Students' Mathematical Problem-Solving Ability in Mobile Learning with Microsoft Kaizala Application

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Abstract

This research was motivated by the fact that the mathematical problem-solving ability of junior high school students during the Covid-19 pandemic in Indonesia was low. The strategy and approach used in learning mathematics are success factors in the mathematics learning process. One of the objectives of this research is to analyze the mathematical problem-solving ability of junior high school students using mobile learning with the Microsoft Kaizala application. The method used in this research is an experiment with a Pre-Experimental Design Research and One-Group Pretest-Posttest Design Research Design. The research was conducted at SMPN 50 Satap Oku, Ogan Komering Ulu Regency, South Sumatra Province. The results showed that the final mathematical problem-solving ability of students who received learning using mobile learning with the Microsoft Kaizala application was better than the students' initial mathematical problem-solving ability and the average percentage of students' mathematical problem-solving ability achievement after using the Microsoft Kaizala application was 85.16% (excellent). It means that the students' problem-solving ability is getting better after using mobile learning with Microsoft Kaizala application.

Keywords: Learning in Covid-19 pandemic, Mathematical problem-solving, Microsoft Kaizala

INTRODUCTION

The advanced technology could be seen in the use of smartphones in children. Many children use it starting from the elementary schools. It is based on a survey conducted by the Ministry of Information and UNICEF in 2014 which also illustrates that most children and adolescent who use gadgets are used to seek information, establish social relations, and have entertainment (Kominfo, 2014). We could look at the high use of smartphone in students age, but the utilization for education still be relatively minimal. The time students have for learning is spent with smartphones. It is in line with Ghozi (2014) that student learning routines are increasingly disrupted because student study time used to operate smartphones for social networking on the internet. Therefore, at this time it is necessary to use technology especially smartphones for education which can make in the form of learning media. Especially in the current Covid-19 pandemic, almost all learning is carried out online.

Wahyono and Yunianta (2018) argues that mobile learning media is very effective in learning mathematics. Learning media is a tool used in the teaching and learning activities to stimulate interest in learning and generate student motivation in participating in education (Srianis et al., 2014). According to (Sumartini, 2016) mathematics plays an essential role in various aspects of life, especially in increasing the power of human thought. Therefore, mathematics is one of the crucial subjects required at every school level from elementary to high school. The Ministry of National

education (Sumartini, 2015) says that learning mathematics in school aims to train thinking and reasoning in concluding, improve problem-solving skills, and improve the ability to convey information or communicate ideas through oral, written, graphic, image, diagrammatic, maps and so on, because it prepares students to be able to use mathematics and mathematical thinking in everyday life so that students are expected to apply mathematics is solving everyday problem. Based on The National Council of Teachers of mathematics (NCTM, 2000) there are five abilities that students must possess in learning mathematics, namely problem-solving skills, reasoning skills, communication skills, connection skills, and representation skills. To achieve the objectives of learning mathematics, students must have some basic mathematical abilities.

One of the essential abilities in learning mathematics is problem-solving ability. Nayazik (2017) stated that problem-solving ability is an essential component of the mathematics curriculum there is a core of mathematical activities so that mathematical problem-solving abilities among students need to get attention in learning. They were learning mathematical problem-solving needs to be developed from an early age because it can help students solve everyday problems in their lives. This is because students can gain experience in using knowledge and skills to solve non-routine problems. The more often they practice solving mathematical problems, the more experience they gain, thus encouraging students to become good problem solvers. (Polya, 2004) suggest that there are four stages in solving problems, namely understanding the problem, developing the plan, carrying out the plan, and results interpretation. Furthermore, according to the opinion (Rahayu & Afriansyah, 2015) problem-solving ability is one that students must possess. Problem-solving is an essential and fundamental ability, which means problem-solving is primary or crucial. Meanwhile, (Setiawan et al., 2020) states that problem-solving skills can be trained formally in schools through learning and assessment. Teachers should create a learning climate that can facilities the development of students' problem-solving abilities. From several statements that several experts have put forward, it shows that the ability to solve mathematical problems is crucial for all students, especially in learning mathematics.

