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The Effect of Providing Non-Cognitive Diagnostic Assessments and Realistic Mathematics Learning Approaches to Improve Students' Mathematical Literacy Skills

Maria Erwinda Kefi[1], Cecilia Novianti Salsinha[2]*, Justin Eduardo Simarmata[3]
[1,2,3]Mathematics Education, Universitas Timor, East Nusa Tenggara, Indonesia
* Correspondence: ceciliasalsinha@unimor.ac.id

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Abstract

This study aims to determine the effect of providing non-cognitive diagnostic assessments and Realistic Mathematics Education (RME) on improving students' mathematical literacy skills. This study applies a quasi-experimental method with a 2x2 factorial-based research design. Grade VIII students at Naiola State Junior High School were the population and sample in this study. The results of this study show that (1) there are differences in mathematical literacy skills between students who are given non-cognitive diagnostic assessments (students with very high, adequate, low and very low interest in learning); (2) there is a difference in students' mathematical literacy skills between students who are taught conventionally); (3) there is significant interactivity between non-cognitive diagnostic assessments and learning approaches to students' mathematical literacy skills. Thus, non-cognitive diagnostic assessments combined with realistic mathematical learning approaches have an effect on improving students' mathematical literacy skills compared to other treatments.

Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh pemberian asesmen diagnostik non-kognitif dan pendekatan pembelajaran matematika realistik(PMR) terhadap peningkatan kemampuan literasi matematis siswa. Penelitian ini menerapkan metode kuasi eksperimen dengan desai penelitian berbasis faktorial 2x2. Siswa kelas VIII di SMP Negeri Naiola menjadi populasi dan sampel dalam penelitian ini. Hasil penelitian ini menunjukkan bahwa (1) terdapat perbedaan kemampuan literasi matematis antara siswa yang diberi asesmen diagnostik non-kognitif (siswa dengan minat belajar sangat tinggi, cukup, rendah dan sangat rendah;) (2) terdapat perbedaan kemampuan kemampuan literasi matematis siswa antara siswa yang dibelajarkan secara konvensional); (3) terdapat interaktif yang signifikan antara asesmen diagnostif non-kognitif dan pendekatan pembelajaran terhadap kemampuan literasi matematis siswa. Dengan demikian asesmen diagnostik non-kognitif yang dikombinasi dengan pendekatan pembelajaran matematika realistik berpengaruh terhadap dalam meningkatkan kemampuan literasi matematis siswa dibandingkan perlakuan lainnya.

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Introduction

Learning is an activity that is created so that the learning process occurs (Prihantini, 2021). In the 21st century, society will experience rapid changes in globalization, demographic transformation, and advanced technology, opening up opportunities to explore new things.

Therefore, fundamental education reform is needed in society in the 21st century (Dewanti et al., 2020).

Mathematical literacy is an individual's ability to use, understand, and apply mathematical concepts in the real world (Maulidya & Achmadi, 2023). The level of mathematical literacy ability in Indonesia requires attention and handling. Mathematics literacy skills in Indonesia have never increased significantly and the test conducted by PISA (Programme For International Student Assessment) in 2022 became the lowest score since 2006. The results of the study (Putrawangsa & Hasanah, 2022) confirm that in terms of the PISA results of Indonesian students from PISA 2000 to PISA 2018 in the aspects of reading and mathematics show a downward trend and are still far from the minimum standard to be able to become citizens who are able to actively and constructively participate in the development of civilization, especially in mathematical literacy skills, around 72% of Indonesian students are at level 1 and below of the six levels of literacy ability mathematics in PISA.

Mathematical literacy skills are essential in mathematics learning because they involve students' ability to formulate, use, and interpret mathematics in a variety of contexts, including in everyday problem-solving. Mathematical literacy skills are also needed so that students can analyze, reason, and communicate mathematical knowledge effectively, as well as solve problems and interpret their solutions. This is marked by the results of initial research conducted by researchers (Widiana et al., 2020) at one of the junior high schools in Jambi City, the researcher provided a mathematical literacy ability test which aimed to determine the initial ability of the student's mathematical literacy ability.

