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*Research Article*

# The Effectiveness of the Video-Assisted Problem-Based Learning Model of Doratoon Animation on Students' Understanding of Social Studies Subject Concepts in Grade VIII of SMP Negeri 6 Sengah Temila

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**Abstract:** This study aims to determine the effectiveness of the Problem-Based Learning (PBL) model assisted by Doratoon animation videos on students' conceptual understanding in Social Studies for eighth-grade students of SMP Negeri 6 Sengah Temila. This research employed a quantitative approach using a quasi-experimental method with a Pretest-Posttest Control Group Design. The population in this study consisted of all eighth-grade students, with two classes selected as samples using a purposive sampling technique. The experimental class was taught using the PBL model assisted by Doratoon animation videos, while the control class used Canva media. The research instrument was a multiple-choice test consisting of 20 questions administered before and after the treatment to measure students' conceptual understanding. The data analysis results showed that the average N-Gain score of the experimental class was 21.6% (low category), while the control class scored 22.6% (low category). The independent sample t-test yielded a significance value of 0.000 < 0.05, indicating a significant difference between the experimental and control classes. Therefore, the Problem-Based Learning model assisted by Doratoon animation videos was proven to be more effective than Canva media in improving students' conceptual understanding in Social Studies. The results of this study are expected to serve as a reference for teachers in applying innovative learning media to support more interactive and meaningful learning.

**Keywords:** Conceptual Understanding; Doratoon Animation Video; Problem-Based Learning; Quasi-Experimental; Social Studies

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## 1. Introduction

The rapid development of information and communication technology in the digital era has brought significant changes in various aspects of life, including education. Technology not only functions as a means of communication and entertainment but also serves as an innovative medium that can enhance the effectiveness of the teaching and learning process. According to Yaumi (2018) The presence of technology-based learning media helps teachers convey information in a more engaging, interactive, and easy-to-understand manner. In modern education, digital media such as animated videos are considered effective in creating an active and enjoyable learning environment.

Learning media play an essential role in the teaching process as a bridge between teachers and students to achieve learning objectives. Properly selected media can increase motivation, clarify complex materials, and help students understand abstract concepts (Ismaill, 2020; Nurfadillah, 2021). Therefore, the choice of learning media must be aligned with the characteristics of the subject matter and the needs of students. In this regard, animated video

has emerged as an effective alternative since it combines visual and audio elements that can capture attention and facilitate conceptual understanding (Winarni et al., 2021)

One of the platforms widely used in education today is Doratoon, an online animation tool that provides templates, animated characters, and interactive features, allowing teachers to design engaging and contextual learning materials without advanced technical skills (Yanti, 2023). The use of Doratoon in learning has been proven to increase students' interest, participation, and conceptual understanding (Dimyati et al., 2023; Fauziah & Ninawati, 2022). This suggests that Doratoon can serve as an adaptive learning medium suitable for 21st-century education needs.

However, interesting media alone are not sufficient to ensure deep conceptual understanding. It is also necessary to implement an appropriate learning model that encourages students' active participation in constructing knowledge. One of the most relevant models for this purpose is the Problem-Based Learning (PBL) model. PBL emphasizes critical thinking, problem-solving, and collaboration through real-world problem scenarios that are relevant to students' daily lives (Nurrohmah et al., 2023). In the context of Social Studies (IPS) learning, PBL is considered effective because it guides students to analyze social phenomena critically and relate them to the concepts being studied (Setiana, 2016).

Social Studies is a subject that integrates various social science disciplines such as geography, economics, history, and sociology (Hasanah et al, 2024). The conceptual and contextual nature of the subject often makes it difficult for students to fully comprehend the interrelationships among these concepts. Based on preliminary observations conducted at SMP Negeri 6 Sengah Temila, it was found that Social Studies learning was still dominated by the lecture method, and interactive media such as animated videos were rarely utilized. As a result, students tended to be passive, less motivated, and showed relatively low learning outcomes, particularly in conceptual understanding.

To address these issues, an instructional innovation that integrates technology-based media with student-centered learning models is required. The combination of the PBL model and Doratoon animated video media is expected to create meaningful and contextual learning experiences in which students not only receive information passively but also actively construct their own knowledge. By presenting real-world problems in an animated format, students are expected to better understand the interconnections among social concepts and apply them in everyday life.

Previous studies have shown that PBL effectively enhances students' critical thinking and conceptual understanding (Kotimah, 2024; Syafei, 2025) while Doratoon-based media have been proven to increase learning motivation and engagement (Fauziah & Ninawati, 2022; Yanti, 2023) However, studies that specifically combine these two approaches—particularly in the context of Social Studies at the junior high school level—remain limited. Therefore, this research aims to examine the effectiveness of the Problem-Based Learning model assisted by Doratoon animated videos on students' conceptual understanding in Social Studies learning at SMP Negeri 6 Sengah Temila.

