



Assessing the Effectiveness of Free Inquiry Learning with a Scientific Approach for Developing Children's Scientific Skills

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Abstracts

This study aims to describe the science abilities of group B children before and after the implementation of the free inquiry method at TK Negeri Pembina Bungi. The background of this research lies in the importance of developing science skills from an early age as a foundation for shaping children's critical, logical, and creative thinking. The free inquiry method was chosen because it allows children to directly explore phenomena in their surroundings, making learning experiences more meaningful and in line with their cognitive development stage. The study employed an experimental approach with a one-group pretest-posttest design. Data were collected through observation, testing, and documentation. The subjects were group B children who actively participated in learning activities using the free inquiry method. Prior to treatment, the children's science skills were still at an early stage, particularly in understanding basic concepts such as recognizing colors. The findings revealed that there was a notable improvement after the implementation of the free inquiry method. The children not only achieved the expected level of development but some of them also demonstrated very good progress. This indicates that the free inquiry method is effective in enhancing children's science abilities, as it encourages active involvement, curiosity, and critical thinking skills from an early age. Therefore, free inquiry learning can serve as an alternative instructional strategy to support the achievement of early childhood education goals, particularly in the field of science development.

Keywords: Learning; Free Inquiry; Kindergarten; Early Childhood Education; Science; Colors



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1. Introduction

Early childhood education is a form of educational provision that focuses on developing behavior and habituation, which includes the first stages of development such as religious and moral values, social-emotional growth, independence, and the development of basic skills. The second stages of development cover language, cognitive, physical, and motor development. These developmental activities are carried out in an integrated manner using a thematic approach, as early childhood education is built upon an interdisciplinary foundation that combines psychology, physiology, child education, health, nutrition, and knowledge of human brain development (Rasmidar, Fitriati, & Riza Oktariana, 2021). In Law No. 23 of 2002 concerning Child Protection, Article 4 states that every child has the right to live, grow, develop, and participate reasonably in accordance with human dignity and to receive protection from violence and discrimination. Meanwhile, Law No. 20 of 2003, Article 1, point 14, stipulates that

early childhood education is a form of guidance directed at children from birth to six years of age, conducted through the provision of educational stimulation to support their physical and spiritual growth and development, so that children are prepared to enter the next level of education (Adzroil & Alaika, 2019).

The Regulation of the Minister of Education, Culture, Research, and Technology (Permendikbud Ristek) Number 5 of 2022 concerning Graduate Competency Standards in Early Childhood Education, Primary Education, and Secondary Education outlines specific standards for learning outcomes. Article 2 paragraph (2) point (a) sets the standards for the level of achievement in early childhood development. Article 4 paragraph (2) explains that the standards for early childhood development achievement, as referred to in paragraph (1), include the profile of learners as an integration of attitudes, skills, and knowledge that describe the developmental outcomes and learning participation at the end of early childhood education. Furthermore, paragraph (3) states that the standards for early childhood development achievement, as referred to in paragraph (2), focus on developmental aspects which include religious and moral values, Pancasila values, physical-motor skills, cognitive abilities, language, and socio-emotional development. Research by Istiningsih (2014) illustrates that schools providing more stimulation and encouragement toward religious awareness are closely related to the improvement of students' scientific learning. Additionally, Yusri (2015), in his study, found that students' scientific learning skills and critical thinking, developed through observing, classifying, and communicating simultaneously had a significant influence on students' thinking ability, while the remaining influence came from other factors outside of children's scientific learning skills.

