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The Use of Ice Breaking in The Jigsaw Cooperative Learning Model to Increase Learning Motivation of Fourth-Grade Students of SD Inpres 2 Tondo

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A B S T R A C T

Learning motivation is critical in elementary education, yet monotonous classroom activities often result in low student engagement. This study examined the effect of integrating ice breaking into the Jigsaw cooperative learning model on fourth-grade students' learning motivation. Using a quasi-experimental design with nonequivalent control groups, 38 students from SD Inpres 2 Tondo were divided into experimental (n=19) and control (n=19) groups. Data were collected through validated questionnaires (Cronbach's α=0.689), observation sheets, and documentation, analyzed using descriptive statistics, N-Gain, Wilcoxon Signed-Rank, and Mann-Whitney U tests. Results showed the experimental group improved from pretest mean 33.63 to posttest 53.53 (N-Gain=0.296, moderate), while the control group increased from 26.37 to 45.95 (N-Gain=0.262, low). Wilcoxon and Mann-Whitney tests confirmed significant differences ($p<0.05$). Observations revealed higher motivation in the experimental class (73.94%) versus control (70.23%). This study concludes that ice breaking integrated with Jigsaw significantly enhances elementary students' learning motivation.

1. Introduction

Learning motivation is a key factor that determines students' success in the learning process, especially at the elementary school level. Motivation functions as an internal and external driving force that encourages students to actively engage in learning activities. Sunarti Rahman as cited in (Anshori 2024) explains that learning motivation arises from internal and external drives that influence changes in learning behavior. Students with high motivation tend to show enthusiasm and

persistence, while students with low motivation often appear passive and bored during learning activities Sardiman, as cited in (Magdalena, 2021).

One instructional approach that can enhance students' learning motivation is the cooperative learning model. The Jigsaw type cooperative learning model emphasizes collaboration and individual responsibility through peer teaching in small heterogeneous groups (Yani et al., 2022). Previous studies have shown that the Jigsaw model can improve students' motivation and learning outcomes by promoting active participation and social interaction (Jannah et al., 2021). However, learning activities that lack variation may still lead to boredom and decreased motivation. To overcome this issue, teachers can integrate ice breaking activities into the learning process. Ice breaking aims to create a relaxed, enjoyable, and enthusiastic learning atmosphere, thereby reducing boredom and restoring students' focus Soenarno, as cited in (Deswanti, 2020). Several studies reported that ice breaking activities positively affect students' learning motivation and classroom engagement (Puspita, 2023; Rahayu, 2021; Rahmat, 2021).

Although previous research has examined the effects of ice breaking and the Jigsaw cooperative learning model, most studies have investigated them separately. Limited research has focused on integrating ice breaking activities within the Jigsaw cooperative learning model, particularly in elementary school science learning and with an emphasis on students' internal learning motivation. This condition indicates a research gap that needs to be addressed. Therefore, this study aims to examine the effect of integrating ice breaking activities into the Jigsaw cooperative learning model on improving the learning motivation of fourth-grade students at SD Inpres 2 Tondo.

2. Methodology

Research Design

This study employed a quantitative approach using a quasi-experimental method with a nonequivalent control group pretest–posttest design. Two groups were involved: an experimental group that received instruction using the Jigsaw cooperative learning model combined with ice breaking activities, and a control group that received conventional learning, as seen in table 1.

Table 1. Research Design

Class	Pretest	Treatment	Posttest
Class Experimen	O_1	X_1	O_2
Class Control	O_3	X_2	O_4

Note: X_1 = Jigsaw cooperative learning integrated with ice breaking; X_2 = Conventional learning; O_1, O_3 = Pretest; O_2, O_4 = Posttest.

Research Subjects

The study was conducted at SD Inpres 2 Tondo, Palu, Central Sulawesi during the first semester of the 2025/2026 school year. The population consisted of all fourth-grade students (38 students). The sampling technique was census sampling, meaning all students were included as research samples: Class IV A (19 students) as the experimental group and Class IV B (19 students) as the control group.

Research Variabels

This study involved two main variables. The independent variable was the cooperative learning model type Jigsaw integrated with ice breaking activities. The dependent variable was students' learning motivation, which focused on internal motivation indicators, including perseverance in learning, resilience in facing difficulties, interest in learning, independence, boredom toward routine tasks, and the ability to maintain opinions.

