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Etnhomathematics: Exploration of Mathematical Elements in *Oklik* Music Art

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Abstract: Etnhomathematics: Exploration of Mathematical Elements in *Oklik* Music Art. **Objectives:** Exploring mathematical elements of *Oklik* as a cultures in Bojonegoro, East Java, Indonesia can be carried out in mathematics learning. This study aims to investigate the mathematical elements in it. **Methods:** Qualitative data analysis is implemented in this study by presenting and interpreting data which is related to mathematical elements. It includes stroke and note patterns that are produced from each instrument and combinations of it. **Findings :** Exploring mathematical elements viewed from types of instruments will produce different tones when it is combined well. When it is connected with musical solmization, it also produces different tones. **Conclusion:** Results of combinations create 32.760 tones that are produced in the notation and various strokes based on 15 combinations of instruments. Meanwhile, the solmization tones which are consisted of 12 tones; it produces 20.736 tones that can be utilized

Keywords: *oklik*, combination of instruments, mathematical elements

Abstrak: Etnomatematika: Eksplorasi Unsur Matematika dalam Seni Musik Oklik. ***Tujuan:*** *Eksplorasi unsur matematika pada Oklik sebgai salah satu budaya di Bojonegoro, Jawa Timur, Indonesia dapat diterapkan dalam pembelajaran matematika.* ***Metode:*** *Penelitian ini menggunakan analisis data kualitatif yaitu dengan menyajikan data dan mengintrepretasikan data tersebut terkait dengan unsur matematika yang terdapat dalam seni musik Oklik. Analisis meliputi pola pukulan dan nada yang dihasilkan dari instrumen serta kombinasi dari beberapa instrumen.* ***Temuan:*** *Menggali unsur matematika dilihat dari sudut pandang jenis instrumen akan menghasilkan nada berbeda. Selain itu jika dihubungkan dengan banyaknya nada dalam solmisasi musik juga akan mengahsilkan nada yang berbeda.* ***Kesimpulan:*** *Berdasarkan hasil kombinasi tersebut diperoleh 32.760 nada dalam notasi dan beragam jenis pukulan sesuai dengan 15 kombinasi instrumen yang dapat digunakan. Sedangkan dari nada solmisasi yang terdiri dari 12 nada terdapat 20.736 pilihan nada yang dapat digunakan dengan syarat nada boleh berulang.*

Kata kunci: *oklik, kombinasi instrumen, unsur matematika.*

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INTRODUCTION

Culture cannot be separated from human's life. There are many things that we have done in our daily lifes which belong to culture. It is in line with (Prahmana, 2022), culture is the results of human creativity, taste, and initiative. According to (Syakhrani & Kamil, 2022) it is person's way of life which is inherited from the ancestors directly to adjust them to their surroundings. Moreover explain that it is rules based on real behavior and actions in a community. Based on those arguments, it can be stated that culture is not always taught; it is a habitual action learned from the ancestors continuously. However, to preserve the existing culture, it needs to integrate the culture into the teaching and learning process in this current era in which technology is rapidly developed (Sudirman, Yaniawati, M, & R, 2019)

Current learning development has to be utilized in creating different learning innovations including mathematics learning. Mathematics learning can be developed by integrating culture such as local wisdom. The integration of culture and mathematics is the mathematics learning that is combined with history, anthropology, linguistics, and philosophy of mathematics which focuses on explaining and understanding different social environments (Oray & Rosa, 2020). Furthermore, (Amit & Qouder, 2017) argue that culture (ethno) and mathematics are called ethnomathematics. It derived from two syllables. First syllable is ethno which means the behavioral rules of a particular group influenced by historical development. Second syllable is mathematics which means an understanding, explanation, and action in comprehending materials such as coding, measurement, deduction, and modelling. D' Ambrasio in (Alangui, 2017) explain that ethnomathematics does not replace formal mathematics; it encourages students to reflect their mathematics learning, including the use of cultural context in it as a culture preservation.

