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COMBINATION OF ETHNOMATHEMATICS AND THE MOZART EFFECT TO IMPROVE PROBLEM-SOLVING SKILLS AND MATHEMATICAL DISPOSITION

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ABSTRACT

The background of this research is that student learning outcomes in analytical geometry lecture during the transition from pandemic to Covid-19 endemic are still low, which is due to a lack of student interest in learning, and they are still accustomed to online learning, thus having an impact on their low problem-solving skills and mathematical disposition. This research aims to determine to what extent implementation of ethnomathematics and the Mozart effect can improve students' problem-solving skills and mathematical disposition in analytical geometry lecture during the transition from pandemic to endemic COVID-19, so the research is important to do. Implementation of ethnomathematics and the Mozart effect in mathematics learning is unique because it's a combination of learning approaches that have never been used before in Indonesia and other countries. The research method used was a quasi-experimental non-equivalent control group design because it was experimental and sample determination wasn't carried out randomly, but using purposive sampling technique on the second-semester students of mathematics undergraduate program, FMIPA, Universitas Padjadjaran. The instruments used in this study were problem-solving skills test, mathematical disposition scale, and students' attitude questionnaire toward learning with implementation of ethnomathematics and the Mozart effect. The results showed that: (1) problem-solving skills of students who received learning by implementing ethnomathematics and the Mozart effect are better than students who achieved direct instruction; (2) mathematical disposition of students who received learning by implementing ethnomathematics and the Mozart effect is better than students who achieved direct instruction; and (3) students are interested and motivated to learn mathematics by implementing ethnomathematics and the Mozart effect. This research concludes that implementation of ethnomathematics and the Mozart effect can improve students' problem-solving skills and mathematical disposition in analytical geometry lecture. It can be seen from good average post test scores achieved by students.

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1. INTRODUCTION

Until February 2023, the COVID-19 pandemic had not 100% ended, but almost all activities had been carried out normally as before the COVID-19 pandemic, including learning activities. Learning activities starting from elementary to university level have been carried out face-to-face [1]; likewise, in learning analytical geometry lectures in mathematics undergraduate program, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran. The condition of the transition from online learning to face-to-face (offline) learning does not necessarily make student learning outcomes better when compared to student learning outcomes during online learning. This is because they are used to learning independently so they rarely discuss and exchange ideas face-to-face with their friends, which impacts their interest in face-to-face learning. The results of a preliminary study conducted by the author in the 3rd week of March 2023, showed that the quiz scores achieved by students in analytical geometry lecture were still low and students' interest in the learning process was also low [2], [3]. The condition is one of impacts that students are used to receiving online learning during the COVID-19 pandemic, so that they become passive in mathematics learning activities (rarely asking questions, expressing their opinions, and answering lecturer questions) and think that mathematics has no connection to real life.

Mathematics learning activities are carried out with the hope that there will be a change in students' behavior and the exploration of mathematical abilities that exist within them [4]. One of these abilities is mathematical problem-solving skills. Mathematical problem-solving skills are the abilities of students to develop strategies and solve a problem, and not just understand the problem [5], [6], [7]. Indicators of mathematical problem-solving skills include 1) understanding the problem, 2) developing strategies or settlement plans, 3) solving the problem according to the plan that has been made, and 4) re-checking the answers [8], [9], [10]. Because problem-solving skills are the core of learning activities, it is necessary to make efforts to improve them so that student learning outcomes can also increase.

The students' learning outcomes in mathematics are influenced by many factors, one of which is mathematical disposition [11]. Mathematical disposition is a person's tendency to feel, believe, and appreciate mathematics [12]. Mathematical disposition should be improved because students with low mathematical dispositions generally feel insecure during the mathematics learning process and are not motivated to study mathematics [13]. The mathematical disposition indicators are (a) confidence in using mathematics, (b) flexibility in mathematics, (c) perseverance and persistence in doing mathematical tasks, (d) high interest and curiosity, (e) monitor and reflect on thoughts, (f) assess the application of mathematics to other situations in mathematics and everyday experience, and (g) appreciation of the role of mathematics [14], [15], [16].