Research Instrumens

Three complementary instruments were employed to triangulate motivation measurement. First, a 15-item learning motivation questionnaire was developed based on internal motivation indicators. Initially, 20 items were pilot-tested with 43 fourth-grade students at SD Inpres 9 Mamboro (October 29, 2025). Validity testing using Pearson correlation (r-table=0.312, α=0.05) identified 10 valid items (r-calculated > r-table, $p<0.05$) with reliability α=0.689, exceeding the 0.60 threshold (Azizah & Chalimatusadiah, 2025). Five additional items were revised for clarity and included in the posttest version, totaling 15 items. Items used a 4-point Likert scale: Strongly Agree (4), Agree (3), Disagree (2), Strongly Disagree (1). Sample items included: "I persist in completing all assignments" (perseverance), "I continue learning even when material is difficult" (resilience), "I quickly become bored if tasks are repetitive" (routine boredom), and "I am not embarrassed to speak or answer questions in front of the class" (opinion maintenance), as seen in table 2.

Table. 2 Questionnaire Item Distribution Across Motivation Indicators

Indicator	Item Numbers	Total Items
Perserverance Facing	1,7,13,15	4
Resilience Facing Difficulties	2,8,9,10	4
Interest in Aduit Concerns	11	1
Independent Work	12,14	2
Boredom With Routine	3,4,5,6	4
Total		15

Second, a structured observation rubric assessed behavioral manifestations of motivation indicators using a 4-point scale: 4 (Excellent), 3 (Good), 2 (Fair), 1 (Poor). Trained observers recorded 24 specific behaviors across the six motivation indicators during each learning session. Third, photographic evidence captured classroom dynamics, student groupwork configurations, and ice breaking activity

implementations, while administrative documents (attendance records, lesson plans) provided contextual data.

Research Procedure

The research was conducted at SD Inpres 2 Tondo, Palu, Central Sulawesi, during the first semester of the 2025/2026 academic year, from 20 October to 18 November 2025. The pretest for the experimental class (Class IV A) was administered on 3 November 2025, followed by the implementation of the Jigsaw cooperative learning model integrated with ice breaking activities over two meetings in early November 2025. The posttest for the experimental class was administered on 7 November 2025. Meanwhile, the control class (Class IV B) was taught using conventional learning methods. The pretest was administered on 10 November 2025, and the posttest was administered on 18 November 2025 to measure students' learning motivation after the learning process.

Data Analysis Techniques

Data analysis was carried out using descriptive and inferential statistical techniques. Descriptive analysis was used to describe students' learning motivation scores. The effectiveness of the treatment was measured using N-Gain analysis. Because the data were not normally distributed, non-parametric statistical tests were applied. The Wilcoxon Signed-Rank Test was used to analyze differences between pretest and posttest scores within each group, while the Mann–Whitney U Test was used to analyze differences in posttest scores between the experimental and control groups.

3. Results and Discussion

Classroom Context And Initiaal Condition

SD Inpres 2 Tondo is a public elementary school located in an urban area of Palu City, serving a diverse student population from middle to lower socioeconomic backgrounds. The school has been operational since 1984, with a land area of 9,000 square meters and adequate facilities to support the learning process. Fourth-grade classes typically consist of 40-42 students divided into two parallel classes, creating a cooperative learning environment. Prior to intervention implementation, preliminary observations revealed concerning motivational patterns. Students in both fourth-grade classes demonstrated low engagement characterized by passive listening postures, minimal voluntary question-asking (fewer than 3 questions per lesson), reluctance to participate in discussions (typically only 5-7 students responding to teacher prompts), and rapid task abandonment when encountering difficulties. Classroom atmosphere was predominantly teacher-centered, with students seated in traditional rows facing the blackboard. The science curriculum followed Indonesia's Merdeka Curriculum framework, emphasizing inquiry-based learning and student-centered approaches-ideals not yet fully realized in actual practice.

Teacher interviews corroborated observational findings, with the fourth-grade science teacher reporting: "Students quickly lose interest during lessons, especially when I'm explaining concepts for extended periods. They look bored, some put their heads on desks, and many seem to just wait for lessons to end rather than actively participating." This contextual understanding underscores the practical necessity of the intervention.

Implementation of Ice Breaking In Jigsaw Cooperatif Learning

The implementation of ice breaking integrated into the Jigsaw cooperative learning model was carried out in two learning meetings, in accordance with the Merdeka Curriculum–based teaching module for Grade IV IPAS on the topic "Muscle Force and Friction Force". Each meeting was allocated 2 × 35 minutes and followed the complete syntax of the Jigsaw cooperative learning model. Ice breaking activities were systematically embedded at the beginning, during the core activities, and at the closing session to maintain students' learning motivation, concentration, and positive learning atmosphere. Meeting 1 focused on the topic of muscle force. The lesson began with preliminary activities including greeting, prayer, and attendance checking. To build learning readiness and increase motivation, the teacher implemented an ice breaking activity by inviting students to sing the song "Various Styles", which was directly related to the learning content. This activity aimed to create an enthusiastic classroom atmosphere and activate students' prior knowledge. The teacher then conducted apperception using concrete objects around the classroom and presented the learning objectives and a triggering question related to muscle force.