Previous studies on free inquiry learning have shown significant contributions to the improvement of critical thinking and science skills among young children. The findings of Istiningsih (2014) revealed that schools providing greater stimulation for religious awareness and scientific activities were able to enhance children's overall learning abilities. Yusri (2015) also found that scientific learning skills involving observing, classifying, and communicating were closely related to the development of children's critical thinking. Research by Rasmidar, Fitriati, and Oktariana (2021) emphasized the importance of thematic approaches in early childhood education, as they are based on interdisciplinary sciences that support cognitive, social, and motor development. Similarly, the study of Adzroil and Alaika (2019) highlighted that early stimulation can strengthen children's readiness to face formal education. Furthermore, research conducted by Istiqomah (2020) demonstrated that inquiry-based learning fosters curiosity and independence in understanding simple science concepts. Susanti and Nuraini (2021) also confirmed that the inquiry method can improve young children's problem-solving skills through direct exploration activities. In addition, Lestari (2022) found that implementing inquiry-based learning not only enhanced cognitive abilities but also supported the development of children's socio-emotional aspects. Collectively, these studies provide a strong foundation indicating that the free inquiry method has great potential to improve science abilities, critical thinking skills, and holistic development in early childhood education.

Although various studies have shown the effectiveness of free inquiry learning in improving the science skills of young children, there are still gaps in its implementation in schools, especially in regions such as Baubau. Initial interviews with teachers

revealed that children's problem solving skills remain low, as seen in their limited ability to identify mistakes, predict possible causes, and make independent decisions. This issue affects the development of critical thinking and curiosity, which should serve as an important foundation in learning science. The main challenge lies in the tendency of teachers to continue relying on conventional teaching methods, as well as the lack of understanding and skills in applying the inquiry approach effectively in the classroom. To address this gap, free inquiry learning can be considered as a solution because it provides children with opportunities to explore, experiment, and construct knowledge through direct experiences. This method not only encourages independent learning but also fosters critical thinking skills and scientific understanding from an early age. The reason this topic is interesting to study is that free inquiry learning is in line with the demands of the twenty first century curriculum, which emphasizes critical, creative, communicative, and collaborative skills. In addition, the findings of this research are expected to provide practical contributions to the development of early childhood education at TK Negeri Pembina Bungi and serve as a reference for other early childhood institutions in optimizing children's science skills in an innovative and meaningful way.

Based on preliminary interviews with classroom teachers in group B at TK Negeri Pembina Bungi, it was found that children's problem-solving abilities were still not optimal. This was evident from the pre-action assessment results, which indicated that children's problem-solving skills remained limited in identifying mistakes, were not yet able to predict causes, and had difficulties in making decisions. Therefore, the researcher considered it necessary to conduct a study using an alternative learning method, namely free inquiry learning, to improve the development of children's science skills in group B at TK Negeri Pembina Bungi. This study is expected to provide one possible solution for optimizing children's scientific abilities. The theoretical expectation and benefit of this research are that it can serve as input, reference material, and motivation for other early childhood education institutions, particularly in the city of Baubau, in supporting the development of science skills among young children.

2. Research methods

The research method used in this study is an experimental approach, which is applied to examine the effect of a specific treatment on a particular condition under controlled circumstances. The controlled condition in this context refers to the process in which the research findings are converted into numerical data. The analysis employed in this study is statistical analysis (Sugiyono, 2011).

The data collection techniques in this study consisted of three main methods, namely observation, tests, and documentation. Observation was carried out to directly monitor children's activities during the learning process with the free inquiry method, particularly focusing on aspects of science skills such as observing, classifying, experimenting, and drawing simple conclusions. Tests were used as instruments to measure children's science abilities before and after the treatment, conducted in the form of pretests and posttests based on predetermined indicators. Documentation was employed to support the research data through records, photographs of activities, and children's work that reflected the development of their science skills. These three techniques were chosen to provide a comprehensive picture of the development of children's science abilities. Through the combination of observation, tests, and

documentation, the data obtained became more valid and accountable, while also allowing the researcher to capture a holistic view of the changes that occurred during the learning process. In this study, the researcher focuses on examining the effectiveness of the free inquiry learning model in developing critical and creative thinking skills, while at the same time fostering open collaboration among learners to enhance the science skills of early childhood students.

