

## THE EFFECTIVENESS OF IMPROVING STUDENT MATHEMATICS LITERACY THROUGH THE USE OF THE FACEBOOK APPLICATION

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### Abstrak

Penelitian ini dilatar belakangi oleh masih rendahnya literasi matematika siswa di Indonesia. Salah satu cara yang dapat dilakukan untuk meningkatkan literasi matematika adalah dengan memanfaatkan kemajuan Teknologi Informatika dan Komunikasi (TIK) yang berkembang saat ini ditandai dengan hadirnya berbagai macam aplikasi media sosial. Tujuan penelitian ini adalah untuk mengetahui efektivitas pemanfaatan aplikasi *facebook* terhadap literasi matematika. Penelitian ini dilakukan di SMA Negeri 1 Dolok Sigompulon Kabupaten Padang Lawas Utara pada semester ganjil tahun ajaran 2021/2022. Populasi dalam penelitian ini adalah seluruh siswa kelas XI SMA Negeri 1 Dolok Sigompulon Kabupaten Padang Lawas Utara. Sampel dalam penelitian ini adalah siswa kelas XI IPA 1 SMA Negeri 1 Dolok Sigompulon Kabupaten Padang Lawas Utara. Metode penelitian yang digunakan dalam penelitian ini adalah pendekatan kuantitatif deskriptif. Pengumpulan data dilakukan dengan angket dan tes. Teknik analisis data dalam penelitian ini adalah analisis deskriptif. Hasil penelitian ini menunjukkan bahwa pemanfaatan aplikasi *facebook* tergolong efektif dalam meningkatkan literasi matematika siswa. Terlihat dari hasil instrumen angket yang menunjukkan bahwa pemanfaatan aplikasi *facebook* terhadap literasi matematika masuk dalam kategori "sangat baik". Begitu juga dengan instrumen tes kemampuan literasi matematika dengan pemanfaatan aplikasi *facebook* menunjukkan hasil yang termasuk kedalam kategori "baik".

**Kata Kunci :** Aplikasi *Facebook*; Efektivitas; Literasi Matematika

### Abstract

This study is informed by the poor level of mathematics literacy among Indonesian students. One strategy to improve mathematics literacy is to leverage innovations in Information and Communication Technology (ICT), which are now undergoing rapid development, as seen by the availability of different types of social media applications. The aim of this study was to investigate the effectiveness of the Facebook application in improving mathematics literacy. This research was conducted in the odd semester of the 2021/2022 academic year at the State Senior High School 1 of DolokSigompulon (SMAN 1 DolokSigompulon), North Padang Lawas Regency. All the students in class XI were included in this study. Students in class XI-Science 1 served as the sample in this study. The descriptive quantitative methodology was adopted in this investigation. Questionnaires and tests are used to collect data. The descriptive analysis technique was included in this study. The results of this research indicate that using the Facebook application to improve students' mathematical literacy is quite effective. As evidenced by the questionnaire instrument's results, using the Facebook application for mathematical literacy is "very good." Similarly, the test instrument for mathematical literacy skills, which utilizes the Facebook application, yields "good" results.

**Keywords:** Effectiveness; Facebook Application; Mathematics Literacy



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## INTRODUCTION

Mathematics is a discipline that is critical in many aspects of life, including the field of education (Hayati & Kamid, 2019). Further, mathematics is the foundation of all sciences (Theresa, 2016). It is because mathematics is capable of addressing a large number of difficulties in human existence. To answer these difficulties, however, we must be able to comprehend and grasp mathematical principles spanning from the simplest to the most complicated (Winarso, 2014). When we can grasp mathematical principles, explain them, and use them to solve problems, we have achieved mathematics literacy.