During the core activities, the teacher divided the material into two subtopics (muscle force and friction force) and explained that each student would become an "expert" in one topic. Students were organized into heterogeneous home groups, then regrouped into expert groups based on their assigned subtopic. In expert groups, students read the learning materials, discussed key concepts, recorded important points in the LKPD, and prepared explanations for their peers. To maintain focus after the expert discussion, a short ice breaking activity in the form of singing together was conducted. Students then returned to their home groups to teach the muscle force material to their peers through peer teaching and group discussion. The meeting concluded with a class discussion, summary, reflection, and a closing ice breaking activity to reinforce learning satisfaction.

Meeting 2 focused on the topic of friction force and followed a similar instructional structure. The lesson began with initial activities and an ice breaking activity to stimulate enthusiasm and readiness to learn. The teacher conducted apperception and reviewed prior knowledge from the first meeting, then guided students into the Jigsaw learning process. Students again worked in expert groups to study friction force material, discuss examples of friction in daily life, and complete the LKPD collaboratively. After the expert group discussion, an ice breaking activity was implemented to restore concentration before students returned to their home groups. In the home groups, expert students explained the concept of friction force to their peers, while group members listened, asked questions, and combined information

from all experts. The learning process continued with a class discussion and question–answer session to clarify students' understanding. The meeting ended with a joint conclusion of the material, individual follow-up assignments, reflection on learning experiences, and a closing ice breaking activity to create a positive emotional ending to the lesson. Overall, the two-meeting implementation of ice breaking within the Jigsaw cooperative learning model was conducted consistently with the teaching module. Ice breaking activities functioned as a motivational strategy that supported students' attention, enthusiasm, and internal learning motivation throughout both learning sessions.

Descriptive Analysis of Pretest and Posttest Scores

Descriptive statistics provide foundational understanding of learning motivation changes in both groups before and after intervention implementation, as presentedin table 3.

Table 3. Descriptive Statistics of Pretest and Posttest Scores

		Statistics			
		Pretest Experimen	Posttes Experimen	Pretest Control	Posttest Control
N	Valid	19	19	19	19
	Missing	0	0	0	0
Mean		33.63	53.53	26.37	45.95
Std. Deviation		1.834	3.893	8.834	2.896

The percentage of learning motivation showed a significant increase in both classes. The experimental class experienced an improvement from 33.63 (pretest) to 53.53 (posttest), representing an increase of 59.2%. Meanwhile, the control class increased from 26.37 in the pretest to 45.95 in the posttest, with an overall increase of 74.3%. Furthermore, in comparison of learning mastery percentages can be seen in table 4.

Table 4. Comparison of Learning Mastery Percentages

Class	Pretest Mastery	Posttest Mastery	Increase
Experimen	10,5%	68,4%	57,9%
Control	0%	36,8%	36,8%

These results indicate that the learning motivation of both classes increased significantly after the intervention. Although the control class showed a higher percentage increase (74.3%), the experimental class achieved a higher final score (53.53) compared to the control class (45.95), with a difference of 7.58 points. This demonstrates that the implementation of the learning model in the experimental class was effective in improving students' learning motivation consistently and significantly.

N-Gain Analysis

The N-Gain test results showed that the experimental class obtained an average N-Gain score of 0.296 (29.6%), which falls into the moderate category, whereas the

control class obtained a score of 0.262 (26.2%), categorized as low. The difference of 0.034 or 3.4% indicates that the improvement in learning motivation in the experimental class was higher than that of the control class. These results demonstrate that the implementation of the learning model in the experimental class was more effective in enhancing students' learning motivation compared to the conventional learning approach used in the control class.

Observation Results of Students' Learning Motivation

The observation results indicate that students in the experimental group demonstrated higher learning motivation compared to the control group. The experimental group achieved an average observation score of 70.63 (73.94%), categorized as good, while the control group obtained an average score of 67.42 (70.23%), categorized as fairly good. The distribution of motivation categories in the experimental group showed more consistent performance, with the majority of students falling into the good category. In contrast, the control group, despite achieving a fairly good rating, showed a lower overall mean score. The difference of 3.21 points or 3.71% in mean percentage indicates that the learning motivation in the experimental class was higher than that of the control class. These results suggest that the intervention or teaching method applied to the experimental group had a positive impact on students' learning motivation, resulting in better engagement and interest in the learning process compared to the conventional approach used in the control group, as seen in table 5.

