programs in Indonesia. The questionnaire was administered through a subject teacher meeting held by the mathematics teacher forum throughout Kudus Regency at Junior High School (SMP) 1 Mejobo in August 2023. Collecting data on mathematics teachers' perceptions of ethnomathematics learning used a questionnaire to obtain comprehensive results (Lim, Yeo, & Handayani, 2022). The questionnaire contained 14 statements and used a 5-point Likert scale for responses: very satisfied (VS), satisfied (S), sufficient (Q), dissatisfied (DS), very dissatisfied (VDS). The questionnaire contains written statements (Braun, Clarke, Boulton, Davey, & McEvoy, 2021) taken from various sources, including Adam (2004); Gerdes (2011); Paraide (2014); Rosa and Orey (2019); Rowlands and Carson (2004) and Sunzuma and Maharaj (2020) and represent the five aspects presented in Table 3. After filling in the questionnaire, direct interviews were conducted (Sumilat, Tuerah, & Setiawan, 2022), thereby maximizing the data obtained. Through interviews with six teachers, additional information was obtained regarding the perceptions of teachers involved in the research. The interviews lasted for 30 minutes, and the participants' identity was kept confidential by only using their initials.

Table 3. Questionnaire profile.

Theory	Indicator	Information
Adam (2004)	Meaningful mathematics (X1)	Ethnomathematics occurs from social reaction activities, so it takes examples from students' own experiences which usually occur in the environment where students live (Rowlands & Carson, 2004; Sharma & Orey, 2017).
	Social mathematics (X2)	Ethnomathematics consists of mathematical concepts and practices taken from certain cultural groups (Gerdes, 2011).
	Contextual thinking (X3)	An ethnomathematics learning environment uses the characteristics of the cultural language so that mathematical concepts are easier to learn (Paraide, 2014).
	Mathematics enculturation (X4)	The focus of learning through culture is related to visuals and geometry to enhance it (Bishop, 1988; Nursyahidah & Albab, 2021).
	Cultured mathematics (X5)	Ethnomathematics is carried out with an activity orientation (Sunzuma & Maharaj, 2020).

Descriptive statistical analysis was used to obtain the average and standard deviation values. Classification of these values (see Table 4) used the method applied by Farzaneh, Kohandani, and Nejadansari (2014).

Table 4. Reliability statistics results for each questionnaire indicator item.

Formula interval	Cronbach's alpha result
$X \geq (M+1.5SD)$	Very good
$(M+0.5SD) \leq X < (M+1.5SD)$	Good
$(M-0.5SD) \leq X < (M+0.5SD)$	Enough
$(M-1.5SD) \leq X < (M-0.5SD)$	Not enough
$X < (M-1.5SD)$	Very less

4. RESULTS AND DISCUSSION

The results of the descriptive statistical data analysis carried out on a sample of 60 mathematics teachers in Kudus Regency determine the perceptions of mathematics teachers in ethnomathematics learning in the independent curriculum program with questionnaire scores of 1-5 obtained a median average of 64.28, 66.00, mode 73 and standard deviation 10.33. Table 5 shows the descriptive statistics results.

Table 5. Descriptive statistics research results.

	1st indicator (X1)	2nd indicator (X2)	3rd indicator (X3)	4th indicator (X4)	5th indicator (X5)	Overall result
N valid	60	60	60	60	60	60
Missing	0	0	0	0	0	0
Method	12.38	11.73	10.57	14.87	14.73	64.28
Median	13.00	12.00	10.00	15.00	15.00	66.00
Mode	14	11	10	15	15	73
Std. Dev.	2.39	2.37	2.89	3.03	2.49	10.33
Reach	11	10	11	14	15	44
Minimum	5	6	5	7	8	40
Maximum	16	16	16	21	23	84

Note: 1st indicator = Mathematics; 2nd indicator = Social mathematics; 3rd indicator = Contextual thinking; 4th indicator = Enculturation mathematics; 5th indicator = Mathematics culture.

The survey results were divided into five categories: Mathematics, Social mathematics, Contextual thinking, Enculturation mathematics, and Mathematics culture. Table 6 shows the results of Kudus Regency mathematics teachers' perceptions of ethnomathematics learning in the independent curriculum program, which are classified as moderate, with 1.67% classifying it as very good, 41.67% as good, 45% as adequate, and 11.67% as fair.

Table 6. Initial perception categories.

Intervals	Frequency	Percentage (%)	Category
$X \geq 84$	1	1.67	Very good
$68 \leq X < 84$	25	41.67	Good
$52 \leq X < 68$	27	45	Adequate
$36 \leq X < 52$	7	11.67	Fair
$X < 36$	0	0	Poor
Total	60	100	

