

# The Effect of Using Pop Up Book Teaching Aids on Mathematics Learning Interest of Grade II Students at State Elementary School 1 Kasugengan Kidul

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## ABSTRACT

This study aimed to determine the effect of using Pop Up Book teaching aids on students' interest in learning mathematics in grade II at State Elementary School 1 Kasugengan Kidul. This research was conducted due to students' low interest in mathematics learning, indicated by limited attention, involvement, and interest during the learning process. This study used a quantitative approach with an experimental method and a One Group Pretest-Posttest Design. The sample consisted of 32 second-grade students. Data were collected using a learning interest questionnaire and analyzed using normality tests, a Paired Samples t-Test, and N-Gain. The results showed an increase in the average learning interest score from 60.56 in the pretest to 69.91 in the posttest. The Paired Samples t-Test showed a significance value of  $0.000 < 0.05$ . Therefore, the use of Pop Up Book teaching aids had a positive effect on improving students' interest in learning **mathematics**.

## Article Info

### Keywords:

Pop Up Book;  
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## ABSTRACT

Penelitian ini bertujuan untuk mengetahui pengaruh penggunaan alat peraga Pop Up Book terhadap minat belajar matematika peserta didik kelas II SD Negeri 1 Kasugengan Kidul. Penelitian ini dilatarbelakangi oleh rendahnya minat belajar matematika yang ditunjukkan melalui kurangnya perhatian, keterlibatan, dan ketertarikan peserta didik selama pembelajaran. Penelitian menggunakan pendekatan kuantitatif dengan metode eksperimen dan desain One Group Pretest-Posttest Design. Sampel penelitian berjumlah 32 peserta didik kelas II. Data dikumpulkan menggunakan angket minat belajar dan dianalisis menggunakan uji normalitas, Paired Samples t-Test, dan N-Gain. Hasil penelitian menunjukkan adanya peningkatan rata-rata minat belajar dari 60,56 pada pretest menjadi 69,91 pada posttest. Hasil uji Paired Samples t-Test memperoleh nilai signifikansi  $0,000 < 0,05$ . Dengan demikian, penggunaan alat peraga Pop Up Book berpengaruh positif terhadap peningkatan minat belajar matematika peserta didik.

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## 1. Introduction

Education is a process of shaping human intellectual and emotional abilities aimed at developing the quality of students. Education constitutes a conscious and planned effort to create a learning process so that students can develop their potential, both in terms of knowledge, skills, and attitudes (Faiz et al., 2022). The success of the educational process is inseparable from effective learning activities involving various components, one of which is the use of instructional media.

In the learning process, instructional media serves as an intermediary between teachers and students in delivering material to make it more effective and efficient. Instructional media can help students understand material that is difficult to comprehend abstractly and create more engaging learning. Therefore, instructional media is needed that is capable of supporting the active involvement of students during the learning process (Pramesti et al., 2025).

Mathematics learning at the elementary school level remains one of the learning areas requiring special attention because many mathematical concepts are abstract. Elementary school students need concrete learning experiences to be able to understand the concepts presented. One effort teachers can make is to use teaching aids in learning. Teaching aids can help explain abstract concepts into more tangible forms, making it easier for students to understand the material being studied.

One type of teaching aid that can be used in mathematics learning is the Pop Up *Book*. A Pop Up *Book* is a three-dimensional instructional medium that displays raised images or objects when the book page is opened, thereby attracting attention and increasing students' interest in following the learning (Febriyanti, et al., 2024). According to Indrianti and Saputri (2025), a *Pop Up Book* is a three-dimensional medium that can stimulate students' imagination and help students understand the depiction of an object more concretely. Furthermore, Simbolon and Fitriyani (2021) state that Pop Up Books *have an* attractive visual display and are capable of fostering students' interest in understanding the learning material.

The use of Pop Up *Book* teaching aids can provide a more engaging learning experience because students do not only receive information through teacher explanations but can also observe and

interact directly with the learning media. Media with visual and interactive elements can help increase students' attention, interest, and involvement in learning activities.

