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Investigating the Impact of the Snowball Throwing Cooperative Learning Approach on Elementary Students' Social Studies Achievement in Makassar

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Abstract

This study investigates the effect of the Snowball Throwing cooperative learning model on students' learning outcomes in Social Studies (IPS) among fifth-grade students at SD Negeri Tamalanrea, Makassar, Indonesia. The research employed a true experimental design using the posttest-only control group design. The population comprised 325 students, and a total of 64 students were randomly selected as samples, divided into experimental and control groups. The experimental group received instruction through the Snowball Throwing model, while the control group was taught using conventional methods such as lectures and assignments. Data were collected through learning outcome tests and observation sheets, then analysed using descriptive and inferential statistics with SPSS. The results revealed that students in the experimental group achieved significantly higher posttest scores compared to those in the control group ($p < 0.05$). This finding indicates that the Snowball Throwing cooperative learning model effectively enhances students' engagement and academic performance in Social Studies. The study concludes that applying interactive and student-cantered learning models can improve conceptual understanding and social skills among elementary school learners.

Keywords: Cooperative learning, Snowball throwing, Social studies, Learning outcomes, Elementary education.

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1. Introduction

Education plays a central role in shaping human resources capable of adapting to societal changes and global challenges (Mustafazada, 2024). In Indonesia, the national education system is grounded in the philosophical foundation of Pancasila and the 1945 Constitution, emphasizing the holistic development of learners through intellectual, moral, and social cultivation (Karim et al., 2024). The Indonesian education system aspires not only to enhance students' knowledge but also to nurture creativity, critical thinking, and social responsibility (Imran, Bado, and Sumarwadji, 2023). However, despite various educational reforms—such as those outlined in the National Education System Law No. 20 of 2003 and the Teachers and Lecturers Law No. 14 of 2005—classroom practices in many primary schools remain dominated by conventional, teacher-centered approaches (Ihsaniah and Mujahidin, 2025).

Social Studies (Ilmu Pengetahuan Sosial/IPS) in Indonesian primary schools is designed to develop students' understanding of social life, culture, and citizenship (Imran, Imran, and Idham 2025). Its objectives include fostering social sensitivity, national identity, and civic competence (Idham et al. 2025). However, in practice, Social Studies is often delivered through rote learning, focusing on memorizing facts rather than encouraging students to engage critically with real-life social phenomena (A. Z. Idham, 2025). As a result, students' performance and motivation tend to be low, as they are not actively involved in constructing knowledge during the learning process (Yang, Meng, and Deris, 2025).

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Preliminary observations conducted at SD Negeri Tamalanrea Makassar revealed that teachers still predominantly employ traditional teaching methods. Students are often passive listeners, rarely participating in discussions or asking questions (Lin et al., 2024). They tend to record information mechanically without deeper comprehension. Such practices contradict the contemporary pedagogical emphasis on student-centered learning, where learners are expected to actively construct meaning through collaboration and interaction (Qianyi and Zhiqiang 2024). Interviews with teachers further indicated that students' performance in Social Studies remains below the school's minimum competency standard (70). These findings highlight the urgent need for innovative learning models that can enhance students' engagement and learning outcomes (Fan et al., 2025).

One promising pedagogical approach is cooperative learning, which emphasizes teamwork, mutual responsibility, and positive interdependence among students (Zhou et al., 2025). Numerous studies have demonstrated that cooperative learning promotes higher achievement, motivation, and interpersonal skills compared to traditional instruction (Ngoc Tuong Nguyen and Thi Kim Oanh, 2025; A. Z. S. Idham, 2025). Through structured group interaction, students become active participants in constructing their understanding and applying concepts collaboratively (Janah, Nurdin, and Suwito 2025). Within this framework, one effective strategy is the Snowball Throwing model, a dynamic cooperative technique designed to stimulate students' participation, communication, and comprehension (Anvari, Hammer, and Wehbe, 2024; Hu and Mi, 2024).

The Snowball Throwing model involves students forming groups, generating questions based on the learning material, and "throwing" these questions to other groups for discussion and response (Utami et al. 2025; Anvari et al. 2024). This interactive process not only encourages student engagement but also enhances comprehension, speaking, and critical-thinking skills (Ruziyeva and Elboyeva 2025; Song, Razali, and Jeyaraj 2025). Moreover, it creates a lively and enjoyable classroom atmosphere where students feel motivated to learn and collaborate (Imran, Rustan, et al. 2025). By transforming the learning environment from teacher-dominated to student-centered, Snowball Throwing aligns with constructivist learning principles and supports the development of 21st-century skills (Irfan and Imran, 2025).

