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The Use of Videos to Improve Low Achieving Students' Understanding of Mathematics

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Abstrak

Pertanyaan tentang bagaimana meningkatkan pembelajaran siswa yang mendapatkan nilai rendah dalam matematika menimbulkan tantangan yang signifikan bagi peneliti dan guru. Peneliti menyelidiki apakah penggunaan video dapat membantu siswa yang berprestasi rendah. Untuk mencapai tujuan ini, penelitian ini menggunakan pendekatan kualitatif. Pengumpulan data dilakukan melalui wawancara, pre-test dan post-test. Penelitian ini melibatkan 15 siswa dari 3 kelas yang berbeda, serta 2 guru matematika. Peneliti melakukan wawancara siswa dan guru mengenai kesan pertama mereka menggunakan video dalam pembelajaran matematika, serta memberikan pre-test dan post-test untuk mengamati kalimat jawaban yang diberikan. Hasil penelitian ini bahwa penggunaan video memudahkan siswa untuk mengingat materi serta siswa dapat berdiskusi, yang menimbulkan dampak memudahkan siswa untuk memahami konsep matematika. Penggunaan video terbukti menjadi strategi yang efektif dalam meningkatkan pemahaman konsep matematis siswa yang berprestasi rendah.

Kata Kunci: Kontekstual, Video, Pemahaman Matematika, Siswa SD

Abstract

The question of how to improve the learning of students who score low in mathematics poses a significant challenge for researchers and teachers. Researchers investigated whether the use of video could help low-achieving students. To achieve this goal, this research uses a qualitative approach. Data was collected through interviews, pre-test, and post-test. This study involved 15 students from 3 different classes and two mathematics teachers. The researcher interviewed students and teachers about their first impressions using videos and gave a pre-test and post-test to check the answers' sentences. This study indicates that video makes it easier for students to remember the material, and students can influence what affects their understanding of mathematical concepts. The use of video proved to be an effective strategy in increasing the knowledge of mathematical concepts of low achieving students.

Keywords: *Contextual, Video, Understanding of Mathematics, Low Achievement Student, Elementary Student*

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INTRODUCTION

Mathematics is a subject that is difficult for students to understand (Morgan, Farkas, & Maczuga, 2015; Jitendra, Nelson, Pulles, Kiss, & Houseworth, 2016). This is in line with research (Karsenty & Arcavi, 2003) which found that several mathematics teachers in schools revealed that students did not hate mathematics but needed more effort when teaching mathematics in class. It is undeniable that in every type, students with a reasonably high level of mathematical understanding work on math practice questions in a short time and maintain stable learning outcomes (Azmy et al., 2022; Ningrum et al., 2022; Sari et al., 2022). However, not a few students also need more time to understand simple concepts, additional time in completing math practice questions, and achieve scores that are only close to the Minimum Completeness Criteria (KKM).

The question of how to improve the effectiveness of the mathematics teaching and learning process presents a significant challenge for researchers and teachers. This challenge is vital for students with low achievement in mathematics where existing teaching methods appear to be underutilized (Setiawan et al., 2021; Utomo et al., 2021; Zulela et al., 2022). In particular, low-achieving students have more difficulty reasoning meaningful mathematical concepts than other students. This difficulty can lead them to focus primarily on procedures. This means they can learn to use mathematical algorithms, such as fraction expansion, without understanding the reasoning behind their answers. In addition, many teachers believe that low achieving students cannot perform tasks with higher-order thinking (Karsenty & Arcavi, 2003).

Teachers often conclude that the most effective way to improve mathematics achievement in low-achieving students is by drilling (Anderson, Reder, & Simon, 2000), focusing on mathematical algorithms or procedures than on mathematical meanings or concepts (Acesta et al., 2021; Fanny et al., 2021; Sudrajat et al., 2021). Low achieving students need interventions to improve students ability to understand mathematical procedures, concepts, and terminology. Because, with the right approach, students can enhance their understanding. In line with supporting research results (Hiebert, Wearne, et al. 1991) reported consistent success in using concrete materials to help students understand decimal fractions. It is also in line with the results of research (Sfard, 2001, 2002; Yackel & Cobb, 1996; Barab & Squire, 2004) that presents mathematical concepts and procedures in contexts relevant to everyday life can be an effective strategy to promote meaningful learning.