One important aspect that needs attention in learning is students' learning interest. Learning interest is students' liking, attraction, and attention towards learning activities, demonstrated through active participation and enthusiasm in following lessons (Hidayah et al., 2023). According to Suwandi (2023), learning interest is an individual's tendency to have a feeling of interest and desire towards learning activities, leading to changes in knowledge, skills, and behavior. Meanwhile, Korompot (2020) explains that learning interest is demonstrated through students' feelings of enjoyment, attraction, attention, and involvement during the learning process.

Based on preliminary observations conducted in Grade II of State Elementary School 1 Kasugengan Kidul, Depok Subdistrict, Cirebon Regency, it was found that students' interest in learning mathematics was still not optimal. This condition was caused by the teacher not yet using three-dimensional teaching aids, not yet using media that can stimulate students, and not yet using interactive book-based learning media. This resulted in students feeling less enjoyment, being less actively involved, showing less interest, and paying less attention during the mathematics learning process.

This problem indicates the need for learning innovations capable of creating more concrete and engaging learning experiences for students. The use of Pop Up *Book* teaching aids *becomes one* alternative that can be applied because it aligns with the characteristics of elementary school students who require visual media and direct experience in understanding learning material.

Several previous studies indicate that the use of Pop Up *Book media* positively influences student learning. Research by Yanti, Manurung, and Mujazi (2025) shows that the use of Pop Up *Book media* *significantly* influences elementary school students' interest in learning mathematics. Furthermore, research by Astuti, Raharja, and Asrul (2022) shows that *Pop Up Book* media can increase students' learning interest through more engaging and interactive learning experiences.

Based on this description, this study aims to determine the influence of using Pop Up *Book* teaching aids on *the* mathematics learning interest of

Grade II students at State Elementary School 1 Kasugengan Kidul.

## 2. Research Method

This study used a quantitative approach with an experimental method. The quantitative approach was used to measure and analyze the influence of using Pop Up Book *teaching* aids on students' mathematics learning interest objectively through numerical data. The experimental method was used to determine changes in students' learning interest after the treatment involving the use of Pop Up Book *teaching* aids.

The research design used was a **Pre-Experimental Design** in the form of a **One Group Pretest-Posttest Design**. This design was implemented by administering an *initial* measurement (pretest) before the treatment and a final measurement (posttest) after the treatment was given to the same group. The use of this design aimed to determine changes in students' mathematics learning interest before and after the use of *Pop Up Book teaching* aids.

This research was conducted at State Elementary School 1 Kasugengan Kidul, Depok Subdistrict, Cirebon Regency. The research population consisted of all 170 students at State Elementary School 1 Kasugengan Kidul. The research sample **was selected** using a total sampling technique, meaning all members of the population targeted by the research were used as the sample. The sample in this study was 32 Grade II students.

The independent variable in this study was the use of Pop Up Book *teaching* aids, while the dependent variable was the mathematics learning interest of Grade II students at State Elementary School 1 Kasugengan Kidul. Data were collected through observation and a learning interest questionnaire. The questionnaire instrument was developed based on indicators of learning interest, including: (1) feeling of enjoyment in learning, (2) active involvement of students, (3) interest in learning, and (4) attention in following lessons.

The research instrument was first tested for validity and reliability before use. The research data were analyzed using descriptive statistical analysis to understand the profile of students' learning interest, the Shapiro-Wilk normality test to determine data distribution, the Normalized Gain (**N-Gain**) test to determine the increase in learning

interest, and the **Paired Samples t-Test** to determine the influence of using Pop Up Book *teaching* aids on students' mathematics learning interest. Data analysis was performed with the assistance of *the Statistical Product and Service Solutions (SPSS)* version 26 application.

## 3. Results and Discussion

### Research Results

This study was conducted with second-grade students at State Elementary School 1 Kasugengan Kidul, Depok Subdistrict, Cirebon Regency, with a sample size of 32 students. The research aimed to determine the effect of using Pop Up **Book teaching** aids on students' mathematics learning interest. The research employed a **One Group Pretest-Posttest Design**, which involved administering an initial measurement before the *treatment* (pretest) and a final measurement after the *treatment* (posttest).

