

THE EFFECT OF EPUB-ASSISTED TEACHING MATERIALS TO IMPROVE STUDENTS' NUMERACY ABILITY

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ABSTRACT

Numeracy ability has increasingly been recognized as a fundamental competence necessary for students to engage meaningfully with mathematics and real-world problem solving. However, many schools still struggle to cultivate strong numeracy due to the limited use of effective and innovative learning materials. This study aims to examine the effectiveness of EPUB-assisted teaching materials integrated with the MERRDEKA (Mulai dari diri, Eksplorasi konsep, Refleksi mandiri, Ruang kolaborasi, Demonstrasi, Elaborasi, Koneksi materi, dan Aksi nyata) learning flow in improving students numeracy ability. A quasi-experimental method was employed using a pretest-posttest control group design. The participants consisted of students from classes XI-C and XI-D, totaling 72 students. Data were collected using a numeracy test as the primary quantitative instrument. The analysis involved calculating N-Gain scores and conducting an independent sample t-test to determine differences in learning improvement between groups. The result showed that the experimental class achieved an N-Gain score of 0.77 (high category), whereas the control class obtained an N-Gain score of 0.45 (medium category). In addition, the independent sample t-test yielded a significance value of $0.001 < 0.05$, indicating a significance difference in numeracy ability improvement between the two groups. Therefore, EPUB-assisted teaching materials integrated with the MERRDEKA learning flow are concluded to be effective in enhancing students numeracy ability.

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INTRODUCTION

To face various challenges in everyday life that involve the use of mathematics, of course students must have fairly high mathematical ability. This is due development of era that have Industry 4.0 and Society 5.0. In this context, numeracy ability becomes an essential competence because it enables individuals to reason, interpret information, and make decisions based on quantitative data, which is increasingly required in modern society. One of mathematics ability have Ministry of Education, Culture, Research and Technology declare is numeracy ability.

According to the Directorate General of Primary and Secondary Education that the numeracy is the ability to use various numbers and simbols of mathematical basic to solve practical problems in context of daily life.

Numeracy ability have similarities and differences with mathematics competence ability. The similarities of numeracy with mathematics competence ability is that both base on the same knowledge and skills. However, the difference of between two lies in the empowerment of knowledge and skills themselves. Someone who only has knowledge of mathematics does not create the person has numeracy ability. This is because numeracy includes the application of mathematics concept in unstructured contextual situation, have many solution, or there is no complete solution, and relate non-mathematics factor. Numeracy ability is also part of students knowledge and skills in 21st century in learning that relate with mathematics concept in reason, analyze, and data interpret (texts, symbols, charts, and numbers) to solve the daily life problem contexts (Faza, Fathina, and Salwa 2022). Numracy ability is also has important role in achieving success in the future (Surahmah, Suriyana, and Novianti 2024). Besides, the students with numeracy ability has greater possibility of being at the top because its application relate to everyday life. Therefore, strengthening numeracy ability is essential to ensure students readiness to participate effectively in academic, professional, and social contexts.

Andreas Schleicher (OECD 2016) that stated the numeracy ability has been the best protection of reducing unemployment rate, increasing low incomes, and improving poor health. This is because, the numeracy ability is needed by all life aspect, in home, work, or society. Furthermore, OECD (2016) that stated the numeracy is ability which includes analytical skill, give the reason, convey effectively ideas, formulate, solve, and interpret of various problem situations. Besides that, Directorate of Basic School (2023) that stated the numeracy ability is knowledge and skills for: 1) use various the numbers and symbols of basic mathematics to solve practical problems of daily life context; and 2) analyze information that presented in various form (chart, table, diagram, etc) and then use the result of analysis to predict and make decisions. In this research, the numeracy ability indicator use of Han et al. (2017) expressed in Table 1 as follows.

Table 1. The Indicator of Numeracy Ability

No	Indicators of Numeracy Literacy Skills
1	Using various numbers and symbols related to operations in algebraic forms to solve problems in everyday life contexts.
2	Analyze information (chart, table, diagram, etc).
3	Interpreting the result of the analysis to make predictions and decisions.