Mathematics literacy refers to an individual's capacity to define, apply, and translate mathematics in a variety of dimensions. It also refers to the ability to think mathematically by utilizing mathematical theories, methods, data, and media to describe, explain, and project occurrences (Mansur, 2018). At the moment, the term "mathematics literacy" is rarely heard by the majority of students and individuals in Indonesia. This is directly proportionate to the degree of mathematics literacy achieved by students in Indonesia, which is regarded as extremely low (Hilaliyah, Sudiana, & Pamungkas, 2019). Based on the results of research conducted by the *Programme for International Student Assessment* (PISA) in the field of mathematics, it shows that the mathematics literacy ability of students in Indonesia is ranked 39th out of 40 countries that were used as research samples in 2003 (Kuswidyanarko, 2017). Then the results of the PISA research show that Indonesian students are ranked 38th out of 41 countries in 2006 (Kembara, Hanny, Gantina, & Kusumawati, 2020). Three years later,

PISA results showed Indonesian students were ranked 61st out of 65 countries (Wardono, Waluya, Mariani, & Candra, 2016). Then, finally, the results of the PISA research show that the mathematics literacy ability of Indonesian students is ranked 62 out of 70 countries in 2015 (Afriyanti, Wardono, & Kartono, 2018). This shows that mathematics literacy in Indonesia is still very low.

In terms of efforts to improve students' mathematics literacy skills, the teaching and learning process must be able to attract students' attention and as much as possible take advantage of the current advances in Information and Communication Technology (ICT) (Gradini, 2019). The progress of Information and Communication Technology (ICT) that is currently developing is marked by the presence of various kinds of social media applications in cyberspace such as Facebook, Instagram, Twitter, Telegram, WhatsApp, Youtube, Tik Tok and so on (Marechal, 2016).

Hootsuite (We Are Social): Indonesian Digital Report 2021 published data on internet and social media users in early 2021. Of Indonesia's 274.9 million overall population (population), up to 345.3 million (125.6%) are unique mobile users, up to 202.6 million (73.7%) are internet users, and up to 170 million (61.8%) are active social media users (Figure 1).



Figure 1. Data on internet and social media users in indonesia in 2021

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As can be observed from these statistics, Indonesia has a relatively high rate of active social media users. Previously, the Ministry of Communication and Informatics published figures on Indonesia's internet users in 2019, which totaled 63 million. 95% of data users access social media and are classified as being of learning age. With statistics on social media users by age, it is 16.68% for those aged 13 to 18 years and 49.52% for those aged 19 to 34 years; the remainder are above 34 years old (Sibuea, Sembiring, & Agus, 2020). This means that the largest social media users after adulthood are students at the junior high and high school levels. From this data, the most accessed social media is Facebook. However, the high number of Facebook social media users including learning ages, both junior high and senior high school has not been optimally utilized to support the process of teaching and learning activities for students (Al-Rahmi, Othman, & Yusuf, 2015).

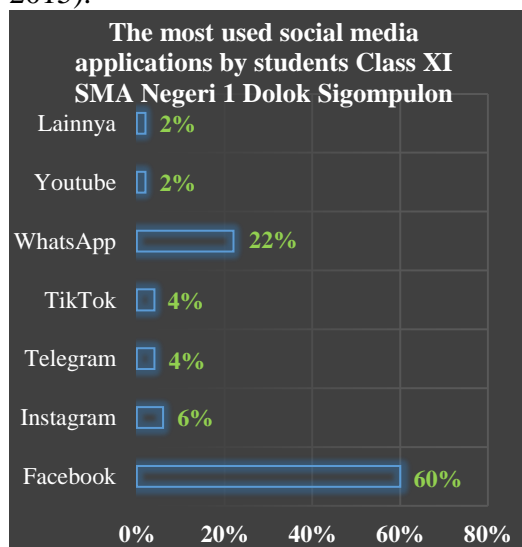


Figure 2. Graph of the preliminary research survey

Based on the results of an initial survey (Figure 2) conducted on class XI students of State Senior High School 1 of Dolok Sigompulon (SMAN 1 Dolok

Sigompulon), about the most preferred and most frequently used social media application in daily activities to communicate, learn or add insight, through the google form link distributed to students, and of the 50 student answers, 60% of students chose Facebook, 22% of students chose WhatsApp, 6% chose Instagram, 4% chose Telegram, 4% chose Tik Tok, 2% chose Youtube and 2% chose others.

