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## The Effect of Fishbowl-Based Concept Sentence Cooperative Models on Critical Thinking and Creativity Skills of Students

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### ABSTRACT

This research is motivated by the low critical thinking skills and creativity of elementary school students. This study aims to test the effectiveness of the implementation of the concept sentence learning model combined with the fishbowl method on improving students' critical thinking skills and creativity in natural science subjects. The method used is experimental research with a one-group pretest-posttest design involving 23 fourth-grade students at Elementary School Inpres Bira 2, Makassar. Data was gathered via questionnaires and examined utilizing paired samples tests and Wilcoxon signed ranks tests. The results showed a significant increase in the average critical thinking score from 68.86 to 88.73 (Sig. 0.000 < 0.05). Furthermore, student creativity scores increased from 51.17 to 75.08, supported by the Wilcoxon test results with an Asymp. Sig. (2-tailed) value of 0.000. The integration of these two methods effectively helps students' structure logical concept sentences while providing a dynamic discussion space for expressing creative ideas. This research contributes an alternative active learning strategy for educators to create a more dynamic and solution-oriented classroom atmosphere.

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## 1. INTRODUCTION

Education is a fundamental element inseparable from human existence and survival. Essentially, every community requires education as a means of transmitting values and knowledge (Kartika & Arifudin, 2022). In line with the mandate of Law No. 20 of 2003, education is defined as a conscious and planned effort to create a learning environment that enables students to actively develop their potential, encompassing spiritual aspects, intelligence, and practical skills (Qudsiyah et al., 2023). Therefore, educational effectiveness is a crucial factor in improving the quality of Indonesia's human resources to produce an intelligent and broad-minded generation (Susilo et al., 2022).

Entering a transformative era, the quality of national education is required to be able to meet global challenges, particularly in equipping students with 21st-century skills (Adeoye et al., 2024; González-Pérez & Ramírez-Montoya, 2022). The core

competencies students must possess include critical thinking, creativity, innovation, and communication and collaboration skills (Thornhill-Miller et al., 2023; Tohani & Aulia, 2022). Specifically, critical thinking is defined as the ability to carefully examine events, conditions, or ideas, form judgments, and make decisions based on objective logical standards (Anggainsi & Sutrisno, 2025; Anggraeni et al., 2023). On the other hand, creativity is considered an intellectual ability inseparable from the critical process of evaluating and considering ideas (Ellerton & Kelly, 2022).

However, the reality of current elementary school learning practices demonstrates a significant gap between curriculum expectations and implementation. Learning tends to be conventional and teacher-centered, leaving students with limited opportunities to express opinions, discuss, and develop ideas independently (Tang, 2023). This situation prevents students' analytical skills in solving problems and generating creative solutions from developing optimally. This lack of active involvement hinders the cognitive stimulation necessary to develop critical thinking patterns from an early age (Leggett, 2023; Ma et al., 2023).

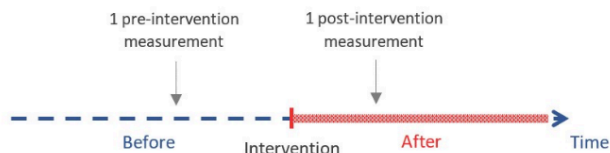
Empirical findings in fourth-grade students at Elementary School Inpres Bira 2, Makassar City, clearly illustrate this problem. Initial observations show that the learning process is ineffective, as low student activity and responsiveness in teaching and learning activities indicate. The use of monotonous and unvaried learning models and methods has resulted in low academic achievement, with only 75% of students exceeding the minimum completion criteria. The limited space for students to explore their curiosity through discussion and questions and answers underscores the urgency of reforming instructional strategies in these classrooms.

Addressing these challenges requires a methodological breakthrough capable of integrating collaborative and systematic thinking. The Concept Sentence learning model emerges as a relevant solution because it is designed to encourage active participation and conceptual mastery through structured sentence construction (Apriliana & Hermawati, 2020; Harahap et al., 2025; Herawaty et al., 2023; Mirasandi et al., 2019). The novelty of this research lies in the combination of the concept sentence model with the fishbowl method. This combination offers a unique learning syntax, where students are not only required to understand concepts textually but also to practice communication skills and critical observation through dynamic "aquarium" panel discussions.

