Utilization of ICT to Improve Mathematical Literacy Skills

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Abstract ICT is one of the learning media that supports the process of teaching and learning activities. Mathematical literacy ability is one of the abilities to be able to interpret a problem in the text. The purpose of this study was to determine the use of ICT on mathematical literacy skills. The methodology used is a mixed-method, the object of research is a class X student in one of the senior high schools in Bandung. The instruments in this study were student worksheets, initial pretest, postest, questionnaires and interviews. Analysis of the data used. The results of the study obtained an increase, and included in the low category, but with ICT students can increase student creativity independently.
Keywords ICT; mathematical literacy skills

A. **INTRODUCTION**

According to (Setiawan, 2018), humans who rule the world are people who control information, technology and media in this day and age. This statement is in line with the program objectives stated in the Minister of National Education of the Republic of Indonesia No. 16 of 2017 which is to be able to utilize information and communication technology for the benefit of learning in the classroom. In today's era, there are many applications that support learning mathematics, such as for learning Zoom, GCR, Geogebra, Power Point and several other software or applications that support learning mathematics .

Technology helps create learning conditions for students' mentality, technology as a medium or learning tool to simplify and speed up the work of students, and of course make students add skills in technology(Suryadi, 2007). According to Terrel and Rendulic, learning feedback through computer technology has a positive impact on students' learning motivation (Arends, 2008).

Students in mathematics subjects are not only able to count, but can be applied to everyday life (Muzaki & Masjudin, 2019). Among the abilities that can bridge to be able to complete the application of mathematics in everyday life is mathematical ability. Mathematical ability is very closely related to everyday life (R. H. N. Sari, 2015). There is data from year to year that mathematical literacy skills, especially the State of Indonesia, are still at the bottom. This result comes from one of the programs initiated by the OECD (Organization for Economic Cooperation and Development), namely the PISA program, where this program is an international standard assessment to assess mathematical ability and the results are given to the government with the aim of preparing the level of effectiveness of the future education system(Stacey, 2015). The results obtained by PISA inform that in 2003 out of 40 participating countries, Indonesia was ranked 39. In 2006 out of 41 participating countries, Indonesia was ranked 38. In 2009 out of 65 participating countries, Indonesia was ranked 61. In 2012 out of 65 participating countries , Indonesia is ranked 64th (Wardono et al., 2015). Finally, in 2018 of the 79 participating countries, Indonesia was ranked 74th (Tohir & Ibrahimy, 2019).

From these data, it is interpreted that literacy skills are still low and there needs to be a solution to improve mathematical literacy skills. The importance of mathematical literacy skills for students in addition to being able to solve problems in everyday life, this mathematical ability can increase awareness and understanding of mathematics which has an impact on being able to solve a problem or be able to solve problems. According to the (Development, 2010), besides being able to help in everyday life, literacy skills greatly encourage the ability to analyze, present arguments and communicate the results of ideas efficiently in solving mathematical problems encountered.

Mathematical literacy is in line with learning objectives in Indonesia, namely individual goals, collective goals, and existential goals(Kartadinata, 2011). These three goals greatly develop the character of a dignified nation. as in the collective goals required of intelligent students in the life of the nation, such as students being able to think logically, critically and systematically in solving problems. Solving this problem is not able to solve problems in the form of routine questions, but problems in everyday life. This ability is called mathematical ability which can (literate) not only understand mathematics but can be used in everyday life.

ICT is very important in mathematical literacy which aims to help students analyze, give reasons, convey ideas, formulate, solve and interpret everyday problems to their friends.(Sulistyawati et al., 2018). By integrating technology learning media such as computers, laptops, and smartphones, it can improve mathematical literacy skills, especially increasing the quality of learning which will further improve the quality of students.(Indrawati, 2020)

B. **METHODS**

The researcher combines exploration (exploratory mixed methods research methodology), where quantitative data collection with tests is used to build mathematical literacy skills and qualitative data is used to identify and explain the use of ICT during learning. The subjects of the research were students of class X SMAN in the city of Bandung. The sample taken was 1 class of 36 students, but with some problems from the pretest not participating and the posttest so that as many as 26 students were analyzed.