Thus, based on the results of the initial survey, the researchers selected Facebook as the social media application that would be used to investigate the efficacy of social media use in improving students' mathematics literacy.

Mark Zuckerberg launched the Facebook application in 2004 (Lauren Hoffman, Proferes, & Zimmer, 2018). With the advancement of technology, this application is no longer used just as a way of communicating or for "status updates" (Muhlis, Jasad, & Halik, 2018). Facebook is currently being used for political and business purposes, as well as integration into the educational system (Hadi, 2016). As seen by the numerous web pages of educational institutions in Indonesia and overseas, Facebook is one of the mandatory symbols on these sites' main pages. Facebook is another social media platform that may be used to aid with learning (Saddhono, Hasibuan, & Bakhtiar, 2019). Because the Facebook application is equipped with features such as Facebook messenger, Facebook group, Facebook share, Facebook video, and the most educationally impactful one is the Facebook page feature or Facebook fanspage, where there are many fanpages with educative content and also related to mathematics literacy.

However, this Facebook application has not been fully leveraged

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to assist active learning activities aimed at improving the students' mathematics literacy skills (Safitri, Pasaribu, Simamora, & Lubis, 2019).

The researcher wishes to perform a study on the efficacy of using the Facebook application on students' mathematics literacy based on the description of the issues mentioned. As such, the aim of this study was to investigate the effectiveness of the Facebook application in improving mathematics literacy.

## **METHOD**

The descriptive quantitative methodology employed in this study attempts to reveal something as it is. According to Arikunto (2021), The purpose of descriptive study is not to test a particular hypothesis, but to simply summarize what is discovered about a variable. According to Arikunto (2021) with a quantitative approach, many studies are required to employ numbers from the start of data collection to analysis and presentation of study findings. Thus, it can be stated that the purpose of quantitative descriptive research in this study is to ascertain, review, and quantitatively characterize the item under investigation in its current state, and to form conclusions about it in line with the phenomena seen throughout the research.

This research was conducted at State Senior High School 1 Dolok Sigompulon (SMA Negeri 1 Dolok Sigompulon), North Padang Lawas Regency in the odd semester of the 2021/2022 academic year. The population in this study were all the students of class XI in State Senior High School 1 Dolok Sigompulon (SMA Negeri 1 Dolok Sigompulon), North Padang Lawas Regency which consisted of 3 classes, namely class XI-Science 1,

class XI-Science 2 and class XI-Social which amounted to 102 students. The technique used in sampling is the cluster random sampling technique. According to Sugiyono (2017) cluster random sampling technique is a sampling technique used to determine the sample if the object to be studied is very broad. Azwar (2016), sampling by means of cluster sampling is to randomize certain groups and not on individual subjects. The samples in this study were students of class XI-Science 1 of State Senior High School 1 of Dolok Sigompulon (SMA Negeri 1 Dolok Sigompulon), North Padang Lawas Regency, totaling 30 students.

Questionnaires and tests were used to collect data for this investigation. In this study, the questionnaire approach will be utilized to collect data on the usefulness of using Facebook applications for learning, particularly in terms of mathematics literacy. The test data collecting approach will be utilized in this study to assess the students' mathematics literacy abilities.

Questionnaires and tests were used as research instruments in this study. The questionnaire tool was used to assess students' proficiency with the most popular and frequently used social media program, in this example, Facebook. The questionnaire contains three indicators, each of which contains ten statements, and is used to assess the effectiveness of the students in class XI-Science 1 of State Senior High School 1 of Dolok Sigompulon (SMA Negeri 1 Dolok Sigompulon)'s use of Facebook social media application in the learning process, particularly with regard to mathematics literacy. This questionnaire has thirty statements. The test instrument was used to assess each student, as well as the mathematics literacy ability for each indication. The

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test consists of ten tasks that are each described in terms of mathematics literacy.