Culture can be utilized in learning process by using local wisdom that is closed to students' life. It will further support the learning achievement because of their love for their own cultures. It is supported by (Handayani, Ardana, Made, & Sudiarta, 2020) who state that to minimize students' difficulties, a learning innovation is needed especially in determining the materials that are related to local wisdom. Bojonegoro is a regency at East Java, Indonesia that has various iconic cultures. Its local wisdoms are *Oklik* music art, *Sandur*, *Kayangan Api*, *Thengul* dance, *Tayub* dance, and *Wayang Thengul* (Prasetya & Karyawanto, 2020). It can be an exploration of cultural elements by integrating it into mathematics learning process. This article discusses exploration of mathematical elements in one of Bojonegoro local wisdoms; it is *Oklik* music art. This exploration is carried out by investigating several points of view to *Oklik* music art. It is viewed from the story behind it, types of instruments used, patterns of strokes, and tones of instruments. This exploration is carried out in depth to obtain the mathematical elements in it. Those elements are provided for students in form of ethnomathematical problems. In this case, they learn culture indirectly.

Further discussion on local wisdom which is characteristic of a region, this article discusses on exploration of mathematical elements in *Oklik* music art. *Oklik* is one of local wisdoms that utilizes several musics instruments in it. There are four instruments in it. The exploration of it includes the types of strokes and tones that are produced from the combination of existing instruments. Each instrument in *Oklik* has different characteristic. *Oklik* music art is close to everyday life, so it will provide different experience when it is applied in mathematics learning process (Irawan, Kencanawaty, & and Febriyanti, 2018). In lined with it, the implementation of cultural elements is able to explore mathematics from society's ideas,

methods, and responses to their surroundings (Prahmana, 2022)

Previous studies on ethnomathematics reveal that the integration of cultural elements and mathematical elements need to be developed as a form of developing mathematics learning. Ethnomathematics is an approach which can be implemented in the learning process. According to (Nur, Budi Waluya, Rochmad, & Wardono, 2020)), the implementation of cultural concept in mathematics learning can improve students' reasoning skill and their higher order thinking skills indirectly. Moreover, student who utilizes ethnomathematics approach in mathematics learning process is able to train those skills. The use of ethnomathematics in mathematics learning process gives new experiences to students that can improve their creativities and cultural understanding (Balamurugan, 2015)

The implementation of ethnomatematics approach is related to the integration of cultural element and the material of geometry. The identification of mathematical element is conducted by understanding the geometric elements found in a culture. The material of geometry which related to straight lines and two dimentional figures is a basic material that can be visually depicted. Many artifacts in culture become the big part of geometry that can integrate ethnomathematics in the learning practice (Vernera, Massarweb, & Bshoutyc, 2019). Furthermore, the learning process that implements ethnomathematics can strengthen the understanding of contextual problems by presenting cultural artifacts that can be developed in geometry. Geometry has important role in mathematics. Therefore, it needs a good understanding of the material by implementing attractive teaching method for students using ethnomathematics approach (Omere & Ogedengbe, 2022) (Sukestiyarno, Nugroho, Sugiman, & Waluya, 2023). Moreover, the concept of geometry that is identified on local culture can be implemented in the learning process using ethnomathematics. However, it needs more research on geometry and other mathematics materials (Sunzuma & Maharaj, 2022) (Suharta, Parwati, & Pujawan, 2020).

Based on previous problems, it needs to conduct another developmental research that integrate cultural elements in mathematics learning of geometry and other materials. This study discussed the integration and identification of mathematical elements in *Oklik* music art viewed from different point of view, namely the combination of existing instruments in *Oklik* that produces different tones. This combination will be integrated in the materials of combination and permutation as a part of discrete mathematics. It provides novelty in identifying mathematical elements in *Oklik* music art with different mathematics materials.

METHODS

Research Design

This study is qualitative research in form of ethnography which belongs to one of qualitative strategies (Abduh et al., 2023). This research includes the combination of fields and observation to understand the cultural phenomena which reflect knowledge and system that lead to cultural life (Yusanto, 2020). This study analyzes local wisdom of *Oklik* music art and identifies mathematical elements in it. Those elements are related to patterns of stokes and tones produced by musical instruments. It will be described mathematically.

Data Collection

Tecniques in collecting data are observation and interview. Direct observation is carried out to identify culture of local wisdom. Moreover, various sources and literatures such as scientific journals and online news articles about *Oklik*

music art are reviewed. Results of interview about *Oklik* music art are the understandings of types of instruments used, differences of strokes, and tones produced by those instruments. It is conducted to obtain complete information to explore mathematical elements in *Oklik* music art.

Data Analysis

Data in this study is analyzed using qualitative data analysis by presenting and interpreting data related to mathematical elements in *Oklik* music art. The analysis includes patterns of strokes and tones produced by each instrument and combinations of it. Furthermore, the analysis results are described in form of ethnomathematical problems related to *Oklik* music art as one of local wisdoms.