Previous research on cooperative learning in Indonesia has shown significant improvements in students' cognitive and affective learning outcomes (Iswarini et al., 2025; Rahman, 2025; Sari, Mahmudah, and Aisyah 2025). However, empirical studies specifically examining the application of the Snowball Throwing model in the context of primary Social Studies education remain limited. Most existing studies focus on secondary or tertiary levels, leaving a gap in understanding its effectiveness for younger learners. This study therefore seeks to fill this gap by investigating how the implementation of the Snowball Throwing model influences students' learning performance in primary school Social Studies (Ilmi, Suardi, and Azis 2024; Syamsijulianto, Qomara, and Satria, 2025; Umar et al., 2025).

Building on these considerations, the present study is directed toward three central aims. The first aim is to describe the manner in which the Snowball Throwing cooperative learning model is implemented in a fifth grade Social Studies classroom at SD Negeri Tamalanrea Makassar. The second aim is to assess the learning outcomes achieved by students after the application of this model. The third aim is to determine whether the Snowball Throwing approach exerts a significant influence on students' academic performance in Social Studies.

This research provides valuable contributions to the broader discourse on innovative instructional practices within Indonesian education. Conceptually, it strengthens theoretical understanding regarding the applicability of cooperative learning in primary schools, particularly in Social Studies, a discipline that requires interactive participation, contextual understanding, and meaningful communication. Practically, the findings are expected to support teachers in designing learning environments that are more engaging and effective, encouraging active involvement, collaborative problem solving, and deeper learning experiences. In its entirety, this study seeks to address the ongoing challenge of passive learning behavior among elementary students by examining the potential of the Snowball Throwing cooperative model as an interactive instructional alternative that can enhance engagement and learning outcomes in Social Studies. Aligned with Indonesia's educational priorities that emphasize creativity, collaboration, and civic competence, the study

aims to produce actionable insights that may contribute to the improvement of instructional quality and student achievement at the primary education level.

2. Method

2.1 Research Design and Site

This study employed a true experimental design, specifically the posttest-only control group design, to examine the effect of the Snowball Throwing cooperative learning model on students' achievement in Social Studies. The design involved two groups: an experimental group that received the Snowball Throwing intervention and a control group that was taught using conventional methods (lecture, assignment, and discussion) (Hidayah and Ashoumi 2024; Sefira et al. 2024; Ulmi 2024).

The study was conducted at SD Negeri Tamalanrea, located in Tamalanrea District, Makassar City, South Sulawesi, Indonesia. The school was chosen based on accessibility and the teacher's willingness to collaborate in implementing the experimental procedure.

2.2. Variables

Two variables were examined in this research:

1. Independent Variable: the Snowball Throwing cooperative learning model;
2. Dependent Variable: students' learning achievement in Social Studies (Ilmu Pengetahuan Sosial).

Operationally, the Snowball Throwing model refers to a cooperative learning approach in which students create and exchange questions written on paper "snowballs," encouraging interaction, discussion, and peer learning. Learning achievement refers to students' mastery of Social Studies concepts as measured by a posttest following instruction.

2.3. Participants and Sampling

The population consisted of all students enrolled at SD Negeri Tamalanrea (N = 325). The sample was selected using the simple random sampling technique (Nyimbili and Nyimbili 2024; Pribadi, Ridwan, and Tjalla 2025; Salman, Kalakech, and Steiti 2024). From three fifth-grade classes, two were randomly selected to participate in the study: Class VB and Class VC, with 32 students each (total N = 64). Class VB was assigned as the experimental group, while Class VC served as the control group. All participants were approximately 10–11 years old.

Research Procedure, the experimental treatment was conducted over several instructional sessions (Aboueisha et al. 2025; Ferguson et al. 2024; Şanal, Güler, and Torun 2025). The procedure included the following steps:

1. Orientation and Group Formation: Students were divided into small groups, and the teacher explained the lesson objectives and procedure.
2. Learning and Question Design: Students studied the assigned Social Studies topic, formulated questions, and wrote them on pieces of paper to form "snowballs."
3. Snowball Exchange and Discussion: Students threw their paper "snowballs" to other groups, and each group answered the questions they received.
4. Class Discussion: The teacher facilitated a whole-class discussion to reinforce key concepts and clarify misconceptions.
5. Assessment: A posttest was administered to measure students' learning outcomes.