However, the facts on the ground are very different, based on survey by The Programme for International Students Assessment (PISA) an initiation program by the organization for Economic Co-operation and Development (OECD) that aims to evaluate the global education system. PISA conducts assessments focused on reading, math, and science skills in 15-year-olds every three years. In 2001, Indonesia participated in PISA for the first time. However, Indonesia's achievement at PISA 2018 is still ranked 72 out of 77 countries, with a student's mathematical ability score of 379. This score is still below the average score of 489. One of the factors causing the low score of students on mathematics competence is the lack of solving ability problems in learning mathematics (OECD in Annizar et al., 2020). The school also experiences this problem. The population of this study shows that students' mathematical problem-solving abilities are still relatively low, as can be seen from the test results, which can see in Figure 1.

From the student's answers, it was apparent students still understood solving problems of mathematical problem-solving abilities, saw from the early stages of understanding the problem that it was less precise in determining the issue than what was stated in the question, then at the scene of planning the problem the student was also less accurate, then at the stage of implementing the plan. Also, the student was wrong, who should have used the Pythagorean Theorem instead of utilizing another

concept, and the last step of interpreting the answer was not carried out. It saw from the results of the details of students solving problems students' mathematical problem-solving abilities are still meagre. Judging from these facts, it shows that the mathematical problem-solving ability of students in Indonesia is still relatively low compared to other countries. It is essential to have a learning model and strategy that can improve students' mathematical solving abilities in learning mathematics. Students can learn actively and can achieve the desire learning goals. In the condition of the Covid-19 pandemic attacking Indonesia, the Covid-19 pandemic in Indonesia has occurred since 2020. Many things have been harmed by the impact of this pandemic, such as the industrial sector and the economy, education, etc. One of the regulations made by the Indonesian government is to impose PSBB or Pembatasan Sosial Berskala Besar (Large-Scale Social Restrictions) in big cities and even in the regions. This has a terrible impact, especially in education, because the pandemic of learning mathematics is carried out online at all levels, both in urban and regional areas.

Figure 1. The student's answer to mathematical problem-solving

The researchers are challenged to find alternative learning methods during the Covid-19 pandemic, namely learning using e-learning. The learning in question is also an alternative solution to students' low mathematical problem-solving ability. The alternative solution is to choose the correct application. One of the alternatives selected by the researcher is to apply the Microsoft Kaizala because, according to several sources, the application is safe for teachers and students to use in communicating, collaborating, and discussing and is easily accessible and also easy to use as well as learning support that can improve students' mathematical problem-solving skills is the Microsoft kaizala. Application Microsoft Kaizala is a message management application. This messaging application is safe for its users, which allows it to collaborate with other people inside and outside the user's organization. Can send and receive message instantly, coordinate tasks, and send invoices. Through Microsoft kaizala expected that students could learn actively, be able to discuss interactively, think critically, and solve mathematical problems well. So far, there have been studies related to relevant research

conducted by (Parlina et al., 2021) students' mathematical problem-solving abilities using The E-learning assisted by The Kaizala Application. Still, the application in previous research only uses applications in the learning process. During the Covid-19 pandemic (Sari et al., 2021) the study's results stated that the teaching materials developed were appropriate to support and facilitate students in problem-solving exploratory activities. However, in these two studies, preparation teaching materials have not utilized the advantageous action survey feature. Therefore, this research wants to examine the use related to Microsoft Kaizala Application to measure the ability of each indicator component of understanding students' mathematical problem-solving skills, which is also strengthened by research (Balkist et al., 2021) the achievement of implementing the Microsoft Kaizala Application that math teachers did in the learning process during the pandemic reached 146% in quantity and enthusiasm. The research results conducted by (Nikmah et al., 2020) through the media of math mobile learning can improve mathematical problem-solving abilities, student learning activities, and teaching skills in the teaching and learning process.