■ RESULTS AND DISCUSSION

A term *Oklik* or *Tongklik* was created when *pagebluk* period happened in Dutch Colonial Era. At that time, there were many people sufferred from deadly disease. When there was a people who was sick in the morning, he was certain to die in the afternoon. Finally, a man decided to find *Srono* or plague medicine by meditating for a month. From the hermitage, he got 6 answers to end the *pagebluk*. Those six answers revealed that all of villagers had to make sounds from bamboo; it was beaten around village; then the river had to be cleaned; the villagers had to plant turmeric and build *Cakruk* or village camps; they had also to make *Teng* or *Teplok* lamps (Novianti, Waluya, & Dewi, 2022). With no hesitation, all villagers made *tong-tongan* from bamboo. They made it varied. Some of it were given holes to produce sounds. Because of it, there was no more *pagebluk*, thieve, and robber. However, the activity was continued. They came together in *Cakruk*. Everynight they produced sounds using *tong-tongan* to patrol around village. They danced, sang, and created stories of hero and struggle. The term *oklik* was derived from the sounds of bamboo being beaten "tong-tong-klek"

Ritual of repelling *pagebluk* became a habit. It was developed into a show of sound rhythm and *oklik* costumes. There was a rhythm of *sesek* and slow. The costumes for the show were white shirt, finger straps, black clothes without buttons, *komprang*, and *udeng*. *Oklik* came from the word "klik klok klik klok" as the sounds of bamboo musical. Its rhythm consisted of *Kinthel Arang*, *Kinthel Kerep*, *Gedhug*, and *Klur* or *Thur* (Anggraeni, Yanuartuti, Juwariyah, Yermiandhoko, & Lodra, 2022). Musics and mathematics could be material in developing mathematics learning. Exploration of mathematical elements in musics could be viewed from several points of view, namely notation, tones, or type of instruments used. *Oklik* was one of Bojonegoro local wisdom which has being preserved. It derived from the word "klik klok klik klok" as sounds of bamboo musical instruments. Its rhythm consisted of four types namely *Thintil Arang, Thintil Kerep, Gedhug* and *Thur/Klur*. When it was played together, it created *oklik* music art (Anggraeni et al., 2022). *Thintil Arang* had a slightly higher pitch than *Thintil Kerep*. *Thintil Arang* and *Thintil Kerep* played the main roles in *Oklik* music art. Both tools in several regions and community had different rhythmic patterns. The other instrument was *oklik gedhug*. This instrument was named based on sounds produced and the way it was played which was stomped on the ground. Its role in *Oklik* was as a *syncup*.

Thur or *Klur* had the lowest sound in *Oklik.* Its role in *Oklik* was as coda of a repetition played. In a bar play, *thur* or *klur* was in the eight stroke. In *gamelan*, it was often called as *gong*. The strokes of each *Oklik* musical instrument were as follows *Thintil Arang* had a stroke pattern "klik klok klik klokklik klok". *Thintil Kerep* had a stroke pattern "klik klok klik klik klok klik klik klok klik klik klok klik".

Gedhug had a stroke pattern "dug dug". *Thur* or *Klur* had a stroke pattern "klur". It could be written as follows *Thintil Arang* had a stroke pattern 1 3 5 7 9 11…., *Thintil Kerep* had a stroke pattern 1 2 3 4 5 6 7 8 9 10…, *Gedhug* had a stroke pattern 4 8 12…,*Thur* or *Klur* had a stroke pattern 8 16…

Based on strokes on each *Oklik* musical instrument, the mathematical elements in it were: 1)*Thintil Arang* had a stroke pattern: 1,3, 5, 7, 9, 11 … This pattern was arithmetic sequence with the first part $a = 1$ and the difference $b = 2$. Formula for the nth sequence was $Un = 2n - 1$. 2) *Thintil Kerep* had a stroke pattern : 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,11 …. This pattern was arithmetic sequence with the first part and the difference . Formula for the nth sequence was. 3) *Gedhug* had a stroke pattern : 4, 8, 12, …. This pattern was arithmetic sequence with the first part and the difference . Formula for the nth sequence was . 4) *Thur* or *Klur* : 8, 16, 24, …. This pattern was arithmetic sequence with the first part and the difference . Formula for the nth sequence was .