Quantitative Data describes mathematical literacy skills while undergoing online and offline learning through a quantitative approach in validating and analyzing the questionnaire instrument by analyzing descriptive qualitative. The instrument is made with a lattice of questions, then validated by judgment with linguists and mathematicians. The instrument used in this research is an essay test to determine mathematical literacy skills and a questionnaire to determine the use of ICT.

C. **RESULT & DISCUSSION**

The initial test was carried out on March 9, 2022, then given online learning treatment using applications such as GCR, Zoom, WA, Geogebra. Then continued with the final test on May 20, 2022, after the test the researchers gave a questionnaire to find out the use of ICT.

Table 1. Results of Mathematical Literacy Ability

Mathematical Ability Literacy	Pretest	Posttest
High	15	16
Medium	9	9
Low	2	1
Total	26	26

In this question instrument, the researcher made a lattice of questions with trigonometry material, as many as 5 description questions. This instrument aims to determine students' mathematical literacy skills. To be able to solve this problem, students must be able to read this problem well and correctly and it is necessary to understand the concept of trigonometry correctly,

so that if students can combine literacy and mathematical understanding well, students can solve correctly.

Based on the results of the initial test, there were 2 students in the low category, 9 students in the medium category, and 15 students in the high category. Then the final test results increased, there were 1 student in the low category, 9 students in the medium category, and 16 students in the high category.

At the time of the initial test, 2 students still did not match the answers, and the results of the illustrations did not match the rubik's cube. 9 students still do not match the correct answer, and the results of the illustration of the student's answer are almost close to the rubik's. 15 students are still in accordance with the correct answer, the results of the illustration of the student's answer are almost close to the rubik's and some students have given the right answer.

At the time of the final test, there were still many students who did not match the answers, and the results of the illustrations did not match the rubik's. 3 students still do not match the correct answer, and the results of the illustration of the student's answer are almost close to the rubik's. 16 students are still partly in accordance with the correct answer, the results of the illustration of the student's answer are almost close to the rubik's and some students have given the right answer.

In taking the increase there were 4 students who decreased from the results of the initial test to the final test. 10 students are in the low category for improvement, 11 students are in the medium improvement category and 1 student is in the high category. The average increase is taken as a whole, the increase is low because the majority of students are in the medium category. Data to describe ICT was taken from questionnaire data as many as 26 students online using Google Form, then students are directed to fill in the data and questions in the Google Form with the aim of filling out this questionnaire to find out how much ICT is useful for learning and to know the improvement of students' literacy skills.

Table 2. ICT Questionnaire Results

Question	strongly agree	Agree	Less agree	don't agree	strongly disagree
1	0%	20%	0%	80%	0%
2	0%	97%	3%	0%	0%
3	0%	38%	0%	68%	0%
4	0%	70%	0%	30%	0%
5	92%	0%	0%	8%	0%
6	0%	89%	0%	11%	0%
7	0%	100%	0%	0%	0%
8	0%	92%	0%	2%	0%
9	0%	100%	0%	0%	0%
10	0%	100%	0%	0%	0%
11	0%	100%	0%	0%	0%
12	0%	100%	0%	0%	0%
13	0%	100%	0%	0%	0%
14	0%	100%	0%	0%	0%
15	0%	92%	0%	8%	0%
16	0%	73%	0%	27%	0%
17	0%	100%	0%	0%	0%
18	0%	100%	0%	0%	0%
19	0%	54%	0%	46%	0%
20	0%	81%	0%	19%	0%