4.1. Mathematics (X1)

The meaningfulness of mathematics is explained from the results of descriptive research in Table 7, which has an average score $\bar{x} = 3.005$. This explains the teachers' perception that mathematics includes real applications in relation to ethnomathematics. Statements 1, 2 and 4 are above average ($\bar{x} = 3.13$, 3.1, 3.3, respectively, average $\bar{x} = 3.005$). However, some teachers were not interested in local culture, as seen in statement 3 with an average value ($\bar{x} = 2.85$, average $\bar{x} = 3.005$). According to statement 1, teachers generally know and study the local culture of the community, which indicates that they communicate with people who live in a traditional cultural environment to know the meaning of mathematics to be applied in learning. In statement 2, applying and using local cultural products in classroom learning examples is seen as an appropriate application regarding local culture as an application of mathematics which is an abstract science. Furthermore, for statement 3, teachers are not interested in all local culture and the products produced, which is related to their lack of innovation, meaning that they cannot connect local culture to mathematics learning. Another reason is that these teachers are not native citizens; therefore, their understanding of local culture is limited. Statement 4 shows that teachers are interested in local culture and its products, such as in learning spatial planning concepts and cultural heritage, which can be used as examples related to mathematics learning. Teachers can give direction to students to explore historical heritage objects, so that the aim of the independent curriculum program regarding exploring and exhibiting works is achieved.

Table 7. Descriptive statistics results for mathematics (X1).

No.	Statement	VDS (%)	DS (%)	QS (%)	S (%)	VS (%)	Mean	Std
1	Get to know and study the local culture of the community	5	15	41.7	38.3	0	3.13	0.853
2	Apply and use local product culture in classroom learning examples	1.7	16.7	51.7	30	0	3.1	0.73
3	Not interested in all the local culture and products produced	8.3	28.3	35	26.7	1.7	2.85	0.971
4	Interested in all local culture and the products produced	3.3	15	33.3	45	3.3	3.3	0.889
Average							3.005	

The results of the first indicator of teacher perception illustrate the meaningfulness of the benefits learning through ethnomathematics in the independent curriculum program. Considering the results of the first indicator as a whole, teachers can utilize ethnomathematics in independent curriculum programs to make learning interesting by presenting mathematical contexts with culture. Cultural contexts and connections emerge during the learning process so that they are easily understood by students. This is what is needed in mathematics learning—how teachers can convey assignments into meaningful lessons that are easily accepted by students (Sullivan et al., 2015).

Learning plans made by mathematics teachers must be designed and explored through meaningful mathematical knowledge. Professional learning schemes can be obtained through tasks that are structured through the cultural and historical context of students' environments related to mathematics. Therefore, it is in accordance

with previous research that meaningful mathematics can be applied culturally in classroom learning to understand basic mathematical concepts (Pathuddin & Nawawi, 2021).

4.2. Social Mathematics (X2)

Social mathematics is a science that can be linked to the socio-cultural conditions of society. The descriptive research results in Table 8 have an average score $\bar{x}$ = 3.00. This explains that teachers have the perception that social mathematics has an important influence in implementing social activities. The means of statements 5 and 6, ($\bar{x}$ = 3.3 and 3.0, respectively) are above the average total score of $\bar{x}$ = 3.00. These average results for statements 5 and 6 show that teachers have an awareness that mathematics is related to social problems, and that in social life there are mathematical activities that are indirectly utilized, even though they are never realized. These results also show that teachers provide real examples of activities related to social mathematics. The social mathematics activities contained in statement 7 have an average of $\bar{x}$ = 2.7. Even though it has a low average score, the explanation in the previous statement directs teachers to take a positive cultural attitude that can relate to mathematics and does not care about foreign cultures so that social mathematics has a big role in the learning process.

Table 8. Descriptive statistics results for social mathematics (X2).

No.	Statement	VDS (%)	DS (%)	QS (%)	S (%)	VS (%)	Mean	Std
5	Search for information on cultural diversity from various relevant sources	3.3	18.3	46.7	30	1.7	3.3	0.829
6	Link local culture with learning materials	5	26.7	31.7	36.7	0	3.00	0.921
7	Don't care about foreign cultural diversity	8.3	45	23.3	15.00	8.3	2.7	1.094
Average							3	

Teachers' perceptions are that social awareness of mathematics includes the application of ethnomathematics that can be practiced directly. Mathematics learning applications can direct students to explore social activities that occur in their environment and then direct them to mathematical concepts. Then mathematical ideas are formed through socio-cultural concepts. Social mathematics indirectly occurs during the learning process in class, namely through a learning process that uses life experience in the environment, making it easier to understand (Snounu, 2019). Teachers who apply ethnomathematics will experience significant changes in learning activities (Mogari, 2014).

This dimension includes the teacher's self-understanding to face challenges and identify them as a social learning context to develop self-reflection in order to create situations that suit learning needs (Fransson & Norman, 2021). Learning activities, especially in mathematics, require real-life application. Social mathematics is an example of real activity in the students' environment that can be used in the learning process. The learning process can adopt several social mathematics components in a cultural environment, which has a positive impact on teachers and students (Brandt & Chernoff, 2015). Previous research shows that the component of ethnomathematics is ethno-modeling, which contains ethical (related to seeking information on cultural sources from relevant sources) and dialogic (related to linking local culture with learning) activities which are part of social mathematics (Umbara, Wahyudin, & Prabawanto, 2021).