This integration of the concept sentence model and the fishbowl method is expected to help students overcome the cognitive and psychological barriers they currently experience. By synergizing active involvement, peer collaboration, and systematic reflection, this strategy aims to create a more progressive and solution-oriented classroom atmosphere. Based on these arguments, this research is crucial for examining the effect of the concept sentence learning model, supported by the fishbowl method, on improving critical thinking skills and creativity in students at Elementary School Inpres Bira 2.

## 2. METHOD

This quantitative study employed a one-group pretest-posttest pre-experimental design. Consistent with Saputra's perspective in Fauziyah & Anugraheni (2020a), this design focuses on administering treatment to one group of subjects without a comparison group to test the influence of specific variables. The primary focus of the study was to analyze the effectiveness of the concept sentence learning model combined with the fishbowl method on improving students' critical thinking skills and creativity in science. To ensure data accuracy, the research instrument, a questionnaire, underwent validity testing using correlation in SPSS software. The results showed that all instruments met validity criteria, making them suitable for use in field data collection.



**Figure 1.** One-Group Pretest-Posttest Pre-Experimental Design

The population in this study included all fourth-grade students at Elementary School Inpres Bira 2, Makassar City, with 23 students as research subjects and a sample. Data collection was conducted comprehensively through observation sheets and questionnaires compiled based on a standardized instrument grid. Next, the collected data was statistically processed using SPSS 26 through a series of analytical procedures, including normality and homogeneity tests as prerequisites, as well as hypothesis testing using paired sample t-tests and Wilcoxon signed-rank tests. This analytical approach was applied to thoroughly evaluate the significance of changes in student abilities before and after the intervention of the learning model.

**Table 1.** Research Instrument Grid

No	Type of Assessment	Indicator Instruments
1	Critical Thinking skills Questionnaire	Providing simple explanations Building basic skills Drawing conclusions Providing further explanations Organizing strategies and tactics
2	Creativity Questionnaire	Fluent thinking Flexible thinking Original thinking Elaboration skills
3	Teacher and student activity Observation Sheet	Consistency with the steps of the concept sentence model Application of the Fishbowl Method Student activeness in group discussions

The data analysis techniques used in this study included descriptive and inferential statistical analysis. Descriptive analysis was applied to provide a systematic and factual

overview of the collected data without the intention of making broad generalizations. Meanwhile, inferential analysis was used as a formal procedure in hypothesis testing to evaluate the significance of the effects of the treatments, thus obtaining accurate conclusions regarding the effectiveness of the applied learning model.

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**3. RESULTS AND DISCUSSION**

**Results**

This research was conducted at Elementary School Inpres Bira 2, Makassar City, involving all 23 fourth-grade students as single subjects without a comparison group. Based on the results of a preliminary study using a pre-test questionnaire, it was identified that students' critical thinking skills and creativity were generally low. This phenomenon was reflected in several key indicators, particularly students' difficulties in constructing logical concept sentences and limitations in expressing creative ideas in Natural Science (IPA) subjects.

The research procedure was carried out systematically through three main stages. The first stage was the administration of a pre-test to measure students' basic abilities before the intervention. The second stage was the implementation of the concept sentence learning model integrated with the fishbowl method, and the second stage was the administration of a post-test to evaluate the effectiveness of the treatment. A comparison of the average scores obtained between the pre-test and post-test questionnaires for the critical thinking and creativity skills variables is presented in detail in Table 2.

**Table 2.** Average Pretest-Posttest Score of Critical Thinking Questionnaire

Questionnaire	Average
Pre-test	68.86
Post-test	88.73

The average pre-test and post-test scores, there was an increase in the average achievement of critical thinking skills using the concept sentence learning model with the fishbowl method. This can be seen from the average pre-test score of students before using the concept sentence learning model with the fishbowl method of 68.86. Then, the average post-test score of students after using the concept sentence learning model with the fishbowl method became 88.73.

**Table 3.** Average pretest-posttest value of Creativity Questionnaire

Questionnaire	Average
Pre-test	51.17
Post-test	75.08

Building upon the average pre-test and post-test scores, there was an increase in the average achievement of students' creativity scores using the concept sentence learning model with the fishbowl method. This can be seen from the average pre- test score of students before using the concept sentence learning model with the fishbowl method of

51.17. Then, the average post-test score of students after using the concept sentence learning model with the fishbowl method became 75.08.