The descriptive analysis technique was included in this study. Descriptive analysis is a type of statistical analysis that attempts to produce a description or description of the study issue using variable data from specific subject groups. The purpose of the questionnaire data analysis in this study was to examine the questionnaire that had been completed by the sample (respondents), specifically to check the completeness of the questionnaire's contents and arrange it according to the respondent's questionnaire, to quantify the responses to each question according to the indicators by assigning a score based on a predetermined weight, and finally to tabulate the data and calculate the percentage of questionnaires completed correctly.

The purpose of this study's analysis of test data is to verify the responses to the questions completed by the research sample, to quantify the responses to each question according to the indicators by assigning a weighted score, to tabulate the data, and to calculate the percentage of data on the respective mathematics literacy abilities. the students and also the proportion of each indication of students' mathematics literacy abilities, and the last one categorizes the data based on predefined criteria.

Table 1. Criteria and intervals for the assessment of the questionnaire instrument

Rating Interval	Criteria
$75\% \leq \text{skor} \leq 100\%$	Very Good
$50\% \leq \text{skor} \leq 75\%$	Good
$25\% \leq \text{skor} \leq 50\%$	Enough
$0\% \leq \text{skor} \leq 25\%$	Less

Adopted from Suastika, I Ketut & Rahmawati (2019).

Table 1 contains the criteria and intervals for evaluating the questionnaire instrument on the effectiveness of the Facebook application on the students' mathematics literacy.

For the criteria and intervals for the assessment of students' mathematics literacy ability test instruments, it can be seen in Table 2.

Table 2. Criteria and intervals for assessment of test instruments

Rating Interval	Criteria
$80\% \leq \text{skor} \leq 100\%$	Very Good
$66\% \leq \text{skor} < 80\%$	Good
$56\% \leq \text{skor} < 66\%$	Enough
$40\% \leq \text{skor} < 56\%$	Less
$\text{skor} < 40\%$	Less enough

Adopted from Hilaliyah, Sudiana and Pamungkas (2019)

## RESULTS AND DISCUSSION

The data obtained from the study were collected through questionnaires and tests completed by respondents.

### The Questionnaire Instrument's Results

The questionnaire instrument on the effectiveness of the use Facebook application to improve mathematics literacy was distributed to 30 research respondents, namely students in class XI-Science 1 of State Senior High School 1 of Dolok Sigompulon (SMA Negeri 1 Dolok Sigompulon). It included three indicators: 1. duration of use of Facebook application; 2. mathematics literacy material as a source of learning, and 3. the effectiveness of the use of Facebook application to improve mathematics literacy. Figure 3 displays the results of the data analysis of the questionnaire instrument on the effectiveness of the use of Facebook application on the mathematics literacy of the students.