After understanding the pattern of each instrument, the player could easily determine the time for him to stroke it (Dewi et al., 2020) as follows: *Thintil Arang*, in which , the player started to stroke in count to 1, then for each 2 strokes. *Thintil Kerep,* in which , the player started to stroke in count to 1, etc. *Gedhug,* in which , the player started to stroke in count to 4, then for each 4 strokes. *Thur* atau *Klur,* in which , the player started to stroke in count to 8, then for each 8 strokes

In addition, different combinations of those four instruments would also produce different patterns (Pryatna et al., 2020). Combinations could be obtained from 2, 3, and 4 different instruments. The number of combination could be calculated using the concept in the materials of combination and permutation in the subject of mathematics school. The formula could be viewed as follow combination of 2 from 4 instruments was as follows . There were 6 combinations consisted of two instruments that could be played, i.e. instrument 1 and 2, 1 and 3, 1 and 4, 2 and 3, 2 and 4, 3 and 4. It could be explained as follows a) Combination of instrument 1 and 2 was *Thintil Arang* and *Thintil Kerep. Thintil Arang* had a stroke pattern "klik klok klik klok klik klok". *Thintil Kerep* had a stroke pattern "klik klok klik klik klok klik klik klok klik klik klok". Both instruments were combined, so it produced a sound "klik klok klik klik klok klik klik" klok klik klik klok. Based on that result, there were two sounds produced simultaneously in the sequence of 1, 3, 5, 7, 9…etc b) Combination of instrument 1 and 3 was *Thintil Arang* and *Gedhug*. *Thintil Arang* had a stroke pattern "klik klok klik klok klik klok". *Gedhug* had a stroke pattern "dug dug dug". Both instruments were combined, so it produced a sound "klik klok dug klik klok dug klik klok dug klik". Based on that result, the stroke patterns of both instruments were 1, 3, 4, 5, 7, 8, 9, 11, 12,….etc c) Combination of instrument 1 and 4 was *Thintil Arang* and *Thur* or *Klur*. *Thintil Arang* had a stroke pattern "klik klok klik klok klik klok". *Thur* atau *Klur* had a stroke "klur". Both instruments were combined, so it produced a sound "klik klok klik klok klur klik klok klik klok klur klik". Based on that result, the stroke patterns of both instruments were 1, 3, 5, 7, 8 , 9, 11, 13,15, 16…etc. d) Combination of instrument 2 and 3 was *Thintil Kerep* and *Gedhug*. *Thintil Kerep* had a stroke pattern "klik klok klik klik klok klik klik klok klik klik klok". *Gedhug* had a stroke pattern "dug dug dug". Both instruments were combined, so it produced a sound "klik klok klik klik klok (dug) klik klik klok klik (dug) klik klok klik klok (dug)". Based on that result, there were two sounds produced simultaneously in the sequence of 4, 8, 12,…etc. e) Combination of

instrument 2 and 4 was *Thintil Kerep* and *Thur* atau *Klur*. *Thintil Kerep* had a stroke pattern "klik klok klik klik klok klik klik klok klik klik klok". *Thur* atau *Klur* had a stroke "klur". If both of instruments were combined, so it produced a sound "klik klok klik klik klok klik klik klok (klur) klik klok klik klik klok klik klik klok (klur)". Based on that result, there were two sounds produced simultaneously in the sequence of 8, 16, 24,…etc. f) Combination of instrument 3 and 4 was *Gedhug* and *Thur* or *Klur*. *Gedhug* had a stroke pattern "dug dug dug". *Thur* or *Klur* had a stroke pattern "klur". Both instruments were combined, so it produced a sound *dug (klur) dug (klur) dug (klur)*. Based on that result, there were two sounds produced simultaneously in the sequence of 8, 16, 24,….