RESEARCH METHOD
This research uses an Experimental Study with the type of research Pre-Experimental Design, which include one group or class given pre and post-test. This one-group and post-test design were carried out on one group without any control or comparison group (Sugiyono, 2014). Pre-Experimental Design and One Group Pre-test Post-test Design were applied in this study to compare students' mathematical problem-solving abilities before and after using the Kaizala application. The sample in this study was one of the classes at SMP Negeri 50 Oku for the 2020/2021 academic year. Namely, class VIII A with 15 students. The procedure in this study is divided into three stages: the planning ore preparation stage, the implementation stage, and the completion stage. The instrument used was five questions describing the mathematical problem-solving ability test. Obtain information about the process and learning outcomes applied. An instrument consisting of a test instrument (mathematical problem-solving ability test) and non-test instruments (observation sheet, Google form questionnaire) was used.
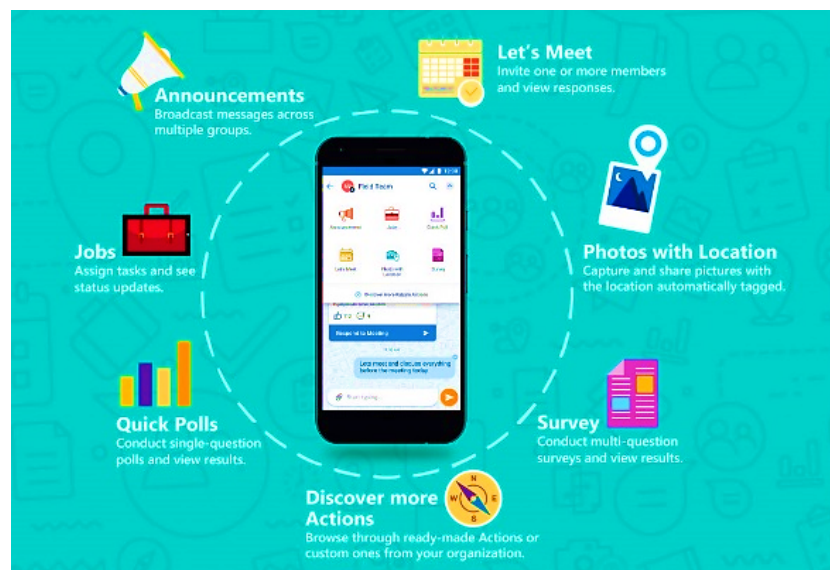

Figure 2. Features on Microsoft Kaizala

Microsoft Kaizala is a chat application that allows users to send and receive messages quickly and easily and can collaborate with other people. In addition, Microsoft Kaizala is also able to make calls, coordinate tasks, take actions, collect feedback, create reports, create attendance lists and other conveniences that can be done anywhere and anytime. So this application is very suitable for use by individuals, organizations, and communities, and can also be used by teachers and students in online learning activities (Kaizala, 2020). In Figure 2, several features of Microsoft Kaizala are presented that can be used in online learning.

RESULTS AND DISCUSSION

The research results describe are the data on students' mathematical problem-solving ability test scores, which will then be presented regarding data analysis and processing.

Chronology of Using Kaizala Features in Mathematics Learning

In learning mathematics, of course, the use of the Microsoft Kaizala application makes it very easy for teachers and students in the online learning process. Some of the features that can be used include inviting friends, starting and chatting, making calls, creating groups, inviting group members, organizing groups, giving announcements, conducting questions and answers through Q&A, checking attendance, making assignments for students, and making quizzes, conducting surveys, provide learning feedback, and use the Microsoft Kaizala application via the web.

The invite friend feature can be accessed using the "people" menu, then select the name of the contact you want to make a friend, then click the invite button then the invited contact will automatically receive a notification in the form of an SMS containing a link to access the Microsoft Kaizala application. In addition, if we have connected with a friend's contact, and then we can chat on Microsoft Kaizala. This chat feature can be done either through private messages or messages in groups that can contain text, images, videos, or voice recordings. Not only that, but Microsoft Kaizala can also make calls that allow users to communicate directly via voice calls or video calls. The user can click on the available voice or video call icon to initiate a call.

Microsoft Kaizala can also perform group formation, and invite group members and group management. The steps taken to access these features are the same as in the WhatsApp application and are not much different. Furthermore, after the group is created, we can access other features, such as giving announcements. In this feature, we can use the "announcement" menu so that announcements will easily appear for each group member. Then we can ask questions using the "Q&A" menu, check student attendance using the "attendance" menu, give assignments to students using the "task" menu, give quizzes to students by clicking on the attachment icon and select "action quiz", conduct a survey learning using the "survey" menu, conducting learning feedback can be adjusted and developed by the teacher using the "Q&A" or "Survey" feature, and this Microsoft Kaizala application can also be accessed via the web, namely through the "Kaizala Web" menu so that on laptops/computers and the user's cellphone will be able to connect. The flow of the use of the Microsoft Kaizala application in learning mathematics in this study is shown in Figure 3.