The numeracy ability is a term that has been around for a long time. But, in Indonesia mathematics learning a literacy numeracy is still new term and feels foreign. That matter has been the students numeracy ability still below average. The Program of Interntaional Students Assessment (PISA) released by OECD expressed that the students numeracy ability in Indonesia is ranked 74th of 79 countries. So, this is showed that the students numeracy ability in Indonesia still very low.

Besides, the low of students numeracy ability in Indonesia has showed by previous research. The research result by Anggraini dan Setianingsih (2022) is show that from 15 students who become a participant of AKM there are 11 students who have low category of numeracy ability and the percentage is 73.3%. Same thing is also shown by Ate & Lede (2022) research result that expressed from 15 students who finishing numracy ability test, get result 73.3% students

has very less category of numeracy ability. These national and international findings confirm that improving numeracy ability is an urgent educational priority in Indonesia.

There are many ways to improve numeracy ability in mathematics learning. One of them is by using innovative teaching materials. According to Poerwati and Amir (2013), teaching materials can be defined as any form of material systematically arranged to enable student to learn, designed in accordance with the current curriculum. In this context, teaching materials assist teachers in systematically delivering content to students. Based on several previous studies, to help students learn effectively, there needs to be good and synchronized availability of teaching materials with the student's needs. Furthermore, Aisyi et al. (2013) stated that the teaching materials is an important component in the learning process. Besides that, Ibrahim (Kharisma and Asman 2018) also stated that mathematics teaching materials are a set of school mathematics content arranged systematically, both written or unwritten in such a way that creates an environment or atmosphere that enables students to learn mathematics. Thus, improving the quality and accessibility of teaching materials is one promising approach to address the numeracy ability.

Meanwhile, the teaching materials that used by teacher in classroom are still limited. The teaching materials that used by teacher for instruction are still the form of formal textbook available at the school library, and thus cannot yet be categorized as contextual based. As a result, students find it difficult to understand these books (Rahim and Wahyuni 2019). The mathematics teaching materials available in the school library are less flexible. The students need a mathematics teaching materials that flexible so they are can be to learn anytime and anywhere. Digital mathematics teaching materials can be solution in this case.

The Electronic Publication (EPUB)-assisted of mathematics teaching materials can be one solution for innovative teaching materials. The research result of Karmila et al. (2023) stated that the EPUB format of digital teaching materials use software SIGIL is valid and useful for teacher and students in learning. Furthermore, Arni et al. (2023) stated that the EPUB-assisted teaching materials has an advantages, namely: 1) Students can be stimulate learning motivation; 2) Students can learn independently; 3) EPUB-assisted is digital books has been standardized; 4) composed of multimedia in the form files, HTML5, CSS, and XHTML; and 5) there are can be include audio and video figures. From the previous research that the EPUB-assisted of mathematics teaching materials was effectively in learning. Amalia and Kustijono (2017) shown that the EPUB-assisted of mathematics teaching materials development by SIGIL software can to improve students critical thinking skills. These finding provide strong evidence that EPUB-assisted teaching materials have the potential to enhance students learning outcomes, including numeracy ability.

Besides electronic format teaching materials, the learning flow is also to needed in the teaching materials. The goal is to support the effectiveness of teaching and learning. The new one of learning flow can used in learning is MERRDEKA learning flow. Triningsih (2023) stated that the MERRDEKA is acronym of M: Mulai dari diri; E: Eksplorasi konsep; R: Refleksi pembelajaran; R: Ruang kolaborasi; D: Demonstrasi kontekstual; E: Elaborasi pemahaman; K: Koneksi antar materi; and A: Aksi nyata. The MERRDEKA learning flow is an instructional approach developed alongside the Merdeka Belajar principle introduced by the Ministry of Education and Culture of Indonesia Republic. This MERRDEKA learning flow is commonly used in teacher training programs aimed at producing skilled and professional educators in line with contemporary needs. The purpose of implementing the MERRDEKA learning flow is to provide students with controlled and guided learning independence (Jamaludin, Pribadi, and Zahara 2023). When combined with innovative digital materials, this structured learning flow can support deeper concept understanding and more meaningful numeracy ability development.