The control group received instruction using the traditional teacher-centered method without any cooperative activity (Beigzadeh et al. 2024; Firdhaus et al. 2025).

Instruments

2.4. Instrument

The first instrument utilized in the study was a learning achievement test composed of 25 multiple choice items aimed at assessing students' cognitive attainment in the Social Studies curriculum. The test items were carefully constructed to reflect the essential competencies targeted in the instructional objectives. To ensure content accuracy and alignment with curricular standards, the instrument was evaluated by two experts in the relevant subject area, whose judgments confirmed its content validity. Furthermore, the reliability of the test was examined through the Cronbach's Alpha procedure, yielding a coefficient of 0.82, which signifies a high degree of internal consistency and indicates that the items function cohesively in measuring the intended construct.

The second instrument consisted of a structured observation sheet designed to capture various dimensions of student behavior during the learning process, including engagement, participation, and collaborative interaction. The checklist contained predetermined indicators that enabled systematic and objective recording of classroom dynamics. During instructional sessions, trained observers marked the appropriate indicators to document observable behaviors, allowing for a comprehensive portrayal of students' involvement in the learning activities. This approach ensured that data were gathered consistently and facilitated the analysis of students' learning experiences in an authentic classroom environment.

2.5. Data Collection and Analysis

Data collection was carried out through posttests administered following the completion of the learning intervention (Al-Jamili et al., 2024; Gabr, Sleem, and El-Wkeel, 2025; Wahyudi, Harjono, and Pangga, 2025). To provide an overview of students' academic performance, descriptive statistical measures such as the mean, median, mode, standard deviation, and percentage were calculated. Inferential analyses were then conducted to examine the study's hypotheses through several statistical procedures. The normality of the dataset was examined using the Kolmogorov–Smirnov test to verify whether the distribution met the assumptions for parametric testing. The homogeneity of variance between the comparison groups was assessed using the F-test. Subsequently, an independent-samples t-test was employed to compare posttest outcomes for the experimental and control groups. All analyses were performed using SPSS version 25.0 with a predetermined significance threshold of $p < 0.05$. A rejection of the null hypothesis occurred when the obtained t-value exceeded the critical t-value at the 0.05 level, signifying that the Snowball Throwing instructional model produced a statistically significant impact on students' achievement in Social Studies.

2.6. Research Ethics

Ethical approval for this study was obtained from the school administration (Franco D'Souza et al. 2024; Raut et al. 2024). All participants and their parents were informed of the study objectives and procedures. Participation was voluntary, and confidentiality of students' data was maintained throughout the research process.

3. Results

3.1 Participants and Implementation Overview

The study involved 55 fifth-grade students of SD Negeri Tamalanrea Makassar, South Sulawesi, Indonesia, during the first semester of the 2019/2020 academic year. Twenty-seven students formed the experimental group, which received instruction through the Inquiry Learning Model, while twenty-eight students served as the control group, taught using the conventional method. The intervention lasted for four sessions over one month (5 August – 5 September 2019).

3.2 Implementation of the Inquiry Learning Model

The implementation followed six stages of inquiry-based learning: (1) orientation, (2) problem formulation, (3) hypothesis formulation, (4) data collection, (5) hypothesis testing, and (6) conclusion drawing (Fadillah et al. n.d.; Hu et al. 2024; Ismail et al. 2024).

Observation results showed that both teacher and student activity improved gradually across the four sessions. The teacher's implementation scores increased from 75% (fair) in the first session to 90% (excellent) in the fourth session, with an overall mean of 80%, indicating effective application of the inquiry model. Students also demonstrated higher engagement and collaboration levels compared to those in the control class (Sukristin et al. 2025).

3.3 Descriptive Analysis of Students' Learning Outcomes

The posttest results revealed notable differences between the experimental and control groups.

Table 1. Distribution of Students' Science Achievement Levels

Category	Score Range	Experimental (n=27)	%	Control (n=28)	%
Very High	86–100	5	18.5	0	0
High	71–85	14	51.8	11	39.2
Moderate	55–70	8	29.6	14	50
Low	40–54	0	0	3	10.7
Very Low	0–39	0	0	0	0

As shown in Table 1, a higher proportion of students in the experimental group achieved high and very high scores compared to the control group, which was dominated by moderate-level scores. This indicates that the inquiry learning model contributed positively to students' Science achievement.