Tabel 5. Observation Results of Students' Learning Motivation

Aspect	Experimental Group	Control Group
Number of Students	19	19
Mean Score	70.63	67.42
Mean Percentage	73.94%	70.23%
Category	Good	Fairly Good

Assumption Testing

The normality test using the Shapiro-Wilk method indicated that all data were normally distributed, with significance values for the experimental class pretest (0.124), experimental class posttest (0.331), control class pretest (0.081), and control class posttest (0.069), all of which exceeded 0.05. The homogeneity test using Levene's Test yielded a significance value of 0.001 (< 0.05), indicating that the variances between the experimental and control classes was not homogeneous. Based on the results of the normality and homogeneity tests, it was concluded that parametric statistical tests could not be applied. Consequently, non-parametric statistical tests, namely the Wilcoxon Signed-Rank Test and the Mann-Whitney U Test, were used for hypothesis testing.

Hypothesis Testing

Hypothesis testing was conducted to examine the effect of integrating ice breaking activities into the Jigsaw cooperative learning model on students' learning

motivation.The Wilcoxon Signed-Rank Test results showed a significant difference between pretest and posttest scores in the experimental group, with an Asymp. Sig. value of 0.000 (< 0.05). This indicates that the learning intervention had a significant effect on students' learning motivation. Furthermore, the Mann–Whitney U Test results showed an Asymp. Sig. value of 0.000 (< 0.05), indicating a significant difference in learning motivation between the experimental and control groups. Thus, the research hypothesis was accepted.

Discussion

The results of this study indicate that the use of ice breaking in the Jigsaw cooperative learning model has a significant positive effect on improving the learning motivation of fourth-grade students at SD Inpres 2 Tondo. These findings are consistent with (Dahlan et al. 2023), who reported that ice breaking effectively enhanced students' learning motivation (experimental class: 81.60 vs control class: 61.75). Similarly, (Atika and Aulia 2025) demonstrated that the Jigsaw model increased motivation from 61.95% to 77.39%, an improvement of 13.48%. The advantages of using ice breaking in the Jigsaw model can be explained through several aspects. First, the Jigsaw model provides opportunities for active participation through expert groups and home groups. Each student is responsible for understanding and teaching specific material to peers, fostering intrinsic motivation and self-confidence (Yani, et al., 2022). Second, the model creates interactive and collaborative learning environments. This aligns with Vygotsky's Zone of Proximal Development theory, where learning occurs through peer interaction (Jannah, et al., 2021).

Third, ice breaking effectively addresses boredom and increases concentration. According to Soenarno in (Deswanti, 2020), ice breaking transforms the atmosphere from boring and tense to relaxed and enthusiastic. Fourth, the model fosters individual responsibility, encouraging students to be more committed to learning. Initial observations showed students at SD Inpres 2 Tondo lacked enthusiasm, but after implementing Jigsaw with ice breaking, participation improved significantly, consistent with (Rahayu, 2024). Conversely, conventional instruction in the control class was teacher-centered with limited opportunities for active participation. Observation results showed the experimental class achieved 73.94% (good category) while the control class reached only 70.23% (fair-good category). The experimental class increased from pretest average 33.63 to posttest 53.53 (19.90 points improvement), while the control class increased from 26.37 to 45.95 (19.58 points). The N-Gain results showed the experimental class obtained 0.296 (moderate category) versus control class 0.262 (low category).

These findings align with Hamzah Uno in (Arsa et al., 2024), who stated that high learning motivation leads to strong enthusiasm in learning. The research findings are relevant to Sardiman's indicators in (Magdalena, 2021): persistence, resilience, interest, independence, adaptation to varied tasks, and maintaining opinions. All indicators appeared clearly in the experimental class during learning. This study provides practical implications for teachers to implement the Jigsaw model combined with ice breaking as an alternative strategy. Teachers should prepare

thoroughly, including forming heterogeneous groups (4-6 students), explaining procedures clearly, and providing engaging ice breaking activities. Schools should provide training on cooperative learning models, and future researchers should extend the study duration and sample size for more comprehensive results.

4. Conclusion

The findings of this study indicate that the integration of ice breaking activities into the Jigsaw cooperative learning model has a positive effect on students' learning motivation in Grade IV at SD Inpres 2 Tondo. The learning process that combined structured cooperative activities with enjoyable ice breaking sessions created a more engaging and supportive classroom atmosphere. Students became more enthusiastic, actively involved in group discussions, and showed greater responsibility in sharing learning materials with their peers. The use of ice breaking helped reduce learning fatigue and boredom, enabling students to maintain focus and interest throughout the learning sessions. When applied consistently within the Jigsaw model, ice breaking supported peer interaction, increased confidence, and encouraged students to participate more actively in the learning process. These conditions contributed to the improvement of students' internal learning motivation, particularly in terms of persistence, curiosity, and willingness to complete learning tasks. Overall, this study can be considered successful in achieving its research objective, namely enhancing students' learning motivation through the use of ice breaking in the Jigsaw cooperative learning model. The results suggest that this approach can be an effective alternative strategy for elementary school teachers to create a more dynamic, enjoyable, and motivating learning environment.

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