Before the treatment, students were first given a mathematics learning interest questionnaire to ascertain the initial condition of their learning interest prior to using the Pop Up Book *teaching* aids. Subsequently, students received mathematics *instruction* using the Pop Up Book *teaching* aids as a learning medium. The use of this medium involved students directly in learning activities through observation of the three-dimensional visual forms presented in the Pop Up Book.

The use of Pop Up *Book teaching* aids in the learning process created a different atmosphere compared to instruction relying solely on verbal explanation. Students appeared more interested in the material presented because the medium had an attractive, colorful display and provided a more concrete representation of the mathematics content. After the learning process using the Pop Up Book *was completed*, students were again given the learning interest *questionnaire* (posttest) to determine changes in learning interest after the treatment.

### A. Results of Students' Mathematics Learning Interest Before and After Using Pop Up Book Teaching Aids

The results of measuring students' mathematics learning interest before and after using Pop Up *Book teaching* aids are presented in Table 1.

Table 1. Results of Students' Mathematics Learning Interest Before and After Using Pop Up Book Teaching Aids

| No | Measurement Stage | Total Score | Mean  | Highest Score | Lowest Score |
|----|-------------------|-------------|-------|---------------|--------------|
| 1  | Pretest           | 1,938       | 60.56 | 67            | 51           |
| 2  | Posttest          | 2,237       | 69.91 | 74            | 65           |

Based on Table 1, there was an increase in students' mathematics learning interest after the treatment involving the use of Pop Up Book teaching aids. **At the** pretest stage, the total score obtained by students was 1,938, with a mean score of 60.56. The highest score at this stage was 67, while the lowest score was 51.

After instruction using Pop Up Book teaching aids, the measurement results at the *posttest* stage showed an increase. The total score increased to 2,237, with a mean score of 69.91. The highest score increased to 74 and the lowest score increased to 65. This indicates that a positive change occurred in *students'* mathematics learning interest after using the Pop Up Book teaching aids.

The increase in the mean score of 9.35 indicates that the use of concrete and engaging learning media can help create a more enjoyable learning experience. The Pop Up Book medium provides *students* with the opportunity to see learning concepts more tangibly through three-dimensional displays, making it easier for them to understand the material and increasing their interest in the instruction.

## B. Results of Learning Interest Based on Learning Interest Indicators

Learning interest in this study was measured based on four indicators: feeling happy while learning, active student involvement, interest in learning, and attention during instruction. The analysis results for each indicator before and after using Pop Up Book *teaching* aids are presented in Table 2.

**Table 2.** Percentage of Students' Mathematics Learning Interest Indicators Before and After Using Pop Up Book

| No | Learning Interest Indicator  | Pretest (%) | Posttest (%) | Category  |
|----|------------------------------|-------------|--------------|-----------|
| 1  | Feeling happy while learning | 73.59       | 87.50        | Increased |
| 2  | Active student engagement    | 75.31       | 86.41        | Increased |
| 3  | Interest in learning         | 76.88       | 86.72        | Increased |

|   |                           |       |       |           |
|---|---------------------------|-------|-------|-----------|
| 4 | Attention during learning | 77.03 | 88.91 | Increased |
|---|---------------------------|-------|-------|-----------|

Based on Table 2, all indicators of learning interest increased after students participated in learning using the Pop Up Book teaching aids. For the indicator of **enjoyment in learning**, there was an increase from 73.59% to 87.50%. This indicates that the use of engaging media can make students feel more comfortable and enjoy the mathematics learning process.

For the **indicator of active student** engagement, there was an increase from 75.31% to 86.41%. This increase shows that the use of *the Pop Up Book* encouraged students to be more active in learning activities. Students did not only listen to the teacher's explanations but were also involved in observing and understanding the material through the media used.

Furthermore, the **indicator of interest in** learning increased from 76.88% to 86.72%. This indicates that the visual display and three-dimensional *form of the Pop Up Book* were able to capture students' attention, making mathematics learning more interesting than before.

