

The Effect of the Role-Playing Method on Students' Critical Thinking in Natural and Social Sciences Learning

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ABSTRACT

Background: Critical thinking is an important higher-order cognitive skill that should be developed from elementary school, yet classroom learning often remains teacher-centered and provides limited opportunities for students to analyze problems, evaluate alternatives, and make reasoned decisions. **Objective:** This study examined the effect of the role playing method on fourth-grade students' critical thinking in the IPAS topic "How We Get All Our Needs" and described the implementation of the learning process. **Method:** A quantitative quasi-experimental design with a pretest-posttest control group was used. The population consisted of 65 fourth-grade students from Classes IV A, IV B, and IV C. Class equivalence was examined using students' first-semester report-card scores, and Classes IV A and IV C were found to be comparable and selected as the sample. Experimental and control group assignment was determined by lottery, resulting in 21 students in the experimental group and 22 students in the control group. The instruments included multiple-choice and essay tests, teacher and student activity observation sheets, and student response questionnaires. Instrument validity testing retained 14 of 16 multiple-choice items and 14 of 16 essay items. Cronbach's alpha coefficients were 0.701 for the multiple-choice test and 0.834 for the essay test. The data were analyzed descriptively and inferentially using normality testing, Levene's homogeneity test, and one-way analysis of variance. **Results and Discussion:** The experimental group obtained a higher posttest mean score of 85.2976 than the control group, which obtained 78.1818. Levene's test showed $p = 0.633$, and one-way ANOVA produced $F = 15.700$ with $p < 0.001$. These results indicate a significant positive effect of role playing on students' critical thinking. The learning process was implemented very well, student activity reached the maximum score in each meeting, and student responses were highly positive. **Conclusion:** Role playing is an effective alternative for contextual IPAS learning because it integrates concrete experience, social interaction, decision making, and reflection.

Keywords: Role Playing, Critical Thinking, Natural and Social Sciences Learning, Primary School, Quasi-Experiment



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INTRODUCTION

Elementary education is a fundamental stage for developing students' knowledge, attitudes, and skills. At this level, students are not only expected to acquire factual knowledge but also to use that knowledge to understand problems, evaluate information, and make decisions in daily life. The orientation of twenty-first-century learning has shifted from the simple transfer of information to the development of higher-order cognitive abilities that are relevant to contemporary educational demands (Pradnyana & Indrayanti, 2024). Among these abilities, critical thinking is one of the most important skills that needs to be cultivated from elementary school.

Critical thinking enables students to analyze information, assess arguments, consider alternatives, and draw logical conclusions (Liesdiani, 2025). This skill is particularly important because elementary students increasingly encounter learning situations that require them to connect concepts with real-life problems. Students who develop critical thinking tend to achieve deeper understanding because they are encouraged to examine causes, consequences, and reasons behind a decision rather than merely memorize information (Syawaliyanti, 2024). Therefore, classroom learning should provide opportunities for students to observe, question, discuss, analyze, and justify the solutions they choose.

In practice, however, elementary learning is still often dominated by teacher explanation. Conventional methods such as lecture, question-and-answer activities, and general discussion may help students receive information, but they do not always provide sufficient direct experience for students to construct meaning actively. This condition was also identified in the fourth grade of SDN 2 Barabai Darat, where students' critical thinking was considered relatively low. Students needed more learning experiences that allowed them to analyze contextual situations, compare alternatives, make decisions, and explain the reasons behind those decisions.

One instructional method that can support such active involvement is role playing. Role playing is a simulation-based learning method in which students act out certain characters, roles, or social functions in a situation designed according to the learning material.

Through this method, students do not only listen to the teacher's explanation but also interact, communicate, cooperate, negotiate, make decisions, and solve problems through a scenario. Activities such as analyzing a situation, responding to a problem, and making decisions during a simulation are closely related to the process of critical thinking (Apriyanti et al., 2022).

Role playing is relevant to IPAS learning, especially in the topic "How We Get All Our Needs." This topic discusses basic economic concepts, including needs, scarcity, priorities, buying and selling activities, and the roles of producers and consumers. Although these concepts are closely related to students' daily lives, they may remain abstract when taught only through verbal explanation. Simulation can transform abstract ideas such as scarcity and priority setting into concrete experiences, making the concepts easier to understand and remember (Nuragusti et al., 2024). In this context, students can act out situations such as a buying and selling process, a family's priority-setting decision, or the roles of producers and consumers.