The results of the questionnaire obtained through the google form, in the first question students chose more answers that disagreed that the teacher gave more opportunities to students with a

percentage of 80% and 20% still answered agree. on the second question that in learning there is already a variation in the use of learning media, with a presentation of 97% and 3% there are still those who do not agree. In the third question that there are still students who do not feel bored with learning with a percentage of 62% and there are still 38% who feel bored. In question 4, the teacher has implemented learning with online learning facilities, where the percentage is 70% and still feels the learning is offline at 30%. In the fifth map, teachers have used technology media with a percentage of 92% and still 8% assess teachers have not used technology media. On the 6th question, students are more fun learning using technology media, this can be seen in the percentage with as many as 89% agree, and there are still those who choose to disagree with a percentage of 11%. In the 7th question of students on being interesting when learning mathematics with technology, this is seen in the percentage of 100%. In question 8, with the help of technology students are more creative, this can be seen from the large percentage of 92% and there are still 2% who disagree. In question 9, with the learning technology media being real and more detailed, this is obtained a percentage of 100%. The 10th question, with technology being able to complete tasks, this is a percentage of 100%.

In the 11th question, the benefit of technology felt by this student was obtained by a percentage of 100%. Question 12, students can access various sources without being limited by distance and time, this is obtained by 100%. The 13th question, the teacher has carried out learning by using assistive media for smooth learning (such as LCD and Laptop), this can be 100%. In question 14, students have used the internet as a way to become suggestions and find learning resources, this is obtained by 100%. In the 15th question, when students have difficulty in learning and are in a position at home, always looking for answers on the internet, this is obtained by 92% and 8% looking for answers in other ways. Question 16, students have used Ebook/LKS media as a learning tool, this is obtained by 73% and 27% there are still answers that do not agree. Question 17, all students can operate laptops or computers, this is obtained by 100%. Question 18, all students can use the internet, this is obtained by 100%. Question 19, students like to learn independently by using online learning or e-learning, this can be a percentage of 54% and 46% choose to disagree. the 20th question, students agree with the existence of teaching materials from E-books or LKS from learning, this can be a percentage of 81% and 19% answered disagree.

The results of the initial test of mathematical literacy ability there are 2 students who are included in the low category and the final test of mathematical literacy ability of 1 student is in the low category, that's because students answered the questions on the initial test on the 4th question, there are still many who answered incorrectly and to illustrate from a story question they have not accurately describes the problem, as well as in the final test 1 students only work on the completion and without any illustrations and even then the student's answer is not correct, therefore the student is included in the low category. According to (Styawati & Nursyahida, 2017) aspects of why the subject is only able to type level 1, among others, the SR subject itself does not study often and interest in mathematics in each module is still lacking only in the form and space module which for him can . In accordance with the results of the interview that the students who worked on this problem were not maximal in their interest in mathematics and produced results that were not maximal.

The results of the initial test of mathematical literacy ability there are 9 students who are in the medium category and the final test of mathematical literacy ability of 9 students is in the medium category, that's because students answer questions that have not been maximally answered correctly, still answer with illustrations and incomplete solutions or incorrect answers in the end of the answer, so that this student is in the category of moderate mathematical literacy ability. According to (Kholifasari et al., 2020) Students with middle type of mathematical literacy skills. Able to formulate problems into mathematical form well with students being able to rewrite what is known from the case, able to model problems.

The results of the initial test of mathematical literacy ability there are 15 students who are in the high category and the final test of mathematical literacy ability of 16 students is in the high category, that's because students answer the question as a whole maximally answer correctly, still answer with illustrations and perfect completion or right answers at the end answers and ends by communicating the results of the conclusions, so that these students fall into the category of high mathematical literacy abilities. In line with the opinion of (E. K. Sari et al., 2021) that students who have high

literacy skills are able to solve problems with clear procedures, use simple strategies, and can explain reasons and communicate the results.

In the first question, the students chose more disagreeing answers that the teacher gave more opportunities to students with a percentage of 80% and 20% still answered agree. in line with Kau's research (Kau, 2017) by being given the opportunity to express ideas, the opportunity to be active in learning, students will increase their skills, especially in ICT.

