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Application of the Relating, Experiencing, Applying, Cooperating, and Transferring (REACT) Strategy to Improve Science Learning Outcomes in Fifth Grade Students at SDN Srengseng Sawah 11

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Abstract

Fifth-grade students at SDN Srengseng Sawah 11 showed low participation and learning outcomes in Natural and Social Sciences (IPAS) because lessons relied on teacher explanation and question-and-answer. This study aimed to determine whether applying the Relating, Experiencing, Applying, Cooperating, and Transferring (REACT) strategy could improve science learning outcomes. Classroom action research following the Kemmis and McTaggart spiral model was conducted with 32 students of class V-B in the 2024/2025 academic year. Data were collected through written tests, teacher and student observation sheets, and documentation, and analysed descriptively as percentages against two success criteria: at least 85% of students scoring 75 or above, and observation scores of at least 90%. The share of students reaching the criterion rose from 53% before the action to 66% in Cycle I and 91% in Cycle II, which met the target. Teacher activity rose from 81% to 97%, and student activity from 73% to 92%. Three students still did not reach the criterion. Because the design had no control group and Cycle II also added class agreements and extra motivation, the gains are consistent with, but not proof of, a REACT effect. The strategy is promising for elementary science and should be tested with comparison groups and longer follow-up.

Keywords: Learning Outcomes; Science; REACT Strategy; Classroom Action Research

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INTRODUCTION

Education develops the skills, knowledge, and attitudes people need in life; Ki Hajar Dewantara described it as the effort to advance the growth of character, mind, and the child's development (Uno & Lamatenggo, 2022). At school, learning should prepare students with spiritual, social, intellectual, and practical skills so that they can face change in their surroundings. In the Merdeka Curriculum, Natural and Social Sciences (*Ilmu Pengetahuan Alam dan Sosial*, IPAS) is a subject that develops inquiry skills, self-awareness, and understanding of one's environment, and lets students see natural and social phenomena as connected (Rahman & Fuad,

2023). Science teaching should therefore focus on students' thinking and active involvement, and its success is visible in learning outcomes, that is, changes in knowledge, understanding, skills, and attitudes resulting from learning (Irawati et al., 2021).

Learning outcomes depend on several factors. Studies of Indonesian elementary students report a positive but modest correlation between learning motivation and science outcomes ($r = 0.227$ in Muslimin et al., 2024; $r = 0.323$ in Humairoh et al., 2024), and motivation and self-efficacy both predict outcomes in regression models (Agustini et al., 2023). Teachers' pedagogical competence and learning strategies also relate to IPAS outcomes (Lentelan et al., 2026). A meta-analysis of cooperative learning in Indonesian elementary science found that average cognitive scores were still below the 75-point minimum criterion (Rahim et al., 2026), which shows that reaching the criterion remains a common challenge.

The same challenge appears in how IPAS is taught under the Merdeka Curriculum. Case studies report that teachers face limited learning media, time constraints, gaps in training, difficulty writing learning-objective targets and designing differentiated activities, and a continued reliance on conventional methods, even as they try to make learning active and contextual (Amalia et al., 2025; Fitri et al., 2026; Hidayatullah et al., 2025; Palangda et al., 2025). Teachers also need time to adapt to the curriculum's new terms and demands (Asmahasanah et al., 2023).

These conditions were observed at SDN Srengseng Sawah 11 during the researcher's teaching practice from July to November. Students had difficulty understanding science lessons, and outcomes did not meet the Learning Objective Achievement Criteria (*Kriteria Ketercapaian Tujuan Pembelajaran*, KKTP). Students were not very active, and teaching methods were limited: students listened to explanations, took part in question-and-answer, and completed assignments, using only simple textbook illustrations. This left students bored and outcomes suboptimal. The pre-research result showed that only 17 of the 32 students (53%) reached the criterion, so 15 students (47%) had not yet reached it.