The observation sheet for children's science abilities contains indicators of student competence in accordance with the Regulation of the Minister of Education, Culture, Research, and Technology Number 5 of 2022. There are six indicators of science skill achievement used, with an assessment scoring system based on observation as follows: BB (not yet developed) score 1, MB (beginning to develop) score 2, BSH (developing as expected) score 3, and BSB (developing very well) score 4. The development of children's science skills is described according to the achievement scale of learning development levels, presented as follows:

Table 1. Criteria for the Achievement Level of Student Learning Development

Percentage	Criteria
75 – 100	Developing very well
50 – 74	Developing as expected
25 – 49	Beginning to develop
≤ 24	Not yet developed

Source: Rating scale options adapted from Sugiyono

The table illustrates the criteria for assessing the level of achievement in children's science learning development based on percentage scores. Children who achieve between seventy-five and one hundred percent are categorized as developing very well, those who reach fifty to seventy-four percent are considered developing as expected, while those within the range of twenty-five to forty-nine percent are classified as beginning to develop. Scores of twenty-four percent or below indicate that the child has not yet developed the targeted skills. These criteria provide a clear benchmark for evaluating the progression of children's science abilities and ensure that the assessment reflects both individual growth and the overall effectiveness of the learning process.

3. Results and Discussion

3.1 Results

This research was carried out at TK Negeri Pembina Bungi, a public kindergarten situated on Anoa Street, KM 12, Liabuku, Bungi District, Baubau City, Southeast Sulawesi Province. The institution is staffed by six educators, consisting of five classroom teachers and one principal, who collaboratively support the teaching and learning process. The study was specifically conducted in Group B, which comprised twenty-four students actively participating in the activities designed for this research. The selection of this site was considered appropriate as the school has sufficient resources, supportive teaching staff, and a conducive learning environment to implement the free inquiry method effectively. TK Negeri Pembina Bungi organizes its learning activities in accordance with the 2013 Curriculum, which is systematically integrated with materials tailored to the developmental needs of early childhood. This curriculum framework emphasizes thematic learning and promotes holistic

development by addressing cognitive, social, emotional, language, and motor aspects. The integration of the curriculum with the free inquiry method in this research provided opportunities for children to explore, experiment, and construct knowledge in a child-centered learning environment. The alignment of the school's educational vision with the objectives of this study created a strong foundation for implementing the research activities and achieving reliable results.

The learning process follows the Weekly Learning Implementation Plan (Rencana Pelaksanaan Pembelajaran Mingguan, RPM) and the Daily Learning Plan (Rencana Pelaksanaan Pembelajaran Harian, RPPH), both of which are based on themes implemented during the first semester of the 2024/2025 academic year. In this study, the focus was to identify the level of science skills of children at TK Negeri Pembina Bungi before and after the application of the free inquiry method. The instruments used to measure changes in the level of children's science skills were tests and observation sheets administered to Group B students (twenty-four children) during the odd semester of the 2024/2025 academic year.

Results of Instrument Trial Measurement

The researcher conducted an instrument trial on group B children to ensure the feasibility and accuracy of the tools used in measuring their science skills. This trial was an essential step to evaluate whether the items in the instrument were appropriate, understandable, and capable of capturing the intended aspects of children's abilities. The results of the calculations provided evidence of the validity and reliability of the instrument, confirming that it could be applied consistently in the main study. By conducting this preliminary test, the researcher ensured that the data collection process would yield accurate and credible findings, thereby strengthening the overall quality of the research outcomes.

1. Validity Test

Based on the validity test carried out by comparing the calculated r-value (r count) with the critical r-value (r table) at a significance level of $\alpha = 5\%$ or 0.05, with the number of respondents (n) being 24 and r table = 0.404, the data obtained are as follows:

Table 1. Item Validity Test Analysis (Before Treatment)

r Count	r Table	Description
0.513	0.404	Valid
0.555	0.404	Valid
0.785	0.404	Valid
0.807	0.404	Valid
0.679	0.404	Valid
0.428	0.404	Valid