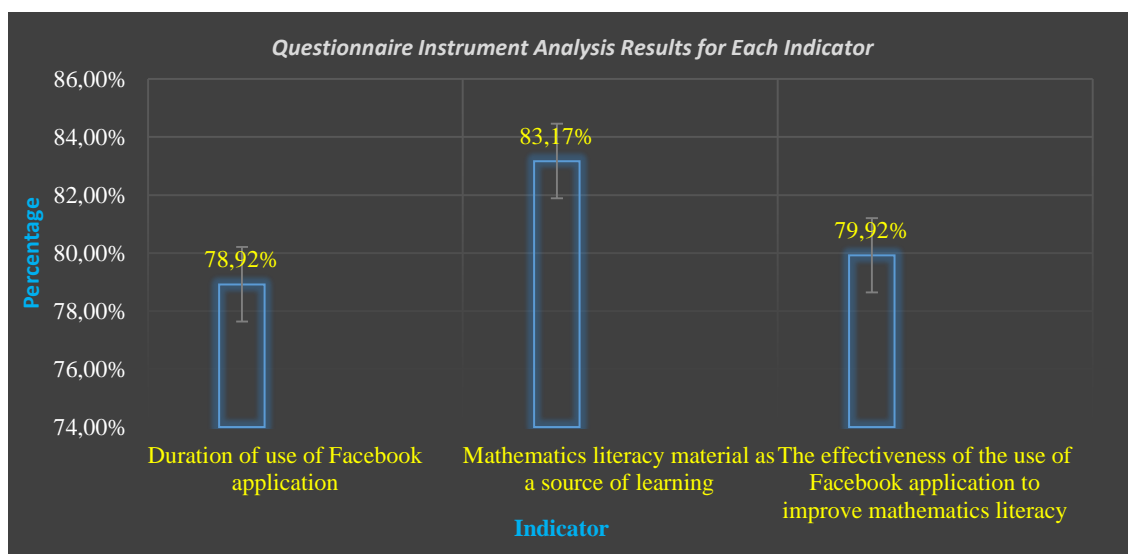


Figure 3. Graph of Questionnaire Instrument Analysis Results for Each Indicator

Based on Figure 3, the results of the questionnaire analysis on the effectiveness of the use of Facebook application on the mathematics literacy, namely the duration of the use of the Facebook application, have a percentage of 78.92%. Referring to table 1, indicator 1, namely the duration of using the Facebook application, is classified as "very good" classified as frequently accessing the Facebook application. This is in accordance with the initial observations and surveys conducted by the researcher, where the students very often access the Facebook application, which can be seen from their Facebook account which looks "online" and is also in accordance with the results of the analysis of the research questionnaire instrument where most of the students answered strongly agree with the statement that they access the Facebook application more than 2 hours every day.

Then for indicator 2, namely mathematics literacy material as a source of learning, has a percentage of 83.17% which belongs to the "very good" criteria. This is in accordance with the initial observations and surveys conducted by the researcher where the

students are seen often sharing "posts" in the form of writing or learning videos related to mathematics.

Then on indicator 3, namely the effectiveness of the use of Facebook applications on mathematics literacy, the percentage is 79.92%. With this percentage, indicator 3 is also classified into the "very good" criteria. The effectiveness of the use of the Facebook application on mathematical literacy in this case is that students are quite effective in utilizing the Facebook application in terms of learning to understand mathematical literacy material from various sources or features in the Facebook application starting from various posts, Facebook pages that discuss mathematical literacy material and learning videos containing mathematical literacy material. From the three indicators, the average percentage is 80.67%. So the results of the data analysis of the questionnaire instrument on the effectiveness of the use of the Facebook application on the mathematics literacy of the students as a whole with the 3 indicators classified into the "very good" criteria.

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### The Test Instrument's Results

Then for the mathematics literacy ability test instrument that was given to 30 research respondents used in this study consisted of 4 indicators, namely: 1. formulating real problems in problem solving, 2. using mathematics in solving problems, 3. interpreting

solutions in problem solving, 4. evaluating solutions in problem solving (Syafitri, Huda, & Haryanto, 2021). The results of the data analysis of the mathematics literacy ability test instrument each indicator of the students' mathematics literacy ability can be seen in Figure 4.