The mathematics literacy component is taken from the newly implemented independent curriculum. Mathematical literacy skills are very necessary in the 21st century as today by every individual, because there are many mathematical problems encountered in the environment of daily life, school, work, and the scope of society. Literacy skills are needed as a basis for formulating, applying, and interpreting mathematics in various contexts. According to Aprima & Sari (2022)a learning plan that is prepared by considering various things about the learning process and individual development is the curriculum. The Ministry of Education, Culture, Research and Technology (Kemdikbudristek) is currently launching a new curriculum known as the new paradigm of the independent curriculum. The independent curriculum is a new curriculum issued by the Ministry of Education, Culture, Research and Technology (Kemdikbudristek) as a form of initiative and developing a more independent and contextual curriculum for students throughout Indonesia. The independent curriculum was launched by the Ministry of Education, Culture, Research and Technology (Kemdikbudristek) as an effort to overcome the learning

crisis in Indonesia. The independent curriculum was chosen as one of the strategies for the recovery of learning due to the Covid-19 pandemic (Nugraha, 2022). The application of the independent curriculum is not only to provide answers to educational problems, but also specifically intended to encourage students in learning to be able to develop according to their interests, talents, potentials and needs.

In the process of implementation, it is not as easy as imagined but there are various challenges. One of the challenges of implementing the independent curriculum is especially at the core of the educational process, namely learning. One of the changes in the learning process is in the evaluation or assessment system. The assessment in the independent curriculum prioritizes the diagnostic assessment process for cognitive and non-cognitive aspects. The main characteristic of the independent curriculum is the design of the learning process based on the results of non-cognitive diagnostic assessments (Laulita et al., 2022). Therefore, teachers need to conduct non-cognitive diagnostic assessments to find out students' learning interests if they want to use the independent curriculum.

Based on initial observations and interviews with teachers in the field of study, it was said that at SMPN Naiola, the independent curriculum had been implemented. The teacher also revealed that the low mathematical literacy ability and student interest in learning can be seen from the low basic ability of students, students are less interested in learning mathematics because it is considered difficult and rarely relates mathematical problems related to real situations. In the learning process, teachers focus more on final results or summative assessments but do not conduct non-cognitive diagnostic assessments. In fact, ideally, non-cognitive diagnostic assessments are important to be carried out.

In accordance with the independent curriculum, learning should be carried out based on student needs, so this non-cognitive diagnostic assessment is carried out to find out students' learning interests. Non-cognitive diagnostic assessments are a useful tool for identifying students' learning interests. By knowing students' learning interests, teachers can create more effective learning, increase learning motivation and help students reach their maximum potential.

After teachers provide non-cognitive diagnostic assessments to find out students' learning interests, teachers need to choose the right learning method or approach according to the needs of students. One of the learning approaches that involves student interaction, namely applying a learning approach that is well used, is Realistic Mathematics Learning (PMR). Realistic Mathematics Learning (PMR) is a mathematics learning approach developed since 1971 by a group of mathematics students from the Freudenthal Institute, Utrecht University in the Netherlands.

Realistic math learning can increase learners' interest because it allows them to learn math concepts in a broader context and allows them to solve math problems related to

daily life (Hanafi and Sumitro, 2019). Because literacy questions contain problems in daily life or nayata, in line with the PMR approach, it is possible to improve students' mathematical literacy skills

Based on the above background description, this study aims to fill the gaps in the literature by combining non-cognitive diagnostic assessments with realistic mathematical learning approaches, which have not been widely explored simultaneously in the educational literature. This research highlights non-cognitive aspects, especially students' interest in learning, which is often overlooked in the development of mathematical literacy. By applying this approach, this study aims to provide new insights on how the integration of the two methods can significantly improve students' mathematical literacy skills, so the researcher wants to examine more deeply the influence of non-cognitive diagnostic assessments and realistic mathematics learning approaches in improving students' mathematical literacy skills with the research title "The Influence of Non-Cognitive Diagnostic Assessments and Approaches Realistic Mathematics Learning to Improve Students' Mathematical Literacy Skills".