Through role playing, students experience situations in which resources are limited and choices must be made. This condition is directly linked to critical thinking because students must interpret whether a good or service is a primary need, secondary need, or desire, and then analyze the consequences of their decisions (Liesdiani, 2025). Priority setting is an essential part of simple economic decision making (Damayanti & Yusnaldi, 2024). Therefore, role playing not only helps students understand IPAS concepts but also provides a learning environment in which they practice reasoning, evaluating, and making decisions based on contextual problems.

Previous studies have demonstrated the use of role playing to improve learning outcomes, learning interest, social attitudes, and social intelligence. Students' involvement in role playing can develop communication, empathy, negotiation, cooperation, and understanding of other people's perspectives (Damayanti & Yusnaldi, 2024). Role playing has also been reported to increase learning interest by stimulating curiosity and internal motivation through learning while playing (Fawziyah, 2022). In relation to critical thinking, Apriyanti, Darlis, and Lestari (2022) reported that role playing contributed to elementary students' critical thinking and social attitudes.

However, the existing evidence still leaves several issues insufficiently addressed. First, previous role-playing studies have commonly examined broad learning outcomes, social attitudes, motivation, or critical thinking as general outcomes, while less attention has been given to how role playing supports critical thinking in learning content that explicitly requires students to evaluate limited resources, compare competing needs, establish priorities, and justify economic decisions. Second, studies of elementary students' critical thinking have also employed other active learning approaches, such as problem-based learning and SAVI learning (Annafis, 2024; Syawaliyatin, 2024), but these findings do not directly explain whether a simulation-based method produces comparable benefits when students must make decisions from different social and economic roles. Third, although role playing has been associated with critical thinking (Apriyanti et al., 2022), further quantitative evidence is needed to determine whether improvements can be observed through measurable critical-thinking performance when role playing is systematically implemented within an IPAS topic centered on needs, scarcity, and priority setting.

Accordingly, the contribution of the present study is not based merely on applying role playing to a different topic or school context. Rather, the study examines role playing as a decision-oriented instructional mechanism in which students are required to interpret needs, evaluate alternatives under conditions of limited resources, negotiate choices from different roles, and justify their decisions. By linking these role-playing processes with measurable critical-thinking outcomes, the study provides empirical evidence on whether experiential economic decision making can support the development of critical thinking among elementary students. The study is expected to provide empirical evidence for teachers and schools in selecting active learning methods that support critical thinking development.

METHOD

This study used a quantitative approach with a quasi-experimental design. The design involved two groups: an experimental group and a control group. Both groups were given a pretest before the learning treatment and a posttest after the learning process. The experimental group received instruction using the role playing method, while the control group received conventional instruction consisting of teacher explanation, question-and-answer activities, and discussion.

The study was conducted in the second semester of the 2025/2026 academic year at SDN 2 Barabai Darat, located on Jalan M. Ramli, Barabai Darat, Barabai District, Hulu Sungai Tengah Regency, South Kalimantan. The population consisted of all fourth-grade students of SDN 2 Barabai Darat, totaling 65 students from three parallel classes. Class IV A consisted of 22 students, Class IV B consisted of 22 students, and Class IV C consisted of 21 students.

Because intact classes were used in the quasi-experimental design, sample selection was preceded by an equivalence test using students' first-semester report-card scores. The equivalence test was conducted to identify classes with comparable initial academic achievement before assigning them as the experimental and control groups.

The results of the equivalence analysis showed that Classes IV A and IV C had comparable academic achievement and were therefore selected as the research sample. Accordingly, the final sample consisted of 43 students from these two classes. After the two equivalent classes had been identified, the designation of the experimental and control groups was determined by lottery to minimize researcher subjectivity in group assignment. One class was randomly assigned as the experimental group and the other as the control group.

The independent variable in this study was the role playing method, while the dependent variable was students' critical thinking in IPAS learning. The learning treatment was implemented in the topic "How We Get All Our Needs." In the experimental group, students participated in simulations related to needs, priority setting, buying and selling, and the roles of producers and consumers. In the control group, students studied the same topic through conventional instruction.

The research instruments consisted of multiple-choice and essay tests, teacher activity observation sheets, student activity observation sheets, and student-response questionnaires. The tests were administered before and after the treatment to determine changes in students' performance.

