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THE EFFECTIVENESS OF LOCAL WISDOM-BASED TEACHING MODULES ASSISTED BY HEYZINE FLIPBOOK TO IMPROVE STUDENTS' NUMERACY

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Abstract

This study aims to examine the effectiveness of the results of the application of teaching modules based on local wisdom assisted by heyzine flipbook to improve students' numeracy. This research has novelty in the teaching module development approach, namely by integrating local wisdom and the use of heyzine flipbook through the Luther-Sutopo development model (concept, design, material collecting, assembly, testing, and distribution). The approach of local wisdom into learning has an important role in preserving culture and increasing the relevance of teaching materials for students. The research method used was quantitative. This study involved 23 students of class VII B at SMP Negeri 3 Kalipucang, Pangandaran Regency. Through pretests and posttests, this study successfully identified significant improvements in learners' numeracy. The average student score increased from 34.14 to 80.19. The average N-Gain value of 0.71 (71%) indicates the achievement of high improvement. In addition, statistical analysis of effect size results 4.34. In addition, statistical analysis using paired sample t-test with a p-value of 0.000 proves that the teaching module based on local wisdom assisted by heyzine flipbook has a huge impact on increasing students' numeracy.

Keywords: Luther-Sutopo, teaching module, local wisdom, heyzine flipbook, numeracy

Abstrak

Penelitian ini bertujuan untuk mengkaji efektivitas hasil penerapan modul ajar berbais kearifan lokal berbantuan heyzine flipbook untuk meningkatkan numerasi peserta didik. Penelitian ini memiliki kebaruan dalam pendekatan pengembangan modul ajar, yaitu dengan mengintegrasikan kearifan lokal dan penggunaan heyzine flipbook melalui model pengembangan Luther-Sutopo (*concept, design, material collecting, assembly*, *testing*, dan *distribution*). Pendekatan kearifan lokal ke dalam pembelajaran memiliki peran penting dalam melestarikan budaya serta meningkatkan relevansi materi ajar bagi peserta didik. Metode penelitian yang digunakan adalah kuantitatif. Penelitian ini melibatkan 23 siswa kelas VII B di SMP Negeri 3 Kalipucang, Kabupaten Pangandaran. Melalui *pretest* dan *posttest*, penelitian ini berhasil mengidentifikasi peningkatan signifikan dalam numerasi peserta didik. Rata-rata nilai siswa meningkat dari 34,14 menjadi 80,19. Nilai N-Gain rata-rata sebesar 0,71 (71%) menunjukkan pencapaian peningkatan yang tinggi. Selain itu, analisis statistik hasil effect size 4,34. Selain itu, analisis statistik menggunakan paired sample t-test dengan nilai p-value sebesar 0,000 membuktikan bahwa modul ajar berbasis kearifan lokal berbantuan *heyzine flipbook* memiliki dampak yang sangat besar terhadap peningkatan numerasi peserta didik. Thus, this teaching module not only supports local wisdom-based learning but is also very effective for improving students' numeracy learning outcomes.

Kata kunci: Luther-Sutopo, modul ajar, kearifan lokal, heyzine flipbook, numerasi

INTRODUCTION

Numeracy is a 21st century life skill that improves the quality of human resources and improves the standard of living, thus determining the progress of a nation (Ministry of Education and Culture, 2017). Improving numeracy is a continuous effort that involves all stakeholders, from schools, families, to communities. The right strategy must be tailored to the characteristics of each region. Numeracy is the main focus in education, as measured in the Minimum Competency Assessment (AKM). According to Junaedi et al., (2024), AKM is able

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to assess the basic competencies that all learners need to develop their skills and actively participate in society. Based on the analysis of the education report card of SMP Negeri 3 Kalipucang in 2024 related to numeracy, the following data were obtained:

Tabel 1. Numeracy SMP Negeri 3 Kalipucang

NO	Numeracy Competency	Achievement Year 2023	Achievement Year 2024	Criteria
1	Competencies in the Data and Uncertainty Domain	52,18 %	51,03 %	Decreased
2	Competencies in the Algebra Domain	51,33 %	55,60 %	Increased
3	Competencies in the Number Domain	49,96 %	55,70 %	Increased
4	Competencies in the Geometry Domain	54,27 %	59,59 %	Increased

Source: Education Report, Kemendikbud (2024)

Based on the 2024 education report card, the domain of data and uncertainty has decreased. One of the efforts that can be done through learning in the domain of data and uncertainty to improve the numeracy competence of students. The material is taken based on Ayuningtiyas (2022) the material in the data and uncertainty domain includes understanding, interpretation and presentation of data and opportunities. The domain of data and uncertainty includes sub domains of data and its representation and uncertainty and opportunities, the material includes data and diagrams, statistics and opportunities.