The table presents the results of the validity test for each item in the instrument developed for this study. As shown, all six items obtained r count values that exceeded the critical value of r table, which was 0.404 at the five percent significance level with twenty-four respondents. This finding confirms that every item met the statistical requirements for validity. In other words, each question or statement included in the instrument was proven to be capable of measuring the intended construct, namely the

science skills of early childhood students. The fact that all items are valid also demonstrates that the instrument has been designed appropriately and is aligned with the objectives of the study. The validity of the items ensures that the measurement process reflects the actual conditions of children's abilities rather than external or unrelated factors. With this confirmation, the instrument can be considered a reliable tool for collecting accurate and meaningful data during both the pretest and posttest stages. Furthermore, the validation process strengthens the credibility of the research findings, since it provides evidence that the results are based on instruments that have been statistically tested and proven to represent the targeted variables.

2. Reliability Test

The reliability test using Cronbach's Alpha aims to determine whether the questionnaire maintains consistency when measurements are conducted repeatedly. According to Wiratna Sujarweni (2014), a questionnaire is considered reliable if the Cronbach's Alpha value is greater than 0.6. After the instrument items were tested for validity, the next step was to examine their reliability. The following are the results of the calculation that was carried out.

Table 2. Reliability Test Analysis (Before Treatment)

Reliability Statistics	
Cronbach's Alpha	N of Items
.689	6

The table presents the results of the reliability test using Cronbach's Alpha for the instrument developed in this study. The value of Cronbach's Alpha obtained was 0.689 for six items, which is higher than the standard threshold of 0.6 as suggested by Sujarweni (2014). This indicates that the items included in the instrument demonstrate good internal consistency, meaning that each question is measuring the same construct in a coherent and dependable manner. With this result, the questionnaire can be considered reliable for assessing children's science skills in the context of this research. Furthermore, the reliability value confirms that if the same instrument were to be administered repeatedly under similar conditions, it would produce stable and consistent results. This strengthens the credibility of the data collection process and provides confidence that the findings derived from this instrument accurately represent the actual abilities of the participants. Therefore, the use of this instrument is justified for both the pretest and posttest stages, ensuring that the evaluation of children's science skills through the free inquiry learning method is supported by a valid and reliable measurement tool.

3. Normality Test

The normality test was conducted to determine whether the sample studied was normally distributed or not. In this research, the normality test was carried out using the one-sample Kolmogorov-Smirnov test with PASW 17.00 software at a significance level of 5% or 0.05. The normality test was applied to both the pretest and posttest data of students' science skills. The decision rule for the normality test states that if the significance value is greater than 0.05, the data are normally distributed. Conversely, if the significance value is less than 0.05, the data are not normally distributed.

Table 3. Results of Normality Test

Science Skills (Group B)	Significance	Conclusion
Pretest / Before Treatment	0.94	Normal
Posttest / After Treatment	0.88	Normal

The results of the normality test displayed in Table 3 indicate that both the pretest and posttest data of group B are normally distributed. The significance value of the pretest was 0.94, which is above the 0.05 threshold, confirming that the data before treatment met the normality assumption. Similarly, the posttest data obtained a significance value of 0.88, also higher than 0.05, which means that the data after treatment were normally distributed as well. This consistency in results across the two stages ensures that the data are suitable for further analysis using parametric statistical methods. The confirmation of normality for both sets of data provides a strong foundation for conducting the next stage of hypothesis testing. Since the data distribution meets the statistical requirements, parametric tests such as the paired sample t-test can be applied with confidence to evaluate the effect of the free inquiry learning method on children's science skills. This finding also enhances the credibility of the study, as it demonstrates that the data collected accurately reflect the participants' performance without significant distortion from distributional irregularities.

4. Homogeneity Test

The homogeneity test aims to determine whether two or more groups of sample data come from populations with equal variances. This is conducted to assess whether the data being analyzed share the same characteristics or not. In this study, the homogeneity test was applied to both the pretest and posttest data of group B. The test was performed using SPSS with a significance level of 5%. The decision rule states that if the significance value is greater than 0.05, the data are considered homogeneous; conversely, if the significance value is less than 0.05, the data are not homogeneous.

