# THE EFFECT OF THE REALISTIC MATHEMATIC EDUCATION LEARNING APPROACH USING INTERACTIVE VIDEO ON THE ABILITY OF UNDERSTANDING MATHEMATICAL CONCEPTS OF STUDENTS OF SMP NEGERI 1 COMAL

Khoerunnisa[1], Heni Lilia Dewi[2]
*UIN K.H. Abdurrahman Wahid Pekalongan*
*khoerunnisa22075@mhs.uingusdur.ac.id*

**ABSTRAK**

Penelitian ini dilatarbelakangi oleh rendahnya kemampuan pemahaman konsep matematis siswa kelas IX SMP Negeri 1 Comal pada materi tabung. Hasil observasi menunjukkan bahwa hanya 50% siswa yang mencapai KKM 75. Pembelajaran yang masih konvensional dan kurangnya penggunaan media membuat siswa kurang memahami konsep secara mendalam. Oleh karena itu, diperlukan pendekatan pembelajaran yang kontekstual dan melibatkan siswa secara aktif, yaitu Realistic Mathematics Education berbantuan video interaktif. Rumusan masalah penelitian ini adalah apakah terdapat pengaruh pendekatan RME berbantuan video interaktif terhadap kemampuan pemahaman konsep siswa pada materi tabung. Penelitian ini bertujuan untuk mengetahui pengaruh penerapan RME berbantuan video interaktif terhadap kemampuan pemahaman konsep matematis siswa. Penelitian ini merupakan penelitian kuantitatif dengan metode quasi eksperimen menggunakan desain Post-test Only Control Design. Sampel terdiri dari dua kelas, yaitu kelas eksperimen yang diberi pembelajaran RME berbantuan video interaktif dan kelas kontrol dengan pembelajaran RME tanpa video. Data dikumpulkan melalui tes posttest dan dianalisis menggunakan uji normalitas, uji homogenitas, serta uji Independent Samples t-Test. Hasil penelitian menunjukkan nilai signifikansi (Sig. 2-tailed) sebesar 0,000 < 0,05, sehingga terdapat perbedaan yang signifikan antara kelas eksperimen dan kelas kontrol. Rata-rata kemampuan pemahaman konsep siswa pada kelas eksperimen lebih tinggi dibandingkan kelas kontrol. Dengan demikian, pendekatan RME berbantuan video interaktif berpengaruh signifikan terhadap kemampuan pemahaman konsep matematis siswa pada materi tabung

**Kata kunci** : Realistic Mathematic Education, Video Interaktif, Pemahaman Konsep.

***ABSTRACT***

*This research was motivated by the low mathematical conceptual understanding of ninth-grade students at SMP Negeri 1 Comal on the topic of cylinders. Observations showed that only 50% of students achieved the Minimum Competency (KKM) of 75. Conventional learning and the lack of media utilization prevented students from fully understanding the concepts. Therefore, a contextual learning approach that actively engages students is needed, namely Realistic Mathematics Education (RME) with the aid of interactive videos. The research question was whether the RME approach*

*with interactive videos influences students' conceptual understanding of cylinders. This study aimed to determine the effect of implementing RME with interactive videos on students' mathematical conceptual understanding. This quantitative study employed a quasi-experimental method using a Post-test Only Control Design. The sample consisted of two classes: an experimental class receiving RME with interactive videos and a control class receiving RME without videos. Data were collected through a post-test and analyzed using normality tests, homogeneity tests, and an Independent Samples t-test. The results showed a significance value (Sig. 2-tailed) of 0.000 < 0.05, indicating a significant difference between the experimental and control classes. The average conceptual understanding ability of students in the experimental class was higher than that of the control class. Thus, the interactive video-assisted RME approach significantly impacted students' mathematical conceptual understanding of the cylinder topic.*
***Keywords**: Realistic Mathematics Education, Interactive Video, Conceptual Understanding.*

## INTRODUCTION

Education is a crucial aspect of human life because it plays a role in developing one's overall potential, including intellectual, emotional, and social aspects. Mathematics, as a subject, plays a strategic role in developing logical, systematic, and critical thinking skills. Learning mathematics emphasizes not only results but also the process of in-depth conceptual understanding. Understanding mathematical concepts provides the foundation for students in solving various problems. Therefore, the ability to understand mathematical concepts needs to be optimally developed throughout the learning process (Fitriyani & Dewi, 2023).