Methods

Based on the type of problem that has been formulated in advance, the type of research used is quantitative research with a quasi experiment design (pseudo-experiment) with a 2 x 2 factorial design. Quantitative research is defined by Sugiyono (2016) as a method with research data in the form of numbers and analyzed using statistics. The research design can be seen in**Table 1.**

Table 1.Factorial Research Design 2× 2

Non-Cognitive Diagnostic Assessment (Interest in Learning)	Learning Approach	
	RME (B_1) (Experiment)	Conventional (B_2) (Control)
Very High (A_1)	A_1B_1	A_1B_2
Enough (A_2)	A_2B_1	A_2B_2
Low (A_3)	A_3B_1	A_3B_2
Very Low (A_4)	A_4B_1	A_4B_2

This research was conducted at Naiola State Junior High School, South Bikomi District, North Central Timor Regency (TTU), East Nusa Tenggara Province (NTT). With the population being all grade VIII students. The samples in this study are class VIIIA and class VIIIB. Class VIII A as the experimental class and class VIII B as the control class. The experimental class is a class that receives treatment of non-cognitive diagnostic assessments (learning interest) with the PMR approach, while the control class is a class that is given non-cognitive diagnostic assessments (learning interest) and learning that is carried out conventionally. Data collection in this study is an instrument in the form of a

learning interest questionnaire, a pretest to find out the average ability of students and a posttest to obtain data on students' mathematical literacy ability

The data analysis technique in this study is the first to conduct instrument tests in the form of validity and reliability tests for the instruments used. Next, a two-way anova hypothesis test was carried out. The prerequisite tests in this study are the normality test and the homogeneity test.

Result and Discussion

The learning interest questionnaire instrument used in this study was adapted from Pujianti, A. (2020) who has developed a similar instrument to measure students' learning interests. Before use, the questionnaire has gone through a validity and reliability test process. The results of the validity test in the previous study showed that the items of statements in the questionnaire had a significant correlation coefficient of the total score, thus meeting the validity requirements of the content and construct. In addition, the reliability test used Cronbach's Alpha, with a coefficient value in the high category, which was > 0.85. In this study, revalidation was carried out to adjust to the characteristics of the respondents, with the result of item validity > 0.553 and Alpha Cronbach's reliability > 0.80, so that the questionnaire instrument is feasible and trustworthy to be used in measuring students' learning interests.

The following are the results of the validity and reliability test of the pretest questions

Table2. Results of the Validity Test of Pretest Questions

Item	r_{xy}	r_{tabel}		Ket
S1	0,768	0,553	0,001	Valid
S2	0,723	0,553	0,002	Valid
S3	0,492	0,553	0,63	Tidak Valid
S4	0,874	0,553	0,000	Valid
S5	0,663	0,553	0,0(	Valid
S6	0,115	0,553	0,6{	Tidak Valid

Table 3. Reliability Test Results for Pretest Questions

Reliability Statistics

Cronbach's Alpha	N of Items
.659	4

From a total of 6 questions developed, a validity test was carried out using the Pearson Product Moment correlation between the score of each item and the total score. The results on**Table 2**It shows that 4 questions were declared valid, because they had significant correlation values (R > 0.553 and P < 0.05), while the other 2 questions did not meet the validity criteria and were excluded from further testing. Furthermore, 4 valid

questions were used in the test to determine the level of internal consistency of the instrument. Based on the SPSS output results displayed on**Table 3**obtained Cronbach's Alpha value of 0.659 with N = 4. This value indicates that the instrument has reliability in the category of fairly reliable. Although the mathematical literacy indicator used consists of three aspects, namely understanding, application and reasoning, the comprehension indicator is represented by 2 question items. This is considered because comprehension is a basic aspect of mathematical literacy that needs to be measured more deeply through more than one question so that the results are more accurate and reflect the overall abilities of students.

Next are the results of the validity and reliability test of the posttest questions

Table4. Results of the Validity Test of Posttest Questions

Item	r_{xy}	r_{tabel}	Ket
S1	616	553	Valid
S2	653	553	Valid
S3	824	553	Valid
S4	674	553	Valid
S5	638	553	Valid
S6	,006	553	Tidak Valid

Table 5. Posttest Reliability Test Results

Reliability Statistics	
Cronbach's Alpha	N of Items
.735	5

The results of the reliability test showed that the instrument had a fairly good level of internal consistency. The reliability test was carried out using Cronbach's Alpha formula, and a score of 0.735 was obtained with 5 valid question items. Based on the interpretation of Cronbach's Alpha value (Arikunto, 2013), the value is included in the category of fairly reliable, so the instrument is declared suitable for use in research. Although the posttest instrument was compiled to measure three indicators of mathematical literacy, the number of questions used was 5 items. This is done so that several indicators, especially understanding and application, are considered to require more in-depth measurement. Therefore, these indicators are represented by more than one question. This approach is taken to improve the accuracy of measurements and obtain a more comprehensive picture of students' mathematical literacy skills.