Next, the researcher conducted normality and homogeneity tests on the pre-test and post-test data using SPSS 26. According to Sufri and Pasaribu (Sihaloho & Harahap, 2025), the normality test is a procedure to determine whether a group of data obtained is normally distributed. Normal distribution is one of the main prerequisites in using parametric statistical tests. If the significance value (Sig.) is more than 0.05, then the data can be declared normally distributed. The normality test can be seen in Table 4.

**Table 4.** Normality test Result of the Critical Thinking Questionnaire

Class	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pretest	.134	23	.200*	.947	23	.258
Posttest	.113	23	.200*	.964	23	.553

The results of the normality test for the critical thinking skills questionnaire, the pre-test data showed a significance value of 0.258 and the post- test data showed a significance value of 0.553 on the Shapiro-Wilk test. Therefore, the data obtained were greater than the significance value > 0.05. Therefore, it can be concluded that the research data were normally distributed and met the requirements for parametric analysis of the research data.

**Table 5.** Normality Test Results of the Creativity Questionnaire

Class	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pretest	.212	23	.009	.885	23	.013
Posttest	.136	23	.200*	.947	23	.255

The results of the normality test of the creativity questionnaire, the pre-test data showed an insignificant value of 0.013 and the post-test data showed a significance value of 0.255 on the Shapiro-Wilk. So the data obtained is greater than the significance value >0.05. It can be concluded that the research data is normally distributed and meets the requirements for parametric analysis of the research data, while for pre-test data that is not normally distributed, a non- parametric test is carried out. After the normality test is carried out, the next step is to conduct a homogeneity test with the help of SPSS 20 using the Levene test. The homogeneity test according to Putri et al. in (Fauziah & Anugraheni, 2020) is used to determine whether two or more groups of sample data can be declared homogeneous or not. The homogeneity test is also used as a requirement for further analysis. The criteria for the homogeneity test are if the significance value or probability value < 0.05 then the variance of the two data groups is not homogeneously distributed. Meanwhile, if the significance value or probability value >0.05 then the

variance of the two data groups is homogeneously distributed. The homogeneity test can be seen in tables 6 and 7.

**Table 6.** Results of the Homogeneity test of Critical Thinking

		Levene Statistic	df1	df2	Sig.
Critical Thinking Skills	Based on Mean	.826	1	44	.368
	Based on Median	.828	1	44	.368
	Based on Median and with adjusted df	.828	1	41.737	.368
	Based on Trimmed mean	.880	1	44	.353

**Table 7.** Result of Creativity Homogeneity Test

		Levene Statistic	df1	df2	Sig.
Creativity	Based on Mean	2.256	1	44	.140
	Based on Median	2.129	1	44	.152
	Based on Median and with adjusted df	2.219	1	37.384	.153
	Based on Trimmed mean	2.108	1	44	.154

The results of the homogeneity test of the critical thinking skills questionnaire, it was proven to be greater than the significance value  $>0.05$ , indicating a significance value of 0.368, and the results of the homogeneity of the creativity questionnaire showed a significance value of 0.140. Therefore, the research data can be declared homogeneous. After conducting normality tests and statistical tests, based on the homogeneity analysis, it can be concluded that the research data is normally distributed and homogeneous. Next, a hypothesis test will be conducted on students' critical thinking skills before and after using the concept sentence learning model with the fishbowl method using the paired samples test while the hypothesis test for students' creativity uses the Wilcoxon Signed Ranks Test with the help of SPSS 26. Decision making in the hypothesis test is Sig. (2-tailed)  $<0.05$ , so  $H_0$  is rejected and  $H_a$  is accepted. The hypothesis test can be seen in table 8.

**Table 8.** Results Paired samples test

	95% confidence interval of the Difference							
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	Df	Sig. (2-tailed)
Critical Thinking Skills	19.86	6.956	1.450	-16.86	-16.86	-13.698	22	0.000

The results of the Paired samples test, it shows that there is an effect of using the concept sentence learning model with the fishbowl method given to the pre-experimental class. This can be seen from the significance value in the Sig. column (2-tailed)  $<0.05$ . This shows that  $H_a$  is accepted and  $H_0$  is rejected. Therefore,  $H_a$  shows

that there is a significant influence on students' critical thinking skills and creativity by giving a pre-test and post-test using the concept sentence learning model with the fishbowl method.

