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The Effect of Mystery Box Media on Fourth Grade Students' Interest in Science Learning

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A B S T R A C T

This study investigates the effect of Mystery Box media on fourth-grade students' interest in learning Natural and Social Sciences (IPAS). The research was motivated by low student engagement due to monotonous teaching methods, limited variation in instructional media, and minimal opportunities for active participation, which reduce students' enthusiasm during lessons. A quantitative approach using a quasi-experimental post-test only control group design was employed, involving two classes: the experimental class taught using Mystery Box media and the control class taught using conventional methods. A validated and reliable learning interest questionnaire served as the research instrument. Data analysis revealed that Mystery Box media significantly improved students' learning interest, supported by a significance value (2-tailed) below 0.05 and an effect size of 2.073, categorized as very large. The findings indicate that Mystery Box media offers an engaging and interactive learning experience, encouraging higher student participation and enthusiasm, particularly in IPAS. This strategy is recommended as an innovative alternative to enhance students' affective involvement in the learning process.

1. Introduction

Education is widely recognized as a fundamental driver in the development of high-quality human resources, as it shapes not only cognitive abilities but also social and emotional competencies that are essential for personal and societal growth. At the elementary school level, Natural and Social Sciences (IPAS) are critical subjects that form students' understanding of the natural environment, social interactions, and their interconnections, providing foundational knowledge that supports lifelong learning. Although the IPAS curriculum is designed to be contextual and connected to everyday life, its implementation still faces several challenges, one of the most significant being the low level of student learning interest. This lack of interest is often associated with monotonous teaching methods, minimal student engagement, and limited variation in instructional media, which can lead students to become

passive participants and result in suboptimal learning experiences. Learning interest is an important factor that influences students' active participation and persistence during learning activities, serving as an internal drive that motivates individuals to focus their attention, exert effort, and sustain involvement in educational processes. According to Nirmala et al. (2024) learning interest is characterized by curiosity, eagerness to explore new knowledge, admiration for specific skills or information, and strong intrinsic motivation to master subjects. Similarly, Jumilah et al. (2024) emphasize that learning interest channels students' energy and attention toward achieving learning objectives. In addition, Adnyana & Yudaparmita (2023) identify several indicators of learning interest, including attentiveness during lessons, positive attitudes toward subjects, enthusiasm, active participation, and consistent engagement in learning activities. A decline in learning interest among students often leads to lower academic performance, reduced enthusiasm, and limited classroom interaction, highlighting the need for educators to develop learning environments that are stimulating, enjoyable, and capable of fostering curiosity.

Wulandari et al. (2023) highlight that instructional media are a key component in creating an active and engaging learning environment, helping to achieve learning objectives more effectively. One of the strategies to enhance learning interest is the use of interactive learning media Rohima (2023) highlights that instructional media play a crucial role in overcoming student boredom and supporting motivation, while Nurhidayati et al. (2023) emphasize that properly designed media can stimulate students' enthusiasm and intrinsic motivation, thereby strengthening their interest in learning. Among these media, the Mystery Box has emerged as an innovative and engaging tool for promoting students' curiosity and participation.

According to Renggani (as cited in Tappareng et al., 2024) the Mystery Box is a game in which students guess the content of a box, providing opportunities for exploration and collaborative discussion of materials that are directly related to lesson objectives. Its interactive and surprise-based nature makes it highly suitable for IPAS learning, which often involves concrete objects and real-world contexts, fostering meaningful engagement and participatory learning. In the context of IPAS, the Mystery Box allows students to interact directly with the learning material so that it is both enjoyable and educational. Alfarizi (as cited in Aflahah et al., 2023) describes this media as an innovative educational tool that supports interactive and engaging learning approaches.

Previous studies have also shown that the use of innovative media, including the Mystery Box, can enhance students' enthusiasm and learning engagement. For instance, Roni et al. (2024) in a study published in the *Basicedu Journal* titled "The Effect of Group Investigation Learning Model Assisted by Mystery Box Media on Critical Thinking Skills of Fifth-Grade IPA Students" at ISBI Singkawang, Indonesia, Results demonstrated that implementing the Mystery Box in a Group Investigation framework significantly boosted students' critical thinking performance. Nevertheless, most existing research has focused primarily on cognitive outcomes, such as literacy, numeracy, or higher-order thinking skills, and is mostly conducted at secondary or higher education levels. This indicates a

research gap regarding the influence of Mystery Box media on affective aspects, especially students' engagement in learning at the primary school level.