In this research, the researcher already has EPUB-assisted teaching materials with the MERRDEKA learning flow that will be implemented in the instruction to assess its effectiveness to improve students numeracy ability. Therefore, the title of this research is “The Effect of EPUB-Assisted Teaching Materials to Improve Students Numeracy Ability”.

METHOD

This research uses quantitative methods. This quantitative study has a quasi experimental with the pretest-posttest control group design. Sugiyono (2015) stated that a quasi experimental is develop of true experimental. Where, there is a control group but does not work for to external variables controlling that completely influence the experiment research. Furthermore, this research uses the pretest-posttest control group design that illustrated in Figure 1.

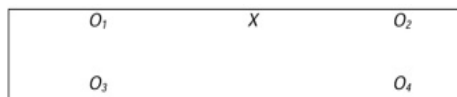


Figure 1. Research Design

Information:

O_1 = Pretest of Experiment Class

O_2 = Posttest of Experiment Class

O_3 = Pretest of Control Class

O_4 = Posttest of Control Class

X = Treatment

In this research population are consisted of all eleven-grade students at Senior High School 1 Cikampek, Karawang City as many 395 students. This research did to the odd semester of 2023/2024 academic year. The sampling technique in this research is the purposive sampling with class XI-C and XI-D as many 72 students as the samples.

The data collection technique used is the test technique. The type of instrument is a description test which functions to see students numeracy ability. The test was then tested in the field to find the validity of 7 test questions. From the 7 test questions which tested, there were 6 test questions that valid category. So that, just 6 test questions that used in this research. Besides that, the 6 test questions doing to realibility test. The realibility value from Cronbach’a Alpha is 0.78 with high category. Furthermore, the 6 test questions doing to difficulty index test. There are 5 test questions has medium category of difficulty index and 1 test question has difficult category of difficulty index. Besides that, the 6 test questions doing to differentiating power test. There are 3 test questions has good category of differentiating power and 3 test questions has medium category of differentiating power. Next, the 6 test questions were given to the experimental and control classes as a pretest. Then, the experimental class given treatment uses EPUB-based of mathematics teaching materials in his learning. Meanwhile, the control class given conventional teaching materials in his learning. After that, each class was given a test with the same questions as the posttest.

To examine the improvement in students numeracy ability, an N-Gain analysis was conducted on the pretest and posttest data using the following formula:

$$N - Gain = \frac{Posttest - Pretest}{Skor Ideal - Pretest}$$

Figure 2. The Formula of N-Gain Analysis

After conducting the N-Gain analysis, the next step is to assign improvement criteria to both the experimental and control classes. The criteria of N-Gain improvement can be seen in the Tabel 2 below:

Tabel 2. The Criteria of N-Gain

No	N-Gain	Criteria
1	$N - Gain > 0,7$	High
2	$0,3 < N - Gain \leq 0,7$	Medium
3	$N - Gain < 0,3$	Low

The normality test was conducted to determine whether the data are normally distributed or drawn from a normal population. In this research, the normality test was performed using a significance level of 5% or 0.05. Before conducting the normality test, the hypotheses were formulated as follows:

H_0 : The data are normally distributed

H_1 : The data are not normally distributed

After conducting the data normality test, the result are then examined. If the significance value is greater than or equal to 0.05, the data are considered to be normally distributed, meaning that H_0 is accepted. Conversely, if the significance value is less than 0.05, the data are considered not to be normally distributed, meaning that H_0 is rejected.

When the data are normally distributed, the next step is to perform a homogeneity test as a prerequisite for conducting parametric testing using an independent sample t-test. However, if the data are not normally distributed, the analysis will be continued using non-parametric test. In this research, the homogeneity test was performed using a significance level of 5% or 0.05. Before conducting the homogeneity test, the hypotheses were formulated as follows:

H_0 : The data are homogen

H_1 : The data are not homogen

After conducting the data homogeneity test, the result are then examined. If the significance value is greater than or equal to 0.05, the data are considered to be homogen, meaning that H_0 is accepted. Conversely, if the significance value is less than 0.05, the data are considered not to be homogen, meaning that H_0 is rejected.