The importance of improving numeracy must be in line with the availability of teaching materials provided by teachers (Sunanti & Apriyanti, 2024). The importance of numeracy improvement must be in line with the availability of teaching materials provided by teachers. Rahayu et al., (2022) explained that learning that only uses teaching materials at school has not encouraged students to have a sense of interest, this makes students face problems in exploring teaching materials, thus causing students' interest in learning numeracy learning material in mathematics learning to decrease.

The development of teaching materials plays an important role in making the learning process more interesting and meaningful. Teaching materials are needed, one of which is an attractive teaching module in accordance with the environment of students and can improve students' numeracy (Musyafak & Agoestanto, 2022). Fazira (2024) developed teaching modules based on local wisdom that can increase students' motivation and curiosity about various cultures that can be related to other mathematics materials. Teaching modules in

local wisdom-oriented learning can improve problem-solving skills because the learning delivered is in accordance with the circumstances that exist in the surrounding environment (Ismah et al., 2024). Related to local wisdom, according to Asmani (Ismah et al., 2024) local wisdom is everything that characterizes regional characteristics including aspects of economy, culture, information technology, communication, ecology and others. The local wisdom raised in this study is local wisdom such as culture, tourist attractions, and its economic potential in Pangandaran Regency.

Based on research by (Rahmadhani & Efronia, 2021), the use of electronic teaching modules is an option for applying technological developments in educational content and the educational process. Heyzine flipbook is one of the e-modules that can be utilized by teachers and students (Erawati et al., 2022). An attractive heyzine flipbook design can make students interested in using it during the learning process and outside the learning process (Humairah, 2022). The teaching module used is a teaching module that connects local wisdom with mathematics subject matter and uses heyzine flipbook media in the learning process.

This study aims to evaluate the effectiveness of developing teaching modules based on local wisdom assisted by heyzine flipbook to improve students' numeracy. The results of the research are in the form of teaching modules that cover the domain of data and uncertainty in data and diagrams, statistics and opportunities.

METHODS

This study uses a quantitative method to measure the numeracy improvement of students after using a local wisdom-based teaching module assisted by heyzine flipbook developed with the Luther-Sutopo model. According to Sutopo (Ali & Rahayu, 2024) the stages include Concept, Design, Material collecting, Assembly, Testing, and Distribution.

According to Sugiyono (2023), the social situation is a source of data consisting of places, actors and activities that are interconnected. An explanation of the three elements is as follows. This research will be conducted in class VII B of SMP Negeri 3 Kalipucang which is located in Sukasirna Hamlet, Bagolo Village, Kalipucang District, Pangandaran Regency. The place was chosen as a place to conduct research for the implementation of local wisdom-based teaching modules assisted by heyzine flipbook to improve students' numeracy. The actors who are the source of research data are as follows: Material experts are experts who

act as material validators. This is to determine the level of validity of the material presented in the teaching module to be developed. Material experts as validators provide an assessment of the level of validity of aspects of content feasibility, presentation feasibility, and contextual assessment in teaching modules, consisting of one lecturer in mathematics education and senior mathematics teachers under the auspices of the Ministry of Education, Culture, Research and Technology. Material Validator 1 is one of the mathematics education lecturers at Muhammadiyah Purwokerto University. Material Validator 2 is the head of MGMP Mathematics SMP Pangandaran Regency. Media experts are experts who act as media validators. This is to determine the level of validation of the teaching module media to be developed. Media experts play a role in providing an assessment of the media both from aspects including aspects of word selection rules in accordance with the characteristics of the target, and aspects of language as a whole as well as the shape, layout, color choice of constituent components, media layout, and display design to its operation. The selected media experts are computer practitioners and/or teachers who are experienced and competent in the field of design and media. Media Validator 1 is one of the informatics engineering lecturers at Siliwangi University. Media Validator 2 is one of the informatics teachers of SMK in Pangandaran Regency as well as the head of KPPD Pangandaran Regency. There were 6 students in class VII A for beta testing. There were 23 students in class VII B of SMP Negeri 3 Kalipucang as the subject for the distribution of local wisdom-based teaching modules assisted by heyzine flipbook to improve students' numeracy. Teachers who joined MGMP Mathematics SMP Pangandaran Regency