**Table 9.** Results Wilcoxon Signed Ranks Test

Information	Pretest - Posttest
Z	-4,199
Asymp. Sig. (2-tailed)	0

The Wilcoxon Signed Ranks Test table above, the Asymp. Sig. (2-tailed) value is 0.000. In accordance with the decision-making criteria, if the significance value is less than 0.05 ( $0.000 < 0.05$ ), then  $H_0$  is rejected and  $H_a$  is accepted. Therefore, it can be concluded that there is a statistically significant difference between students' creativity before and after treatment.

## Discussion

This study aimed to evaluate the effectiveness of the concept sentence learning model integrated with the fishbowl method on the critical thinking skills and creativity of fourth-grade students at Elementary School Inpres Bira 2, Makassar City. Overall, the data analysis showed a significant positive impact on both variables.

### Improved Critical Thinking Skills

Prior to the intervention, the critical thinking skills of fourth-grade students at Elementary School Inpres Bira 2 were classified as low, with an average pre-test score of 68.86. This low achievement aligns with initial observations that identified significant obstacles for students in constructing logical concept sentences and limitations in expressing creative ideas in natural science subjects. This phenomenon reinforces the theoretical view that without the intervention of a structured learning model, students tend to experience difficulty conducting in-depth analysis and systematically synergizing scientific concepts (Yao et al., 2023; Zhao, 2022).

After using the concept sentence learning model with the fishbowl method, the average score went up a lot to 88.73. This increase was validated through a paired samples test, which showed a significance value (Sig. 2-tailed) of 0.000, which is less than 0.05. Theoretically, this success demonstrates that the use of the concept sentence model is effective in guiding students to develop more structured thinking through the systematic arrangement of key sentences, which in turn optimizes their academic performance.

This achievement aligns with previous studies that emphasize the importance of dynamic discussion spaces to stimulate higher-level cognitive abilities (Liu et al., 2022; Wu, 2020). The integration of the fishbowl method in this study provides a space for students to interact and communicate their ideas more openly. This is supported by statistical prerequisite data, which states that the research data is normally distributed and homogeneous, thus meeting the criteria for valid parametric analysis. In general, the combination of conceptual sentence structure and group discussion dynamics has been

a successful way to help elementary school students improve their critical thinking skills.

### Improved Student Creativity

The student creativity aspect in this study showed significant development after the learning intervention was implemented. Empirical data showed an increase in the average creativity score from 51.17 in the pre-test to 75.08 in the post-test. The normality test results showed that the pre-test creativity data were not normally distributed, with a significance value of 0.013. However, non-parametric statistical analysis still confirmed the model's positive effect. The Wilcoxon Signed Ranks Test yielded a significance value of 0.000, confirming a significant statistical difference between creativity levels before and after the intervention.

Theoretically, this achievement demonstrates that the fishbowl method can create a learning ecosystem conducive to the growth of creative ideas through dynamic discussion forums (Han & Hamilton, 2023). The interactions within this method strategically divide student roles, with those in the inner circle given space to experiment with ideas directly, while students in the outer circle receive cognitive stimulation from observing the ongoing problem-solving process. This interaction pattern aligns with social learning theory, which emphasizes that creative expression can develop optimally when students are given the opportunity to explore in an active and supportive social environment (Li et al., 2023; Saka, 2025).

The effective integration of the concept sentence model and the fishbowl method provides a significant contribution to addressing students' limitations in conveying innovative ideas, particularly in science subjects. With clear sentence structures and open discussion spaces, students are no longer just passive recipients of information; they are now active participants who can come up with new ideas. This aligns with various previous studies that suggest that cooperative learning models that provide structured freedom of expression tend to produce higher levels of creativity than conventional methods (Filippou et al., 2022; Parida et al., 2025). Therefore, the results of this study validate that the combination of these two methods is a reliable strategy for optimizing students' creative potential at the elementary school level.

### Analysis of Statistical Requirements

The validity of this study's results is strongly supported by a series of rigorous statistical prerequisite tests to ensure that the data meet the criteria for parametric analysis. Based on the Shapiro-Wilk normality test, the critical thinking ability and creativity post-test data were declared normally distributed, as they had a significance value above 0.05. Theoretically, a normal distribution is a primary prerequisite for using parametric statistics to ensure that the sample is representative of the population (Vrbin, 2022). The rigor of this test aligns with the principles of quantitative research methodology, which emphasizes that a normal data distribution is the foundation for accurate hypothetical conclusions (Fadela & Rocha, 2025; Lim, 2025).