Combination of 3 from 4 instruments was as follows . There were 4 combinations consisted of three instruments that could be played, i.e. instrument 1, 2 and 3; instrument 1, 2 and 4; instrument 1, 3 and 4; and instrument 2, 3 and 4. It could be explained as follows a) Combination of instrument 1, 2 and 3 was *Thinting Arang*, *Thintil Kerep* and *Gedhug*. *Thintil Arang* had a stroke pattern "klik klok klik klok klik". *Thintil Kerep* had a stroke pattern "klik klok klik klik klok klik klik klok klik klik klik" . *Gedhug* had a stroke pattern "dug dug dug". Those instruments were combined, so it produced a sound "klik klok klik klik klok dug klik klok klik klik klok dug". Based on that result, there were two sounds produced simultaneously in the sequence of 1, 3, 4, 5, 7, 8, 9, 11,12, 13….etc. b) Combination of instrument 1, 2 and 4 was *Thinting Arang*, *Thintil Kerep* and *Thur* or *Klur*. *Thintil Arang* had a stroke pattern "klik klok klik klok klik". *Thintil Kerep* had a stroke pattern "klik klok klik klik klok klik klik klok klik klik". *Thur* or *Klur* had a stroke pattern "klur". Those instruments were combined, so it produced a sound *Klik* "klok klik klik klok klur klik klok klik klik klok klur". Based on that result, there were two sounds produced simultaneously in the sequence of 1, 3, 5, 7, 8, 9, 11,13, 15, 16….etc. c) Combination of instrument 1, 3 and 4 was *Thinting Arang*, *Gedhug* and *Thur* or *Klur*. *Thintil Arang* had a stroke pattern "klik klok klik klok klik". *Gedhug* had a stroke pattern "dug dug". *Thur* or *Klur* had a stroke pattern "klur". Those instruments were combined, so it produced a sound "klik klok dug klik klok dug (klur) klik klok dug klik klok dug (klur)". Based on that result, there were two sounds produced simultaneously in the sequence of 8,16…etc. d) Combination of instrument 2, 3 and 4 was *Thinting Kerep*, *Gedhug* and *Thur* or *Klur*. *Thintil Kerep* had a stroke pattern "klik klok klik klik klok klik klik klok klik klik klok". *Gedhug* had a stroke pattern "dug dug". *Thur* or *Klur* had a stroke pattern "klur". Those instruments were combined, so it produced a sound "klik klok klik klik (dug) klok klik klik klok klik klik (dug) (klur) klok". Based on that result, there were two sounds produced simultaneously in the sequence of 8,16…etc.

Based on previous discussion about combination of 4 *Oklik* instruments, there will be 15 strokes with different tones when it is combined. Table 1 shows the number of those combinations.

Table 1. Combination of *oklik* instruments

Combination of Instruments	Number of tones
1 from 4 different instruments	4
2 from 4 different instruments	6
3 from 4 different instruments	4
4 from 4 different instruments	1

Based on table 1, it can be concluded that there are 15 different tones produced when the instruments are combined in a song. Types of strokes are produced the same as previous discussion. Moreover, in the discussion of tones in three octaves, it is stated that it will produce 36 different tones. In other words, there will be 36 tones used in 15 combinations of instruments.

When the combination of instruments in *Oklik* music art is connected with seven general music scales, it will produce various tones (Rahayu & Trilaksana, 2022). However, there were 12 tones in musics that become basic tones in composing a song. Those tones consist of 7 fundamental tones and 5 tones between it. Furthermore, the keys on piano consist of black and white colors. The white color is basic tone symbolized by the letters of alphabet; the black color between it is the increase of basic tone which belongs to major tone arrangement (Wajongkere et al., 2019). There are twelve tones in an octave. Octave is tones in the interval with the same names i.e. from the first tone (Do) to the eight tone (Do'). Meanwhile, there are 12 tones based on table. There are three octave levels in notation, namely low octave, medium octave, high octave. In one octave, there will be 12 tones. It means that there are 36 tones which can be utilized.

Meanwhile, the songs that are often sung in *Oklik* performance are *Oklik Bojonegoro, Ngadeso, Pring- Pring, Kebangeten*, and *Kange Yune* (Anggraeni et al., 2022). Example of lyric in a song "*Kange Yune"* can be viewed as follows:

Kange Yune
Pak e mbok e
Kenthungane, sajak e nemu irama
Ngajak opo yo kang yo yo
rungokno yo yu yo
E sajak ee ono woro-woro

The first lyric in that song is *Pak e mbok e* [Daddy, Mommy]. It is divided into syllables of *Pak – e – mbok – e*. There are 4 syllables in it. Each syllable can use 7 tones and it may be repeated. In other words, each syllable can have the same tone with other syllables. So, first notation until seven notation can fulfill each of it. It can be viewed in table 2.