So far, some studies have been carried out regarding mathematical disposition, such as those conducted by Rahlan and Sofyan [17] and Febriyani et al. [11], with research objects of grade VII students and focused on finding the effect of mathematical disposition on certain mathematical abilities. Then, Rezita and Rahmat [18] and Mahmud et al. [19] conducted research on grade XI students to find the relationship between mathematical dispositions and other mathematical abilities, and student learning outcomes without applying any learning approach to improve students' mathematical disposition. This research was conducted on students of the university and implemented a unique learning approach, namely a combination of ethnomathematics and the Mozart effect, to enhance students' mathematical disposition because the music of Mozart K.448 sonata duo piano that is played during learning activities using ethnomathematics could manipulate the students' mood and stimulate enthusiasm to learn mathematics [20], [21].

Ethnomathematics is the knowledge that relates mathematical concepts to cultural elements [22], [23], [24], [25]. Ethnomathematics is also the knowledge of how to teach mathematical concepts in the context of local culture and the characteristics of the students [26]. Ethnomathematics is a learning approach that provides opportunities for students to explore their culture, which contains mathematical concepts and ideas [27]. So, ethnomathematics is a learning approach that integrates local culture with mathematical concepts. Therefore, by implementing ethnomathematics in mathematics learning, students are expected to feel that mathematics is part of the culture and is closely related to their daily lives so that they are even more motivated to learn, so it's hoped that it can improve students' problem-solving skills and mathematical disposition. In this research, the culture applied in ethnomathematics is Sundanese. Ethnomathematics can be implemented in lectures that contain concepts that can be linked to culture, one of which is analytical geometry.

Many researchers are interested in researching the implementation of ethnomathematics in mathematics learning, as was done by Ratnaningsih et al. [28], who developed learning media with an

Android-based ethnomathematics approach for grade IX students. Abdullah et al. [29], implemented Augmented Reality with an ethnomathematics approach to SMP/MTs students. Sukestiyarno et al. [30] applied ethnomathematics to improve students' spatial skills. Hendriyanto et al. [31] examined research trends in the use of ethnomathematics for mathematics learning. In this case, the researchers implemented ethnomathematics combined with Mozart's music composition in an effort to improve students' problem-solving skills because it can stimulate students' brain when learning mathematics [32].

The success of the mathematics learning process is supported by several factors, including the interest of students in learning. Students' interest will arise if the teacher can create a comfortable learning atmosphere that does not make students feel tense, anxious, or depressed [26]. One effort that can be made is to implement music into learning mathematics. This is because music can develop memory, strengthen the brain's nervous system, and make students more focused and able to communicate better [33], [34], [35], especially classical music. The type of classical music that can increase one's intelligence is Mozart's music (better known as the Mozart effect) [36]. Mozart's music can make students feel calm, and composition of the tones in Mozart's music can stimulate the performance of the forebrain in humans and have a positive impact on reasoning so that students' mathematical abilities can be explored and developed so that they can achieve better learning outcomes [26].

In this research, the implementation of the Mozart effect was combined with ethnomathematics. The Mozart effect is relevant when combined with ethnomathematics because a) Mozart K.448's music has rather soft dynamics and has a tempo of less than 200 beats/minute; it has a calming effect on students and makes them easier to understand the mathematical concepts being taught without feeling anxious; b) based on researchers' observations, so far no traditional Sundanese music have been found that has dynamics and tempo equivalent to Mozart K.448's music. Meanwhile, based on previous research, so far, only Mozart K.448s' music can increase human intelligence [37], [38]; and c) so far, there has been no research that implements a combination of the Mozart effect and ethnomathematics in Indonesia and other countries. The form of its implementation is Mozart's music played during the learning process of analytic geometry lecture on the topic of lines equations and planes in space. The Mozart music that is played is Mozart K.448 (also called sonata duo piano D major) with rather soft dynamics (commonly referred to as a mezzo piano), at a frequency of 8000-32,000 hertz, and tempo of allegro con spirito (equivalent to 120-168 beats/minute). Combining the implementation of the Mozart effect with ethnomathematics is done because the music of Mozart K.448, which is played during the learning process, can stimulate students' brains [39], facilitate the complex nervous system involved when students learn mathematical concepts [40], can manipulate students' moods, and can improve students' cognitive performance [21]. So that they can more easily understand the relationship between the mathematical concepts being taught and their culture. Apart from that, students also become more creative in finding connections between the mathematical concepts they learn and their culture.