Next, a prerequisite test was carried out for hypothesis testing, namely the normality test. Normality test Normality test is carried out to determine the normality of the

distribution of data. A data is said to be normal if the significant value > 0.05. The results of the kolmogorov-smirnov normality test are as follows:

Hipotesis:

H_0 = The data is normally distributed if the significant value > 0.05

H_1 = The data is not normally distributed if the significant value < 0.05

From the results of the normality test, the results of the experimental class and control class pretest had significant values in Kolmogorov-Smirnov, namely: 0.200>0.05 and 0.168>0.05. Thus the results of the normality test in the experimental class and the control class were normally distributed.

Table 6. Post-test Normality Test Results

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Standardized Residual for Nilai	,122	49	,168	,972	49	,288

From the results of the normality test, the postest results of the experimental class and the control class had a significant value in Kolmogorov-Smirnov, namely: 0.168 > 0.05. Thus the results of the normality test in the experimental class and the control class were normally distributed. Next, a prerequisite test is carried out for hypothesis testing, namely the homogeneity test. The homogeneity test is carried out to find out whether the students in the class have homogeneous variations or not. This is done to ensure whether the homogeneity assumptions in each data category have been fulfilled or not. A data is said to be homogeneous if it has a significant value of >0.05. The following is the homogeneity test data:

Hipotesis :

$H_0: \sigma_1^2 = \sigma_2^2$: The variance of the two groups is homogeneous if the value is significant$>$ 0,05

$H_1: \sigma_1^2 \neq \sigma_2^2$:The variance of the two groups is not homogeneous if the value is significant$<$ 0,05

Table 7.Pretest homogeneity test results

Test of Homogeneity of Variance

		Statistic	df1	df2	Sig.
Pretest Result	Based on Mean	,596	1	47	,114
	Based on Median	,469	1	47	,123
	Based on Median and with adjusted df	2,469	1	42,505	,124
	Based on trimmed mean	,719	1	47	,106

From the results of the calculation above, the significant value on the based on mean is 0.114. Because the significant value is greater than >0.05, the data is homogeneous.

Table 8. Posttest homogeneity test results

Test of Homogeneity of Variance

	Levene Statistic	df1	df2	Sig.
Based on Mean	1,983	7	41	,181
Based on Median	1,392	7	41	,235
Based on Median and with adjusted df	1,392	7	32,702	,242
Based on trimmed mean	1,965	7	41	,084

The results of the calculation of the homogeneity test of the mathematical literacy test of students obtained a significant score based on mean 0.181 > 0.05. Thus, the data on the mathematical literacy test of students is homogeneous.

Next, the results of the hypothesis test using two-way anova:

First Hypothesis: Research Hypothesis with Learning Model Factors

$H_{0(A)}$: There was no difference in mathematical literacy skills between students who were taught with the PMR and Conventional Approaches.

$H_{1(A)}$): There is a difference in mathematical literacy skills between students who are taught with the PMR and Conventional Approaches

Table 9 present the average value (mean) of students' mathematical literacy ability in each class

Table 9. Average values of experimental classes (PMR) and control classes (conventional)

Class	N	Mean
Experiment (RME)	22	81.00
Control (Convensional)	27	63.74

Based on **Table 9**, it can be seen that the average mathematical literacy ability of students in the experimental class (using the PMR approach) is 81.00 while the control class (using conventional learning) has an average of 63.74. This average difference shows that students who follow learning with the PMR approach have higher mathematical literacy skills compared to students who study conventionally.

