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The Effectiveness of the Discovery Learning Model Assisted by Powtoon Animated Video Media on Elementary School Students' Interest and Learning Outcomes in Social Studies

Mutmainnah [1], Suardi *[2], Kaharuddin [3]
[1,2]*Pendidikan Dasar, Universitas Muhammadiyah Makassar, Makassar, 90221, Indonesia*
[3]*Pendidikan Sosiologi, Universitas Mihammadiyah Makassar, Makassar, 90221, Indonesia*

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* *Corresponding author:*

E-mail: suardi@unismuh.ac.id

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A B S T R A C T

This study aims to analyze the effectiveness of the Discovery Learning model assisted by Powtoon animated video media on students' interest and learning outcomes in Social Studies at the elementary school level. A quasi-experimental design with a nonequivalent control group format was employed. The sample consisted of two classes: an experimental group that received instruction using the Discovery Learning model supported by Powtoon animated videos, and a control group that received conventional instruction. Data collection instruments included a learning interest questionnaire and a learning outcomes test, both validated through tests of validity and reliability. Descriptive statistical analysis was used to interpret the data. The results indicated a significant increase in both learning interest and learning outcomes in the experimental group compared to the control group. The integration of the Discovery Learning model with Powtoon animated media proved effective in fostering interactive, motivating, and conceptually enriching learning experiences. These findings suggest that combining a constructivist approach with visual digital media offers an innovative solution for enhancing the quality of Social Studies education in elementary schools.

1. Introduction

Education in the 21st century has undergone significant transformations, particularly in the integration of technology to enhance pedagogical practices. Digital learning media have emerged as essential tools for improving student engagement, motivation, and academic achievement (Hansen et al., 2024; Kleftodimos, 2024). The incorporation of information and communication technology (ICT) in classrooms has redefined instructional strategies, offering educators innovative methods to foster active and independent learning (Hikmawati et al., 2021; Mulbar & Hasanah, 2021). In this context, the Indonesian education system has increasingly emphasized student-centered approaches to develop

higher-order thinking skills and deepen conceptual understanding (Muchlis et al., 2021; Suwandi et al., 2024).

One of the student-centered pedagogical models gaining prominence is Discovery Learning. This approach empowers students to construct their own knowledge through inquiry, problem-solving, and exploration, thereby fostering cognitive autonomy and critical reasoning skills (Susanti et al., 2022; Triwahyuningtyas & Prastiti, 2021). Empirical evidence supports its effectiveness in enhancing students' comprehension, retention, and emotional engagement across various subject areas (Hariyanto et al., 2023; Maifi & Ahmad, 2021; Syawaludin et al., 2022). Furthermore, digital innovations such as animation-based platforms have magnified the impact of Discovery Learning by presenting visually rich content that adheres to multimedia learning principles (Moe-Byrne et al., 2022; Muktiarni et al., 2023).

Despite these advances, several challenges persist in the practical implementation of innovative instructional models such as Discovery Learning. Teachers frequently struggle to develop engaging, contextually appropriate, and interactive instructional materials that can be smoothly integrated into their teaching practices (Gunawan et al., 2021; Ratumbuysang et al., 2021). Additionally, elementary students especially those in rural or under-resourced settings often exhibit low engagement and motivation due to conventional and monotonous teaching methods (Begeny et al., 2023; Utaminingsih, 2021). These obstacles hinder the realization of meaningful learning, particularly in social studies, where abstract thinking and contextual understanding are critical.

To overcome these limitations, increasing attention has been given to the use of animated video-based media. Tools such as Powtoon have gained popularity for their user-friendly interface and capacity to produce visually compelling content that maintains student interest (Chikeme et al., 2024; Subagis, 2021). The integration of Discovery Learning with animated video media presents a promising pedagogical strategy for promoting active learning, enhancing conceptual understanding, and stimulating students' intrinsic motivation (Li & Zhou, 2021; Van Hell et al., 2021).