This application also has advantages including the facility that can view group history. So that if there are new group members who enter, the member can see the posts that have been given previously. Thus the teacher does not need to repost materials or documents if there are new members added to the group (Kaizala, 2020).

1. **Problem Presentation**

2. **Trial and Error**

3. **Data Collection**

4. **Data analysis**

5. **Creating a Hypothesis**

6. **Conclusion**

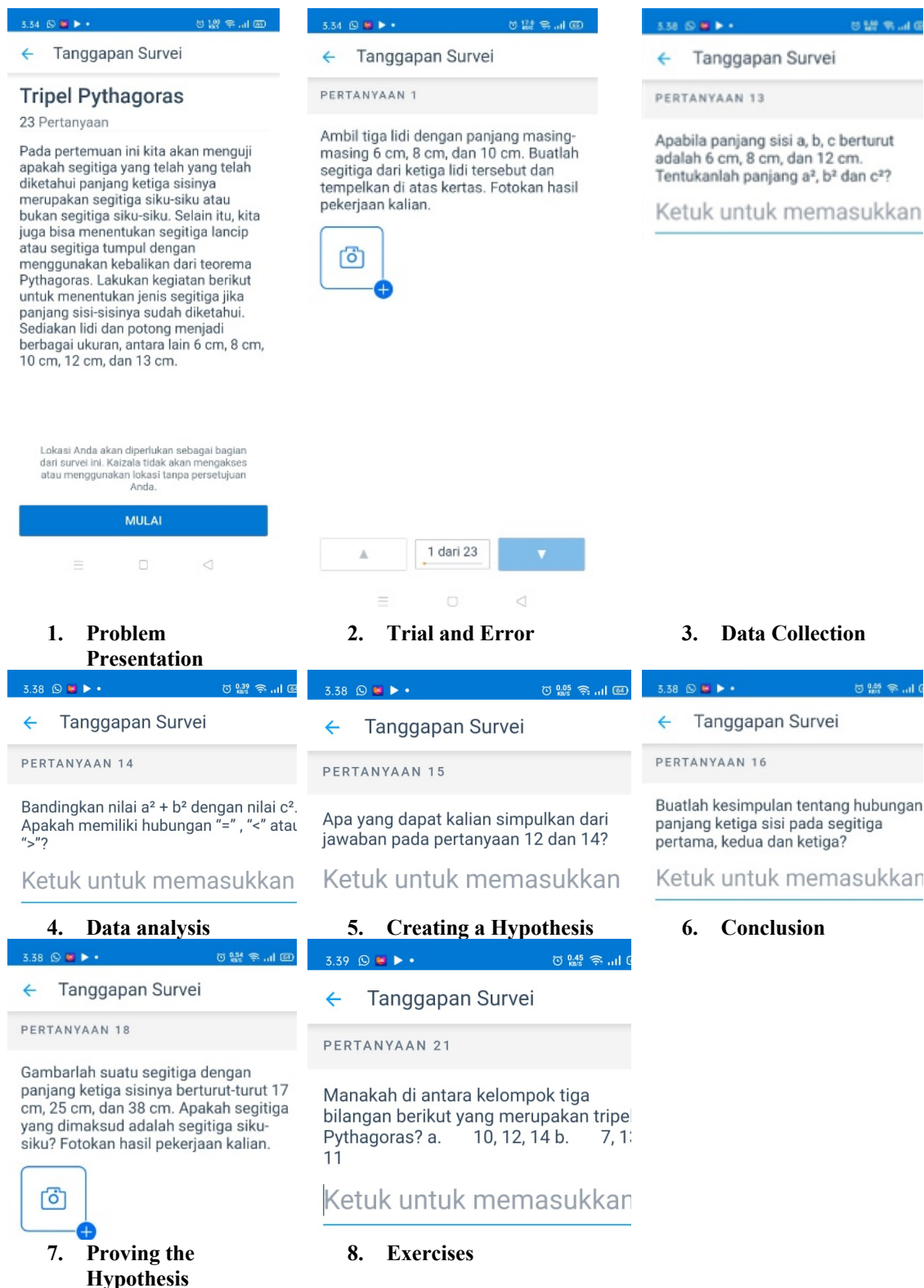7. **Proving the Hypothesis**

8. **Exercises**

Figure 3. The flow of Microsoft Kaizala application use in mathematics learning

The use of Microsoft Kaizala in online learning can improve students' mathematical problem-solving abilities. Based on research Susilawati (2020) states that the use of the Microsoft Kaizala application by utilizing the features contained in the application can improve students' ability to think mathematically. Thus, this application can also improve students' mathematical problem-solving ability.

Results Analysis of Students' Mathematical Problem-Solving Ability
At the analysis stage, it was found that the eighth-grade students of SMPN 50 Oku Satap Oku were less involved in online learning activities. Data analysis was conducted to determine whether students' mathematical problem-solving abilities after receiving learning using the Kaizala application were better than early students' mathematical problem-solving abilities obtained from the results of statistical tests using SPSS version 17 (See Table 1).

Table 1. Statistical Description

	N	Minimum	Maximum	Mean	Std. deviation
Pre-test	15	30	66	48.93	9.881
Post-test	15	70	92	82.13	6.610
Valid N (Listwise)			15		

From the statistical description data, it was found that the average score of students on the pre-test was 48.93 with a standard deviation of 9.881 while the average score of the students on the final test (post-test) was 82.13 with a standard deviation of 6.610. From the descriptive data, it can be seen that the post-test score is greater than the pre-test score, with a difference in the average score of 33.2. Furthermore, the data must be tested using The Paired Sample T-Test if the data is normally distributed, whereas if the data is not normally distributed, a Non-Parametric with The Wilcoxon Signed Ranks. So before doing The T-Test or Non-Parametric Test, the data is tested first whether it is normally distributed or not. Furthermore, the results of the normality test are presented in Table 2.