Research on the Mozart effect has been carried out by several researchers, such as Verrusio et al. [36] who tested the impact of the Mozart effect on the human brain. Then, Gasenzer et al. [41], Sesso and Sicca [42], and Paprad et al. [43] investigated the relationship between the Mozart effect and neurosurgery and also epilepsy, and determined its impact. Meanwhile, in this research, what is being studied is the implementation of the Mozart effect in mathematics learning, and so far, none has implemented the Mozart effect in learning mathematics.

Based on this description, this study aims to determine: (1) are mathematical problem-solving skills of students who received learning by implementing ethnomathematics and the Mozart effect better than students who achieved direct instruction? (2) is mathematical disposition of students who received learning by implementing ethnomathematics and the Mozart effect better than students who achieved direct instruction? and (3) How do students' attitudes and motivation towards learning by implementing ethnomathematics and the Mozart effect? In this case, what is meant by students' attitude is their attitude during 3 meetings in obtaining learning mathematics through the implementation of ethnomathematics and the Mozart effect.

2. RESEARCH METHODS

This research used a quasi-experimental non-equivalent control group design [44], namely the experimental group and the control group were not randomly selected [45]. The research was experimental and determination of sample using purposive sampling technique. The experimental group was given the learning treatment for 3 meetings (at weeks 11, 12, and 13) by implementing ethnomathematics and the Mozart effect (EtMo) in the experimental group, and the control group was given the direct instruction treatment (DI). The technical implementation of EtMo is that students achieved the material using an ethnomathematics approach and Mozart K.448's music is played during learning activities for 3 weeks (3 meetings). While the technical implementation of DI is that students achieved the material using direct instruction and without playing any music (silence) for 3 meetings. The volume of Mozart K.448's music played in the experimental class is adjusted to the number of students and room capacity. In this case, the researchers used 2 speakers placed at the front (facing the students' position).

This research was conducted on 80 second-semester students (each class consisted of 40 students) in the mathematics undergraduate program, Faculty of Mathematics and Natural Sciences, Universitas Padjadjaran, in the subject of analytical geometry. The selection of 80 second-semester students was done by purposive sampling based on classes in mathematics undergraduate program, with the character of having heterogeneous academic abilities. Purposive sampling is a non-random sampling technique where the sample group is targeted to have certain attributes or certain considerations **[46]**, **[47]**. This method can be used in large populations but is more effective with smaller sample sizes and more homogeneous populations **[47]**. The reason for choosing analytical geometry lecture is because, based on the results of a preliminary study conducted by the authors, it shows that student learning outcomes in analytical geometry lecture are still low because it achieved an average score below 50. Moreover, the implementation of ethnomathematics and the Mozart effect are considered suitable for application in analytical geometry lectures, with the aim that students realize that the concepts of analytical geometry are related to their culture and daily life and their interest in learning is increased.

In this research, the instruments used were: (1) Problem-solving skills test in the form of a description of five questions with the topic of lines equation and planes in space. This test is used to measure students' mathematical problem-solving skills. The test contains the following indicators: a). able to understand the problem, b). able to develop strategies or settlement plans, c). able to solve the problem according to the plan that has been made, and d). able to re-check the answers carefully; (2) Mathematical disposition scale in the form of a Likert scale of 12 statements. It contains six statements that are positive and six statements that are negative. This instrument is used for measuring students' mathematical disposition. There are four choices given in the scale, namely SS (strongly agree), S (agree), TS (disagree), and STS (strongly disagree); and (3) Students' attitude questionnaire in the form of a Likert scale containing ten statements. It consists of five statements that are positive and five statements that are negative. This questionnaire is used to measure students' attitudes toward mathematics learning which implements ethnomathematics and the Mozart effect. In this questionnaire, four choices were given, namely SS (strongly agree), S (agree), TS (disagree), and STS (strongly disagree). The instruments have been tested and analyzed, including validity, reliability, differentiating power, and level of difficulty.