Validation is carried out to see the feasibility of the teaching module developed (Yunanda et al., 2023) . To determine the quality level of the effectiveness of the product developed is to calculate the quality of effectiveness based on the results of the pretest and posttest using the effect size formula (Musyarifah, 2023). Data analysis to determine the numeracy improvement of students through the use of teaching modules that have been developed can be seen through the average improvement test measurement data. Numeracy improvement is analyzed using Normalized Gain (N-Gain). The N-Gain test is a commonly used method to measure interventions in improving learner learning outcomes (Sukarelawan et al., 2024). To test the hypothesis, all statistical tests were carried out using SPSS Statistics 25 in conducting a normality test. The normality test aims to determine whether the data from

each test is normally distributed or not. The normality test uses the Shapiro-Wilk test (Fauziah et al., 2023).

This study employs the following numeracy indicators, adapted from Han et al. (2017): (1) Utilizing diverse numerical representations and mathematical symbols to address real-world problems, (2) Analyzing information presented in various formats, including graphs, tables, charts, diagrams, and others, and (3) Interpreting analytical findings to make informed predictions and decisions..

RESULTS AND DISCUSSION

In the seventh meeting, students completed a posttest to evaluate the effectiveness of the locally-inspired teaching module utilizing Heyzine flipbooks. This posttest, along with the pretest administered in the first meeting, provided data on students' numeracy levels in class VII B at SMP Negeri 3 Kalipucang.

Table 2. Results Pretest and Posttest Results of Learner Numeracy

Data	*Pretest*	*Posttest*
Min	11,11	51,85
Max	55,56	100,00
Total	785,19	1.844,44
Average	34,14	80,19
Average Posttest – Average Pretest	46,05	
standard deviation Pretest	10,59	

Based on Table 2, the pretest data obtained is the smallest value of 11,11, the largest value of 55,56, the total value of 785,19 and the average value of 34,14. While the posttest data is the smallest value of 51,85, the largest value is 100, the total value is 1.844,44 and the average value is 80,19.

To assess the impact of teaching modules incorporating local wisdom and utilizing Heyzine flipbooks on students' numeracy skills, researchers calculated the effect size (ES):

$$ES = \frac{Mean\ of\ Posttest - Mean\ of\ Pretest}{Standar\ Deviations\ of\ Pretest}$$

$$ES = \frac{80{,}19 - 34{,}14}{10{,}59}$$

$$ES = \frac{46{,}05}{10{,}59}$$

$$ES = 4{,}34$$

From these calculations, the effect size is 4.34 > 1.00 which is in the “High Effectiveness” criteria. This means that the use of local wisdom-based teaching modules assisted by heyzine flipbook to increase student numeracy in learning activities has a high effect in increasing student numeracy.

To quantify the improvement in students' numeracy following the implementation of a local wisdom-based teaching module enhanced by Heyzine flipbooks, researchers analyzed pretest and posttest scores using the Normalized Gain calculation:

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

The results of the N-Gain calculation can be seen in table 3 below:

Table 3. N-Gain Calculation Results

No	Subject	*Pretest*	*Posttest*	*Posttest* - *Pretest*	Skor Ideal - *Pretest*	*N-Gain* Skor	Category
1	RS 1	55,56	96,30	40,74	44,44	0,92	High
2	RS 2	25,93	59,26	33,33	74,07	0,45	Medium
3	RS 3	44,44	100,00	55,56	55,56	1,00	High
4	RS 4	44,44	88,89	44,44	55,56	0,80	High
5	RS 5	29,63	77,78	48,15	70,37	0,68	Medium
6	RS 6	29,63	81,48	51,85	70,37	0,74	High
7	RS 7	29,63	81,48	51,85	70,37	0,74	High
8	RS 8	29,63	77,78	48,15	70,37	0,68	Medium
9	RS 9	33,33	85,19	51,85	66,67	0,78	High
10	RS 10	11,11	74,07	62,96	88,89	0,71	High
11	RS 11	33,33	88,89	55,56	66,67	0,83	High
12	RS 12	44,44	85,19	40,74	55,56	0,73	High
13	RS 13	37,04	92,59	55,56	62,96	0,88	High
14	RS 14	44,44	81,48	37,04	55,56	0,67	Medium
15	RS 15	44,44	85,19	40,74	55,56	0,73	High
16	RS 16	33,33	74,07	40,74	66,67	0,61	Medium
17	RS 17	25,93	66,67	40,74	74,07	0,55	Medium
18	RS 18	44,44	77,78	33,33	55,56	0,60	Medium
19	RS 19	37,04	70,37	33,33	62,96	0,53	Medium
20	RS 20	25,93	81,48	55,56	74,07	0,75	High
21	RS 21	11,11	51,85	40,74	88,89	0,46	Medium
22	RS 22	33,33	85,19	51,85	66,67	0,78	High
23	RS 23	37,04	81,48	44,44	62,96	0,71	High
Averrage				**46,05**	**65,86**	**0,71**	**High**

Based on the results of the calculation of the Normalized Gain, 11 students or 47.83% of students experienced an increase in the medium category, and as many as 12 students or 52.17% of students experienced an increase in the high category. For the calculation of N-Gain as a whole, the N-Gain is 0.71, then according to the table of Nomalized Gain criteria it is between 0.70 < N-Gain ≤ 1.00 with the criteria "High". This means that the increase in the value of students' numeracy skills after using the teaching module based on local wisdom assisted by heyzine flipbook is high.

Furthermore, to see the significance of increasing the numeracy of students after using the teaching module based on local wisdom assisted by heyzine flipbook, it is described as follows using the normality test:

Tests of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
Nilai_Pretest	.933	23	.127
Nilai_Posttest	.951	23	.306

Figure 1. Normality Test Results

Based on the results of the normality test test with the Shapiro-Wilk test, the Sig value is obtained. Pretest 0.127 and Sig value. Posttest 0.306 is greater than 0.05. Because on the Pretest Sig. > 0.05 it can be concluded that the data is normally distributed. On the Posttest Sig. > 0.05 it can be concluded that the data is normally distributed. Thus, based on the Shapiro-Wilk test, both pretest and posttest data are normally distributed based on the results of the Shapiro-Wilk test, the next analysis uses parametric tests. In this case, the test used is the paired sample t-test, which is suitable for comparing the average between two conditions measured in the same group, namely before (pretest) and after (posttest) intervention.

For decision making using the Paired Sample t-test, the results are as follows:

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	Posttest - Pretest	46.05609	8.34314	1.73967	42.44824	49.66393	26.474	22	.000

Figure 2. Paired t test results

Based on the paired t-test results, the t-count value = 49.588 with degrees of freedom (df) = 22 and p-value = 0.000, which is smaller than the significance level α = 0.05. In addition, the t-count value (24.474) obtained is greater than the t-table (2.07387), which leads to the rejection of the null hypothesis (H_o) stating there is no difference between the pretest and posttest scores. Conversely, the alternative hypothesis (H_1) stating that there is a significant difference is accepted. Thus, it can be concluded that there is a significant difference between the pretest and posttest scores, which indicates an increase in students' numeracy after using the local wisdom-based teaching module assisted by heyzine flipbook.

Based on the results of the calculation of effect size to see the effectiveness of the teaching module. The effect size result of 4,34 > 1,00 is in the “High Effectiveness” criteria. This means that the use of teaching modules based on local wisdom assisted by heyzine flipbook to increase student numeracy in learning activities has a high effect in increasing student numeracy. (Nuraini & Setyowati, 2023) explained that local wisdom is proven to have good effectiveness because there is an increase in value in learning, it is because learning is related to the daily lives of students. In another study conducted by Rismala et al., (2023) digital numeracy-based mathematics learning is more effective in improving students' mathematical understanding, especially in numeracy.