If data are normally distributed, the next analysis is independent sample t-test. This analysis is classified as a parametric statistical test used to compare the means of two different samples. In this research, the t-test was used to determine whether there is a significant difference in the improvement of numeracy ability between the experiment and control classes and the data used for the t-test were the N-Gain scores. In this research, the independent sample t-test was performed using a significance level of 5% or 0.05 to examine the following hypotheses:

H_0 : The improvement students numeracy ability of the experimental class is not greater than that of the control class

H_1 : The improvement students numeracy ability of the experimental class is greater than that of the control class.

If the $t_{\text{test}} \geq t_{\text{table}}$ then H_0 is accepted, meaning the improvement students numeracy ability of the experimental class is not greater than that of the control class. Conversely, for $t_{\text{test}} < t_{\text{table}}$ value then H_0 is rejected, meaning the improvement students numeracy ability of the experimental class is greater than that of the control class.

RESULTS AND DISCUSSION

Results

The result of this research are increasing numeracy ability using the EPUB-assisted teaching materials with MERRDEKA learning flow. In the experimental class was given the treatment uses EPUB-assisted teaching materials in his learning. Meanwhile, in the control class was given the treatment uses conventional teaching materials in his learning. The data of pretest and posttest are processed to find N-Gain values of each class. In the experimental class there are 44.4% students with high category of N-Gain values and 55.6% students with medium category of N-Gain values. Meanwhile, in the control class there are 75% students with medium category of N-Gain values and 25% students with low category of N-Gain values. The average N-Gain values in experimental class is 0.66 with medium category and in control class is 0.34 with medium category. N-Gain result between experimental and control class shown in the following Table 3.

Table 3. N-Gain Values

N-Gain Data	Values of Experimental Class	Categories	Values of Control Class	Categories
Average	0.66	Medium	0.34	Medium
Minimum	0.38	Medium	0.17	Low
Maximum	0.77	High	0.45	Medium

Furthermore, the N-Gain data will be processed to find whether there is a difference in the increase of numeracy literacy skills between experimental and control class. But before that, it is analyze the normality and homogeneity of data. If the data is normally distributed, then the analyze of a defference in the increase of numeracy literacy skills between experimental and control class uses parametric statistical analysis. But, if it's the opposite then data analysis uses non-parametric statistical. The normality analyze of data uses Shapiro-Wilk analysis with result shown in the following Table 4.

Table 4. The Data Normality Test

Data	Class	Significance	Result
N-Gain	Experiment	0.136	The Data is Normally Distributed
	Control	0.373	The Data is Normally Distributed

Based on Table 4, the N-Gain value for the experimental class is 0.136 and the control class is 0.373. Since both values are greater than 0.05, it can be concluded that the two N-Gain values are normally distributed. Because both N-Gain values are normally distributed, the testing proceeds with the homogeneity test of N-Gain data. The test result of homogeneity data shown in the following Table 5.

Table 5. The Data Homogeneity Test

Data	Significance	Result
N-Gain	0,001	The Data is not Homogeneous

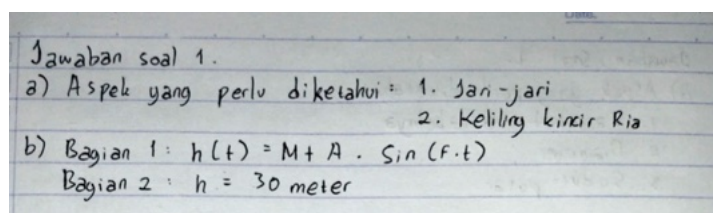
Based on Table 5, the data homogeneity of N-Gain values is not homogeneous. However, since the data is normally distributed, the data analysis to observe the average difference in the improvement of numeracy literacy skills is conducted using parametric statistic analysis with independent sample t-test. The test result of average difference N-Gain values using independent sampel t-test is following Table 6.