Prior to their use in the main study, the test instruments were subjected to validity and reliability testing. The initial instrument consisted of 16 multiple-choice items and 16 essay items. The validity analysis showed that 14 of the 16 multiple-choice items and 14 of the 16 essay items met the validity criteria; the remaining items were excluded from the final instrument. Reliability was examined using Cronbach's alpha. The reliability coefficient was 0.701 for the multiple-choice items and 0.834 for the essay items. Essay questions were used so that students could demonstrate analysis, reasoning, and conclusion-making processes rather than merely selecting answers. Quantitative assessment of critical thinking requires clear and measurable indicators to ensure that the instrument measures thinking processes rather than simple recall (Wangsa et al., 2021).

Observation sheets were used to assess the implementation of the learning process. The indicators were developed based on role playing syntax, including preparation, selection of roles, organization of the classroom situation, implementation of simulation, discussion, evaluation, and reflection. The development of the observation indicators was informed by the role playing syntax of Joyce and Weil (2011) and practical learning steps described by Shoimin (2014). Observations were conducted by two observers during the implementation of the learning process.

Student responses were collected using a questionnaire with dichotomous "Yes" and "No" answer options. The questionnaire examined students' interest, motivation, ease of understanding the material, and perceived usefulness of the learning method. The response indicators followed the aspects of student learning interest described by Arikunto (2019), while the dichotomous response format followed the principle of the Guttman scale, which supports clear and consistent answers for elementary students (Sugiyono, 2019).

Data were analyzed using descriptive and inferential statistics with the assistance of IBM SPSS Statistics. Descriptive statistics were used to calculate the mean, minimum score, maximum score, and standard deviation of the pretest and posttest scores for both groups. Before hypothesis testing, prerequisite analyses were performed. A normality test was conducted to determine whether the data were normally distributed, while homogeneity of variance was examined using Levene's test. A normality test was used to determine whether the data were normally distributed, while homogeneity of variance was tested using Levene's Test. The data were considered homogeneous if the significance value was greater than or equal to 0.05. Hypothesis testing was conducted using one-way analysis of variance at a significance level of 0.05. The null hypothesis was rejected when the significance value was less than 0.05.

RESULTS AND DISCUSSION

Result

Before the treatment was implemented, the initial academic equivalence of the three fourth-grade classes was examined using students' first-semester report-card scores. The equivalence analysis was used to identify classes with comparable academic achievement prior to sample selection. The results showed that Classes IV A and IV C had comparable initial academic achievement and were therefore selected as the research sample. Following sample selection, the designation of the experimental and control groups was determined by lottery. The results indicated that the potential sample classes had comparable initial academic ability, allowing the experimental and control groups to be selected for further analysis.

The descriptive analysis of critical-thinking scores showed that the two groups had relatively similar pretest performance. The control group obtained a mean pretest score of 38.5227, whereas the experimental group obtained a mean score of 39.7619, resulting in a difference of approximately 1.24 points. This relatively small difference indicates that the two groups entered the intervention with similar levels of measured critical-thinking performance. This similarity indicates that both groups began the study with comparable initial critical thinking ability. After the learning process, the posttest mean score of the control group increased to 78.1818, whereas the experimental group that received *role playing* instruction obtained a higher posttest mean score of 85.2976. The difference between the two *posttest* means was approximately 7.12 points.

Table I. Descriptive Statistics of Students' Critical Thinking Scores

Group	N	Pretest Mean	Posttest Mean	Posttest Minimum	Posttest Maximum	Posttest SD
Control	22	38.5227	78.1818	70	90	5.61311
Experimental	21	39.7619	85.2976	75	95	6.16067

As presented in Table I, improvement occurred in both groups, suggesting that the learning process contributed to increased performance regardless of instructional method. Nevertheless, students who participated in role-playing activities achieved a higher

posttest mean, minimum score, and maximum score than students who received conventional instruction. The descriptive pattern therefore indicates a stronger improvement in measured critical-thinking performance in the experimental group. Importantly, this descriptive difference alone does not establish statistical significance. Inferential testing was subsequently conducted to determine whether the difference between the posttest scores of the two groups was statistically meaningful.