Addressing this issue is crucial, as examining the impact of interactive media on students' motivation and engagement can provide significant insights for both educational practice and theory. Therefore, the present study seeks to investigate the effect of Mystery Box media on the learning interest of fourth-grade students in IPAS. The findings are expected to provide practical guidance for teachers in creating more engaging and contextually relevant learning experiences, as well as to contribute to the theoretical foundation for future research in elementary education.

2. Methodology

Research Approach and Design

This study employed a quantitative method, utilizing a quasi-experimental design with a post-test only control group approach. This type of design, as explained by Sugiyono (as cited in Agustina et al., 2024) This design represents a variation of the true experimental design, incorporating both experimental and control groups while not fully controlling for all external variables that may influence the implementation of the study. It was specifically chosen to allow a clear comparison between the experimental group, which received the treatment, and the control group, which followed conventional instruction, without the need for a pretest. By omitting the pretest, the focus of the evaluation is placed entirely on the outcomes observed after the intervention, enabling researchers to assess the direct impact of the treatment on students' learning interest. This approach helps reduce potential pretest-related biases and emphasizes the effectiveness of the applied instructional method in producing measurable differences between the two groups. The study involved two homogeneous groups, namely the experimental group that received treatment using the Mystery Box media and the control group that used conventional learning media. The study utilized this design to assess how the implementation of Mystery Box media influences students' engagement and interest in science learning.

Subjects of the Study

The subjects of this study consisted of two fourth-grade classes. Class IV-B, comprising 32 students, was designated as the experimental group receiving instruction using the Mystery Box media, while class IV-A, also consisting of 32 students, served as the control group following conventional learning without media. The participants were selected using purposive sampling, in which the researcher determined the sample based on specific criteria considered relevant to the research objectives, such as similarity in academic characteristics and the practicality of managing the experimental process. As Rizqi et al. (2025) explains, this technique involves establishing predetermined criteria to obtain data that is both relevant and in-depth.

Research Instrument

The instrument used in this study was a questionnaire on students' learning interests, arranged in the form of a Likert scale with a rating range of 1 to 5. The questionnaire consisted of 30 statements. The validity of the instrument was tested using the Pearson Product Moment correlation technique, while its reliability was calculated using the Cronbach's Alpha formula. According to Safitri & Suryadi (2023), Cronbach's Alpha is commonly applied to ensure the reliability of an instrument. Only instruments that met the valid and reliable criteria were used to measure students' learning interests after the treatment was given.

Data Collection Techniques

Data collection was conducted after the treatment had been administered to the experimental class. The learning interest questionnaire was distributed to students in both the experimental and control groups, and they were instructed to complete it independently within a specified time frame. The data collection process was carried out concurrently for both groups to maintain consistency in treatment and to ensure the validity and reliability of the data obtained.

Data Analysis Technique

The data in this study were analyzed quantitatively with the support of statistical software. The initial stage of analysis involved conducting prerequisite tests, including the normality test using the Shapiro-Wilk method and the homogeneity of variance test using Levene's Test, to ensure that the data were normally distributed and that variances across groups were consistent, which is essential for the proper application of parametric statistical procedures. After verifying that the assumptions were satisfied, the data were analyzed using an Independent Sample t-Test to compare the mean learning interest of the experimental group, taught with the Mystery Box media, and the control group, taught using traditional methods, at a significance threshold of $\alpha = 0.05$. In addition, To evaluate the magnitude of the treatment effect, the effect size was calculated using Cohen's d, which was interpreted as low ($ES < 0.2$), moderate ($0.2 \leq ES < 0.8$), or high ($ES \geq 0.8$). The validity of the instrument was examined through content validity using expert judgment and construct validity through factor analysis, while the validity coefficient for each item was calculated using the Pearson Product Moment correlation, with items considered valid if the r_{value} obtained exceeded the r_{table} value. Instrument reliability was measured through internal consistency using Cronbach's Alpha, yielding $\alpha = 0.853$, which exceeded the 0.70 threshold, indicating good reliability. The instrument was also tested in a trial phase with a sample having characteristics similar to the research subjects to ensure that it accurately and consistently measured students' learning interest. Ethical principles were strictly observed throughout the study, including obtaining official permission from the school, approval from the homeroom teacher, maintaining student confidentiality, and ensuring that learning activities in the control group did not cause any risk or discomfort. All collected data were used solely for academic purposes, and the research findings will be submitted to the school as

recommendations for enhancing the quality of learning through the use of effective and innovative instructional media, which are expected to significantly improve students' learning interest.