Recent studies have confirmed the educational benefits of animated media in enhancing learning experiences. Animation facilitates dual coding, reduces cognitive load, and accommodates diverse learning preferences, thereby supporting retention and comprehension (Moe-Byrne et al., 2022; Muktiarni et al., 2023). When combined with structured inquiry approaches such as Discovery Learning, animated media can aid exploratory learning by visually simplifying complex concepts (Akihary et al., 2023; Nusantari et al., 2021). This integration promotes knowledge construction and leads to more meaningful learning outcomes (Thomas & Liu-Thompkins, 2024; Tusa'Diah & Asmar, 2021).

Moreover, the use of animated videos has been associated with heightened student motivation and self-efficacy. Engaging multimedia content has been shown to spark curiosity, increase time-on-task, and sustain attention throughout the learning process (Aldalur & Perez, 2023; Barghazan et al., 2023; Huynh et al., 2024). In

social studies where historical and cultural contexts demand imaginative and narrative comprehension animation can enhance relevance and facilitate deeper understanding (Manurung & Pappachan, 2025; Sulistyo & Dwidayati, 2021). This supports the development of both cognitive and affective domains, as emphasized in educational curricula.

Learning motivation is consistently linked to academic achievement, with numerous studies confirming that students with higher interest levels tend to perform better across disciplines (Liu, 2024; Renzetti et al., 2021; Usman et al., 2022). Animated instructional media significantly influence students' enthusiasm and attitudes toward learning, making them valuable assets for curriculum implementation (Muktiarni et al., 2023; Subagis, 2021). Consequently, integrating engaging media within structured pedagogical models can enrich the learning environment and cultivate lifelong learning habits (Gunawan et al., 2021; Wahyuni et al., 2022).

While the advantages of both Discovery Learning and animated media are well documented, there remains a scarcity of empirical studies that explore their combined application in elementary school contexts, particularly within Indonesia. Much of the existing research investigates either Discovery Learning or multimedia tools in isolation (Ahmad et al., 2021; Mulbar & Hasanah, 2021), with limited attention to their synergistic potential within a structured experimental framework (Hikmawati et al., 2021; Suwandi et al., 2024).

Additionally, studies focusing on affective outcomes such as interest and motivation are relatively limited compared to those emphasizing cognitive performance (Muchlis et al., 2021; Syawaludin et al., 2022). This imbalance restricts comprehensive understanding of how such interventions influence overall learning experiences. Furthermore, inconsistencies in the pedagogical design, curriculum alignment, and empirical validation of animated instructional media persist across studies (Chikeme et al., 2024; Hansen et al., 2024). These issues underscore the need for rigorously designed research that simultaneously addresses instructional quality and multidimensional learning outcomes.

This study aims to evaluate the effectiveness of the Discovery Learning model enhanced with Powtoon-based animated video media in improving elementary students' interest and learning outcomes in social studies. The novelty of this research lies in its dual focus on cognitive and affective learning domains within the Indonesian elementary education context, where such integrative pedagogical innovations are still underexplored. The study is limited to Grade IV students within a specific educational cluster and adopts a quasi-experimental design to ensure internal validity and contextual relevance. By addressing existing gaps and leveraging modern instructional technologies, this study seeks to contribute meaningful insights to the field of technology-integrated pedagogy.

2. Methodology

This study adopted a quasi-experimental research design using a non-equivalent control group with a pretest-posttest format. Such a design is commonly employed in educational research to evaluate intervention effects within naturally occurring classroom contexts where random assignment is not feasible (Barghazan et al., 2023; Chikeme et al., 2024). It was deemed appropriate for this study due to its ability to account for initial group differences through pretesting and statistical controls (Renzetti et al., 2021; Van Hell et al., 2021).

The intervention centered on the Discovery Learning model, which, when combined with animation-based digital media, has demonstrated potential for enhancing student engagement and conceptual understanding (Hikmawati et al., 2021; Triwahyuningtyas & Prastiti, 2021). In this study, the experimental group received instruction based on the Discovery Learning model enhanced by Powtoon animated videos, while the control group received conventional instruction. The instructional design adhered to the six syntactic phases of Discovery Learning: stimulation, problem statement, data collection, data processing, verification, and generalization (Muchlis et al., 2021; Susanti et al., 2022; Wahyuni et al., 2022).