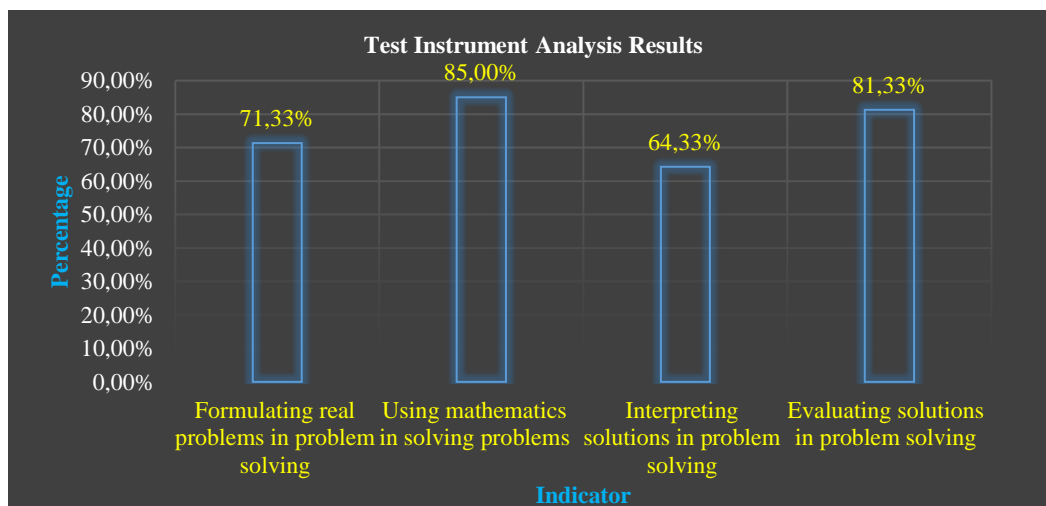
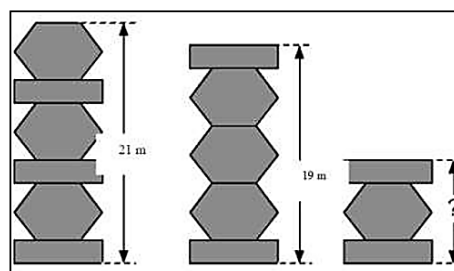


Figure 4. Graph of test instrument analysis results for each indicator of mathematical literacy ability

Based on Figure 4, the results of the analysis of the mathematics literacy ability test of the students on indicator 1, namely formulating real problems in problem solving, have a percentage of 71.33%. Referring to table 2, indicator 1, namely formulating real problems in problem solving is classified as "good" criteria. In indicator 1, the students are able to write and formulate real problems or are able to write down the information contained in the questions given. For example, in one of the examples of the mathematics literacy ability test instrument items in Figure 5, the students can know the information or real problems contained in the questions, where the questions are related to linear equation material.

Dibawah ini adalah 3 tower yang memiliki tinggi berbeda dan tersusun dari dua bentuk yaitu bentuk segi-enam dan persegi panjang.



Berapa tinggi tower yang paling pendek tersebut?

Figure 5. Sample items for a test of a student's mathematics literacy ability

Then for indicator 2, which is using mathematics in problem solving, has a percentage of 85.00% where with this percentage, indicator 2 belongs to the "very good" criteria. This can be seen from the ability of the students in using mathematics to make problem-solving plans contained in the questions.

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In this indicator, most of the students are classified as very literate, and in working on the questions that have been given, the students have been able to write down the formulas used in solving problems.

Then, on indicator 3, which is interpreting solutions in problem solving, the percentage is 64.33%. By this percentage, indicator 3 belongs to the "enough" criteria. Seen from the ability to interpret solutions in carrying out problem solving plans, on this indicator some of the students are classified as quite literate. Most of the students have been able to solve problems with the right work and results, but there are still students who have not been able to find the right answers. In addition, the less than optimal results of students' mathematics literacy abilities on the indicator of interpreting solutions in carrying out problem solving plans are caused by the students being less familiar with questions related to mathematics literacy and questions that are free or independent. which has many solutions

in its completion, as well as questions in the form of stories accompanied by pictures, so that students are less than optimal in interpreting and knowing patterns of problem solving (Khoirudin, Dwi Styawati, & Nursyahida, 2017).

Then, on indicator 4, which is evaluating solutions in problem solving, the percentage is 81.33%. By this percentage, the indicator 4 belongs to the "very good" criteria. In this indicator, most of the students have the ability to evaluate solutions in re-checking what has been done. In this indicator, most of the students belong to the very literate level with the ability to evaluate or re-check the questions that have been done. From the 4 indicators, the average percentage is 75.50%. So the results of the data analysis of the test instrument for the mathematics literacy ability as a whole with the 4 indicators classified into the "good" criteria.

In addition, the researcher also presents the results of the data analysis of the test instruments for each student which can be seen in Figure 6.