To assess the improvement in students' numeracy following the implementation of the local wisdom-based teaching module with Heyzine flipbooks, the Normalized Gain (N-Gain) was calculated. The resulting N-Gain of 0.71 falls within the "High" category, indicating a high level of improvement.

To determine the statistical significance of this improvement, a normality test (Shapiro-Wilk) was conducted. Both the pretest (Sig. = 0.127) and posttest (Sig. = 0.306) data were found to be normally distributed, as their significance values exceeded 0.71. This led to the rejection of the null hypothesis (no significant difference) and the acceptance of the alternative hypothesis, confirming a statistically significant increase in students' numeracy skills after utilizing the local wisdom-based teaching module with Heyzine flipbooks.

The N-Gain evaluation indicated a "High" level of improvement in student numeracy following the implementation of the teaching module. Statistical analysis corroborated this finding, confirming an increase in numeracy skills. Observations during the research revealed that students in class VII B of SMP Negeri 3 Kalipucang faced challenges in solving numeracy

problems. They were unaccustomed to this type of question and required more interactive learning experiences with digital support. While the N-Gain and statistical analysis demonstrate a positive impact, further optimization is necessary. Nevertheless, the findings align with the initial problem analysis conducted during the research observation. This is supported by (Eprilia et al., 2023) that in local wisdom-based learning can improve students' numeracy. Then in another study stated that developing Canva-based interactive teaching materials through Heyzine can be an alternative learning that has the effectiveness to improve students' numeracy (Sukesi & Jusra, 2024).

To improve learner numeracy, this study employs a teaching module that incorporates local wisdom and utilizes the Heyzine flipbook platform, as detailed below:

Figure 3. Teaching Module Based on Local Wisdom Assisted by Heyzine Flipbook

CONCLUSION

Based on the results of the N-Gain evaluation, the increase in numeracy after using the teaching module in the “High” criteria, based on the results of statistical calculations there is an increase. If it is concluded that the numeracy of students after using the teaching module has increased but not fully optimal. It was found that students of class VII B SMP Negeri 3 kalipucang still had difficulty in solving numeracy test questions, students were not accustomed to working on questions related to numeracy, students needed interactive learning with digital assistance. Based on the results of the N-Gain evaluation and statistical calculations, there is an increase in numeracy after using the teaching module but not yet optimal. However, this can answer the results of the problem analysis during the research observation. This is supported by Eprilia et, al. (2023) that in local wisdom-based learning can improve students' numeracy. Then in another study stated that developing Canva-based

interactive teaching materials through Heyzine can be an alternative learning that has the effectiveness to improve students' numeracy (Sukesi & Jusra, 2024).

Based on the results of the calculation of Effect size to see the effectiveness of the teaching module. Effect size results were obtained in the “High Effectiveness” criteria. This means that the use of teaching modules based on local wisdom assisted by heyzine flipbook to increase student numeracy in learning activities has a high effect in increasing student numeracy. Nuraini & Setyowati (2023) explain that local wisdom is proven to have good effectiveness because there is an increase in value in learning, it is because learning is related to the daily lives of students. In another study conducted by Rismala et al., (2023) digital numeracy-based mathematics learning is more effective in improving students' mathematical understanding, especially in numeracy.

Furthermore, to find out whether there is a significant increase in students' numeracy after using the teaching module, a hypothesis test was conducted. The normality test conducted with the Shapiro-Wilk test showed that the pretest and posttest data had a normal distribution. The results of the variance homogeneity test showed no significant difference in variance between groups, which means that the assumption of homogeneity of variance was met. Therefore, the analysis continued with a parametric test, namely the paired sample t test. The t-test results show that the Sig. value is smaller than the specified significance level, so H_0 which states there is no difference between the pretest and posttest scores is rejected. Conversely, H_1 which states that there is a significant difference between the pretest and posttest is accepted.

Thus, it can be concluded that the use of local wisdom-based teaching modules assisted by heyzine flipbook provides a significant increase in students' numeracy. The t-count value obtained is much greater than the t-table, which supports the rejection of the null hypothesis and acceptance of the alternative hypothesis. This result shows that the teaching module based on local wisdom assisted by heyzine flipbook successfully improves learners' numeracy significantly.

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