Participants were selected through purposive sampling and consisted of Grade IV students from two comparable elementary schools within a single educational cluster. To assess the impact of the intervention, both groups completed pretests and posttests measuring interest in learning and academic achievement in social studies. All instruments underwent validity and reliability testing in accordance with best practices in educational measurement (Gunawan et al., 2021; Utaminingsih, 2021).

The instructional media Powtoon-based animations were developed in accordance with multimedia learning theory, emphasizing principles such as dual-channel processing and spatial/temporal contiguity to minimize cognitive load and enhance knowledge retention (Hansen et al., 2024; Kleftodimos, 2024; Moe-Byrne et al., 2022). These principles have been empirically validated in a range of educational contexts (Muktiarni et al., 2023; Ratumbuysang et al., 2021).

Data collection instruments comprised a Likert-type learning interest questionnaire and standardized achievement tests, both targeting the cognitive and affective domains addressed by the instructional intervention. The questionnaire's construct validity had been established in previous studies using similar contexts (Nusantari et al., 2021; Sulistyo & Dwidayati, 2021; Tusa'Diah & Asmar, 2021).

Data analysis included both descriptive and inferential statistics. Descriptive statistics summarized central tendency and dispersion measures (mean, standard deviation, variance), while inferential analysis employed analysis of covariance (ANCOVA) to control for baseline differences and determine the significance of treatment effects (Li & Zhou, 2021; Thomas & Liu-Thompkins, 2024; Usman et al., 2022). Statistical analyses were performed using JASP software, with relevant assumptions tested prior to interpretation.

Although the primary methodology was quantitative, the design implicitly acknowledged mixed-methods considerations by recognizing qualitative aspects of the learning process. This reflects a broader recognition in educational research of the importance of multidimensional evaluation strategies (Begeny et al., 2023; Renzetti et al., 2021).

In summary, this methodological approach reflects current best practices in educational research and aims to examine the pedagogical effectiveness of integrating Discovery Learning with animated digital media. By addressing both cognitive and affective dimensions of learning, the study seeks to offer comprehensive insights into the instructional potential of this combined strategy (Aldalur & Sagarna, 2023; Hariyanto et al., 2023; Manurung & Pappachan, 2025; Mulbar & Hasanah, 2021; Subagis, 2021).

3. Results and Discussion

Results

Learning Interest Data

To investigate the impact of the Discovery Learning model supported by Powtoon-based animated video media on the learning interest of fourth-grade students in Cluster I of Tompobulu Subdistrict, Maros Regency, a descriptive statistical analysis was performed using JASP software. The descriptive data are summarized in Table 1.

Table 1. Descriptive Statistics of Students' Learning Interest

Descriptive Statistics

	Pretest Minat Belajar		**Posttest Minat Belajar**	
	Eksperimen	**Kontrol**	**Eksperimen**	**Kontrol**
Valid	25	24	25	24
Missing	0	0	0	0
Mode	65.000	55.000	76.000	71.000
Median	59.000	59.500	84.000	75.000
Mean	60.160	59.708	84.000	74.500
Std. Deviation	6.956	6.273	6.258	7.507
Variance	48.390	39.346	39.167	56.348
Range	29.000	28.000	21.000	26.000
Minimum	46.000	45.000	75.000	60.000
Maximum	75.000	73.000	96.000	86.000

[a] The mode is computed assuming that variables are discrete.

Additional statistics revealed the following:

1. In the experimental group (N = 25), the pretest interest scores ranged from 46 to 75, with a mean of 60.16 and a standard deviation of 6.96. After the intervention,

the posttest scores increased significantly, ranging from 75 to 96, with a mean of 84.00.
2. In the control group (N = 24), the pretest mean was 59.71, with scores ranging from 45 to 73. The posttest mean increased to 74.50, with a range from 60 to 86.

These results indicate that prior to the intervention, both groups exhibited similar levels of learning interest. However, following the application of Discovery Learning integrated with Powtoon animations, students in the experimental group demonstrated a more substantial increase in their interest scores compared to those in the control group. The reduced range and consistent increase in median and mode suggest improved homogeneity in post-intervention interest levels. These findings suggest that the visual and interactive elements of animated media, when combined with inquiry-based pedagogy, effectively enhanced affective engagement among students.