Table 6. Independent Sample T-Test of N-Gain Values

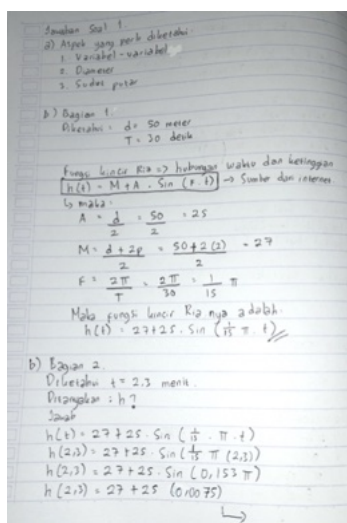
Class	Mean	Significance	Result
Exsperiment	0,63	0,001	H_0 is rejected
Control	0,34		

Based on Table 6, it can be seen that the significance value is $0.001 < 0.05$, which means that H_0 is rejected in this case. Therefore, it can be concluded that there is a significant difference in the average improvement of numeracy ability between the experimental class and the control class. In other words, the improvement students numeracy ability of the experimental class is greater than that of the control class.

To show the improvement in giving pre-test and post-test questions, it is presented in the following figure.

**Figure 3.** The No.1 Answer of Pre-test Question

Based on the Figure 3 in (a) point, the students can't identify of variable informations in the question. In the (b) point to part-1, the students can't to solve the problem process. To part-2, the students are only providing answers carelessly.

**Figure 4.** The No.1 Answer of Post-test Question

Based on Figure 4, in the number 1 post-test questions of (a) point, students are already able to identify variables according aspect to the informations and instructures provided in the questions. In the (b) point to part-1, students are already able to transform quantative and variables aspect in the information into the form of a function. Next, in the (b) point to part-2, students are already able to solve the problems process.

Jawaban soal 2.

a) Misalkan bulan ke- $n = n$
 Jumlah buah naga = $f(n)$
 Maka $f(n) = 4 \cdot \left(\frac{1}{2}\right)^n$

b) 200 kwintal

Figure 5. The No. 2 Answer of Pre-test Question

Based on Figure 5, in the (a) point of number 2 question, the students can't transform in the table informations to form a function. In the (b) point of number 3 question, the students are only providing answer carelessly.

Jawaban Soal 2.

a) Misal : Bulan ke- $n = n$
 Jumlah buah naga bulan ke- $n = f(n)$
 Bentuk umumnya : untuk $n=1$ untuk $n=2$
 $f(n) = b \cdot a^n + c$ $f(1) = b \cdot a^1 + c$ $f(2) = b \cdot a^2 + c$
 $2 = b \cdot a + c \dots (1)$ $6 = b \cdot a^2 + c \dots (2)$

Sehingga, untuk $n=3$ Eliminasi (2) & (1)
 $b \cdot a^3 + c = 6$ $f(3) = b \cdot a^3 + c$ $b \cdot a^3 + c = 12$
 $b \cdot a + c = 2$ $12 = b \cdot a^3 + c \dots (4)$ $b \cdot a^3 + c = 6$
 $a(2b-a) = 6$ $a(2b-a) = 6$
 $a \cdot 4 = 6$ $a(2b-a) = 4$
 $a = \frac{6}{4} = \frac{3}{2}$ $\frac{3}{2}(2b - \frac{3}{2}) = 4$
 $\frac{3}{2} \cdot 2b - \frac{9}{4} = 4$
 $\frac{3}{2} \cdot 2b = 4 + \frac{9}{4}$
 $\frac{3}{2} \cdot 2b = \frac{25}{4}$
 $\frac{3}{2} \cdot b = \frac{25}{4}$
 $b = \frac{25}{4} \cdot \frac{2}{3}$
 $b = \frac{25}{6}$
 Substitusi $b = \frac{16}{3}$ dan $a = \frac{3}{2}$ untuk mencari nilai c !
 $f(1) = b \cdot a + c$ $2 = 8 + c$
 $2 = \frac{16}{3} \cdot \frac{3}{2} + c$ $c = (-6)$