Table 4. Homogeneity Test Analysis

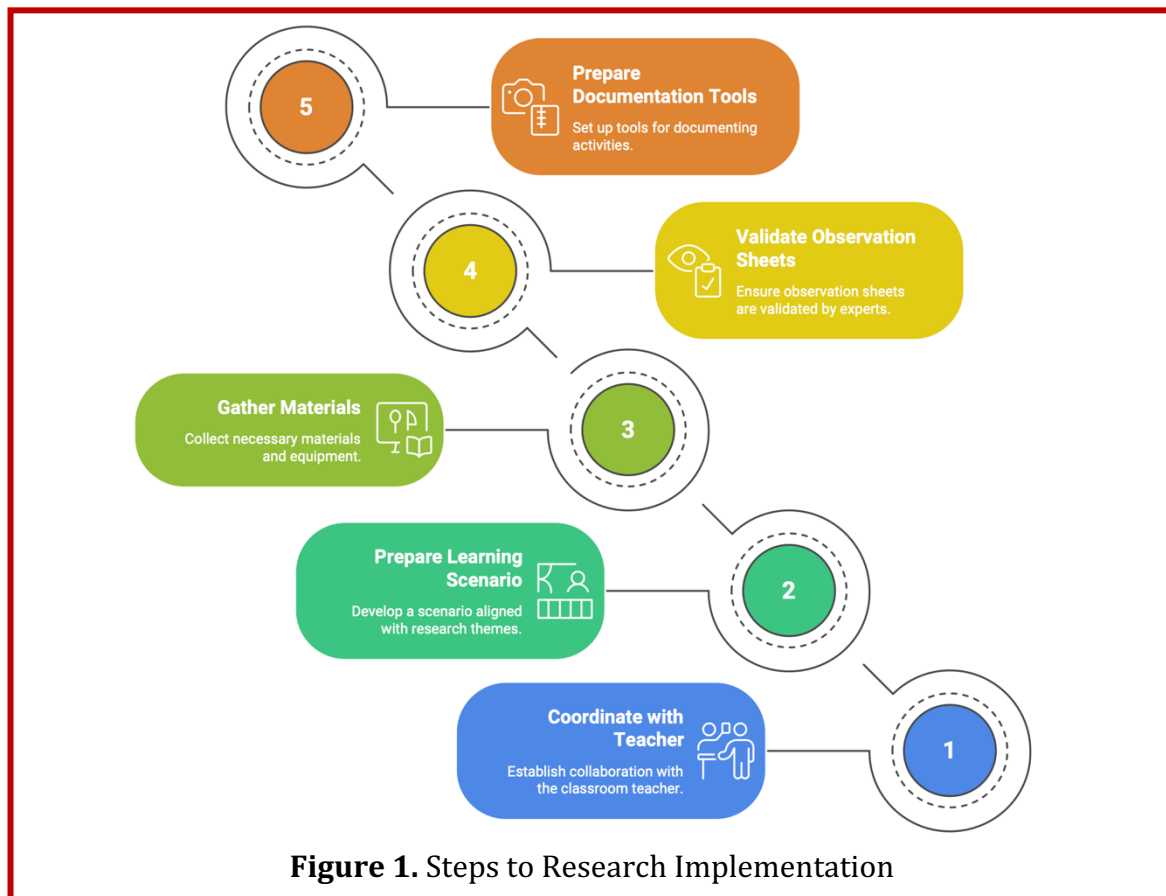
Science Skills	Significance	Conclusion
Pretest / Before Treatment	0.185	Homogeneous
Posttest / After Treatment	0.344	Homogeneous

The results presented in Table 4 show that the pretest data obtained a significance value of 0.185, which is greater than the 0.05 threshold. This indicates that the pretest scores were homogeneous, meaning that the data had similar variance and reflected consistent characteristics across the sample group. Likewise, the posttest data produced a significance value of 0.344, which is also higher than 0.05, confirming that the posttest scores were homogeneous as well. The confirmation of homogeneity in both pretest and posttest data strengthens the validity of subsequent statistical analysis. This result also indicates that the participants in group B shared relatively similar learning conditions, which provides a fair basis for evaluating the effectiveness of the free inquiry learning method in enhancing early childhood science skills.