The results of testing the validity of the problem-solving skills test using Pearson Product Moment correlation analysis show that the five questions include valid criteria in the high category (numbers 3, 4, and 5) and very high (numbers 1 and 2). Validation was carried out by three mathematics education experts from several universities, and based on the results of the Cochran-Q test obtained Sig = 0.368 (more than 0.05), so it can be said that the experts have given the same assessment of the face validity of all question items and are considered for use as a research instrument. Meanwhile, based on the results of reliability testing using Alpha-Cronbach it's 0.87, and it's interpreted as reliable in the high criteria. Differentiating power, based on testing using the Anates V4 program, two questions were interpreted on good criteria (numbers 1 and 2) and three questions were on quite good (numbers 3, 4, and 5). Level difficulty, based on the testing results using the Anates V4 program, one question was interpreted on easy criteria (number 1), three questions were on medium criteria (number 2, 3, and 5), and 1 question was on difficult criteria (number 4). The results of testing the validity of mathematical disposition scale using the Anates V4 program show that eight statements were interpreted as valid on significant criteria (numbers 1, 2, 3, 6, 7, 8, 9, and 12) and four statements were interpreted as valid on strongly significant (numbers 4, 5, 10, and 11). Meanwhile, based on reliability testing obtained 0.82, and it's interpreted as reliable on the high criteria. The results of testing the validity of students' attitude questionnaire show that seven statements were interpreted as valid on significant criteria (numbers 1, 2, 4, 5, 6, 8, and 9), and three statements were interpreted as valid on strongly significant (numbers 3, 7, and 10). Meanwhile, based on the results of reliability testing, it obtained 0.84, and it's interpreted as reliable in the high criteria.

Because this research is descriptive and inferential study, the data obtained from the results of problem-solving skills test, mathematical disposition scale, and students' attitude questionnaire were analyzed through the following stages: i) normality test using One-Sample Kolmogorov Smirnov; ii) test the homogeneity of variance using the Lavene statistical test; iii) calculate the normalized gain; iv) hypothesis testing using one-way ANOVA, and v) data from the students' attitude questionnaire were analyzed descriptively.

3. RESULTS AND DISCUSSION

3.1 Results of Mathematical Problem-Solving Skills Test Analysis

Mathematical problem-solving skill tests were given to students of the experimental group (which were given the EtMo learning treatment) and the control group (which were given the DI treatment). Pre-test and post-test questions given to the experimental group and control group were the same with the topic of lines equations and planes in space. A pre-test is given to investigate students' initial abilities in mathematical problem-solving skills, and a post-test is to determine students' mathematical problem-solving tests after completing the entire learning process.

At the 11^{th} meeting, experimental and control groups students were given a pre-test. The pre-test contains five questions that measure students' problem-solving skills in analytical geometry lectures on topic lines equations and planes in space. At the 11^{th} meeting, both the experimental group and the control group were not given any treatment. In order to obtain description of the data got from the pre-test results, descriptive statistics testing was carried out. The results of pre-test descriptive statistics for experimental group and control group can be seen in **Table 1**.

Table 1. Pre-Test Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Dev
Pre-test Experiment	40	34	51	42.33	5.663
Pre-test Control	40	37	49	40.63	3.232

A comparison of two means was carried out to determine the difference between the initial abilities of students in the experiment group and the control group. To determine the type of test to be used, a normality and homogeneity tests are carried out. The normality test used is a one-sample Kolmogorov Smirnov because the data is on an interval scale and is in the form of single data. The results show that the p-value of the experiment group and the control group is 0.200 ($> \alpha$), so it can be concluded that the initial abilities of students in the experiment group and the control group are normally distributed at a significance level of $\alpha = 0.05$. Next, a homogeneity test was carried out the Lavene test because there are two groups of data were tested. The results show that p-value of experiment group and control group is 0.303 ($> \alpha$). It can be concluded that experiment group and control group have homogeneous variance.

After the normality test and homogeneity test were carried out, the mean difference test of initial abilities was carried out using one-way ANOVA. The results of the mean difference test of students' initial abilities in the experimental and control group are presented in **Table 2**.