Mathematical conceptual understanding is a student's ability to understand, explain, and apply concepts in various situations. Students with a strong conceptual understanding find it easier to connect mathematical concepts. Conversely, students with a weak conceptual understanding tend to have difficulty solving a variety of problems. This demonstrates that conceptual understanding is not only related to memorization but also to a deeper understanding of the material. Therefore, conceptual understanding is an important indicator of successful mathematics learning (Sari & Dewi, 2022).

Based on observations at SMP Negeri 1 Comal, students' mathematical conceptual understanding remains relatively low. This is evident from daily assessments, which show that only about 50% of students achieved the Minimum

Completion Criteria (KKM) of 75. This indicates that most students do not yet fully understand mathematical concepts. This low conceptual understanding is influenced by the still-conventional learning style. Furthermore, the lack of engaging learning media also leads to students being less active in the learning process.

One approach that can be used to improve understanding of mathematical concepts is Realistic Mathematics Education (RME). This approach emphasizes learning linked to real-life contexts, making it more meaningful for students. Through RME, students are encouraged to actively discover and construct their own mathematical concepts. The learning process becomes more interactive because it involves discussion and exploration. Therefore, the RME approach is considered effective in improving students' understanding of mathematical concepts (Badriyah, 2025).

In addition to the learning approach, the use of media also plays a crucial role in improving the quality of learning. One such medium is interactive video, which presents material in a visual and engaging manner. Interactive videos can help students understand abstract concepts more concretely. Furthermore, this medium can increase student motivation and engagement in learning. Therefore, the use of interactive video is expected to support the implementation of the RME approach in improving students' understanding of mathematical concepts (Nafia et al., 2023).

## METHOD

This study uses a quantitative approach with a quasi-experimental method that aims to determine the effect of the Realistic Mathematics Education (RME) approach assisted by interactive videos on students' mathematical concept understanding abilities. The research design used is Post-test Only Control Design, where there are two groups, namely the experimental class and the control class without a pretest. This study was conducted at SMP Negeri 1 Comal with a population of all ninth-grade students, while the research sample was determined using a cluster sampling technique, namely selecting samples based on existing groups or classes. From several available classes, two classes were selected as

research samples, namely one class as an experimental class that received learning with the RME approach assisted by interactive videos and one class as a control class that received learning with the RME approach without interactive videos. The data collection technique in this study used a test instrument in the form of post-test questions to measure students' mathematical concept understanding abilities on the cylinder material. The instrument used first went through an expert validation process by two lecturers to assess the feasibility of the content, construction, and language so that it was suitable for use in research. The data obtained were then analyzed using prerequisite tests in the form of normality tests and homogeneity tests to determine the distribution and similarity of data variance, and continued with hypothesis testing using the Independent Samples t-Test to determine any significant differences between the two groups.

## DISCUSSION

The results of the study indicate that the implementation of the Realistic Mathematics Education (RME) approach with the aid of interactive videos was very well implemented and provided a more contextual and meaningful learning experience for students. The learning was designed based on three main principles of RME, namely didactical phenomenology, guided reinvention, and self-developed models, which allow students to build concepts gradually from real contexts to formal representations. In the experimental class, the use of interactive videos was proven to increase student engagement in observing, discussing, and developing mathematical models. This is different from the control class that implemented RME without media, where student activity tended to be less optimal and more dependent on teacher explanations. This finding is in line with the opinion that mathematics learning should start from real experiences so that concepts are easier to understand (Gravemeijer, 1994).

**Table 1. Descriptive Statistics for Test Score Data**

| **Descriptive Statistics** | | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Ulangan Kelas Kontrol | 32 | 63 | 79 | 72.91 | 4.051 |

| | | | | | |
|---|---|---|---|---|---|
| Ulangan Kelas Eksperimen | 32 | 65 | 82 | 75.59 | 4.149 |
| Valid N (listwise) | 32 | | | | |

**Table 2. Posttest Data Descriptive Statistics Descriptive Statistics**

| **Descriptive Statistics** | | | | | |
|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Posttest Kontrol | 32 | 66 | 85 | 75.72 | 5.275 |
| Posttest Ekspserimen | 32 | 69 | 100 | 84.25 | 6.801 |
| Valid N (listwise) | 32 | | | | |

Based on Table 1 and Table 2, the initial abilities of students in both classes were relatively equivalent, so the difference in final results can be attributed to the treatment given. After learning, students' mathematical concept understanding in the experimental class showed a higher improvement compared to the control class. Students in the experimental class were better able to explain concepts, identify examples and non-examples, and present concepts in various representations. This indicates that the integration of interactive video in the RME approach can help visualize abstract concepts more concretely. Thus, students not only understand procedures but also understand the meaning of concepts in depth (Fitriani et al., 2025).