4.3. Contextual Thinking (X3)

The descriptive research results for the third indicator show that contextual thinking has an average score of $\bar{x}$ = 2.6 (see Table 9). These findings demonstrate the low average way in which teachers apply mathematics learning to real-world situations to encourage students to apply it in learning activities. The results of statements 8 and 10 show that teachers can process and apply local culture to learning. This will enable contextual learning to occur in

the mathematics learning process through ethnomathematics in which contextual learning emphasizes students' experiences in everyday life in the family, community and cultural environment as a guide for integration in the learning process. However, the average results of statement 9 indicate that teachers believe that some local cultural products cannot be used as learning examples; therefore, it is possible that there is a lack of teachers' perception in teaching mathematics using ethnomathematics. In general, teachers have not mastered the cultural aspect in mathematics learning from students' cultural experiences. There are many factors that prevent teachers from having the right mindset and using innovation in ethnomathematics learning.

Table 9. Descriptive statistics results for contextual thinking (X3).

No.	Statement	VDS (%)	DS (%)	QS (%)	S (%)	VS (%)	Mean	Std
8	Local culture as an example of benefits can be applied	11.7	38.3	33.3	15.0	1.7	2.57	0.945
9	There are certain criteria that can be used as learning examples	10.0	53.5	21.7	3.3	11.7	2.53	1.112
10	Examples from local culture are more suitable for use in the learning process than examples from foreign culture	18.3	33.3	21.7	13.3	13.3	2.7	1.293
Average							2.6	

Contextual delivery of ethnomathematics learning has not been fully implemented by teachers. This happens due to a lack of ability to combine lesson material with students' real situations. This situation arises because some mathematical material cannot be conveyed through contextual problems (Peni, 2019). Contextual mathematics activities are expected to have a positive impact in solving mathematical problems because they are close to students' lives as direct practice in a cultural environment. Thus, teachers can include situations experienced by students in planning and delivering mathematics learning activities in the classroom (Tanase, 2020).

4.4. Enculturation Mathematics (X4)

Table 10 shows the descriptive research results for enculturation, which has an average score $\bar{x} = 2.55$. The mathematics enculturation indicator contains only one statement since only one of the four statements is valid. The results of indicator X4 explain that teachers have the perception that the mathematics learning process can be adopted from traditional systems and rules that exist in the students' culture. Through the experience of teachers who have insight into local culture and teaching experience, the results of mathematical enculturation in the delivery of learning will produce two-way communication between teachers and students, making learning more active and communicative. Mathematics enculturation is a learning process that uses symbols, shapes and traditional activity patterns as stimuli to students.

Table 10. Descriptive statistics results for enculturation mathematics (X4).

No.	Statement	VDS (%)	DS (%)	QS (%)	S (%)	VS (%)	Mean	Std.
11	Have a view and prioritize local culture over foreign culture	13.3	40.0	31.7	8.3	6.7	2.55	1.048
Average							2.55	

Teachers' perceptions of mathematics enculturation show that they can connect students' traditional ways of learning with mathematics learning. In mathematical enculturation, teachers adopt activities and moral and historical values that can be used in learning. Enculturation activities in previous research show that moral values and cultural activities can be used in everyday life (Prahmana & D'Ambrosio, 2020). A student's traditional environment is a community with certain characteristics that are included in the mathematics learning process so

that innovative learning habits are formed (Kusuma, Dewanto, Ruchjana, & Abdullah, 2017). Mathematical enculturation in the classroom occurs through mathematical ideas developed through oral communication, which includes feedback during the learning process between students and their classmates and between students and teachers (Muthelo & Chigonga, 2018).

4.5. Mathematics Culture (X5)

Table 11 contains the descriptive research results for cultural mathematics, which has an average score of $\bar{x}$ = 2.926. This explains that teachers have cultural perceptions of mathematics. According to the results for statements 12, 13 and 14 ($\bar{x}$ = 3.12, 2.83, and 2.83, respectively), teachers are skillful in presenting regional culture as a learning solution. Regarding statement 12, teachers support the learning process with culture through assignments. By giving individual and group assignments that contain cultural content related to mathematics, teachers create a form of culture that can be applied to create a solution that makes everything possible, which makes it easier for students to comprehend the aims and objectives. Statement 13 is evidence that the teachers agree that mathematics is related to ethnomathematics. Cultural mathematics is a learning pattern using ethnomathematics that is effective and efficient and can be used in real life in the learning process. The remains of cultural artifacts can be used as learning media material and as a concrete manifestation of culture and mathematics. For statement 14, the teachers also convey that artifacts, which are a part of cultural heritage, can be directly applied to flat-sided building materials.

Table 11. Descriptive statistics results for cultural mathematics (X5).

No.	Statement	VDS (%)	DS (%)	QS (%)	S (%)	VS (%)	Mean	Std
12	Student assignments relate to the student's cultural scope	6.7	15.0	46.7	23.3	8.3	3.12	0.993
13	Mathematics subjects are closely related to ethnomathematics	5.0	30.0	43.3	20.0	1.7	2.83	0.867
14	Be proud of local cultural products that can be used as role models in eye learning	8.3	28.3	36.7	25.0	1.7	2.83	0.960
Average							2.926	

According to previous research by Orey and Rosa (2014) the results of the fifth indicator show that teachers' perceive cultural mathematics to be an advantage that can be realized as learning material and resources in the mathematics learning process. The learning process cannot be separated from culture. These results are supported by other research that mentions that forms of culture that can be used during the learning process are in the form of artifacts and activities (Hendriyanto et al., 2023). Furthermore, mathematics is cultivated through ethnomathematics in the form of artifacts, especially in geometry (Hariastuti, Budiarto, & Manuharawati, 2022). As a result, there is a combination of teachers and students who have cultural experiences as a strong basis for learning mathematics (Meeran & Van Wyk, 2022; Sunzuma & Maharaj, 2019).