Table 2. Notation in first lyric of a song "*Kange Yune*"

Syllable	Number of possible notation
Pak	12
E	12
Mbok	12
e	12

In table 2, it can be concluded that there are 12^4 or $12 \ x \ 12 \ x \ 12 \ x \ 12 = 20.736$ tones for the first line in a lyric of *Kange Yune*. It will be different when we want to create 4 different tones from 4 syllables in that first lyric. The tones; which have been used in first syllable; cannot be used in other syllables. It can be said that there are $12 \ x \ 11x \ 10 \ x \ 9 = 11.880$ tones which can be used in the first lyric of a song "*Kange Yune".*

Those explanation can be connected with mathematics material especially in the concept of permutaion. When in one set, there is n element in which element of r ($r < n$), so the formula of permutation will be as follow $P(12,4) = 11.880$. In the first lyric of *Kange Yune*, there are 4 syllables with 2 possibility of tones a) There are 20.736 tones which can be used when the tones may be repeated. B) There are 11.880 tones which can be used when the

tones cannot be repeated. Those calculation is in one octave. When the tones of a song consist of three octaves, there will be 62.208 tones in which it can be repeated. And there will be 35.640 tones in which it cannot be repeated.

Meanwhile, the different combination of instrument produces 15 types of strokes in that first lyric. It can be calculated using permutation concept $P(15,4) = 32.760$. Based on the result of that calculation, it can be concluded that in a song *Kange Yune* using *Oklik* music art, the first lyric consists of 4 syllables with tens of thousands of tones in the notation and various types of strokes which are appropriate with the combination of instruments. It shows that a song writer can produce unlimited creativity in creating tones for each lyric.

Result of analysis which is related to the combination of *Oklik* musical instruments shows that *Oklik* as regional music art in Bojonegoro, East Java has mathematical elements which are related to the materials of combination and permutation in discrete mathematics. It enables cultural element of traditional musics to be one of media in teaching mathematics (Indrawati, Septiana, & Rahmawati, 2021). In addition (Luiz, 2007) states that there is a relationship between musics and learning in which musical experiences are in line with cognitive performance in mathematics learning. Moreover, *Oklik* is regional music which becomes a part of local wisdoms that is close to everyday life. Therefore, the integration and exploration of mathematical elements in art musics enable students to be close to the culture in their surroundings (Bazinet & Marshall, 2015). Furthermore, the use of cultural elements related to instrumental musics will make musics and mathematics to be more accessible for students and teachers, so the teachers can create mathematics learning design by implementing a cultural exploration context (Barraza & Araujo, 2023)

Possible types of strokes produced by several *Oklik* instruments are the results of identification and exploration of mathematical elements in it especially for the material of mathematical sequences and series. The identification shows that mathematics has a broad scope when it is integrated into social and culture (Widada, Agustina, Serlis, & Dinata, 2018). In addition, analysis result related to various tones produced using permutation concept shows that there is a close relationship between musics and mathematics, so mathematics learning will be more meaningful and able to change paradigm of mathematics learning which deals to formulas and number to be related to cultural elements in it (Fouze & Amit, 2017). The use of musics as cultural element in teaching mathematics needs appropriate strategy to make it effective and in line with learning goals. Teaching strategy is part of integrating mathematical elements in culture that is called ethnomathematics. According to D'Ambrasio, ethnomathematics which is applied in certain cultural environment examines social habits (Musawwir & Kusnandi2, 2020). In line with this (Murhaini & Achmadi, 2021) explains that it is the art of understanding and explaining the social and cultural environment through the process of measuring, calculating, mathematical modelling, and making conclusion from a group of cultures that are well integrated.

■ CONCLUSIONS

This study concludes that the combination of four musical instruments of *Oklik* produces fifteen different tones. When it is related to the permutation concept of seven scales in an *Oklik* song, it produces 20.765 tones in which it can be repeated. However, it produces 11.880 tones when it is not repeated. It shows that the exploration and identification of mathematical elements in *Oklik* can be implemented in the material of discrete mathematics. However, it is

necessary to develop the identification and exploration of mathematical elements in *Oklik* from the perspective of other mathematical materials. Moreover, the calculation of these scales is still based on basic scales, so further research is needed to identify the mathematical elements of this musical instruments in more complete scales.

Integrating culture in mathematics learning can be carried out using various points of view (Lidinillah, Rahman, Wahyudin, & Aryanto, 2022) as in *Oklik* music art which is one of local wisdoms in Bojonegoro, East Java, Indonesia. Based on mathematical elements in *Oklik* music art viewed from tones of instrumental combinations, there are various tones' combinations for each lyric in a song. These combinations produces thousands of tones that can be used by a song writer to create a lyric. It shows that investigating mathematical elements of a culture is able to develop the context of mathematics learning.

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