3. Results and Discussion

Research Instrument Trial

a. Validity Testing

Validity testing is a process used to evaluate the ability of an instrument to accurately capture the construct or variable under investigation. In this study, validity was assessed using the Pearson Product Moment correlation coefficient. According to Janna & Herianto (2021), validity testing can be calculated through the product moment correlation to ensure that each item of the instrument appropriately measures the intended variable. The correlation coefficient for each questionnaire item was calculated based on responses from 33 students (n = 33). The obtained r-values were then compared with the r-table value of 0.344, corresponding to a 5% significance level for a sample size of 33. An item was considered valid if the calculated r-value exceeded the r-table value. The results of the validity test for each questionnaire item are presented in Table 1.

Table 1. Classification of Validity of Learning Interest

Questionnaire Items		
Classification	**Number of Items**	**Item Numbers**
Valid	20	1, 3, 4, 6, 7, 9, 10, 11, 14, 15, 17, 18, 20, 21, 22, 23, 25, 26, 28, 29
Invalid	10	2, 5, 8, 12, 13, 16, 19, 24, 27, 30

Based on the test results, 20 questions that were declared valid were used as instruments in the research to measure students' interest in learning science.

b. Reliability Testing

Instrument reliability testing is conducted to assess the extent to which the questionnaire items that have been declared valid show internal consistency. This step is important to ensure that each item in the instrument can provide stable and reliable results when used in measuring students' learning interests. According to Syabrinildi (2024), Cronbach's Alpha is usually used to evaluate reliability; it is a measure of the internal consistency of an instrument, with higher alpha values indicating greater reliability. In this study, the reliability calculation technique was carried out using the Cronbach's Alpha formula, which is commonly used to measure the reliability of instruments in scale form. The results of the reliability test can be seen in Table 2.

Table 2. Reliability Test Results

Variable	Number of Items	Cronbach's Alpha	Interpretation
Interest in Learning	20	0.853	Very Reliable

Reliability testing was conducted to ensure that the measurement instrument used in this study possessed adequate internal consistency. According to Wulansari (2024) reliability testing aims to verify that a measuring tool produces consistent results when applied repeatedly. High reliability indicates that each item in the questionnaire consistently measures the same construct and provides stable results when used in similar contexts. In this study, reliability was calculated using Cronbach's Alpha, one of the most commonly used methods for assessing the internal consistency of multi-item instruments. The results of the test showed that the instrument met the criteria for excellent reliability. This provides confidence that the data collected from the instrument can be relied upon to accurately measure students' learning interest, thereby supporting the overall validity of the research findings.

Research Data Description

According to Febriyana et al. (2023) descriptive analysis is used to examine data by breaking it down or presenting it in the form of frequency descriptions and frequency distributions. This descriptive data helps provide an initial overview of the conditions of both groups before the treatment is applied. The purpose of descriptive analysis is to determine the tendency of values, data distribution, and initial differences between the experimental group and the control group. The general characteristics of the data are presented in Table 3.

Table 3. Descriptive Statistics Table of Students' Learning Interests in the Experimental and Control Groups

	N	Range	Minimum	Maximum	Mean	Std. Decition
Experimental	32	26	70	96	85.03	6.423
Control	32	19	62	81	72.88	5.241
Valid N (listwise)	32					

The figure presents an overview of students' learning interest scores in both the experimental and control groups. The analysis shows a clear difference in the patterns of scores between the two groups, with the experimental group exhibiting higher and more evenly distributed scores compared to the control group. This observation provides an initial indication that the implementation of Mystery Box media may have a positive impact on students' learning interest. Nevertheless, the interpretation of the treatment effect cannot rely solely on visual inspection; inferential statistical analysis is needed to determine whether the differences between the groups are statistically significant. The figure serves to illustrate the distribution of learning interest scores in both the experimental and control groups. This analysis aims to provide a clearer depiction of the data distribution and to help identify patterns of learning interest in the group receiving treatment with mystery

box media compared to the group undergoing conventional learning without special media intervention. The visualization of these findings is presented in Figure 1.