Table 10. Two-Way Anova Test Results

Between-Subjects Effects

Dependent Variable: Kemampuan Literasi Matematis

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6378.013[a]	7	911.145	49.268	.000
Intercept	235688.072	1	235688.072	12744.403	.000
Minat Belajar	2563.452	3	854.484	46.205	.000
Kelas	2474.271	1	2474.271	133.792	.000
Minat Belajar * kelas	66.225	3	22.075	11.194	.001
Error	758.232	41	18.493		
Total	257565.000	49			
Corrected Total	7136.245	48			

a. R Squared = ,819 (Adjusted R Squared = ,798)

Based on the test results in **Table 10**, it can be seen that the learning model factors (PMR and conventional) have a value$F$ = 133,792 with a significant value of 0.000. Next steps determineF_{tabel} in a way thatF_{A} (tabel) = F_a(*DK,A DK* ε) dimana F_B(tabel) = F_B(tabel) = $F_{(0,05)}$ (*DK, 1 DK* 41) so that value ofF_{tabel} 4,079.After that, a comparison was made with theF_{hitung} andF_{tabel}throwH_0(A) rejected. Because of the results ofF_{hitung} = 133,792 > 4,079 thenH_0(A) rejected. Thus, it can be concluded that there is a difference in the mathematical literacy ability of students who are learned with PMR and conventional approaches.

Second Hypothesis: Research Hypothesis with Learning Interest Factors

H_0(B): There is no difference in mathematical literacy ability between students who have very high, moderate, low and very low interest in learning.

H_1(B): There is a difference in mathematical literacy ability between students who have very high, sufficient, low and very low interest in learning.

Table 11 The following presents the mean scores of mathematical literacy ability and students' learning interests

Table 11. Average Score of Mathematical Literacy Ability and Student Learning Interest

Learning Interest	Mean
Very High	84,58
Enough	74,29
Low	64,15

Very Low	61,40

Table 12. Two-Way Anova Test Results

Tests of Between-Subjects Effects

Dependent Variable: Nilai

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6378.013[a]	7	911.145	49.268	.000
Intercept	235688.072	1	235688.072	12744.403	.000
Minatbelajar	2563.452	3	854.484	46.205	.000
Kelas	2474.271	1	2474.271	133.792	.000
Minatbelajar * Kelas	66.225	3	22.075	11.194	.001
Error	758.232	41	18.493		
Total	257565.000	49			
Corrected Total	7136.245	48			

a. R Squared = .894 (Adjusted R Squared = .876)

Based on the results of the anova test in Table 13, it shows that the non-cognitive diagnostic assessment variable (learning interest) has a value of F = 46.205 with a significant value of 0.000. Next steps determineF_{table}in a way thatF_A(tabel) = F_a(*DK, A DK*ε) whereF_B(tabel) = F_B(tabel) = F($_{0,05}$) (*DK, 3 DK* 41) so that the valueF_{tabel}. = 2,833.After that, a comparison was made betweenF_{hitung} andF_{tabel}thenH_0(B) rejected. Because of the results ofF_{hitung} = 46,205 > 2,833 thenH_0(B) rejected. Therefore, it can be concluded that there is a difference between mathematical literacy ability and very high, sufficient, low and very low interest in learning.

Third Hypothesis: Research Hypothesis on the Interaction of Learning Models with Learning Interests

H_0(AB) : There was no interaction of mathematical literacy ability between students who had very high, moderate, low and very low interest learned with the PMR and Conventional Approaches

H_1(AB) : There is an interaction of mathematical literacy skills between students who have very high, sufficient, low and very low learning interests learned with PMR and Conventional Approaches

Table 13. Mathematical Literacy Ability Based on Learning Interests and Learning Models

Non-Cognitive Diagnostic Assessment (Learning Interest)	Class	N	Mean
Very High (A_1)	Experiment (RME) (B_1)	7	91,14
Enough (A_2)		7	79,71
Low (A_3)		4	75,50

Very Low (A_4)		4	71,00
Very High (A_1)		5	75,40
Enough (A_2)		7	68,86
Low (A_3)		9	59,11
Very Low (A_4)	Control (Convensional) (B_2)	6	55,00

Comparison of ($A_1 B_1$) ($A_2 B_1$) ($A_3 B_1$) ($A_4 B_1$), namely very high learning interest learned with the PMR approach has an average score of 91.14 which is better than the moderate, low and very low learning interest, where the average value of sufficient learning interest is 79.71, low learning interest 75.50 and very low learning interest 71.00. Likewise, in the control class, very high learning interest learned with the conventional learning approach had an average score of 75.40 better than moderate, low and very low learning interest, with an average score of 68.86, low learning interest 59.11 and very low learning interest 55.00.

Based on**Table 13**Students' learning interest in the experimental class and the control class had a higher value, namely very high learning interest which had an average score for the experimental class of 91.14 and the average score of the control class of 75.40 was better than the moderate, low and very low learning interest.