Table 2. Population Distribution Normality Test

Data	*Shapiro-Wilk*	
	Significance	Description
Pre-test	0.976	Normally Distributed
Post-test	0.684	Normally Distributed

Based on Table 2, the normality test results using The Shapiro-Wilk Test obtained a pre-test significance value of 0.0976 > 0.05 and a post-test significance value 0.684 > 0.05 which means that the pre-test and post-test are normally distributed.

Table 3. Population Distribution Normality Test

Data	Kolmogorov-Smirnov	
	Significance	Description
Pre-test	0.200	Normally Distributed
Post-test	0.200	Normally Distributed

Based on Table 3, the normality test results using The Kolmogorov-Smirnov Test obtained a pre-test of 0.200 > 0.05 and a post-test 0.200 > 0.05 which means the data

comes from a normal distribution. Then the next test is to test The Homogeneity. From the results of the analysis of The Homogeneity Test, it can be seen in Table 4.

Table 4. The Homogeneity Test

Levene Statistic	df1	df2	Sig
1.830	1	28	0.187

Based on Table 4, it can be seen that the results of the homogeneity test show a significant value of 0.187 which means 0.187 > 0.05 it can be said to be homogeneous variants. So, it can be conclude that the classes before and after using The Microsoft Kaizala homogenous variants. Because the prerequisite test data are normally distributed and homogeneous, the next test uses a parametric test of The Paired Sample T-Test. The results of the calculation analysis can be seen in Table 5.

Table 5. The Paired Sample T-Test Results

Pre-test Post-test	
Pair 1.Sig (2-tailed)	Description
0.000	H_0 rejected

Based on Table 5, a significance value of 0.000 is obtained, meaning that the significance value of the Paired t-test test data from the pretest and post-test results is smaller than 0.05, so (H_0 is rejected). So it can be concluded that the mathematical problem-solving ability of final students after receiving learning using the Microsoft Kaizala application is better than the mathematical problem-solving abilities of early students in other words the post-test results are better than the pretest results. This happens because the Microsoft Kaizala application can provide convenience in learning and provide convenience in improving students' mathematical problem-solving abilities (Mustakim, 2020; Parlina et al., 2021). In addition, the use of Microsoft Kaizala during online learning is very good and has a positive effect on learning (Yulianto, 2020).