METHOD

Research Design

This research was used qualitative research with a descriptive method (Asrifah et al., 2020; Irawan & Iasha, 2021). This design was chosen because it contains characteristics such as allowing to express perceptions, researcher participation from researchers, aligning the original setting, flexibility in research design, realizing inductive analysis with qualitative data.

Data source

This study involved 15 third-grade students from three different classes and two mathematics teachers.

Data Collection and Analysis Techniques

The data collection technique was carried out using a short structured interview method, pre-test, and post-test. Structured interviews were conducted with two teachers and 5 of 15 students immediately after the lesson at the first meeting where the video was presented. This interview was intended to inform their impressions and perceptions about video as an educational tool. Two questions were asked: (Q1) What is the difference (if any) between video lessons and other lessons? (Q2) What is more helpful for remembering material, reading, or watching? Why?

The second instrument is pre-test and post-test. A pre-test was given to 15 students after they finished studying the material and started using videos on this topic. Post-test was given two weeks after. Students were

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asked to answer the following questions in the previous test: "Dani ate 4/5 chocolate bars. Itay eats 8/10 from similar bars. Itay told Dani that he was eating more chocolate because he was eating more chocolate chunks. Is he right? Explain your answer. The post-test questions were asked similarly, using different fractions and 9/12. In this test, students have the freedom to choose which action to use in the situation.

Thus, this action analysis can help researchers determine whether students can adapt their answers to mathematical concepts. Students' understanding of mathematical concepts was obtained using an instrument adapted from Gray and Tall's (1994) categorizing each answer related to the procedure or concept, according to the following criteria:

1. Procedural focus: students' answers were classified as procedural focused when the first procedure was explained, namely, multiplying the numerator and denominator by the same number (e.g., "This is multiplication by three and multiplication by 8").
2. Focus on meaning: student statements were classified as focused on purpose when they demonstrated knowledge of the ideas underlying the extension process and outcome. For example, the answer at this level might be, "the parts get smaller."

RESULT AND DISCUSSION

The video was used to develop students' understanding of mathematical concepts in this study. Students showed an explicit preference based on the pre-test results that focused their answers on the multiplication procedure, even though there were instructions to use stories or pictures. Students chose not to use chocolate diagrams, the number of chocolate pieces, etc. Students do not show evidence of why the currently discussed equivalence of scores 4/5 = 8/10 is true. In several meetings, the discussion of fractions was given in contextual videos. Videos presented traces in the form of pieces of chocolate bars. Chocolate bars served are 4/5 as much as 8/10. This video shows the amount remains the same, only divided more. Hence, students know the process, what is distributed remains the same under the procedural and conceptual instrument references adopted from Gray and Tall (1994).

After several meetings discussing fractions using videos, more students used concept-focused answers in the post-test than in the pre-test. This strengthens the researcher's belief that contextual videos make it easier for students to understand fractions (Iasha, 2018; Sudrajat et al., 2018; Wahyudiana et al., 2021). In addition, using video to present the story in context is more helpful in increasing students' understanding than using a test to show the same level. This premise is based on the interviewed teachers' descriptions of the large amount of work they had to bring the concept of fractions to life. Teachers feel free from these needs with visualization provided through videos. Teachers can focus more on interacting with students individually (Husda et al., 2022; Listiyanti & Indrawati, 2022; Susanti et al., 2022).

Students who participate in the interaction session can remember the story in the video. Students use it spontaneously to think about how to conceptualize fractions. This is based on the premise of interviewing students, meaning that the use of videos makes it easier for students to remember stories, thus making it a way to understand the concept of fractions. Therefore, the researcher believes that using this video is an effective and potentially successful strategy to develop the understanding of students scoring low in mathematics, as shown in the student interviews and post-test results (Afrizal et al., 2022; Sharifah & Hamdu, 2022). The above results show that using video to present stories in context can improve understanding of mathematical concepts. The use of videos makes it easier for students to remember stories. Therefore, the researcher believes that this combination proves to be an effective strategy in helping students who lack an understanding of mathematical concepts.

CONCLUSION

This research is supported by previous research in the field of mathematics education which shows that students with difficulties can overcome them and improve their understanding with appropriate instructional support. Although further research is needed to explore student learning, these findings are expected to indicate that it is best to set instructional goals to improve understanding, rather than just drill procedural operations with practice and repetition. Furthermore, using contextual stories presented through videos and followed by interaction sessions (discussions) proved to be an effective strategy in promoting understanding of mathematical concepts of low achieving students. This has important implications for mathematical pedagogy, especially when dealing with low-achieving students.

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