Table 14. Two-Way Anova Test Results

Tests of Between-Subjects Effects

Dependent Variable: Nilai

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6378.013[a]	7	911.145	49.268	.000
Intercept	235688.072	1	235688.072	12744.403	.000
Minatbelajar	2563.452	3	854.484	46.205	.000
Kelas	2474.271	1	2474.271	133.792	.000
Minatbelajar * Kelas	66.225	3	22.075	11.194	.001
Error	758.232	41	18.493		
Total	257565.000	49			
Corrected Total	7136.245	48			

a. R Squared = .894 (Adjusted R Squared = .876)

Based on the test results in Table 14, it shows that the interaction between the learning interest factor and the learning approach (PMR and conventional) has a value of *F* = 11.194 with a significant value of 0.001. Next steps determineF_{tabel}in a way thatF_A (tabel) = F_a(*DK,A DK* ε) whereF_B(table) = $F_{(0,05)}$ (*DK, 3 DK* 41) so that the valueF_{tabel} 2,833. After that, a comparison was made betweenF_{hitung} andF_{tabel}so thatH_0(AB) rejected. Because of the results of F_{hitung} = 11,194 > 2,833 so thatH_0(AB) rejected. Therefore, it can be concluded that there is an interaction of mathematical literacy skills between the learning interests learned with the PMR and conventional approaches. This shows that the influence of learning approaches (PMR or Conventional) on mathematical literacy skills depends on the level of students' learning interest. In other words, the learning approach used will give different results depending on the student's learning

interest category (very high, adequate, low, or very low). This shows that the PMR approach is more effective when applied to students with high interest in learning.

The learning interest questionnaire instrument used in this study was compiled based on several indicators, namely: feelings of pleasure, student interest, student involvement, diligence in learning and diligence in doing mathematics assignments and diligence and discipline in learning mathematics. The learning interest questionnaire instrument used in this study was adapted from(Pujianti, 2020) who has developed a similar instrument to measure students' learning interests. Before use, the questionnaire has gone through a validity and reliability test process. The researcher used a valid and reliable learning interest questionnaire because the instrument was proven to be able to measure aspects of learning interest accurately (validly) and consistently (reliably) based on the test results in previous research. The use of validated instruments was also chosen because it was more efficient in terms of time and resources, so researchers did not need to prepare and test instruments from scratch.

Based on the results of the validity test of 6 pretest questions, 4 questions were declared valid. The four questions were then tested for reliability and showed reliable results, so they were suitable for use as pretest questions. Although the mathematical literacy indicator used consists of three aspects, namely understanding, application and reasoning, the comprehension indicator is represented by 2 question items. This is considered because comprehension is a basic aspect of mathematical literacy that needs to be measured more deeply through more than one question so that the results are more accurate and reflect the overall abilities of students.

Furthermore, for the results of the validity test of posttest questions (mathematical literacy ability) which consisted of 6 questions, there were 5 valid questions and 1 invalid question. The five questions that were declared valid were then tested for reliability and showed reliable results. Although the posttest instrument was compiled to measure three indicators of mathematical literacy, the number of questions used was 5 items. This is done so that several indicators, especially understanding and application, are considered to require more in-depth measurement. Therefore, these indicators are represented by more than one question. This approach is taken to improve the accuracy of measurements and obtain a more comprehensive picture of students' mathematical literacy skills.

After the instrument is declared valid and reliable, the next step is to carry out a prerequisite test for analysis in the form of a normality test and a homogeneity test. Based on the results of the normality test using the Kolmogorov-Smirnov test in Table 6 for the experimental class, a significant value of $0.200 > 0.05$ and a control class of $0.170 > 0.05$ and in Table 6 a significant value of $0.168 > 0.05$ was obtained. This shows that the data from both groups are distributed normally.

Furthermore, the variance homogeneity test was carried out using Levene's Test for Equality of Variances, which can be seen in Table 7 and Table 8, a significant value (based on mean) of $0.114 > 0.05$ and $0.181 > 0.05$. This shows that the variance of the data between the two groups is homogeneous.