Table 2. Mean Difference Test of Initial Mathematical Problem-Solving Skills

	Sum of Square	df	Mean Square	F	Sig.
Between Groups	57.800	1	57.800	2.719	0.103
Within Groups	1658.150	78	21.258		
Total	1715.950	79			

Based on **Table 2**, it can be seen that the p-value is 0.103 ($> \alpha$). Therefore, it can be concluded that there is no mean difference between the initial mathematical problem-solving skills of the experimental and control groups. Thus, based on **Table 1** and **Table 2** it can be said that the initial mathematical problem-solving skills of the experimental and control groups before being given treatment are the same.

The pre-test results achieved by students can be influenced by several factors. First, students who take part in analytical geometry lectures are period students in 2022, who are included in the "COVID-19 era" students who carry out the entire learning process of all lectures online due to pandemic conditions which have not made it possible to carry out face-to-face learning for the past two years, so that during the transition from the pandemic to the COVID-19 endemic, students were still accustomed to the online learning atmosphere which caused a decrease in their activity in asking questions, expressing opinions, or discussing with colleagues [49]. Second, because for two years, students have been carrying out online learning, when faced with the transition from the pandemic to the COVID-19 endemic, they are still in a condition where they are starting to readjust to face-to-face learning so this has an impact on the learning outcomes they achieve.

After the experimental group was given the EtMo treatment and the control group was given the DI treatment for 3 meetings with the same topic, namely lines equation and planes in space, the two groups were given a post-test at the 13^{th} meeting to determine the impact of implementing EtMo and DI on students' mathematical problem-solving skills. This test contains questions which are exactly the same as the questions in the pre-test. Descriptive statistics testing was carried out to obtain description of the data got from the results of post-test. Table 3 presents the results of post-test descriptive statistics for the experimental group and the control group.

Table 3. Post-Test Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Dev
Post-test Experiment	40	43	97	68.35	11.950
Post-test Control	40	39	61	46.75	6.894

In order to determine the difference between the mathematical problem-solving skills of students in the experiment group and the control group after they were given the treatments, the comparison of two means was carried out. The normality and homogeneity tests are carried out to determine the type of test to be used, and the normality test used is one-sample Kolmogorov Smirnov. The results show that the p-value of the experiment group is 0.111 ($> \alpha$) and the p-value of the control group is 0.182 ($> \alpha$). It can be concluded that the mathematical problem-solving skills of students in the experiment group and control group are normally distributed at a significance level of $\alpha = 0.05$. And because of no more than two groups of data were tested, so a homogeneity test was carried out the Lavene test. The results show that the p-value of the experiment group and the control group is 0.586 ($> \alpha$), and it can be concluded that the experiment group and the control group have a homogeneous variance.

After the experiment group and the control group were declared to be normally distributed and have a homogeneous variance, the mean difference test of the mathematical problem-solving skills was carried out using one-way ANOVA. The results of mean difference test of students' mathematical problem-solving skills in the experimental group and the control group can be seen in Table 4.

Table 4. Mean Difference Test of Mathematical Problem-Solving Skills

	Sum of Square	df	Mean Square	F	Sig.
Between Groups	9331.200	1	9331.200	98.056	0.000
Within Groups	7422.600	78	95.162		
Total	16753.800	79			

Table 4 describes that the p-value $< \alpha$, which is 0.000. It means that there is a mean difference between the mathematical problem-solving skills of the experimental group and the control group. Table 3 and Table 4 show that the mathematical problem-solving skills of students in the experimental group and the control group were different and the average score achieved by students of the experiment group was higher than the control group. It can be concluded that the mathematical problem-solving skills of students who received learning by implementing ethnomathematics and the Mozart effect were better than students who received direct instruction.

3.2 Normalized Gain Analysis Results

The normalized gain analysis needs to be done to determine the increase in students’ mathematical problem-solving skills between the experimental group and the control group. For obtaining description of the data got from the results of normalized gain analysis, descriptive statistics testing was done. Normalized gain descriptive statistics are presented in **Table 5**.