In question 2 that in learning there is already a variation in the use of learning media, with a presentation of 97% and 1 % there are still those who do not agree. In the third question, there are still students who do not feel bored with learning with a percentage of 62% and there are still 38% who feel bored. In question 4, the teacher has implemented learning with online learning facilities, where the percentage is 70% and still feels the learning is offline at 30%. In the 5th question, teachers have used technology media with a percentage of 92% and there are still 8% assessing that teachers have not used technology media. there are those who choose not to agree with a percentage of 11%. In line with Bunyamin's research (Bunyamin et al., 2020) with varied interaction patterns that aim to avoid boredom, boredom and liven up the learning atmosphere. Likewise with Pratiwi's opinion (Pratiwi & Ediyono, 2018) with varied learning will make students happy and excited in learning.

In the 7th question of students being interested in learning mathematics with technology, this is seen in the percentage of 100%. In question 8, with the help of technology students are more creative, this can be seen from the large percentage of 92% and there are still 2% who disagree. In question 9, with the learning technology media being real and more detailed, this is obtained a percentage of 100%. In line with Syahputra's opinion (Saputra, 2019), this multimedia-based media-assisted learning looks quite good and increasing.

The 10th question, with technology being able to complete tasks, this is a percentage of 100%. In the 11th question, the benefit of technology felt by this student was obtained by a percentage of 100%. In line with Zabir's research (Zabir, 2018), there is a relationship between technology and what is useful for students so that it can motivate students to study more enthusiastically.

Question 12, students can access various sources without being limited by distance and time, this is obtained by 100%. In line with Yuangga's opinion (Yuangga & Sunarsi, 2020), distance education is an education system that is free to be followed by anyone without being bound by limitations of place, distance, time, age, gender and other non-academic boundaries. This system gives freedom to learners or learning citizens to participate in learning activities freely and independently.

The 13th question, the teacher has carried out learning by using assistive media for smooth learning (such as LCD and Laptop), this can be 100%. In line with Muammar's research (Muammar & Suhartina, 2018), learning with IT-assisted media has an important role in feelings of pleasure and increasing interest in the material.

In question 14, students have used the internet as a way to become a means and find learning resources, this is obtained by 100%. Agree with Sasmita (Sasmita, 2020), that the internet is used as an effort to get references, both in the form of research, information so that it can increase the level of education.

In the 15th question, when students have difficulty in learning and are in a position at home, always looking for answers on the internet, this is obtained by 92% and 8% looking for answers in other ways. In line with Putri's opinion(Putri et al., 2021), that students have one method that facilitates learning, namely by having an internet or wifi area and this is a solution when students have difficulty finding materials and materials for assignments.

Question 16, students have used Ebook/LKS media as a learning tool, this is obtained by 73% and 27% there are still answers that do not agree. In line with Aftiani's research (Aftiani et al., 2021), the developed Ebook-assisted media can increase independence and interest in learning. So that with the help of the Ebook media students are more independent in learning.

Question 17, all students can operate laptops or computers, this is obtained by 100%. Question 18, all students can use the internet, this is obtained by 100%. Agree with the wajib (Aziz et al., 2021) statement, that students who are in urban areas are already proficient in operating laptops so they are not stiff.

Question 19, students like to learn independently by using online learning or e-learning, this can be a percentage of 54% and 46% choose not to agree. in line with Rohani's research (Rohani & Zulfah, 2021) that with the happy aspect more than 50% of learning with online media or e-learning.

The 20th question, students agree with the existence of teaching materials from E-books or LKS from learning, this can be a percentage of 81% and 19% answered disagree. In line with Rusli's research(Rusli & Antonius, 2019) that the results of student responses to the Ebook module media are in the good category and can increase interest in learning outcomes.

D. **CONCLUSION**

This research can be concluded that with ICT learning there is an increase in students' mathematical literacy skills. However, the increase in mathematical literacy skills with the help of ICT gain is still in the low category, as can be seen from the results of the data and discussion above. Then the use of this application and ICT makes students more independent in learning in class, this is clearly seen in the results of the questionnaire data.

Suggestions for further research, to pay attention to the use of ICT media that must focus on learning so that students can focus on learning and following well. Because if ICT is not focused or not used properly it will interfere with learning activities so that research results are not maximal.

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