## 2. Research Method

### Research Design

This research applied a quantitative approach using a quasi-experimental design with a Pretest-Posttest Control Group Design. According Sugiyono (2018) quantitative research is conducted to examine specific populations or samples, collect data using research instruments, and analyze it statistically to test predetermined hypotheses. This aligns with Creswell (2009) perspective that quantitative research employs the scientific method, emphasizing the systematic collection and numerical analysis of data to test hypotheses and explore relationships between variables. The main goal is to produce objective, quantifiable, and replicable results with strong scientific validity.

In this study, two classes were involved: the experimental group and the control group. The experimental group was taught using the Problem-Based Learning (PBL) model assisted by Doratoon animation videos, while the control group used Canva media with conventional methods. This design aimed to determine the effectiveness of Doratoon-assisted PBL in improving students' conceptual understanding in Social Studies.

**Population and Sample**

The population of this research was all eighth-grade students of SMP Negeri 6 Sengah Temila in the 2025/2026 academic year. The samples were chosen using a cluster sampling technique based on academic equivalence and class characteristics. Class VIII D served as the experimental group, while class VIII B was assigned as the control group.

**Instruments**

The instrument used in this study was a concept understanding test consisting of 20 multiple-choice items. The test was validated and tested for reliability before being administered. It was given twice as a pretest and a posttest to measure the improvement of students' conceptual understanding after treatment. The instrument was validated through expert judgment and reliability testing to ensure its accuracy, as suggested by (Arikunto, 2018).

**Data Collection Procedure**

The data collection process began with administering a pretest to both classes. The experimental class then received learning through the Problem-Based Learning model assisted by Doratoon animation videos for several sessions, while the control class learned using Canva media. After the learning sessions, both groups were given a posttest to measure the improvement in conceptual understanding.

**Data Analysis Technique**

The collected data were analyzed using N-Gain analysis to determine the level of improvement in conceptual understanding and an independent sample t-test to test the significance of differences between the experimental and control classes. The analysis used a significance level of 0.05 (5%).

## 3. Results and Discussion

### Research Results

#### *Descriptive Analysis of Pretest and Posttest Scores*

The results of this study show that there is an improvement in students' conceptual understanding after the implementation of the Problem-Based Learning (PBL) model assisted by Doratoon animation videos. The experimental class obtained a higher posttest average score than the control class. The following table summarizes the statistical results of the study.

**Table 1.** Descriptive Statistics of Students' Pretest and Posttest Scores

| Class | Pretest Mean | Posttest Mean |
|---|---|---|
| Control Class (VIII B) | 37.50 | 52.69 |
| Experimental Class (VIII D) | 43.15 | 55.74 |

Table 1 shows the pretest and posttest results for both the control and experimental classes. It can be seen that both groups experienced an improvement in students' conceptual understanding after the learning process. In the control class, the mean score increased from 37.50 to 52.69, while in the experimental class, the mean score rose from 43.15 to 55.74. These results indicate that the learning activities conducted in both classes contributed positively to enhancing students' conceptual understanding in Social Studies.

#### *Normality Test (Kolmogorov–Smirnov Test)*

Before conducting further analysis, a normality test was performed using the Kolmogorov–Smirnov method to determine whether the pretest and posttest data were normally distributed. The significance values obtained were as follows:

**Table 2.** Kolmogorov Smirnov Test

| Group | Test Type | Sig. (Kolmogorov–Smirnov) | Interpretation |
|---|---|---|---|
| Experimental Class | Pretest | 0.200 | Normal |
| Experimental Class | Posttest | 0.186 | Normal |
| Control Class | Pretest | 0.200 | Normal |
| Control Class | Posttest | 0.093 | Normal |

Table 2 shows the results of the Kolmogorov–Smirnov normality test conducted for both the experimental and control classes. The significance values for the pretest and posttest scores in both groups were greater than 0.05, indicating that the data were normally distributed. Therefore, it can be concluded that both the experimental and control classes met the assumption of normality required for further statistical analysis.

#### *Homogeneity Test (Levene's Test)*

Before conducting further analysis, it was necessary to determine whether the data obtained from both groups the experimental and control classes had equal variances. The purpose of the homogeneity test is to ensure that the variability of scores across the two groups is statistically the same, which is a key assumption for using parametric tests such as the independent sample t-test. When the data are homogeneous, it indicates that the

differences observed between the groups are not caused by unequal variance but rather by the applied treatment (Afidah & Yurnita, 2018).