5. DISCUSSION

Based on the findings of the study, mathematics teachers' perceptions of the independent curriculum program with ethnomathematics learning is in the medium category. The majority of teachers expressed positive views about ethnomathematics learning in the independent curriculum program. This can be seen from the research results for each indicator that teachers can concretize the abstract conditions of mathematics learning into real situations in students' lives. In addition, the teachers also agreed to integrate ethnomathematics with the independent curriculum program. The results of this research are in line with Ebersole and Kanahele-Mossman (2020) who state that mathematics is easily understood through culture.

This study also shows that there are still teachers who have not implemented mathematics learning with culture. The teachers' responses regarding the implementation of ethnomathematics learning in the independent curriculum program does not apply the principle of flexibility, which provides lesson space according to students' circumstances. Teachers should be flexible in implementing learning to suit the objectives of the independent curriculum (Fitriyah & Wardani, 2022). Increasing students' learning achievement is correlated with mathematics teachers' positive perceptions of ethnomathematics learning. Research on teachers' perceptions of ethnomathematics learning in independent curriculum programs is the first step in improving learning resources, especially those based on culture. Previous research (Konokman, Yelken, Karasolak, & Cesur, 2018) stated that teachers' perceptions of the curriculum in general were still low with respect to including the development of mathematics material. The aim of this research was to measure teachers' perceptions of ethnomathematics learning in independent curriculum programs. It is hoped that the results can provide information for teachers and stakeholders to develop learning resources and ethnomathematics learning designs in independent curriculum programs.

The results of this research were further strengthened by a questionnaire which found that a third of the research sample had a positive perception of ethnomathematics learning in the independent curriculum program. The results are influenced by three strong aspects, namely mathematics that is meaningful in the context of ethnomathematics; mathematics that is indirectly related to culture (social mathematics); and mathematics as contextual thinking. Previous research shows that positive teacher perceptions have a big influence on the implementation of learning (Arslan-Cansever, Ceylan, Çavas, Ates-Çobanoglu, & Anagün, 2021). Teaching can be directed by giving meaning to current information with the current state of knowledge (d'Entremont, 2015) so that contextual thinking and conveying mathematical concepts will be fun for students.

The results of further research show that mathematics enculturation and mathematics culture influence teachers' perceptions of mathematics learning using ethnomathematics. Even though the average results are not very high, this greatly influences teachers' views on the perception of mathematics. Previous research by Albanese, Povedano, and Lopez (2017) states that mathematics can be more easily understood through cultural mathematics learning. Learning mathematics in conditions that are considered extraordinary among other subjects requires culture to be included in the learning process, and that the enculturation felt in society can make mathematics more interesting. Previous research by Torres-Velasquez and Lobo (2005) states that societal culture is a tool that can be used to maximize mathematics learning. This research shows the impact of teachers' positive perceptions of mathematics learning with ethnomathematics in an independent curriculum program.

However, teachers' interest in cultural knowledge and mathematical enculturation is still low. Currently, the independent curriculum program applies culture in learning through works that contain cultural concepts to solve mathematical problems, for example, traditional houses and buildings that have characteristic shapes can be used in geometric concepts, and traditional clothing shapes can be used in calculation concepts regarding arithmetic. Ethnomathematics does not only study mathematics and culture, but teachers can use it in learning which is expected to improve students' level of achievement (d'Entremont, 2015; Tanase, 2020). Thus, mathematics teachers are influential in creating and designing learning with ethnomathematics in independent curriculum programs.

6. CONCLUSION

The overall research results conclude that the perception of mathematics teachers in Kudus Regency toward ethnomathematics learning in the independent curriculum program is moderate, with the most dominant frequency being in the medium category. All aspects of the indicators used influence the results. Teachers' understanding of meaningful mathematics is high, the second aspect of social mathematics is high, the third aspect of contextual thinking is sufficient, the fourth aspect of mathematical enculturation is sufficient, and the fifth aspect of cultural mathematics is quite good.

Ethnomathematics is not only fun and meaningful but also more concrete in students' minds according to what students can know and discover in living cultures. This research found that teachers generally have a positive perception of ethnomathematics learning in the independent curriculum program, and they provided suggestions for including ethnomathematics in the independent curriculum because it has the same curriculum goal, namely improving the quality of education through cultural and social emphasis. Through collaboration between mathematics and culture in Indonesia in an independent curriculum, it will be easier to implement mathematics learning, which is classified as abstract learning.

Even though the teachers' initial perception was moderate, their understanding of meaningful mathematics and social mathematics had a high average value. Teachers have the expertise to combine the mathematics learning process combined with ethnomathematics in an independent curriculum, which will influence students to achieve the expected level of learning. The results can be used for further research to develop models to overcome teachers' difficulties experienced during the mathematics learning process with ethnomathematics in independent curriculum programs. Schools should focus on the implementation of independent curriculum programs by providing training and empowering teachers. Empirically, this research found a contextual correlation between cultural philosophy and independent curriculum programs that was not found in previous research.