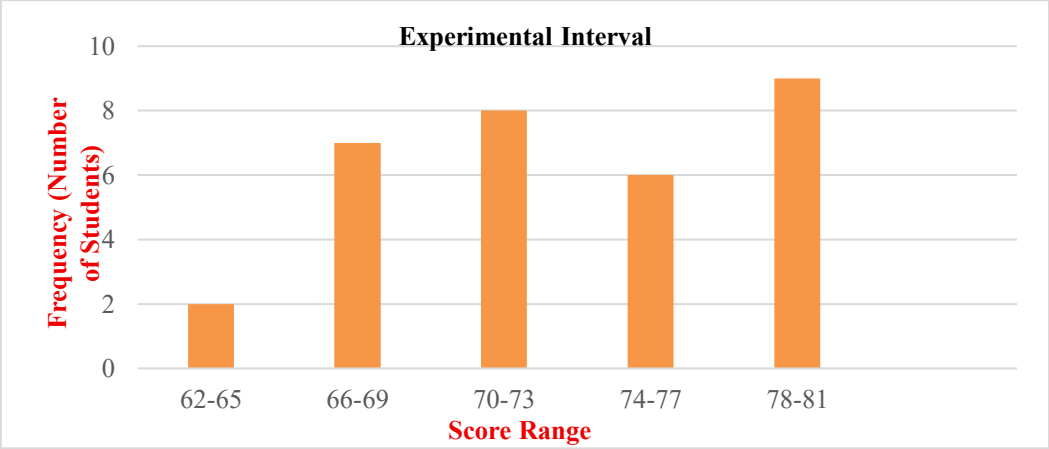

Figure 1. Histogram Diagram of Learning Interest Distribution in Experimental Class

The histogram visualization indicates that students' learning interest in the experimental group is generally in the high category. The graph pattern shows a relatively balanced distribution with a peak in a specific category, suggesting the effectiveness of the treatment in attracting attention and enhancing student engagement. The absence of extreme low values in the curve further suggests that most students responded positively to the applied learning approach. In contrast to the experimental group the histogram visualization is used to illustrate the distribution of students' learning interest scores in the control group. This analysis aims to provide a clear picture of how students' interest levels vary when conventional learning methods are applied without the use of Mystery Box media. By displaying the frequency of scores within specific intervals, the histogram helps identify the dominant categories and overall distribution pattern. The visualization of these findings is presented in Figure 2.

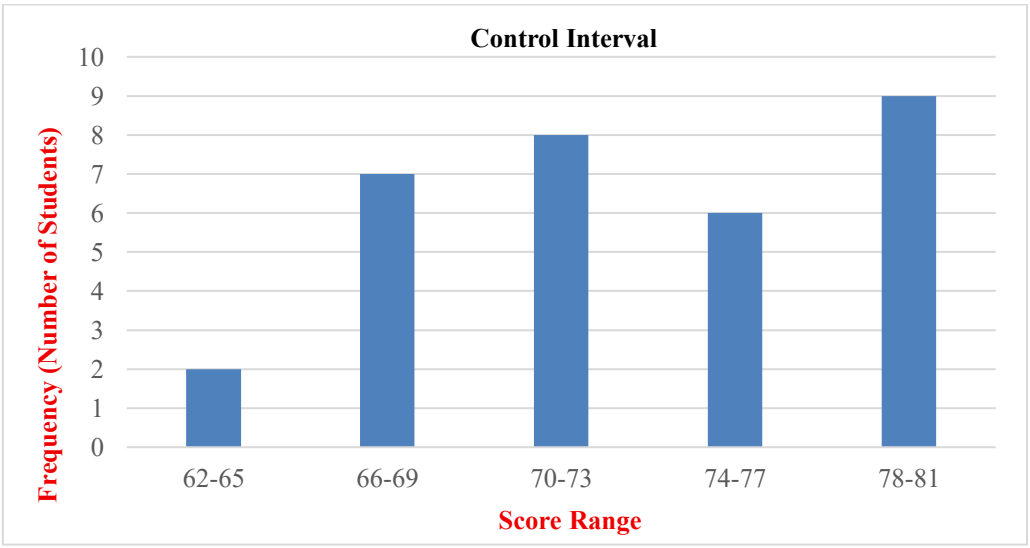

Figure 2. Histogram Diagram of Learning Interest Distribution in Control Class

The histogram visualization shows that students' learning interest in the control group is distributed relatively evenly across various interval categories, with no dominant peak. This pattern indicates that the conventional learning approach has not significantly increased students' interest. The spread of the distribution reflects variations in students' responses to the learning process without treatment and suggests that student engagement has not been optimally developed.