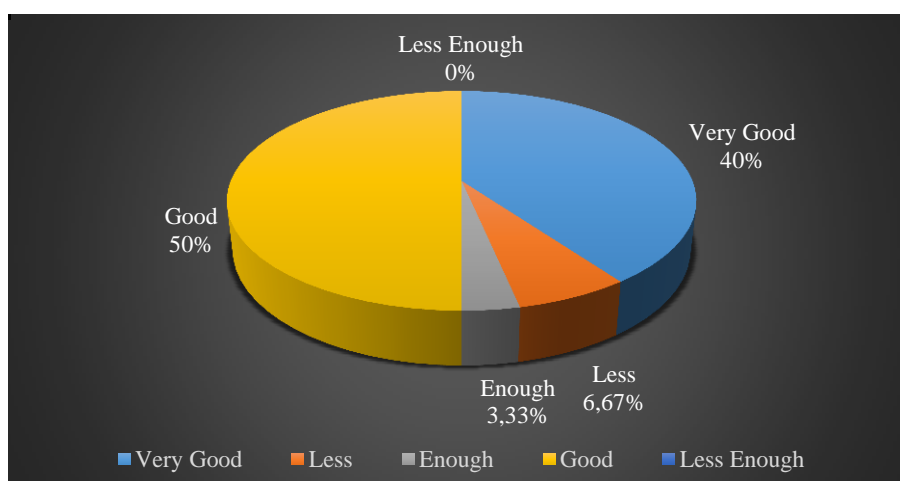


Figure 6. Diagram of the Results of Instrumental Analysis of Mathematics Literacy Ability Tests for Each Student

Based on Figure 6, the results of the data analysis of the mathematics literacy ability test instrument obtained 40% of the students or 12 of 30 students

who have mathematics literacy abilities with the criteria of "very good". Where the 12 students belong to the very literal level for the overall indicators of

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mathematics literacy ability. Then obtained 50% of students or 15 of 30 students who have mathematics literacy skills with the criteria of "good". Where the 15 students are classified as literate students for all indicators and have good mathematics literacy skills. Then obtained 3.33% of students or 1 of 30 students who have mathematics literacy skills with the criteria of "enough". Where 1 student belongs to the level of students who are quite literate for all indicators and have sufficient mathematics literacy skills. Then obtained 6.67% of students or 2 of 30 students who have mathematics literacy skills with the criteria of "less". Where the 2 students belong to the level of students who are less literate for all indicators and have poor mathematics literacy skills.

From the explanation above, overall students are classified as having good mathematical literacy by using the Facebook application effectively. This is in accordance with Fadillah(2019) which states that Information Technology (IT) is effective in improving students' mathematical literacy, it's just that this research focuses on Information Technology, while this research focuses on the Facebook social media application which is basically also related to Information Technology. In addition, this study is also in accordance with Afriyanti (2018) which explains the development of mathematical literacy through technology-based learning. Then this research is also in line with Suni's research (2020) which explains that there is an increase in students' mathematical literacy skills by utilizing the WhatsApp application where the application has very similar features, even the Facebook application has more complete features.

This research, it is hoped that it will have a good impact on students' mathematical literacy skills by utilizing the Facebook application effectively. Starting from reading mathematical literacy materials on various Facebook pages, watching and understanding mathematics literacy learning videos on the Facebook application or sharing mathematical literacy materials through posts on the Facebook application.

## **CONCLUSION AND SUGGESTION**

The results and discussion above indicate that using the Facebook application to improve students' mathematical literacy is quite effective. As evidenced by the questionnaire instrument's results, using the Facebook application for mathematical literacy is "very good." Similarly, the test instrument for mathematical literacy skills, which utilizes the Facebook application, yields "good" results.

For future researchers, the findings of this study can serve as a baseline for comparison and reference material and a basis for further investigation into the use of the Facebook application to improve students' mathematical literacy. Future researchers are expected to examine additional sources and references regarding the effectiveness of Facebook applications on mathematical literacy to produce more comprehensive research findings. Additionally, future researchers are expected to conduct interviews and incorporate Facebook applications into their research to enhance students' mathematical literacy further.

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