This increase in students' mathematical problem-solving abilities after using Microsoft Kaizala occurs because it is proven to be able to provide convenience to students and teachers through the available features (Parlina et al., 2021). Some of the features found in Microsoft Kaizala include being able to access material in the form of videos, documents and photos. Microsoft Kaizala can also carry out continuous discussions between teachers and students in class groups that have been created by the teacher, give announcements in class, conduct questions and answers through the Q&A menu, check student attendance, take quizzes, provide learning feedback, and conduct surveys.

Analysis of Achievement of Mathematical Problem-Solving Ability
This analysis was taken from the results of the final test (post-test) of students' mathematical problem-solving abilities, to know how students' mathematical problem-solving abilities were after learning using The Microsoft Kaizala. The following is the frequency of students' mathematical problem-solving abilities after using The Microsoft Kaizala Application.

From Table 6 it can be seen that the frequency of the post-test results with the first indicator, namely understanding the problem, is 96.66%, as well as the frequency of the post-test results, the second indicator, namely planning the problem, is 74.66%,

while the frequency of the posttest results with the third indicator, namely implementing the plan. is 73.33%, and the frequency of posttest results with the last indicator interpreting the results obtained is 96%. So that the overall average indicator of students' mathematical problem-solving ability is 85.16%. So it can be concluded that the achievements made by students in problem-solving ability using mobile learning assisted by the Microsoft Kaizala application overall have an excellent interpretation.

Table 6. Achievement indicators of Mathematical Problem-Solving Ability

No	Indicators	Frequency of Percentage (%)	Criteria
1	Understanding the problem	96,66	Excellent
2	Developing the plan	74,66	Good
3	Implementing the plan	73,33	Good
4	Results Interpretation	96,00	Excellent
	Average of Mathematical Problem-Solving Ability	85,16	Excellent

The final mathematical problem-solving ability of students after getting mobile learning assisted by the Microsoft Kaizala application can be better, because in the Microsoft Kaizala application there is a group chat feature that allows students to discuss and collaborate in understanding the ongoing learning. In this case, the discussion is related to social interaction. So that students who have more understanding can share their understanding with students who do not understand in the ongoing learning. This is also reinforced by the results of research (Hidayah & Aulia, 2015) that students' problem-solving abilities in learning mathematics after using the MMP learning model are in the good category for steps to understand problems, plan solutions, and carry out settlement plans and re-examine.

Another relevant research from this research is research by (Parlina et al., 2021) that the final mathematical problem-solving ability of students after receiving learning using the Kaizala application is better than the students' initial mathematical problem-solving abilities. It is also strengthened by the results of research (Nuryadi, 2019) showing that the Android-based mobile learning mathematics learning media meets the valid, practical and effective criteria in terms of problem-solving abilities. Furthermore, based on research from (Amalia, 2021) stated that student learning outcomes during the Covid-19 pandemic decreased, but after using the Microsoft Kaizala application, students' ability to solve problems and student learning outcomes increased well. Not only that, the results of research conducted by (Nurlaela et al., 2022) show that by using the Microsoft Kaizala application some positive differences and improvements make students able to solve problems on math problems properly and precisely. This means that the results of the studies that have been carried out indicate that any type of mobile learning can be applied to mathematics learning during the Covid-19 pandemic and assist students in exploring mathematical problem-solving abilities.

The existence of digital platforms such as Microsoft Kaizala used in online learning is also able to have a good influence on improving the quality of education (Kusumaningrum & Wijayanto, 2020). The impact of this research can also provide positive things in the development of learning technology for students and schools, although it has obstacles in terms of facilities and others (Septian & Komala, 2019).

CONCLUSION

Based on the results of the research and the results of the analysis of students' mathematical problem-solving abilities conducted at SMP Negeri 50 OKU for the 2020/2021 academic year which involved 15 students, it concluded that the final mathematical problem-solving ability of students who received learning using mobile learning assisted by the Microsoft Kaizala application better than the students' initial mathematical problem-solving ability, in other words, the posttest results are better than the pretest results. And the achievement of students' mathematical problem-solving skills after getting learning using the Microsoft Kaizala application has an excellent criteria.

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