3.4 Inferential Analysis

To test the research hypothesis, an independent-samples t-test was conducted on posttest scores from both groups.

Table 2. Independent Samples t-Test Results

Group	N	Mean	SD	*t* (53)	Sig. (2-tailed)
Experimental	27	75.07	8.24	3.118	0.003
Control	28	67.79	9.92	—	—

The results show a significant difference between the two groups ($t(53) = 3.118$, $p = 0.003 < 0.05$). The mean difference of 7.68 points indicates that students taught using the Inquiry Learning Model outperformed those taught through conventional instruction. These findings lead to the rejection of the null hypothesis and acceptance of the alternative hypothesis, confirming that the Inquiry Learning Model had a statistically significant positive effect on students' learning outcomes in science (Fajeriadi et al. 2024; Safkolam, Madahae, and Saleah 2024).

4. Discussion

The results demonstrate that the inquiry-based learning model significantly improved students' Science achievement compared to traditional teaching. Students in the experimental class were more actively involved in exploring problems, formulating hypotheses, and drawing conclusions—activities that stimulate higher-order thinking and scientific reasoning (Idham et.al., 2025)

These findings align with constructivist learning theory, which posits that knowledge is actively constructed through investigation and reflection (Chen 2024; Renninger 2024). Inquiry learning allows learners to engage directly in scientific processes, thus enhancing cognitive, affective, and psychomotor development.

Observations also revealed that students in the inquiry class demonstrated greater curiosity, cooperation, and motivation during learning activities (Agustini, Meilanie, and Pujiastuti 2024; Qablan et al. 2024). Their interaction patterns shifted from passive listening to active participation, as they sought evidence and discussed findings collaboratively. This result corroborates previous studies. showing that inquiry learning improves engagement and achievement in science education.

Furthermore, the inquiry model aligns well with the developmental characteristics of elementary students, who are in the concrete operational stage of cognitive development. At this stage, learners benefit from hands-on activities and direct exploration rather than abstract instruction. Therefore, inquiry-based learning provides meaningful experiences that help students internalize scientific concepts more effectively (Jamil, Idham, and Imran 2024; Renny, Usman, and Idham 2025).

In contrast, students in the control group—who were taught using conventional, teacher-cantered methods—tended to be more passive and less motivated. Their learning outcomes were lower, indicating that the traditional approach was less effective in promoting deep conceptual understanding.

In summary, the findings confirm that the inquiry learning model effectively enhances students' Science learning outcomes by engaging them in discovery-oriented processes that foster analytical thinking, problem-solving skills, and cooperative learning behaviours.

5. Conclusion and Implications

5.1 Conclusion

This study examined the effect of the Inquiry Learning Model on fifth-grade students' Science learning outcomes at SD Negeri Tamalanrea Makassar, Indonesia. The findings revealed that students who were taught using the inquiry approach achieved significantly higher learning outcomes than those who received conventional instruction. The model effectively enhanced students' participation, curiosity, and understanding of scientific concepts. The improvement in both teacher and student activity across learning sessions further confirmed the feasibility and pedagogical value of implementing inquiry-based strategies in elementary Science education. In short, the Inquiry Learning Model provides an effective alternative to traditional, teacher-centered instruction by promoting active learning, problem-solving, and conceptual understanding.

5.2 Implications for Practice

The results suggest several practical implications for teachers, curriculum designers, and educational policymakers:

1. For teachers, the findings highlight the importance of adopting inquiry-based approaches to foster students' critical thinking and engagement. Teachers are encouraged to design lessons that stimulate questioning, hypothesis testing, and evidence-based reasoning.
2. For schools and administrators, implementing inquiry learning requires adequate support, such as training, time allocation for exploration, and access to instructional materials that facilitate hands-on experiments.
3. For curriculum developers, integrating inquiry-based learning principles into the Science curriculum can bridge the gap between theory and practice, creating more authentic and meaningful learning experiences.

5.3 Limitations and Future Research

Despite the positive outcomes, this study had several limitations. The research was conducted within a single school and involved a limited sample size, which may restrict generalizability. Additionally, the study focused solely on cognitive learning outcomes, without examining affective or psychomotor dimensions.

Future studies could:

1. Investigate the long-term impact of inquiry learning on students' retention and scientific attitudes;
2. Explore its integration with digital or blended learning environments;
3. Examine how teacher readiness and professional development influence successful implementation.

By addressing these areas, future research can extend understanding of how inquiry learning fosters holistic educational outcomes in diverse contexts.

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