Furthermore, the analysis of conceptual understanding indicators showed that the experimental class achieved higher achievement in almost all indicators compared to the control class. The indicators for the ability to explain concepts and transform representations reached a very high category, indicating that students have the flexibility to think in understanding the concept of cylinders. Interactive videos act as a bridge between abstract concepts and visual representations, helping students construct understanding independently. This finding is supported by previous research that states that RME-based digital media can improve the quality of mathematics learning (Rif'atun et al., 2025).

**Table 3. Results of Normality Test**

| **Tests of Normality** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Kelas | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | |
| | | Statistic | df | Sig. | Statistic | df | Sig. |
| Hasil | Posttest Kontrol | .077 | 32 | .200* | .972 | 32 | .569 |
| | Posttest Eksperimen | .093 | 32 | .200* | .981 | 32 | .826 |

Furthermore, a homogeneity test was conducted to determine whether the variances of the two classes were equal. The results showed that the significance value was greater than 0.05. This indicates that both groups had homogeneous variances. Therefore, the data met the requirements to proceed with hypothesis testing using parametric tests.

**Table 4. Results of Homogeneity Test**

| **Test of Homogeneity of Variance** | | | | | |
|---|---|---|---|---|---|
| | | Levene Statistic | df1 | df2 | Sig. |
| Hasil | Based on Mean | .552 | 1 | 62 | .460 |
| | Based on Median | .511 | 1 | 62 | .478 |
| | Based on Median and with adjusted df | .511 | 1 | 51.090 | .478 |
| | Based on trimmed mean | .553 | 1 | 62 | .460 |

After the data were confirmed to be normal and homogeneous, hypothesis testing was conducted using the Independent Samples t-Test. The results showed that the significance value (Sig. 2-tailed) was 0.000 < 0.05. This indicates that there is a significant difference between the experimental class and the control class. Thus, it can be concluded that the RME approach assisted by interactive video has a significant effect on students' mathematical conceptual understanding.

**Table 5. Results of Hypothesis Test**

| **Independent Samples Test** | | |
|---|---|---|
| | Levene's Test for | t-test for Equality of Means |

| | | Equality of Variances | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| Results | Equal variances assumed | .552 | .460 | -5.607 | 62 | .000 | -8.531 | 1.522 | -11.573 | -5.490 |
| | Equal variances not assumed | | | -5.607 | 58.384 | .000 | -8.531 | 1.522 | -11.576 | -5.486 |

The statistical test results also support these findings. Based on the Independent Samples t-test, a significance value of 0.000 < 0.05 was obtained, indicating a significant difference between the experimental and control classes. The higher mean score of the experimental class indicates that the implementation of interactive video-assisted RME has a positive effect on students' mathematical concept understanding. Furthermore, the confidence interval that does not contain zero further confirms that the difference is statistically significant. These results are in line with previous research stating that interactive learning can significantly improve conceptual understanding and student engagement (Cahyani et al., 2024).

The findings of this study are also supported by previous research showing that the RME approach is effective in improving students' mathematical conceptual understanding (Sari & Dewi, 2022). Moreover, the use of interactive video has been proven to enhance students' motivation and learning outcomes (Nafia et al, 2023) Therefore, the combination of the RME approach and interactive video provides more optimal results compared to using the approach without media. This indicates that integrating learning approaches with appropriate media is essential in improving the quality of mathematics learning.

## CONCLUSION

Based on the results of the research that has been conducted, it can be concluded that the application of the Realistic Mathematics Education (RME) learning approach assisted by interactive videos has a significant effect on students' conceptual understanding ability on the cylinder material at SMP Negeri 1 Comal. This is evidenced by the results of the Independent Samples T-Test which shows a significance value (Sig. 2-tailed) of 0.000 < 0.05, so that the null hypothesis ($H_0$) is rejected and the alternative hypothesis ($H_1$) is accepted. In addition, the average conceptual understanding ability of students in the experimental class is higher than the control class. Thus, it can be concluded that the application of the Realistic Mathematics Education (RME) approach assisted by interactive videos has a significant effect on students' mathematical conceptual understanding ability, so this approach can be used as an effective learning alternative in supporting the mathematics learning process.

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