Constructivist and active approaches are widely proposed for such problems. Meta-analyses report large positive effects of constructivist learning on outcomes (Tanjung et al., 2023) and gains of about half a standard deviation from active learning in STEM courses (Xu et al., 2026), and a review of elementary science concluded that hands-on experience and peer collaboration support concept understanding (Dewi & Elisa, 2025). Collaborative learning can be read through Vygotsky's social constructivism, in which peers and teachers scaffold understanding (Maghfiroh & Muttaqin, 2025). Contextual learning links content to real situations and is associated with higher science achievement (Karasubaşı & Güngör-Seyhan, 2023; Picardal & Sanchez, 2022). In Indonesian elementary classrooms, classroom action research on contextual teaching and learning (CTL) has raised IPAS outcomes (Ivalent & Zuryanty, 2025; Pepilina et al., 2025; Waqi & Arwin, 2025; Yolanti & Winanto, 2023), as has problem-based learning (Firdaus et al., 2025).

One CTL-based strategy is REACT, which has five stages: Relating, Experiencing, Applying, Cooperating, and Transferring (Sri Utami et al., 2016). It guides students to connect new material with prior knowledge and daily life, explore, apply, work in groups, and transfer what they learn to new situations. A mixed research synthesis of 29 studies found a large effect of REACT on science achievement (Akay & Kanadli, 2021), and primary and secondary studies have reported better achievement than conventional teaching (Arıkan & Aladağ, 2021; Quainoo et al., 2021). In elementary Indonesia, REACT has been linked to concept understanding in science (Rahmadini et al., 2025) and to critical thinking in mathematics (Astuti et al., 2025). A comparison study on fifth-grade science also found REACT outcomes were better for students with high critical thinking, but not significantly different from conventional teaching for those with low critical thinking (Farida et al., 2023). Among the studies reviewed here, classroom action research on REACT in elementary science, with attention to the process of improvement across cycles, is less documented. This study therefore applies REACT to improve science learning outcomes in class V-B of SDN Srengseng Sawah 11 and examines teacher and student activity during implementation.

METHODS

This study used classroom action research (CAR), research carried out in the classroom through cycles of planning, action, observation, and reflection to solve a specific learning problem. It followed the spiral model of Kemmis et al. (2014): Cycle I was planned, implemented, observed, and reflected on, and Cycle II refined the plan according to the reflection on Cycle I, continuing until the targets were reached (Figure 1).

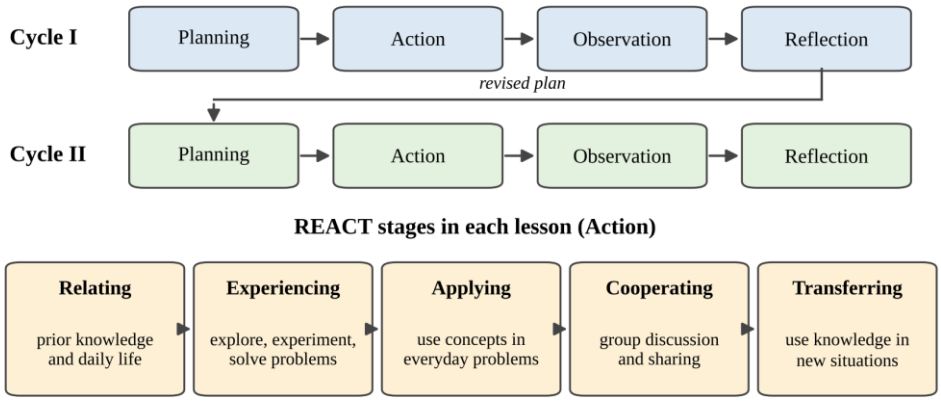


Figure 1. Cycle design (Kemmis & McTaggart spiral) and the five REACT stages applied in each cycle

The subjects were 32 students of class V-B of SDN Srengseng Sawah 11, South Jakarta, in the 2024/2025 academic year. Each cycle had three meetings. The first author taught the REACT lessons as the researcher, observers rated teacher and student activity with observation sheets during the lessons, and the classroom teacher took part in the reflection after each cycle. In each cycle the lesson followed the five REACT stages: relating (connecting the topic to students' prior knowledge

and daily life), experiencing (exploration, simple experiments, and problem solving), applying (using concepts in everyday problems), cooperating (group discussion and sharing), and transferring (using knowledge in new situations).