The indicator with the greatest increase following the treatment was the **aspect of attention during** learning, which rose from 77.03% to 88.91%. This indicates that the use of the *Pop Up Book* media can help students focus more on following the lessons, as the material is presented through more concrete media that aligns with the characteristics of elementary school students.

## C. Results of Prerequisite Tests and Hypothesis Testing

Before conducting hypothesis testing, a normality test was performed to determine whether the research data were normally distributed. The normality test was conducted using the **Shapiro-Wilk** test on the pretest and posttest data.

The results of the normality test showed that the significance value for the pretest data was 0.172 and for the posttest data was 0.361. Both values are greater than the significance level of 0.05, so it can be concluded that the research data are normally distributed. Therefore, hypothesis testing was performed using the parametric statistical test, namely the **Paired Samples t-Test**.

The results of the Paired Samples t-Test are presented in the following table.

**Table 3.** Results of the Paired Samples t-Test for Mathematics Learning Interest

| Data             | t-statistic | Sig. (2-tailed) | Description |
|------------------|-------------|-----------------|-------------|
| Pretest-Posttest | -13.016     | 0.000           | Significant |

Based on Table 3, a significance value of 0.000 was obtained. This value is less than 0.05 ( $0.000 < 0.05$ ), so it can be concluded that there is a significant difference in students' mathematics learning interest before and after the use of the Pop Up Book teaching aids.

These results indicate that the use of the Pop Up Book *teaching aids* has an effect on increasing the mathematics learning interest of second-grade students at State Elementary School 1 Kasugengan Kidul.

## Discussion

### A. The Use of Pop Up Book Teaching Aids in Mathematics Learning

Mathematics learning at the elementary school level requires teaching strategies that can help students understand concepts more concretely. This is because lower-grade students are still in a stage of cognitive development that requires learning experiences through real objects or visual media. The use of teaching aids in learning is one alternative that teachers can use to bridge abstract mathematical concepts, making them easier for students to understand.

Based on the research results, the use of *Pop Up Book* teaching aids brought changes to the mathematics learning process in the second grade of State Elementary School 1 Kasugengan Kidul. Before using this media, mathematics learning tended to rely on direct delivery methods, so students lacked engaging learning experiences. After the treatment using the Pop Up Book, students showed better engagement during the learning process.

The *Pop Up Book*, as a learning medium, has the characteristic of a three-dimensional visual display that can capture students' attention. When the book pages are opened, students can see the form of objects appearing realistically, making learning more interesting and not solely dependent on the teacher's explanation. According to Febriyanti et al. (2024), the Pop Up Book is a learning medium with three-dimensional visual elements that can help students understand material through more concrete learning experiences.

In line with this view, Indrianti and Saputri (2025) explain that *Pop Up Book media* can stimulate students' imagination by presenting objects in a more engaging form compared to conventional learning media. The use of media with appealing visual elements, colors, and shapes can increase student attention, making them more interested in participating in learning activities.

In this study, the *Pop Up Book* served not only as a teaching aid for the teacher to explain the material but also provided students with the opportunity to interact directly with the learning media. Students became more active in observing, asking questions, and responding during the learning process. This indicates that concrete and interactive learning media can create a more enjoyable learning atmosphere.

### B. The Increase in Mathematics Learning Interest After Using the Pop Up Book Teaching Aid

The results indicate an increase in students' mathematics learning interest after using the Pop Up Book teaching aid. This is evident from the increase in the average score of students' learning interest, which rose from 60.56 in the pretest stage to 69.91 in the posttest stage. Furthermore, all indicators of learning interest—encompassing feelings of enjoyment, active involvement, interest, and attention—showed improvement after the treatment.

The increase in the **aspect of enjoyment in learning** shows that the *Pop Up Book* was able to create a more positive learning experience for students. Engaging learning media can reduce the perception that mathematics is a difficult and boring subject. Students became more comfortable following the lessons because the material was delivered through media suited to their characteristics.

This aligns with the opinion of Hidayah et al. (2023), who state that learning interest can be seen from the presence of students' feelings of enjoyment and interest in learning activities. When students feel comfortable and interested in the learning, they will engage more easily in the learning process.