Students' Learning Achievement

To evaluate students' academic achievement in Social Studies, pretests were administered during the initial session, followed by posttests after the final instructional session. The results are summarized in Table 2.

Table 2. Descriptive Statistics of Students' Learning Achievement

Descriptive Statistics

	Pretest Hasil Belajar		**Posttest Hasil Belajar**	
	Eksperimen	**Kontrol**	**Eksperimen**	**Kontrol**
Valid	25	24	25	24
Missing	0	0	0	0
Mode	37.000	37.000	80.000	70.000
Median	47.000	40.000	87.000	70.000
Mean	45.000	42.042	84.040	66.708
Std. Deviation	9.979	9.452	8.820	12.260
Variance	99.583	89.346	77.790	150.303
Range	37.000	33.000	30.000	40.000
Minimum	30.000	27.000	67.000	47.000
Maximum	67.000	60.000	97.000	87.000

[a] The mode is computed assuming that variables are discrete.

Detailed observations include:
1. In the experimental group (N = 25), the pretest scores ranged from 30 to 67, with a mean of 45.00. After the intervention, scores improved significantly to a range of 67 to 97, with a mean of 84.04.
2. In the control group (N = 24), pretest scores ranged from 27 to 60 (mean = 42.04), and posttest scores increased to a range of 47 to 87 (mean = 66.71).

The statistical data reveal a clear improvement in both groups, with the experimental group showing a more pronounced increase in learning achievement. The narrowing range and lower posttest standard deviation in the experimental

group indicate that the treatment not only enhanced average performance but also promoted more consistent learning outcomes across students. These results support the effectiveness of combining Discovery Learning with animated digital media in fostering cognitive gains in elementary-level Social Studies.

Discussion

The findings of this study demonstrate that the implementation of the Discovery Learning model integrated with Powtoon-based animated video media significantly improves both students' learning interest and academic achievement in Social Studies. These results reinforce previous research supporting the effectiveness of Discovery Learning in promoting active engagement, self-directed inquiry, and deep conceptual understanding (Muchlis et al., 2021; Susanti et al., 2022; Triwahyuningtyas & Prastiti, 2021). Additionally, the integration of animated instructional media aligns with multimedia learning theories that emphasize the combination of visual and verbal channels to optimize cognitive processing (Hansen et al., 2024; Kleftodimos, 2024; Moe-Byrne et al., 2022).

The observed increase in students' learning interest supports the growing body of evidence suggesting that visually rich media can enhance motivation, attention span, and emotional engagement during lessonsn (Barghazan et al., 2023; Hikmawati et al., 2021; Muktiarni et al., 2023). Animated content serves as an effective stimulus for curiosity and retention, helping to sustain students' interest throughout the learning process (Huynh et al., 2024; Syawaludin et al., 2022). These affective improvements are particularly aligned with 21st-century educational goals, where sustained interest is viewed as a key driver of academic success (Nusantari et al., 2021; Sulistyo & Dwidayati, 2021; Tusa'Diah & Asmar, 2021).

The significant academic gains observed in the experimental group are consistent with literature on the cognitive benefits of Discovery Learning when supplemented with instructional media. Students exposed to exploratory learning environments supported by multimedia tend to exhibit better comprehension, problem-solving ability, and retention of information (Ahmad et al., 2021; Akihary et al., 2023; Mulbar & Hasanah, 2021). These outcomes are attributed to the structured learning phases of Discovery Learning, which foster active engagement with content through systematic data gathering, analysis, and generalization (Gunawan et al., 2021; Wahyuni et al., 2022).

Although the control group also exhibited improvement, the gains were more modest in comparison. This suggests that while traditional instruction may yield certain benefits, it lacks the interactive and student-centered features that enhance depth of learning (Usman et al., 2022; Van Hell et al., 2021). The superior performance of the experimental group confirms the pedagogical value of Discovery Learning, especially when delivered through engaging media that facilitate conceptual clarity and contextual visualization (Chikeme et al., 2024; Subagis, 2021; Thomas & Liu-Thompkins, 2024).