Data were collected with written tests of science learning outcomes, observation sheets for teacher and student activity during REACT lessons, and documentation. Observers completed the observation sheets for each meeting. Data analysis followed data collection, reduction, presentation, and conclusion drawing. Test results were expressed as the percentage of students reaching the criterion (score of 75 or above), and observation results as the percentage of the maximum score. The success indicators were at least 85% of students scoring 75 or above, and observation scores of at least 90%. Triangulation across tests, observations, and documentation was used to check the findings, and results below the target served as the basis for revising the next cycle.

RESULTS & DISCUSSION

Results

Learning Outcomes

Table 1 and Figure 2 summarise the results. Before the action, 53% of the 32 students (17 students) reached the criterion. In Cycle I the share rose to 66% (21 students), an increase of 13 percentage points, but it was below the 85% target, so a second cycle was needed. In Cycle II it rose to 91% (29 students), an increase of 25 percentage points from Cycle I and above the target. The research was stopped after Cycle II because the target was achieved. Three students (9%) still did not reach the criterion.

Table 1. Results of the Written Test and Observations by Stage

Indicator	Pre-research	Cycle I	Cycle II	Target
Students reaching the criterion (score ≥ 75)	53% (17 of 32)	66% (21 of 32)	91% (29 of 32)	≥ 85%
Teacher activity	–	81%	97%	≥ 90%
Student activity	–	73%	92%	≥ 90%

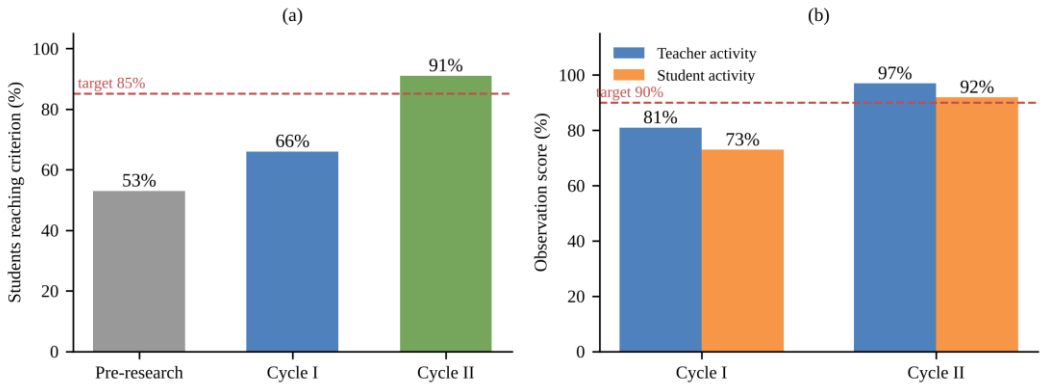


Figure 2. (a) Share of students reaching the criterion and (b) teacher and student activity by stage. Dashed lines mark the targets

Teacher and Student Activity

Observers rated the REACT lessons in both cycles. In Cycle I, teacher activity reached 81% and student activity 73%, both below the 90% target. In Cycle II, teacher activity reached 97% (an increase of 16 percentage points) and student activity 92% (an increase of 19 points), so both targets were met. Student activity in Cycle I showed that students were not yet engaged in the REACT process and were not yet taking responsibility for understanding the material, which agrees with the test results of that cycle.

Reflection and Revision between Cycles

The reflection on Cycle I identified limited engagement and insufficient motivation, especially at the stage when students solved the evaluation questions. In Cycle II, therefore, the teacher and students made class agreements at the start, and the researcher gave more motivation during the evaluation stage. In Cycle II, students were observed asking questions actively, connecting science concepts with daily life, discussing in groups, expressing opinions with more confidence, and completing the evaluation questions. The three students who had not reached the criterion were analysed against their earlier scores and discussed with the classroom teacher; they had consistently been in the lowest category in science and processed and applied information more slowly.