Funding: This study received no specific financial support.
Institutional Review Board Statement: The Ethical Committee of the Universitas Negeri Semarang, Indonesia has granted approval for this study (Ref. No. B/17460/UN37.1.4/KM.07/2024).
Transparency: The authors state that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

REFERENCES

Abel, V. R., Tondeur, J., & Sang, G. (2022). Teacher perceptions about ICT integration into classroom instruction. *Education Sciences*, *12*(9), 609. https://doi.org/10.3390/educsci12090609

Abiam, P. O., Abonyi, O. S., Ugama, J., & Okafor, G. (2016). Effects of ethnomathematics-based instructional approach on primary school pupils' achievement in geometry. *Journal of Scientific Research and Reports*, *9*(2), 1-15. https://doi.org/10.9734/jsrr/2016/19079

Adam, S. (2004). Ethnomathematical ideas in the curriculum. *Mathematics Education Research Journal*, *16*(2), 49-68. https://doi.org/10.1007/BF03217395

Albanese, V., Povedano, N. A., & Lopez, R. B. (2017). Ethnomathematics and its diverse approaches for mathematics education (M. Rosa & L. Shirley, eds.). In (pp. 3-19): Springer International Publishing. https://doi.org/10.1007/978-3-319-59220-6.

Aningsih, Z. M. S., Neolaka, A., Iasha, V., & Setiawan, B. (2022). How is the education character implemented? The case study in Indonesian elementary school. *Journal of Educational and Social Research*, *12*(1), 371–380. https://doi.org/10.36941/jesr-2022-0029

Arslan-Cansever, B., Ceylan, B., Çavas, P., Ates-Çobanoglu, A., & Anagün, S. S. (2021). Self-efficacy and teaching skills perceptions of primary school teachers: A predictive study. *Shanlax International Journal of Education*, *9*(4), 236-246. https://doi.org/10.34293/education.v9i4.4142

Ayele, M. A., Woldeyesus, K. M., Aboretugne, M. A., Gobaw, M. K., Wamisho, A. D., Mamie, A. H., . . . Berhe, G. D. (2019). Teachers' classroom teaching practices in Amhara region and Addis Ababa city, Ethiopia. *Africa Education Review*, *16*(3), 1-21.

Azmi, C., Hadiyanto, H., & Rusdinal, R. (2023). National curriculum education policy" curriculum merdeka and its implementation". *International Journal of Educational Dynamics*, *6*(1), 303-309. https://doi.org/10.24036/ijeds.v6i1.437

Bishop, A. J. (1988). Mathematics education in its cultural context. *Educational Studies in Mathematics, 19*(2), 179-191. https://doi.org/10.1007/BF00751231

Brandmiller, C., Dumont, H., & Becker, M. (2020). Teacher perceptions of learning motivation and classroom behavior: The role of student characteristics. *Contemporary Educational Psychology, 63*, 101893. https://doi.org/10.1016/j.cedpsych.2020.101893

Brandt, A., & Chernoff, E. J. (2015). The importance of ethnomathematics in the math class. *Ohio Journal of School Mathematics, 71*(71), 31-37.

Braun, V., Clarke, V., Boulton, E., Davey, L., & McEvoy, C. (2021). The online survey as a qualitative research tool. *International Journal of Social Research Methodology, 24*(6), 641-654. https://doi.org/10.1080/13645579.2020.1805550

Chahine, I. C. (2020). Towards African humanity: Re-mythologising ubuntu through reflections on the ethnomathematics of African cultures. *Critical Studies in Teaching and Learning, 8*(2), 95-111.

Chan, C. K. Y., & Luo, J. (2022). Exploring teacher perceptions of different types of 'feedback practices' in higher education: Implications for teacher feedback literacy. *Assessment & Evaluation in Higher Education, 47*(1), 61-76. https://doi.org/10.1080/02602938.2021.1888074

Chandra Handa, M. (2020). Examining students' and teachers' perceptions of differentiated practices, student engagement, and teacher qualities. *Journal of Advanced Academics, 31*(4), 530-568. https://doi.org/10.1177/1932202X20931457

d'Entremont, Y. (2015). Linking mathematics, culture and community. *Procedia-Social and Behavioral Sciences, 174*, 2818-2824. https://doi.org/10.1016/j.sbspro.2015.01.973

Dasaprawira, M. N., & Susanti, E. (2019). Developing mathematics questions of PISA type using Bangka context. *Journal on Mathematics Education, 10*(2), 303-314.