Hypothesis Testing

a. Normality Test Results

According to Gunawan et al. (2023) the normality test is a statistical procedure used to determine whether the data distribution in a study follows a normal pattern. In this study, the normality test was conducted using the Shapiro–Wilk method, which is appropriate for sample sizes of fewer than 50 or up to 100 subjects. The results of the normality test are presented in Table 4.

Table 1. Results of the Normality Test of Learning Interest Data

Using Shapiro-Wilk		
Group	**Sig (Shapiro wilk)**	**Distribution**
Experimental	0.566	Normal
Control	0.274	

Based on the results in Table 4, the significance values (Sig.) for both groups are greater than 0.05 (experimental = 0.566; control = 0.274). Therefore, it can be concluded that the data from both classes are normally distributed, and the use of a parametric test is appropriate.

b. Homogeneity Test

Before conducting inferential statistical analysis, a homogeneity of variance test was performed to ensure that the data from the experimental and control groups had equal variances. Homogeneity testing is a statistical method used to determine whether two or more data groups come from populations with the same variance Sonjaya et al. (2025). Levene's test was used for this purpose, and the results are presented in Table 5.

Table 2. Results of Homogeneity Test of Learning Interest Data

Using Levene				
Variable	**Levene Statistic**	**df1**	**df2**	**Sig.**
Learning Interest	0.685	1	62	0.411

The results of the homogeneity test, as shown in Table 5, indicate that the data have equal variance between the experimental and control groups. This finding meets the assumption for using parametric tests, allowing the comparative analysis between groups to be conducted using the appropriate statistical approach.

c. Independent t-test

Subsequently, an independent-samples t-test was performed to determine whether a significant difference in learning interest existed between the experimental and control groups. The outcomes of this test are presented in Table 6.

Table 6. Independent t-Test Result of Students' Learning Interests

Variable	T	df	Sig. (2-tailed)	Mean Difference	Std. Error	95% Confidence Interval
Equal Variances Assumed	8.295	62	0.000	12.156	1.465	9.227 – 15.085

Based on the results in Table 6, the significance value (Sig. 2-tailed) is 0.000, which is less than 0.05. This indicates a significant difference in learning interest between students taught using mystery box media and those taught using conventional methods. The mean difference of 12.156 suggests that the use of mystery box media contributes to an increase in students' learning interest.

d. Effect Size Test

This analysis was extended by calculating the effect size to determine the magnitude of the treatment's impact on the studied variable. This test aims to provide a quantitative measure of the strength of the relationship or the treatment's effect, ensuring that the results are not only statistically significant but also practically meaningful. According to Syaftin (2024), moreover, effect size allows for the comparison of a variable's influence across studies that use different measurement instruments The results of the effect size calculation are presented in Table 7.

Table 3. Effect Size Calculation Results

Comparison	Mean Difference	Pooled Standard Deviation (SD)	Cohen's d	Category
Experimental vs Control	12.156	5.861	2.073	Very Large

The effect size results presented in Table 7 reveal that the treatment had a very strong influence on enhancing students' learning interest. This substantial impact indicates that the difference between the experimental and control groups is not only statistically significant but also meaningful in practice. Overall, these findings provide solid evidence that the implemented learning approach can effectively promote students' interest and engagement in the learning process.

Discussion

A quasi-experimental design featuring a post-test-only control group was employed in this study, allowing researchers to directly compare students' learning interest between the experimental group exposed to the Mystery Box media and the control group receiving conventional instruction. The data collection instrument underwent

a rigorous validation process to ensure both accuracy and reliability. Of the 30 initial questionnaire items, 20 met the validity criteria and were subsequently used as the primary instrument, with reliability confirmed through a Cronbach's Alpha of 0.853, indicating very high internal consistency. This careful preparation of the instrument ensured that the data collected accurately reflected the students' learning interest and minimized potential measurement errors, thus strengthening the credibility of the research findings.

With the instrument validated and reliable, the implementation of the intervention revealed noticeable differences in the characteristics of the learning process between the two groups. The experimental group demonstrated high levels of enthusiasm, active engagement, and curiosity when interacting with the Mystery Box media, resulting in a more interactive and dynamic classroom environment that encouraged collaborative learning, peer discussion, and student participation. Students in this group frequently asked questions, shared ideas, and demonstrated creativity in problem-solving tasks, indicating that the Mystery Box media not only captured their attention but also promoted higher-order thinking and meaningful learning experiences.