Dengan demikian fungsinya adalah:
 $f(n) = b \cdot a^n + c$
 $f(n) = \frac{16}{3} \left(\frac{3}{2}\right)^n - 6$

b) $n = 10$
 maka $f(n) = \frac{16}{3} \left(\frac{3}{2}\right)^n - 6$
 $f(10) = \frac{16}{3} \left(\frac{3}{2}\right)^{10} - 6$
 $f(10) = 301,6$
 Jadi, jumlah panennya adalah 301,6 kwintal.

Figure 6. The No.2 Answer of Post-test Question

Based on Figure 6, in the (a) point of number 2 question, the students are able to transform the aspects of information in the table into an exponential function. In the (b) point, the students are already able to solve the problem process.

Jawaban Soal 3.

↳ langkah-langkahnya
 Sudah betul

Figure 7. The No.3 Answer of Pre-test Question

Based on Figure 7, the students are only provide superficial answers without offering analytical argumentations for problem solving.

Jawaban Soal 3.

Menurut pendapat saya, langkah yang dilakukan Arman sudah benar hanya saja terdapat kesalahan saat mengubah bentuk eksponen ke logaritma.

Yang Arman lakukan:

$$N(t) = N_0 \cdot \left(\frac{1}{2}\right)^{\frac{t-t_0}{5}}$$

Menjadi:

$$t = t_0 + 5 \cdot \frac{\log\left(\frac{N(t)}{N_0}\right)}{\log\left(\frac{1}{2}\right)}$$

Yang seharusnya:

$$N(t) = N_0 \cdot \left(\frac{1}{2}\right)^{\frac{t-t_0}{5}}$$

menjadi:

$$t = \frac{t_0 + 5 \cdot \log\left(\frac{N(t)}{N_0}\right)}{\log\left(\frac{1}{2}\right)}$$

Sehingga hal ini mempengaruhi hasil perhitungan, yang seharusnya adalah:

$$t = \frac{704,8}{\frac{\log\left(\frac{15\% N_0}{N_0}\right)}{\log(0,8)}} = \frac{704,8}{2,147} \Rightarrow t = 285,34 \text{ tahun}$$

Figure 8. The No.3 Answer of Post-test Question

Based on Figure 8, the students are already able to giving answer with offering analytical argumentations from them reasoning for problem solving.

These are some examples of the improvement in students' numeracy ability, as observed from the results of the pre-test and post-test. It can be seen that after implementing EPUB-assisted teaching materials with MERRDEKA learning flow, students have demonstrated an enhancement in their numeracy ability through solving various problems related to functions and their modelling. Therefore, the improvement students numeracy ability of the experimental class greater than that of the control class.

Discussions

The effectiveness of EPUB-assisted teaching materials with MERRDEKA learning flow is evaluated based on the improvement of students numeracy ability. In this research, the improvement in numeracy ability of students who used EPUB-assisted teaching materials with MERRDEKA learning flow is better than those who used conventional teaching materials. The implementation of learning for both experimental and control classes was carried out over 6 session, with each session lasting 5 lesson. During the learning process, students were divided into heterogeneous groups. In the experimental class, students followed the learning process according to the MERRDEKA learning flow which was integrated into the teaching materials. Meanwhile, in the control class, students only participated in group learning using conventional teaching materials under the guidance of a teacher. After 6 learning session, students in each class were given numeracy literacy skills test questions. These numeracy literacy questions were, of course, aligned with the numeracy literacy indicators and the material on functions and their modelling.