Table 5. Descriptive Statistics of Normalized Gain

	N	Minimum	Maximum	Mean	Std. Dev
Gain Experiment	40	12	0.94	0.4592	0.18106
Gain Control	40	–20	0.34	0.0983	0.11216

Based on **Table 5**, it can be seen that the average gain of the experimental group is higher than the control group. Thus, it can be said that there is a tendency that learning by implementing ethnomathematics and the Mozart effect increases the variability of students' mathematical problem-solving skills in analytical geometry lectures.

A comparison of two means was done to determine the difference between the gain of students in the experimental group and the control group. For determining the type of test to be used, a normality and homogeneity tests are carried out. The normality test used is one-sample Kolmogorov Smirnov. The results show that the p-value of the experiment group is 0.142 ($> \alpha$) and the p-value of the control group is 0.091 ($> \alpha$), so it can be concluded that the gain achieved by the experiment group and the control group are normally distributed at a significance level of $\alpha = 0.05$. And next, a homogeneity test was done the Lavene test because there are two groups of data were tested. The results show that the p-value of the experiment group and the control group is 0.136 ($> \alpha$). It can be concluded that the experiment group and the control group have a homogeneous variance.

After the two sample groups were stated to be normally distributed and have a homogeneous variance, a normalized gain mean difference test was then performed, and the results of which can be seen in **Table 6**.

Table 6. Mean Difference Test of Normalized Gain

	Sum of Square	df	Mean Square	F	Sig.
Between Groups	2.606	1	2.606	114.921	0.000
Within Groups	1.769	78	0.23		
Total	4.375	79			

Table 6 describes that the p-value is 0.000, which is < α. That is, there is a difference mean of gain in the mathematical problem-solving skills between students of the experimental group and the control group, so it can be concluded that the gain of the students’ mathematical problem-solving skills who get learning by implementing ethnomathematics and the Mozart effect with students who get direct instruction is significantly different, and the gain of the students’ mathematical problem-solving skills of the experimental group was higher than the control group. It is because Mozart K.448’s music which is played during the learning process can stimulate the brain by associating academic content with real life so that it can improve the students' academic abilities **[50]**.

3.3 Results of Students' Mathematical Disposition Analysis

After receiving mathematics learning for three meetings, students of the experimental group and the control group filled out the mathematical disposition scale. This disposition scale is in the form of a Likert scale, which contains 12 statements. The scale is used to determine students' mathematical disposition towards the implementation of ethnomathematics and the Mozart effect and students' mathematical disposition who received direct learning in analytical geometry lectures. Descriptive statistics testing should be done to obtain a description of the data obtained from the results of mathematical disposition. Descriptive statistics of the mathematical disposition scale are presented in **Table 7**.

Table 7. Descriptive Statistics of Mathematical Disposition

	N	Minimum	Maximum	Mean	Std. Dev
DisMath_Exp	40	22	42	35.35	4.347
DisMath_Cont	40	18	27	21.86	3.081

For determining the difference between mathematical disposition of students in the experimental group and the control group after they received the treatments, the comparison of two means was carried out. The normality and homogeneity tests are done to determine the type of test to be used, and the normality test used is a one-sample Kolmogorov Smirnov. The results show that the p-value of the experimental group is 0.092 and the p-value of the control group is 0.064, which is $> \alpha$. It can be concluded that the mathematical dispositions of students in the experimental group and the control group are normally distributed at a significance level of $\alpha = 0.05$. Because there are two groups of data were tested, so a homogeneity test was carried out the Lavene test. The results show that the p-value of the experimental group and the control group is 0.095 ($> \alpha$), and it can be concluded that the experimental group and the control group have homogeneous variance. Next, the mean difference test of mathematical disposition was done using a one-way ANOVA. The results of mean difference test of the mathematical disposition of students in the experimental group and the control group can be seen in **Table 8**.

Table 8. Mean Difference Test of Mathematical Disposition

	Sum of Square	df	Mean Square	F	Sig.
Between Groups	3655.276	1	3655.276	42.628	0.000
Within Groups	1932.421	78	83.207		
Total	5587.697	79			

Table 8 shows that the p-value is 0.000 ($< \alpha$). Therefore, it can be concluded that there is mean difference between mathematical disposition of students in the experimental group and the control group. Based on **Table 7**, it can be seen that the average score achieved by students of the experimental group was higher than the control group. It can be concluded that mathematical disposition of students who received mathematics learning by implementing ethnomathematics and the Mozart effect were better than students who received direct instruction.