Discussion

The results show that science learning outcomes in class V-B improved across cycles when REACT was applied, from 53% to 66% and then 91% of students reaching the criterion, with the target met in Cycle II. This agrees with research that reports gains from REACT in science and related subjects (Akay & Kanadli, 2021; Arıkan & Aladağ, 2021; Astuti et al., 2025; Quainoo et al., 2021) and with action research in which contextual approaches raised IPAS outcomes in several cycles (Ivalent & Zuryanty, 2025; Pepilina et al., 2025; Waqi & Arwin, 2025; Yolanti & Winanto, 2023).

The five REACT stages offer a plausible explanation, although the study did not test each stage separately. Relating connects prior knowledge and skills with science concepts, so students can see how concepts relate to their experience. Experiencing lets students discover concepts through exploration, simple experiments, and problem solving. Applying asks them to use concepts in daily life, cooperating lets them exchange ideas and develop communication, and transferring helps them use knowledge in new situations. Through these stages REACT touches the three domains of learning outcomes: cognitive (understanding, analysing, and solving problems), affective (motivation, curiosity, respect for others' opinions), and psychomotor (hands-on activity and skills). Group work reflects the social constructivist view that peers scaffold learning (Maghfiroh & Muttaqin, 2025), and cooperative learning has a large effect on science achievement in meta-analysis (Yaşar et al., 2024), while well-structured cooperative groups with dialogic teacher talk strengthen inquiry-based science (Gillies, 2023). The observed increases in student activity, such as asking questions, discussing, and expressing opinions, are consistent with these mechanisms.

The process data suggest that implementation quality mattered. In Cycle I the teacher activity score (81%) and student activity score (73%) were below the target, and students were not yet engaged or taking responsibility, which coincided with an outcome below the criterion. After the class agreements and added motivation, activity scores exceeded 90% and outcomes met the target. This is consistent with studies linking motivation and teacher competence with outcomes (Humairoh et al., 2024; Lentelan et al., 2026; Muslimin et al., 2024), although those relationships are modest and do not show that motivation alone explains the gain. It also means the strategy and the added agreements and motivation cannot be separated, which is a main limit on causal interpretation.

The three students who did not reach the criterion were consistently in the lowest science category and processed information more slowly. This agrees with the internal factor of differences in students' ability to understand material (Mu'in et al., 2024) and with evidence that REACT may help students with stronger critical thinking more than those with weaker critical thinking (Farida et al., 2023). They are a reminder that a classical completeness target of 85% leaves some students behind. Teachers could add scaffolding, such as pairing, guiding questions, or short remedial sessions, for such students.

This study has limitations. First, it was action research in one class of 32 students without a control group, so improvement may also reflect practice effects on similar test items, maturation, and the researcher's presence, and the study cannot attribute the whole gain to REACT. Second, Cycle II added class agreements and extra motivation, so the effect of REACT alone is not isolated. Third, outcomes were reported as classical completeness percentages, so average scores, effect sizes, and statistical tests are not available, and no delayed test measured retention. Fourth, the number of observers and the validity and reliability of the instruments are not reported here. Future research should use quasi-experimental or mixed-method designs with comparison classes, report mean scores and effect sizes, add a delayed retention test, and examine each REACT stage.

CONCLUSION

The REACT strategy, implemented in two cycles in class V-B of SDN Srengseng Sawah 11, was associated with improved science learning outcomes. The share of students reaching the criterion rose from 53% before the action to 66% in Cycle I and 91% in Cycle II, meeting the 85% target, and teacher and student activity rose from 81% to 97% and from 73% to 92%, respectively. The five stages were carried out as follows: relating to prior knowledge, experiencing through observation, experiments, and problem solving, applying concepts to daily problems, cooperating in discussion and sharing, and transferring knowledge to new problems.

Given the limits of a single-class design without a comparison group, and the added class agreements and motivation in Cycle II, the findings should be read as promising evidence rather than proof of effectiveness. Science teachers are encouraged to try REACT, combined with clear class agreements and support for students who learn more slowly, and further research should test its effect with control groups and longer follow-up.

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