The prerequisite analysis indicated that the posttest data fulfilled the assumption of normality, allowing parametric testing to be conducted. The homogeneity test produced a Levene statistic of 0.232 with a significance value of 0.633. Since the significance value was greater than 0.05, the posttest variances of the experimental and control groups were considered homogeneous.

Table II. Homogeneity and Hypothesis Testing Results

Test	Statistic	Significance	Decision
Levene's Test	0.232	0.633	Homogeneous variance
One-way ANOVA	F = 15.700	0.000	H ₀ rejected

Because the assumptions for parametric analysis were satisfied and the two groups demonstrated nearly comparable pretest performance, a one-way ANOVA was used to compare their posttest scores. The analysis produced F = 15.700 with $p < 0.001$. Therefore, the null hypothesis was rejected. The result indicates a statistically significant difference in posttest critical-thinking scores between students who learned through role playing and those who received conventional instruction. This result indicates that there was a significant difference in critical thinking between students who learned through role playing and those who learned through conventional instruction.

The implementation of learning was also observed through teacher and student activity. The observations conducted by two observers showed that teacher activity was in a very good category. The teacher implemented the orientation stage, prepared the scenario, assigned roles, explained rules, facilitated the simulation, guided discussion, and led reflection. The teacher functioned as a facilitator who directed the learning process without dominating the students' role playing activities. Student activity was observed during four meetings. Both observers gave identical scores, and all meetings reached the maximum possible score. In the first meeting, student activity reached 21 out of 21. In the second meeting, it reached 25 out of 25. In the third meeting, it reached 24 out of 24. In the fourth meeting, it reached 16 out of 16. The average score was 21.5 out of 21.5.

Table III. Student Activity Observation Results

Meeting	Obtained Score	Maximum Score
I	21	21
II	25	25
III	24	24
IV	16	16
Average	21.5	21.5

The student-response questionnaire also indicated highly positive perceptions of the role-playing learning process. Students reported that they enjoyed participating in the activities, found the learning material easier to understand, and felt more motivated during the learning process. Students also perceived the interactive nature of role playing as helpful in encouraging participation. These responses should be interpreted primarily as students' perceptions of the learning experience rather than as direct evidence of increased critical-thinking ability. The collaborative classroom atmosphere reduced students' fear of making mistakes and encouraged both physical and mental involvement during learning.

Discussion

The principal finding of this study is that students who participated in role-playing instruction achieved significantly higher posttest critical-thinking scores than those who received conventional instruction. The experimental and control groups began with relatively similar pretest means, differing by only approximately 1.24 points. After the intervention, the difference increased to approximately 7.12 points in favor of the experimental group. The ANOVA result confirmed that this posttest difference was statistically significant (F = 15.700, $p < 0.001$). Before the treatment, the pretest mean scores of the experimental and control groups were relatively similar, indicating that the two groups had comparable initial ability. After the treatment, both groups improved, but the experimental group achieved a higher posttest mean score than the control group. The significant ANOVA result indicates that this difference was not only descriptive but also statistically meaningful.

The higher achievement of the experimental group can be explained by the experiential character of role playing. During the simulation, students were required to understand a problem situation, identify available choices, communicate with peers, make decisions, and evaluate the results of those decisions. These activities correspond closely with critical thinking because they involve

analysis, reasoning, and conclusion-making. Apriyanti et al. (2022) emphasize that analyzing situations, responding to problems, and making decisions during role playing are important parts of the critical thinking process.

In the IPAS topic “How We Get All Our Needs,” students encountered concepts such as needs, wants, scarcity, buying and selling, producers, consumers, and priority setting. These concepts may be difficult for elementary students if they are presented only through verbal explanation. Role playing transformed these concepts into concrete learning experiences. Students did not merely memorize definitions but experienced simulated situations that required them to decide which needs should be prioritized when resources were limited. This supports Nuragusti et al. (2024), who explain that role playing helps transform abstract concepts into concrete experiences that are easier to understand and remember.

The findings are also consistent with the idea that critical thinking involves interpreting information, evaluating alternatives, and drawing logical conclusions (Liesdiani, 2025). In the role playing process, students had to distinguish between needs and wants, analyze the consequences of choices, and explain why certain priorities should be selected. This process encouraged students to build arguments based on reasons rather than simply choosing answers. As a result, role playing provided a learning situation in which students could practice critical thinking directly within a meaningful context.