Ebersole, M. M., & Kanahele-Mossman, H. (2020). Broadening understandings of the cultural value of aloha in a teacher educator program. *Journal of Culture and Values in Education, 3*(2), 81-99. https://doi.org/10.46303/jcve.2020.14

Farokhah, L., Arisetyawan, A., & Jupri, A. (2017). The effect of ethnomathematics-based SAVI (Somatic, auditory, visualization, intelectually) approach on mathematical communication skill on geometry in elementary school. *International E-Journal of Advances in Education, 3*(9), 534-543. https://doi.org/10.18768/ijaedu.370417

Farzaneh, N., Kohandani, M., & Nejadansari, D. (2014). A textbook evaluation of socio-cultural contexts in top notch series. *Procedia-Social and Behavioral Sciences, 98*, 472-481. https://doi.org/10.1016/j.sbspro.2014.03.442

Fitriyah, C. Z., & Wardani, R. P. (2022). Independent curriculum paradigm for elementary school teachers. *Scholaria: Jurnal Pendidikan Dan Kebudayaan, 12*(3), 236-243. https://doi.org/10.24246/j.js.2022.v12.i3.p236-243

Fouze, A. Q., & Amit, M. (2017). Development of mathematical thinking through integration of ethnomathematic folklore game in math instruction. *Eurasia Journal of Mathematics, Science and Technology Education, 14*(2), 617-630. https://doi.org/10.12973/ejmste/80626

Fransson, G., & Norman, F. (2021). Exploring how a digitally skilled teacher's self-understanding influences his professional learning strategies. A research cooperation between a teacher and a researcher. *Teacher Development, 25*(4), 432-448. https://doi.org/10.1080/13664530.2021.1891131

Gavarrete, M. E. (2015). The challenges of mathematics education for indigenous teacher training. *Intercultural Education, 26*(4), 326-337. https://doi.org/10.1080/14675986.2015.1073878

Gerdes, P. (2011). *African basketry: Interweaving art and mathematics in Mozambique Mozambican ethnomathematics research centre.* Paper presented at the Coimbra Portugal: Proceedings of the 14th Bridges International Conference.

Gök, R. (2020). The perceptions of school administrators concerning" merit" concept: A metaphor study. *Journal of Pedagogical Research, 4*(3), 299-311. https://doi.org/10.33902/JPR.2021464340

Hadi, A., Marniati, M., Ngindana, R., Kurdi, M. S., Kurdi, M. S., & Fauziah, F. (2023). New paradigm of Merdeka belajar curriculum in schools. *Al-Ishlah: Jurnal Pendidikan, 15*(2), 1497-1510. https://doi.org/10.35445/alishlah.v15i2.3126

Hariastuti, R. M., Budiarto, M. T., & Manuharawati. (2022). International journal of educational methodology traditional houses in ethnomathematical-thematic-connected-based mathematics learning. *International Journal of Educational Methodology*, *8*(3), 535–549.

Haryanto, T. N., & Subanji, S. R. (2017). Ethnomathematics in Arfak (West Papua-Indonesia): Numeracy of Arfak. *International Journal of Scientific & Technology Research*, *6*(9), 325-327.

Hendriyanto, A., Priatna, N., Juandi, D., Dahlan, J. A., Hidayat, R., Sahara, S., & Muhaimin, L. H. (2023). Learning mathematics using an ethnomathematics approach: A systematic literature review. *Journal of Higher Education Theory and Practice*, *23*(7), 59–74. https://doi.org/10.33423/jhetp.v23i7.6012

Hidayati, N. A., Waluyo, H. J., & Winarni, R. (2020). Exploring the implementation of local wisdom-based character education among Indonesian higher education students. *International Journal of Instruction*, *13*(2), 179-198. https://doi.org/10.29333/iji.2020.13213a

Johnson, J. D., Smail, L., Corey, D., & Jarrah, A. M. (2022). Using Bayesian networks to provide educational implications: Mobile learning and ethnomathematics to improve sustainability in mathematics education. *Sustainability*, *14*(10), 5897. https://doi.org/10.3390/su14105897

Jumriani, J., Mutiani, M., Putra, M. A. H., Syaharuddin, S., & Abbas, E. W. (2021). The urgency of local wisdom content in social studies learning: Literature review. *The Innovation of Social Studies Journal*, *2*(2), 103-109. https://doi.org/10.20527/iis.v2i2.3076

Konokman, G. Y., Yelken, T. Y., Karasolak, K. R., & Cesur, E. (2018). Teachers' perception: Competent or not in curriculum development. *Malaysian Online Journal of Educational Sciences*, *5*(4), 56-73.

Kurniawan, M. Y. N., Sugianor, S., & Pandiangan, A. P. B. (2024). Obstacles and challenges in implementing the independent curriculum at Sekolah Dasar Negeri (SDN) 019 Bengalon. *Classroom Experiences*, *2*(1), 1-8.

Kusuma, D. A., Dewanto, S. P., Ruchjana, B. N., & Abdullah, A. S. (2017). The role of ethnomathematics in West Java (A preliminary analysis of case study in Cipatujah). *Journal of Physics: Conference Series*, *893*(1), 1-9. https://doi.org/10.1088/1742-6596/893/1/012020

Kuzminykh, A. A., & Enikolopov, S. N. (2015). Perception of aggressiveness of communicative information depending on a speaker's gender. *International Journal of Information and Education Technology*, *5*(1), 68-73. https://doi.org/10.7763/ijiet.2015.v5.478

Lim, W. W., Yeo, K. J., & Handayani, L. (2022). The perception of special education teacher in teaching students with dyslexia. *International Journal of Evaluation and Research in Education*, *11*(2), 979-985. https://doi.org/10.11591/ijere.v11i2.22476

Machaba, F., & Dhlamini, J. (2021). Ethnomathematics as a fundamental teaching approach in mathematics teaching and professional learning in Sub-Sahara Africa. In (pp. 59-76). Cham: Springer International Publishing.