Students numeracy ability can be seen from the average score of students during the pre-test. Based on there result, it can be categorized that students numeracy ability are still relatively low. The numeracy ability developed withing students will influence their mathematical understanding of various situatuons and conditions related to mathematical phenomena in everyday life. Khandria Kholifatun, Jumini, and Sugiyanto (2023) were stated that numeracy ability is related to and can influence students mathematical understanding, with a correlation of 23%, indicating a positive effect. Furthermore, Hidayat et al. (2022) argued that the development of the e-module in the EPUB format offer alternative solutions to improve students' mathematical reasoning ability. In addition, Puspaningtyas and Ulfa (2020) the focus of these numeracy ability is for students to formulate, apply, and interpret mathematics in

various context, which include mathematical reasoning and using mathematical concept, procedural, facts, and tools to describe, explain, and predict phenomena in daily life. The EPUB-assisted teaching materials with MERRDEKA learning flow was created for students help to improve of them numeracy ability.

From the data presented on the effectiveness of using EPUB-assisted teaching materials with MERRDEKA learnig flow, it can be explained that the use of these teaching materials can improve students numeracy ability. This is in line with the result of a study conducted by Amalia and Kustijono (2017), which stated that EPUB-assisted teaching materials are effective for developing critical thinking skills. This can be seen from the result of hypothesis test that has been presented. Additionally, the increase in average scores can also be observed from the students work on the given problems on the test questions.

The average mistakes by students in solving the numeracy literacy test problems during the pre-test are: 1) Inability to identify quantitative and variables aspect, and inability to solve functions modelling problems effectively (reading and understanding error); 2) Inability to solve problems presented in various forms (tables, graph, diagrams, etc) effectively (transformation error); 3) Inability to formulate analytical arguments based on the problem-solving results (situastional comprehension error); and 4) Inability to develop problem-solving strategies (weakness in process skill). This is in line with Gufron et al. (2021) who stated that in the issue of numeracy literacy skills, the students are still unable to read and understand the information in the text of the problems, leading to errors in process skills, transformation, and argumentation. Meanwhile, Az-Zahroh and Permadi (2022) who stated in the working to numeracy literacy skills test questions, the students has mistakes, including: 1) reading errors; 2) comprehension errors; 3) transformation errors; 4) weakness in process skills; and 5) encoding errors. Meanwhile, Wardhani et al. (2016) is also who stated has summarized several mistakes made by students in solving numeracy literacy problems, includes: 1) transformation; 2) comprehension; and 3) process skill.

Then, based on the post-test result, students didn't make too many mistakes in solving the given problems. During the post-test, students were able to identify numerical and variable aspects within the problem text, solve problems based on their identification, create solutions by transforming information into tables, formulate arguments about the problem-solving result, and develop problem-solving strategies. Based on the post-test result too, the EPUB-based teaching materials with MERRDEKA learning flow is effective to improve the numeracy literacy skills.

CONCLUSION

After going through various trials, including normality tests, homogeneity tests, and hypothesis tests, as well as the exposures presented in the discussion, the researcher concluded that the use of EPUB-assisted teaching materials with MERRDEKA learning flow is effective in improving the numeracy ability of grade XI students at senior high school on the topic of Functions and Modelling. Where the improvement in students' numeracy ability in the experimental class is indicated by an N-Gain score of 0.66, which is categorized as medium, while the control class achieved an N-Gain score of 0.34, categorized as medium. However, a significant difference in the improvement of students' numeracy ability between the experimental and control classes is evidenced by the t-test result, with a significance value of $0.01 < 0.05$. Therefore, it can be concluded that the research hypothesis is accepted, indicating that the use of EPUB-assisted teaching materials significantly improves students' numeracy ability compared to conventional teaching materials.

Future research is recommended to expand the scope of this study by involving a larger and more diverse sample across different school and educational level in order to enhance the

generalizability of the findings. In addition, further studies may explore the effectiveness of EPUB-assisted teaching materials integrated with the MERRDEKA learning flow on other mathematical topics or learning domains, such as problem-solving, reasoning, or mathematical literacy. It is also suggested that subsequent research employ mixed-methods or longitudinal designs to examine not only the quantitative improvement in numeracy ability but also students' learning processes, engagement, and retention over time. Furthermore, comparative studies incorporating different digital learning platforms or instructional models may provide deeper insights into the relative effectiveness of EPUB-assisted teaching materials in supporting mathematics learning.

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