In contrast, the control group exhibited lower involvement, with learning activities that were largely one-way, minimally stimulating, and less able to foster student engagement. Observations revealed that students in the control group often appeared passive, rarely initiating discussions, and showed limited motivation to participate actively in classroom activities. These observations suggest that conventional learning approaches have not fully succeeded in enhancing students' learning interest, while the integration of innovative instructional media, such as the Mystery Box, appears to significantly support increased motivation, participation, and overall engagement in the learning process.

By combining a reliable measurement instrument with careful observation of learning activities, this study provides a comprehensive understanding of the potential benefits of using interactive media to enhance student interest and involvement in classroom learning. The results of the data analysis strongly support these findings. The average score of learning interest in the experimental group reached 85.03, much higher than the control group, which only obtained an average score of 72.68. In addition, the Cohen's d value of 2.073 shows a very large treatment effect, indicating that the use of the Mystery Box media not only provides statistically significant results but is also practically meaningful in increasing learning interest. The distribution of the experimental group's scores is also more concentrated in the high category, while the control group's scores tend to be spread out and evenly distributed across various intervals, indicating a lack of learning stimuli that can spark students' interest as a whole. These quantitative results are complemented by qualitative observations, which highlight the dynamic interactions, collaboration, and curiosity-driven learning that occurred in the experimental group.

Theoretically, these results are consistent with the constructivist approach and the theory of learning interest, which emphasizes the importance of active involvement

of students in the learning process through media that is contextual, interesting, and in accordance with the characteristics of elementary school students. The Mystery Box, as a learning medium, creates a fun and interactive learning atmosphere, thus encouraging students to pay attention to learning, show a liking for the material, be enthusiastic, and actively participate in the learning process. This aligns with the indicators of learning interest used in this study, which include emotional involvement, attention, motivation, and active participation. When students feel happy and emotionally engaged, they tend to be more focused, persistent, and motivated to participate in learning activities optimally. Moreover, the integration of sensory and hands-on experiences through the Mystery Box allows students to connect abstract concepts with real-life applications, further deepening understanding and fostering intrinsic motivation.

This study is in line with the findings of Vahira et al. (2024) which show that game-based learning media, such as puzzles, are effective in increasing students' interest in learning. Similarly, the present research demonstrates that the use of Mystery Box media fosters an enjoyable learning environment that stimulates curiosity, critical thinking, and collaborative interaction among students. These findings highlight the role of innovative and interactive media in not only enhancing cognitive outcomes but also promoting affective engagement, which is often overlooked in traditional classroom settings.

The practical implications of this study underscore the importance of teachers not only focusing on delivering material but also on carefully selecting learning media that are appropriate to student characteristics and the teaching content. Media that is interesting, interactive, and emotionally engaging has been proven effective in increasing students' learning interest, particularly at the elementary education level, where children are in the concrete operational stage according to Piaget’s theory of cognitive development. Therefore, teachers should strive to design learning strategies that not only convey knowledge effectively but also stimulate curiosity, sustain attention, and motivate students to actively and independently engage in the learning process. Additionally, the study suggests that schools and curriculum developers should support the integration of interactive learning media, provide teacher training for effective implementation, and encourage continuous innovation to create a more stimulating, student-centered learning environment. By doing so, the educational process becomes more meaningful, enjoyable, and capable of developing both cognitive and affective aspects of students, ultimately preparing them for lifelong learning and problem-solving in diverse real-world contexts.

4. Conclusion

This study shows that the implementation of Mystery Box contextual media in learning has a significant and positive impact on improving students’ interest in learning. The analysis results indicate a clear difference in learning interest between students who received the Mystery Box learning treatment and those who experienced conventional learning. Mystery Box media successfully created a learning atmosphere that is interactive, enjoyable, and student-centered, thereby

encouraging students to pay greater attention to the learning process, show enthusiasm, participate actively, and develop a positive attitude towards the subject matter.

The success of this research demonstrates that learning media which are creative, engaging, and tailored to the characteristics of elementary school students can foster affective involvement and build a more lively and collaborative classroom environment. For students, such media provide a meaningful and enjoyable learning experience that increases their engagement. For educators, the Mystery Box is recommended as an effective learning strategy to enhance students' interest in learning, especially in the elementary school context that requires a concrete and contextual approach.

Furthermore, future research is encouraged to explore variations in the design and implementation of Mystery Box media, consider aspects such as time allocation and preparation, and adapt the approach to different subject areas to maximize its potential benefits. This study offers practical contributions to the selection of learning media that align with the needs and characteristics of students.

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