Another strength of the intervention lies in its adaptability to diverse learner needs. Animated instructional tools such as Powtoon can support multiple learning styles by offering both visual and auditory content, thereby increasing accessibility and comprehension across student populations (Begeny et al., 2023; Renzetti et al., 2021). Moreover, the accessibility and ease of use of Powtoon provide teachers with a practical and scalable tool that can be readily integrated into routine instruction (Aldalur & Sagarna, 2023; Manurung & Pappachan, 2025; Suwandi et al., 2024).

The reduction in score variability observed in the posttest results of the experimental group further suggests that the intervention promotes more equitable learning outcomes. The narrowing of score ranges and standard deviations indicates increased consistency in student achievement, aligning with the goals of inclusive education (Li & Zhou, 2021; Utaminingsih, 2021). This points to the model's potential in closing achievement gaps among learners with different baseline abilities (Hariyanto et al., 2023; Ratumbuysang et al., 2021).

Furthermore, Discovery Learning fosters critical thinking and metacognitive skills competencies that are essential for lifelong learning and adaptive problem-solving (Ahmad et al., 2021; Muktiarni et al., 2023). When these skills are cultivated in an engaging and interactive digital environment, students are more likely to internalize and apply knowledge beyond the classroom context (Suwandi et al., 2024; Wahyuni et al., 2022).

However, several practical challenges should be considered. Effective implementation requires adequate teacher preparation, time for content development, and reliable infrastructure (Gunawan et al., 2021; Subagis, 2021). Although Powtoon is user-friendly, the quality and instructional value of the animations heavily depend on the teacher's ability to design pedagogically sound and content-relevant materials (Kleftodimos, 2024; Syawaludin et al., 2022).

From a theoretical perspective, this study reinforces the value of integrating constructivist learning principles with multimedia learning frameworks. It confirms that active knowledge construction, when supported by engaging visual media, enhances both affective and cognitive outcomes (Moe-Byrne et al., 2022; Muktiarni et al., 2023; Thomas & Liu-Thompkins, 2024). These insights provide a strong empirical foundation for the continued refinement of digital learning strategies in primary education (Hikmawati et al., 2021; Mulbar & Hasanah, 2021; Usman et al., 2022).

In conclusion, this study contributes to the expanding evidence base supporting discovery-based instruction enriched with digital animation as an effective approach to improving learning dynamics in elementary classrooms. It advocates for the adoption of more holistic and student-centered instructional models that are better suited to meet the demands of modern education (Chikeme et al., 2024; Huynh et al., 2024; Manurung & Pappachan, 2025).

Accordingly, educational stakeholders including policymakers, school administrators, and curriculum developers are encouraged to promote the

integration of such approaches in teacher training and instructional design. Doing so will maximize the educational potential of digital tools to enhance engagement, learning quality, and equity across diverse student populations (Hansen et al., 2024; Renzetti et al., 2021).

4. Conclusion

This study concludes that the integration of the Discovery Learning model with Powtoon-based animated video media significantly improves both students' learning interest and academic achievement in Social Studies at the elementary level. Students in the experimental group demonstrated greater gains in motivation and academic performance compared to those who received conventional instruction. The structured, inquiry-driven nature of Discovery Learning, when enriched with engaging digital visualizations, contributes to deeper conceptual understanding, increased learner engagement, and more equitable academic outcomes.

The pedagogical implications are notable, suggesting that multimedia-supported constructivist learning environments have the potential to reshape conventional instructional practices. In particular, this integrative approach fosters not only cognitive growth but also affective engagement, promoting a more holistic learning experience for students.

This research adds to the expanding evidence base advocating for the intentional use of technology in instructional design. It also highlights the importance of supporting factors such as teacher professional development, infrastructure readiness, and alignment with curricular goals to ensure the effective and sustainable implementation of such innovations. Future studies are encouraged to investigate the long-term effects, scalability across grade levels, and adaptability of this approach for varied learner demographics and content domains.

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