3.4 Analysis Result of Students' Attitudes towards Learning by Implementing Ethnomathematics and the Mozart Effect

In order to get information regarding students' attitudes and their motivation toward learning by implementing ethnomathematics and the Mozart effect in analytical geometry lectures for three meetings (only given to students of experiment group), a Likert scale questionnaire was used. The questionnaire is not used to see students' formed attitudes, but only for getting information about their attitudes towards the learning they have received. The attitudes referred to is whether the students feel interested and motivated to learn or even feel not interested and motivated at all. This questionnaire includes ten statements. Filling out the questionnaire was done after students had finished learning by implementing ethnomathematics and the Mozart effect. The questionnaire was analyzed descriptively. The recapitulation of students' attitude questionnaire analysis results is presented in **Table 9** and the recapitulation of the percentage index of statement items can be seen in **Table 10.**

Tabel 9. Recapitulation of the Students' Attitude Questionnaire Analysis Results

Score	Frequency
15 - 20	2
21 - 26	7
27 - 32	26
33 - 38	5
Total	40
Average	28.93

Table 10. Recapitulation of Percentage Index of Statement Items

Interpretation	Statement Item to	Number of Statements Items
Agree	1, 3, 4, 6, 7, 8, 10	7
Strongly Agree	2, 5, 9	3
Amount		10
Average Index (%)		73.261

Table 10 describes that the average percentage index achieved was 73.261 %. It means the students of the experimental group agreed (interested) and were motivated to learn mathematics by implementing ethnomathematics and the Mozart effect in analytical geometry lectures on the topic of lines equations and planes in space. The students' learning outcomes are influenced by several factors, one of which is their attitudes and motivation to learn, so if students are interested and motivated to learn, students' learning outcomes can increase **[49]**.

4. CONCLUSIONS

Based on the results of the mathematical problem-solving skills test analysis show that there is a mean difference between the mathematical problem-solving skills of students who received mathematics learning by implementing ethnomathematics and the Mozart effect, and students who received direct instruction. It can be seen from the p-value is 0.000 ($< \alpha$) and the average of post-test (test of mathematical problem-solving skills) score of students who achieved mathematics learning with implementation of ethnomathematics and the Mozart effect was higher than students who received direct instruction. It means, mathematical problem-solving skills of students who received mathematics learning by implementing ethnomathematics and the Mozart effect are better than students who achieved direct instruction in geometry analytical lectures. The results of normalized gain analysis show that there is difference mean of gain in the mathematical problem-solving skills between students who got mathematics learning with implementation of ethnomathematics and the Mozart effect, and students who got direct instruction. It's shown with the p-value $< \alpha$, which is 0.000, and the gain of the mathematical problem-solving skills of students who received mathematics learning using implementation of ethnomathematics and the Mozart effect was higher than students who received direct instruction. It can be concluded that implementation of ethnomathematics and the Mozart effect can improve the students' mathematical problem-solving skills. The results of the students' mathematical disposition analysis show that there is a mean difference between the mathematical disposition of students who got mathematics learning with implementation of ethnomathematics and the Mozart effect, and students who got direct instruction. It can be seen from the p-value $< \alpha$, which is 0.000 and the average score achieved by students who received mathematics learning using implementation of ethnomathematics and the Mozart effect was higher than students who received direct instruction. It can be concluded that implementation of ethnomathematics and the Mozart effect can improve the students' mathematical disposition. Based on the results of the students' attitudes questionnaire analysis found that the average percentage index achieved was in the range of 60 %-79.99 %. It means, students are interested and motivated to learn mathematics by implementing ethnomathematics and the Mozart effect. These results indicate that implementation of ethnomathematics and the Mozart effect can improve students' mathematical problem-solving skills and mathematical disposition in analytical geometry lectures during the transition period from the pandemic to endemic COVID-19.

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