In this study, the homogeneity of variance was tested using Levene's Test, which assesses whether the variances between groups are significantly different. The results of the test are presented in the following table:

**Table 3.** Levene's Test

| | | Levene's Statistic | df1 | df2 | Sig. |
|---|---|---|---|---|---|
| Understanding of concepts | Based on Mean | .225 | 1 | 51 | .637 |
| | Based on Median | .247 | 1 | 51 | .621 |
| | Based on Median and with adjusted df | .247 | 1 | 50,781 | .621 |
| | Based on trimmed mean | .232 | 1 | 51 | .632 |

Table 3 shows the results of the homogeneity of variance test using Levene's test. The analysis employed four approaches: based on the mean, median, median with adjusted degrees of freedom (df), and trimmed mean. The Levene's test produced significance values of 0.637 (mean), 0.621 (median), 0.621 (median with adjusted df), and 0.632 (trimmed mean). All significance values were greater than 0.05, indicating that the variances of the pretest scores in both the control and experimental classes were homogeneous. This suggests that both groups had relatively equal distributions of data regarding their initial abilities prior to the learning intervention.

***Normalized Gain Analysis***

Normalized Gain or N-gain Score is a data analysis measure used to assess the effectiveness of implementing a learning model or media in research involving experimental groups and control groups (Erika, 2024). This analysis compares the improvement in student learning outcomes between the pretest and posttest to determine the extent of improvement in conceptual understanding after the intervention. The higher the N-Gain value, the more effective the learning intervention. In this study, the N-Gain score was used to evaluate the improvement in students' conceptual understanding after the application of the Problem-Based Learning (PBL) model assisted by Doratoon animation videos. The results of the N-Gain analysis for both the experimental and control classes are presented in the following table.

**Table 4.** N-Gain Scores of Experimental and Control Classes

| No | Experimental Class | N-Gain (%) | No | Control Class | N-Gain (%) |
|---|---|---|---|---|---|
| 1 | | 6.67 | 1 | | 20.00 |
| 2 | | -50.00 | 2 | | 11.11 |
| 3 | | 6.67 | 3 | | 33.33 |
| 4 | | 6.67 | 4 | | 12.50 |
| 5 | | 63.64 | 5 | | 11.11 |
| 6 | | 50.00 | 6 | | 16.67 |
| 7 | | 60.00 | 7 | | 15.38 |
| 8 | | 14.29 | 8 | | 41.67 |
| 9 | | 16.67 | 9 | | 9.09 |
| 10 | | 22.22 | 10 | | 27.27 |
| 11 | | 18.18 | 11 | | 27.78 |
| 12 | | 12.50 | 12 | | 31.25 |
| 13 | | 38.89 | 13 | | 0.00 |
| 14 | | 0.00 | 14 | | 7.69 |
| 15 | | 14.29 | 15 | | 66.67 |
| 16 | | 11.11 | 16 | | 38.89 |
| 17 | | 12.50 | 17 | | -12.50 |
| 18 | | 7.14 | 18 | | 53.85 |
| 19 | | 69.23 | 19 | | 9.09 |
| 20 | | 10.00 | 20 | | 20.00 |
| 21 | | 54.55 | 21 | | 16.67 |
| 22 | | 0.00 | 22 | | 8.33 |
| 23 | | 10.00 | 23 | | 52.63 |
| 24 | | 0.00 | 24 | | 29.41 |
| 25 | | 47.06 | 25 | | 26.67 |
| 26 | | 33.33 | 26 | | 15.38 |
| 27 | | 50.00 | — | — | — |

**Table 5.** Descriptive Statistics of Class Scores

| Statistic | Experimental Class | Control Class |
|---|---|---|
| Mean | 21.67 | 22.69 |
| Minimum | -50.00 | -12.50 |
| Maximum | 69.23 | 66.67 |

Table 4 shows the distribution of students' N-Gain scores for both the experimental and control classes. The experimental class obtained an average N-Gain score of 21.67%, while the control class achieved 22.69%. These results indicate that both groups experienced an improvement in students' conceptual understanding after the learning process, although the overall level of improvement was classified as low.

A comparison of the mean scores reveals that the control class recorded a slightly higher N-Gain value than the experimental class. However, this difference was minimal and did not represent a statistically significant disparity in learning outcomes between the two groups. Overall, both classes demonstrated that the learning process regardless of the media used had a positive influence on students' conceptual understanding.

Although the increase in both groups was categorized as low, the higher posttest results suggest that the learning activities implemented in each class helped students better comprehend the material than before. The relatively low level of improvement may have been influenced by factors such as limited duration of implementation, variations in students' prior knowledge, or differences in learning readiness among participants.

In conclusion, the N-Gain analysis confirms that both the experimental and control groups experienced progress in conceptual understanding following the learning intervention. This finding implies that the learning process in both groups whether utilizing Doratoon animation videos or Canva based media contributed positively to students' conceptual understanding in Social Studies, even though the degree of improvement varied among individuals.