In addition to increasing enjoyment, the *Pop Up Book* also enhanced **students' active involvement**. In lessons before using the media, some students tended to be passive as they only received material from the teacher's explanation. However, after using the Pop Up Book, students became more active in

observing the media, answering questions, and participating in learning activities.

This increase in involvement demonstrates that interactive media can encourage students to participate directly. According to Korompot et al. (2020), learning interest is shown not only through liking the learning but also through students' involvement and attention during the learning process.

Regarding the **indicator of interest** in learning, the *Pop Up Book* had an influence because this media has a different appearance from ordinary learning media. The three-dimensional form *present* in the *Pop Up Book* provides a more engaging visual experience, fostering students' curiosity about the material being studied.

Furthermore, the improvement in the **indicator of attention during** learning shows that the *Pop Up Book* helped students focus more during the learning process. Engaging media can reduce student boredom, directing their attention more effectively toward the material presented by the teacher.

These findings reinforce the opinion of Simbolon and Fitriyani (2021), who state that *Pop Up Book* media possesses visual appeal capable of increasing student attention and interest in following lessons. Thus, the use of learning media suited to student characteristics can be a supporting factor in enhancing learning interest.

### C. The Effect of Using the Pop Up Book Teaching Aid on Students' Mathematics Learning Interest

Based on the results of the hypothesis test using the Paired Samples t-Test, a significance value of  $0.000 < 0.05$  was obtained. This result indicates a significant difference in students' mathematics learning interest before and after using the *Pop Up Book* teaching aid. Therefore, the use of the *Pop Up Book* teaching aid is proven to affect the mathematics learning interest of Grade II students at State Elementary School 1 Kasugengan Kidul.

The effect demonstrated in this study occurred because the *Pop Up Book* provided a more meaningful learning experience for students. The learning medium served not only as a tool for conveying information but also as a means of building student interest and motivation to follow the lessons.

The results of the N-Gain analysis showed a value of 0.4666, which falls into the moderate

category. This indicates that the use of the *Pop Up Book* increased students' learning interest, although the increase was moderate. This improvement shows that engaging learning media can contribute to changing student attitudes toward participating in mathematics learning.

These findings align with the research by Yanti, Manurung, and Mujazi (2025), which demonstrated that the use of *Pop Up Book* media significantly influences the mathematics learning interest of elementary school students. That study explained that *Pop Up Book* media can increase student engagement by providing a more enjoyable learning experience.

Furthermore, these results are also supported by research by Astuti, Raharja, and Asrul (2022), which indicated that the use of *Pop Up Book media* can enhance student learning interest through the presentation of more engaging and interactive material. The consistency of these findings suggests that the characteristics of the *Pop Up Book* as a three-dimensional visual medium hold potential for increasing student engagement in elementary school learning.

Based on the research results and discussion, it can be concluded that the use of *Pop Up Book* teaching aids positively influences students' mathematics learning interest. This medium can serve as an alternative learning tool for teachers to create more engaging, concrete, and developmentally appropriate learning activities for elementary school students.

### 4. Conclusion

Based on the results of the study on the influence of using *Pop Up Book teaching aids* on the mathematics learning interest of second-grade students at State Elementary School 1 Kasugengan Kidul, it can be concluded that the use of *Pop Up Book* teaching aids positively influences the increase in student learning interest.

The research results show an increase in mathematics learning interest after the treatment using *Pop Up Book* teaching aids. This is evident from the increase in the average score of student learning interest from 60.56 at the pretest stage to 69.91 at the posttest stage. Furthermore, the results of the Paired Samples t-Test show a significance value of  $0.000 < 0.05$ , indicating a significant difference between learning interest before and after the use of *Pop Up Book* teaching aids.

The use of Pop Up *Book* teaching aids increased learning interest by providing a more engaging, concrete, and interactive learning experience. This medium helped enhance students' feelings of enjoyment, active involvement, curiosity, and attention during the mathematics learning process.

Thus, Pop Up *Book* teaching aids can be used as an alternative instructional medium for mathematics at the elementary school level to increase student learning interest.

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