The next stage in data analysis is to test hypotheses using the two-way Anova test to determine the influence of each

1. Differences in mathematical literacy skills between students who are taught with PMR and Conventional Based on the results of the analysis of the pretest questions, it was obtained that most students still had difficulty in understanding the material, simplifying algebraic forms and relating the concept to real situations. This shows that students need a conceptual and meaningful learning approach. To answer these needs, a learning

approach is needed that is able to relate mathematical concepts in real situations that are close to students' lives. One relevant approach to this goal is PMR. PMR is an approach that initiates learning from real-world contexts to build an in-depth understanding of mathematical concepts (Angraeni & Ugi, 2020; Nabillah et al., 2023).

2. Differences in Mathematical Literacy Ability of Students with Very High, Sufficient, Low, Very Low Learning Interest Based on the results of the anova test in Table 15, it shows that the student's learning interest has a value of F = 46.205 with a significant value of 0.000. Because ,F-count. = 46,205 > 2,833 h-0. (B) refused. Therefore, it can be concluded that there is a difference between mathematical literacy ability and very high, sufficient, low and very low interest in learning. However, if you look at Table 9 the average value of mathematical literacy ability based on learning interest, students with high interest in learning have an average of 84.58, enough 74.29, low 64.15 and very low 61.40, this shows that the higher the interest in learning that students have, the higher their mathematical literacy skills. Thus, there is a positive relationship between learning interest and students' mathematical literacy skills. These results are supported by (Saraswati et al, 2023) who stated that the higher the student's interest in learning, the higher their mathematical literacy ability. (Manullang et al., 2024) also support this, that high interest in learning can improve mathematical literacy.
3. Interaction of Mathematical Literacy Ability of Students with Very High, Sufficient, Low, Very Low Learning Interest Learned with PMR and Conventional Approaches. Based on Table 14, students' learning interests in the experimental class and the control class had a higher value, namely very high learning interest which had an average score for the experimental class of 91.14 and the average score of the control class of 75.40 was better than the moderate, low and very low learning interest. PMR provides better results than conventional approaches, especially for students who have a very high interest in learning. These results are supported by research conducted by (Fatima et al., 2022) in their research to find differences in students' interest in mathematics between the group that was treated in the form of a PMR model and the group that was not treated. Increased interest scores in both treated groups, given the good PMR model. This study shows that the application of the PMR model has an effect on increasing students' interest in mathematics subjects. The results of this study show that student interest is significantly able to improve students' mathematical skills, this is in line with the opinion of (Siagian, 2015) and (Putri & Widodo, 2018) that a person who has a high interest in learning will be able to follow the learning process well so that he will be able to produce the best performance in his learning, especially in mathematics lessons. Based on this, a new view emerges that this interest can be one of the factors to improve students' mathematical abilities

In contrast, in the control class that used a conventional approach that was generally oriented towards lecture methods, teacher explanations, whiteboards, and the use of textbooks. In this approach, students are not given enough space to explore the fascination between mathematical concepts and everyday life. Teachers in serving as facilitators and motivators in teaching and learning activities should be able to create a conducive learning atmosphere in order to arouse students' interest so that students are active in learning activities. Teachers must also create a conducive classroom atmosphere through varied and interesting teaching methods that encourage students' interest in learning (Rohaeti, 2012). This was reinforced by the results in the experimental class, which showed a higher average score than the control class, especially in the very high

learning interest category. Thus, it can be concluded that learning interests play an important role in improving mathematical literacy skills, and its effect will be more optimal when combined with appropriate and effective learning models.

Based on the results of the anova test in Table 15, it shows that there is an interaction between learning interests and learning approaches (PMR and Conventional). This can be seen in the interaction factor between learning interest and learning approach, a significant value of 0.001 is obtained at a significant level of 5%, then ,H-0. (AB) was rejected. This suggests that students' varying learning interests depend on learning. The PMR approach has been proven to be able to improve students' understanding of concepts and mathematical literacy skills in general. This study is corroborated by the findings of (Agustina et al., 2022) who found that there was variation between the experimental group and the control and the use of the PMR learning model had an influence on students' mathematical numeracy literacy skill.

Conclusion

Based on the results of the research and discussion on the Effect of Providing Non-Cognitive Diagnostic Assessments and Realistic Mathematics Learning Approaches to Improve Students' Mathematical Literacy Skills, it can be concluded that the Realistic Mathematics Learning (PMR) approach has an effect after being given a non-cognitive diagnostic assessment on students' mathematical literacy skills, especially adjusted to students' learning interests.

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