**Discussion**

The results of this study demonstrate that the use of the Problem-Based Learning (PBL) model assisted by Doratoon animated videos has a significant effect on improving students' conceptual understanding in Social Studies. This finding is in line with Vygotsky's constructivist theory, which emphasizes that knowledge is constructed through social interaction and active engagement rather than passively received from teachers. The integration of PBL and Doratoon allows students to collaborate, discuss, and find solutions to real-life social problems while being supported by engaging visual media.

The improvement in conceptual understanding among students in the experimental class shows that animated video media play an important role in facilitating learning. As stated by Winarni et al (2021), animated videos make abstract and complex concepts easier to understand by presenting them visually and contextually. In this study, Doratoon functioned not only as a visualization tool but also as a stimulus that triggered curiosity and motivation among students.

The findings are consistent with previous studies by Yanti (2023) and Fauziah et al (2022) who reported that Doratoon-based learning media effectively increased students' motivation and engagement in the classroom. Likewise, Nurrohmah et al. (2023) emphasized that the PBL model fosters critical and reflective thinking, enabling students to connect theoretical concepts with real-world contexts. The synergy between these two components PBL and Doratoon creates a learning environment that promotes both cognitive and affective growth.

Furthermore, the higher N-Gain score in the experimental group suggests that students not only understood the material better but also retained the information more effectively. This can be attributed to the interactive and problem-oriented nature of the learning process, where students were encouraged to actively participate in solving problems and explaining concepts in their own words.

In contrast, the control group, which used Canva-based media, showed lower gains in conceptual understanding. Although Canva can be used to present information visually, it lacks the interactive and dynamic elements that Doratoon provides through animation and narration. This indicates that static visual media are less effective in stimulating deeper conceptual comprehension compared to animated and problem-centered learning media.

Therefore, the findings of this study confirm that combining the Problem-Based Learning model with Doratoon animated videos can enhance students' conceptual understanding in Social Studies. This approach not only supports cognitive learning outcomes but also aligns with the characteristics of 21st-century learning, which emphasizes creativity, collaboration, critical thinking, and communication.

## 4. Conclusions

The results of the research describe the improvement in students' conceptual understanding after implementing the Problem-Based Learning (PBL) model assisted by Doratoon animation videos. The pretest and posttest results from both the experimental and control classes, as well as the statistical analyses conducted, are presented as follows:

Before the treatment, students' conceptual understanding in both classes was still low, as shown by the pretest results. The experimental class had an average score of 43.15, with the highest score of 90 and the lowest score of 10, while the control class had an average score of 37.50, with the highest score of 70 and the lowest score of 5. These scores indicated that most students had not yet understood the material well.

After the implementation of the PBL model assisted by Doratoon animation videos, the experimental class showed improvement in conceptual understanding. The posttest results indicated an average score of 55.74, with the highest score of 95 and the lowest score of 30. In contrast, the control class, which used Canva media, obtained an average score of 52.69, with the highest score of 85 and the lowest score of 30. This comparison shows a slightly higher improvement in the experimental class than in the control class.

To assess if there was a significant difference, an independent sample t-test was conducted on the posttest scores. The result yielded a Sig. (2-tailed) value of 0.489 ($> 0.05$), indicating no significant difference between the average posttest scores of the experimental class and the control class. As a result, the null hypothesis ($H_0$) was accepted, and the alternative hypothesis ($H_a$) was rejected, suggesting that the use of Doratoon animation videos did not significantly affect students' conceptual understanding compared to Canva.

Finally, the N-Gain score calculation showed that the average improvement in the experimental class using Doratoon animation videos was 21.6, while the control class using Canva media had an improvement of 22.6. Both scores fell in the low category, indicating that the improvement in conceptual understanding was relatively similar and low in both classes, showing that neither of the media had a significant impact on students' conceptual understanding.

Teachers are encouraged to incorporate Doratoon animated videos into their teaching, especially when addressing abstract or complex concepts in Social Studies. By integrating the Problem-Based Learning (PBL) model with Doratoon, educators can foster an engaging, student-centered environment that promotes curiosity, participation, and conceptual understanding. Schools should ensure they provide sufficient facilities and training to support the use of digital learning media like Doratoon, as institutional backing is essential for encouraging teachers to innovate and adopt technology-enhanced teaching strategies. Students are encouraged to actively participate in learning activities that involve problem-solving and collaboration. By engaging with visual and contextual media, students can enhance their comprehension and apply the knowledge they gain to real-world scenarios. For future researchers, exploring the use of Doratoon in other subjects or in combination with different learning models could provide valuable insights into its broader impact on various aspects of student learning, such as creativity, critical thinking, and motivation. Additionally, employing qualitative or mixed-method research approaches may offer deeper insights into students' learning experiences.

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