Mahdum, M., Hadriana, H., & Safriyanti, M. (2019). Exploring teacher perceptions and motivations to ICT use in learning activities in Indonesia. *Journal of Information Technology Education: Research*, *18*, 293–317. https://doi.org/10.28945/4366

Maipita, I., Dalimunthe, M. B., & Sagala, G. H. (2021). *The development structure of the merdeka belajar curriculum in the industrial revolution era*. Paper presented at the Proceedings of the International Conference on Strategic Issues of Economics, Business and Education (ICoSIEBE 2020), 163 (ICoSIEBE 2020), 145–151. https://doi.org/10.2991/aebmr.k.210220.026.

Meeran, S., & Van Wyk, M. M. (2022). Mathematics teachers' perceptions of socio-cultural diversities in the classroom. *Journal of Pedagogical Research*, *6*(3), 72-87. https://doi.org/10.33902/jpr.202215441

Mogari, D. (2014). An in-service programme for introducing an ethno-mathematical approach to mathematics teachers. *Africa Education Review*, *11*(3), 348-364. https://doi.org/10.1080/18146627.2014.934992

Muthelo, D., & Chigonga, B. (2018). Attributes of mathematics enculturation: Sarah's experiences in the mathematics classroom. *Pedagogical Research*, *3*(1), 1–9. https://doi.org/10.20897/pr/87019

Nabaho, L., Aguti, J. N., & Oonyu, J. (2019). Academics' perceptions of good teaching: Assessing the degree of parity with student evaluation of teaching questionnaires. *Africa Education Review, 16*(4), 95-111. https://doi.org/10.1080/18146627.2017.1390395

Ndari, W., & Mahmudah, F. N. (2023). Implementation of the merdeka curriculum and its challenges. *European Journal of Education and Pedagogy, 4*(3), 111-116. https://doi.org/10.24018/ejedu.2023.4.3.648

Newman, I., & Ridenour, C. (1998). *Qualitative-quantitative research methodology: Exploring the interactive continuum qualitative-quantitative research: A false dichotomy in educational leadership faculty publications.* Retrieved from https://ecommons.udayton.edu/eda_fac_pub/122/

Nursyahidah, F., & Albab, I. U. (2021). Learning design on surface area and volume of cylinder using Indonesian ethno-mathematics of traditional cookie maker assisted by Geogebra. *Mathematics Teaching Research Journal, 13*(4), 79-98.

OECD. (2018). *3. PISA 2018 mathematics framework in Pisa 2018 assessment and analytical framework*. Retrieved from https://www.oecd-ilibrary.org/docserver/b25efab8-en.pdf?expires=1725346701&id=id&accname=guest&checksum=F72F9D0CF2A409CF64E6546A6961E6EB

Ogunkunle, R. A., Harcourt, P., Harcourt, P., George, N. R., & Ed, M. (2015). Integrating ethnomathematics into secondary school mathematics curriculum for effective artisan creative skill development. *European Scientific Journal, 11*(3), 386–397.

Orey, D. C., & Rosa, M. (2014). *The borrowers: Using transportation, addresses, and paralelepípedos to prompt creativity using ethnomodeling*. Paper presented at the Proceedings of the Problem@Web International Conference: Technology, Creativity and Affect in Mathematical Problem Solving, 120–132. Universidade do Algarve.

Paraide, P. (2014). Challenges with the implementation of vernacular and bilingual education in Papua New Guinea. *Contemporary PNG Studies, 21*(2), 44-57.

Parsons, S. A., Hutchison, A. C., Hall, L. A., Parsons, A. W., Ives, S. T., & Leggett, A. B. (2019). US teachers' perceptions of online professional development. *Teaching and Teacher Education, 82*(1), 33-42. https://doi.org/10.1016/j.tate.2019.03.006

Pathuddin, H., & Nawawi, M. I. (2021). Buginese ethnomathematics: Barongko cake explorations as mathematics learning resources. *Journal on Mathematics Education, 12*(2), 295-312.

Payadnya, I., Suwija, I. K., & Wibawa, K. A. (2021). Analysis of students' abilities in solving realistic mathematics problems using" what-if"-ethnomathematics instruments. *Mathematics Teaching Research Journal, 13*(4), 131-149.

Peni, N. R. (2019). Development framework of ethnomathematics curriculum through realistic mathematics education approach. *IOSR Journal of Research & Method in Education, 9*(4), 16-24.

Prahmana, R., & D'Ambrosio, U. (2020). Learning geometry and value from patterns: Ethnomathematics in Yogyakarta Batik patterns. *Indonesia, 11*(3), 439-456.