The results support previous studies showing that role playing can positively influence elementary students’ critical thinking and social attitudes (Apriyanti, Darlis, & Lestari, 2022). They also align with studies suggesting that contextual learning produces better critical thinking development than conventional learning (Liesdiani & Susilowati, 2025). Similar evidence from active learning research also indicates that contextual and case-based approaches can improve students’ conceptual understanding and critical thinking because students are asked to examine real problems and construct reasoned responses (Fajariah et al., 2026). These similarities suggest that learning methods that place students as active participants are more effective than instruction dominated by information delivery.

The success of the treatment was also supported by the quality of implementation. Observation data showed that the teacher implemented the role playing syntax systematically, including orientation, scenario preparation, role distribution, rule explanation, simulation, discussion, and reflection. This is important because role playing can lose its instructional purpose if it is not supported by clear objectives, structured scenarios, and guided reflection. Fawziyah (2022) emphasizes that role playing needs clear scenarios, rules, teacher facilitation, and debriefing to remain focused on academic goals.

Nevertheless, the maximum scores recorded across all four meetings should be interpreted carefully. They indicate that all behavioral indicators included in the observation instrument were observed, but they do not necessarily imply that every student demonstrated an identical level or quality of cognitive engagement. Thus, the observation results function primarily as evidence of implementation fidelity and participation, whereas the test results provide the primary quantitative evidence regarding critical-thinking outcomes. Students were involved not only physically in acting out roles but also cognitively and socially in interpreting scenarios, negotiating decisions, and reflecting on the learning experience. This finding is consistent with Damayanti and Yusnaldi (2024), who explain that role playing develops interaction, empathy, cooperation, and social problem-solving because students must understand and respond to roles within a group context.

These responses should be interpreted primarily as students’ perceptions of the learning experience rather than as direct evidence of increased critical-thinking ability. Nevertheless, when considered together with the observation data, they indicate that the intervention was positively received and provided a classroom environment that supported active participation. These responses show that role playing created a supportive learning atmosphere in which students were not afraid to participate or make mistakes. Learning activities that stimulate curiosity and provide playful experiences can strengthen students’ motivation to learn (Fawziyah, 2022). In this study, motivation and participation appear to have supported students’ ability to engage more deeply with the critical thinking tasks.

From a practical perspective, these findings imply that role playing can be used as an alternative strategy for teaching IPAS materials that involve social interaction, economic decisions, and contextual problem solving. Teachers can use short, realistic scenarios to help students understand abstract concepts and practice reasoning. However, the implementation of role playing requires careful planning. The teacher needs to manage time, distribute roles fairly, and ensure that discussion and reflection remain focused on the learning objectives. Without such planning, role playing may become merely entertaining rather than academically meaningful.

The contribution of this study lies not only in demonstrating a statistical difference between role-playing and conventional instruction but also in showing how role playing can be connected to decision-oriented critical-thinking processes within elementary IPAS learning. Its contribution lies in testing role playing not merely as a method to increase learning interest or social interaction, but as a strategy for developing measurable critical thinking in the topic of needs and priority setting. Several limitations should be considered when interpreting the findings. First, the study involved only 43 fourth-grade students from one elementary school, which limits the extent to which the findings can be generalized to broader student populations. Second, the intervention focused on a single IPAS topic, namely “How We Get All Our Needs,” so the results may not necessarily represent the effectiveness of role playing across other IPAS topics. Third, the study employed intact classes within a quasi-experimental design rather than randomly assigning individual students to experimental conditions. Although the classes were selected based on an initial equivalence test and the experimental and control conditions were subsequently determined by lottery, unmeasured differences between the classes cannot be completely excluded.

CONCLUSION

The role-playing method had a positive and statistically significant effect on fourth-grade students' critical thinking in the IPAS topic "How We Get All Our Needs." The experimental group achieved a higher posttest mean score than the control group, and one-way ANOVA confirmed a significant difference between the two groups. The findings indicate that role playing can support critical thinking by combining concrete experience, social interaction, decision making, communication, and reflection. These findings indicate that role playing supports critical thinking because it combines concrete experience, social interaction, decision making, communication, and reflection. In the context of IPAS learning, role playing helps students understand needs, scarcity, and priority setting through situations that resemble everyday life. However, the findings should be interpreted within the limits of a single-school sample and one IPAS topic. Future studies should examine broader samples, different learning topics, and more detailed indicators of students' reasoning processes.

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