In addition to normality, the reliability of these findings was strengthened through a homogeneity test using Levene's test to ensure equality of variance between data groups. The analysis results indicated that the data variance was homogeneous, with a significance value of 0.368 for the critical thinking variable and 0.140 for the creativity variable. Achieving values greater than the 0.05 threshold indicates that the differences in scores were truly caused by the concept sentence model and fishbowl method interventions, not by unequal baseline variation within the sample. The consistency of the results of these prerequisite tests provides a solid scientific basis for researchers to proceed to the inferential analysis stage, while ensuring that the results of this study have high methodological credibility in accordance with formal educational study standards.

The integration of the concept sentence learning model and the fishbowl method has been empirically proven to overcome students' initial obstacles in expressing ideas and constructing scientific concepts independently. Theoretically, this success is possible because the concept sentence model provides a structured cognitive framework for students to construct key sentences, while the fishbowl method creates a dialectical space that supports the assimilation and accommodation of new knowledge. These findings reinforce various previous studies that emphasize that the effectiveness of science learning in elementary schools depends heavily on teachers' ability to provide tools that bridge abstract understanding to concrete expression through directed social interactions (Darling-Hammond et al., 2024; Hindman et al., 2020; Soysal, 2021).

Furthermore, the implementation of this model not only impacts cognitive achievement but also effectively stimulates students' procedural abilities, fostering logical and creative thinking. The synergy between the language structure of concept sentences and the discussion dynamics in the fishbowl allows students to practice systematic problem-solving while openly exploring innovative ideas. Therefore, this learning model is considered highly relevant for implementation in the elementary education curriculum, as it creates a more dynamic, solution-oriented classroom atmosphere and is oriented toward the development of higher-order thinking skills, which are essential in the modern era.

Theoretically, this research makes a significant contribution to strengthening integrated learning models by presenting empirical evidence regarding the effectiveness of combining the concept sentence model and the fishbowl method in simultaneously improving students' cognitive and affective aspects. The results validate the theory that learning Natural Science requires specific strategies capable of stimulating students' ability to construct logical concept sentences and express creative ideas, in order to overcome previously identified learning barriers. Through this approach, the literature on innovative learning models at the elementary school level gains additional strong references regarding the synergy between group discussion methods and linguistic structures in science.

Practically, this research offers concrete solutions for educators by increasing the average critical thinking ability score from low (68.86) to excellent (88.73), and increasing student creativity from 51.17 to 75.08. The use of this structured model has

proven effective in helping students overcome limitations in expressing ideas. Furthermore, this research serves as a reference for the use of valid evaluation instruments and statistical tests—such as the Shapiro-Wilk, Levene, Paired Samples, and Wilcoxon Signed Ranks Tests—in the context of action research in elementary schools. For related institutions, particularly Elementary School Inpres Bira 2 Makassar, these results serve as strategic recommendations for sustainably improving the quality of student learning processes and outcomes.

#### 4. CONCLUSION

The application of the concept sentence learning model integrated with the fishbowl method has been proven to significantly improve the critical thinking skills of fourth-grade students at Elementary School Inpres Bira 2 Makassar. This success is demonstrated by an increase in the average critical thinking score from 68.86 in the pre-test to 88.73 in the post-test, and is supported by the results of the Paired Samples Test with a significance value of 0.000, which is less than 0.05. Furthermore, this model has a positive impact on student creativity, with an increase in the average score from 51.17 to 75.08, which is confirmed by the results of the Wilcoxon Signed Ranks Test with an Asymp. Sig. (2-tailed) value of 0.000. Overall, the integration of these two methods effectively helps students structure logical concept sentences while providing a dynamic discussion space for expressing their creative ideas in science subjects.

As a recommendation, educators are advised to implement the concept sentence learning model integrated with the fishbowl method as an innovative strategy, especially for materials that require in-depth conceptual understanding and develop student creativity. The school, particularly SD Inpres Bira 2 Makassar, is expected to provide ongoing support by providing adequate discussion facilities to support active learning models to consistently improve the quality of science learning. Considering that this study used a single subject without a comparison group, future researchers are recommended to conduct similar studies on a larger scale or use a pure experimental design to strengthen the generalizability of the research results across different educational contexts.

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