Purwanto, W. R., Waluya, S. B., Rochmad, & Wardono. (2020). Analysis of mathematical critical thinking ability in student learning style. *Journal of Physics: Conference Series, 1511*(1), 1511. https://doi.org/10.1088/1742-6596/1511/1/012057

Rahayu, R., Rosita, R., Rahayuningsih, Y. S., Hernawan, A. H., & Prihantini, P. (2022). Implementation of the independent learning curriculum in driving schools. *Jurnal Basicedu, 6*(4), 6313-6319. https://doi.org/10.31004/basicedu.v6i4.3237

Rohimah, U., & Sholikha, I. (2023). The challenges of implementing the merdeka curriculum in Arabic language learning: Perspectives from Indonesian lecturers and students. *Journal of Arabic Language Learning and Teaching, 1*(2), 85-92. https://doi.org/10.23971/jallt.v1i2.142

Rosa, M. (2018). The anthropological dimension on ethnomodelling research based on ethnomathematics and modelling. *Open Access Journal of Archaeology & Anthropology, 1*(1), 1–8.

Rosa, M., & Orey, D. C. (2019). Mathematical modeling as a virtual learning environment for teacher training programs. *Uni-Pluriversidad, 19*(2), 80-102. https://doi.org/10.17533/udea.unipluri.19.2.04

Rowlands, S., & Carson, R. (2004). Our response to Adam, Alangui and Barton's "A comment on Rowlands & Carson 'where would formal, academic mathematics stand in a curriculum informed by ethnomathematics? A critical review. *Educational Studies in Mathematics, 56*(2-3), 329–342. https://doi.org/10.1023/B:EDUC.0000040370.10717.82

Sharma, T., & Orey, D. C. (2017). Meaningful mathematics through the use of cultural artifacts. *Ethnomathematics and Its Diverse Approaches for Mathematics Education*, 153-179. https://doi.org/10.1007/978-3-319-59220-6_7

Snounu, Y. (2019). Defying exclusionary democracy through resilience in Palestinian higher education. *Journal of Culture and Values in Education, 2*(3), 61-78.

Suhartini, S., Sekarningrum, B., Sulaeman, M., & Gunawan, W. (2019). Social construction of student behavior through character education based on local wisdom. *Journal of Social Studies Education Research, 10*(3), 276-291.

Sullivan, P., Askew, M., Cheeseman, J., Clarke, D., Mornane, A., Roche, A., & Walker, N. (2015). Supporting teachers in structuring mathematics lessons involving challenging tasks. *Journal of Mathematics Teacher Education, 18*(2), 123-140. https://doi.org/10.1007/s10857-014-9279-2

Sumilat, J. M., Tuerah, R. M. S., & Setiawan, B. (2022). The utilization of online media in calculation operations mathematics learning in elementary school students. *Journal of Educational and Social Research, 12*(3), 90–97. https://doi.org/10.36941/jesr-2022-0069

Sunzuma, G., & Maharaj, A. (2019). Teacher-related challenges affecting the integration of ethnomathematics approaches into the teaching of geometry. *Eurasia Journal of Mathematics, Science and Technology Education, 15*(9), em1744. https://doi.org/10.29333/ejmste/108457

Sunzuma, G., & Maharaj, A. (2020). Exploring Zimbabwean mathematics teachers' integration of ethnomathematics approaches into the teaching and learning of geometry. *Australian Journal of Teacher Education (Online), 45*(7), 77-93. https://doi.org/10.14221/ajte.2020v45n7.5

Supriadi, S. (2022). Elementary school students reflection: Didactical design analysis on integer and fraction operations on mathematical concepts with Sundanese ethnomathematics learning. *Pegem Journal of Education and Instruction, 12*(4), 192-199. https://doi.org/10.47750/pegegog.12.04.19

Surip, M., Dalimunte, S. F., & Sumarsono. (2023). The development of a lexical-semantic teaching material using local wisdom values and information technology. *Journal of Higher Education Theory and Practice, 23*(4), 47–59. https://doi.org/10.33423/jhetp.v23i4.5888

Tanase, M. (2020). Is good teaching culturally responsive? *Journal of Pedagogical Research, 4*(3), 187-202. https://doi.org/10.33902/JPR.2020063333

Torres-Velasquez, D., & Lobo, G. (2005). Research, reflection, and practice: Culturally responsive mathematics teaching and English language learners. *Teaching Children Mathematics, 11*(5), 249-255. https://doi.org/10.5951/tcm.11.5.0249

Umbara, U., Wahyudin, W., & Prabawanto, S. (2021). Exploring ethnomathematics with ethnomodeling methodological approach: How does Cigugur indigenous people using calculations to determine good day to build houses. *Eurasia Journal of Mathematics, Science and Technology Education, 17*(2), em1939. https://doi.org/10.29333/EJMSTE/9673

Verner, I., Massarwe, K., & Bshouty, D. (2019). Development of competencies for teaching geometry through an ethnomathematical approach. *The Journal of Mathematical Behavior, 56*, 100708. https://doi.org/10.1016/j.jmathb.2019.05.002

Weldeana, H. N. (2016). Ethnomathematics in Ethiopia: Futile or fertile for mathematics education? *Momona Ethiopian Journal of Science, 8*(2), 146-167. https://doi.org/10.4314/mejs.v8i2.4

Zaenuri, & Dwidayati, N. (2018). Exploring ethnomathematics in Central Java. *Journal of Physics: Conference Series, ICMSE2017, 983*(1), 1-7. https://doi.org/10.1088/1742-6596/983/1/012108