Implementation of the Free Inquiry Method

The initial activities were carried out by coordinating with the principal and the teachers who assisted the researcher during the learning process. Planning activities

included designing a learning scenario to develop children's science skills through the free inquiry method for group B at TK Negeri Pembina Bungi, Baubau City.



The research was carried out through four treatments in group B with different activities, all using the free inquiry method. Before the treatments began, a pretest was conducted to measure children's initial science skills in recognizing colors. The pretest was carried out by introducing various colors using origami paper and different coloring tools. For the posttest, data collection was conducted after the children received lessons and understanding about both primary and secondary colors. The learning process included several steps such as recognizing the colors of the rainbow by singing the rainbow song, identifying primary and secondary colors using origami paper, and allowing children to freely explore colors with the coloring materials prepared by the researcher. This exploration enabled children to observe changes when two colors were mixed, as well as situations where no color change occurred. The final meeting concluded with the posttest to measure the science skills of the children.

Results of Instrument Trial Measurement

1. Implementation of the Pretest

Before carrying out the main research, a pretest was first conducted since no test had previously been administered at this school to measure children's abilities in the same context. During the pretest, the researcher provided questions related to colors, particularly the colors of the rainbow, as well as questions on primary and secondary colors. The children were also asked whether they knew that mixing two colors would result in a new color. Afterward, the researcher continued by giving origami paper for

the students to classify colors into primary and secondary categories and providing liquid coloring so that the children could experiment with mixing two colors. This activity allowed the researcher to observe the initial science skills of the children. The results of the pretest reflected the science abilities of group B children at TK Negeri Pembina Bungi before the treatment with the free inquiry method was applied. The first data collected served as the baseline for comparison with subsequent learning outcomes. This analysis was continued with the research conducted in group B at TK Negeri Pembina Bungi, Baubau City. The percentage data of children's science skills in group B before the pretest are presented in Figure 2 below.

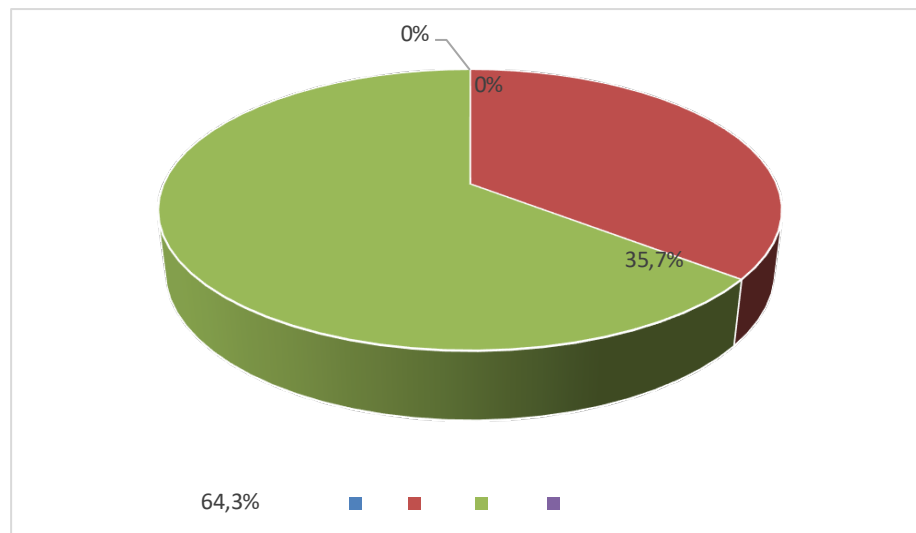


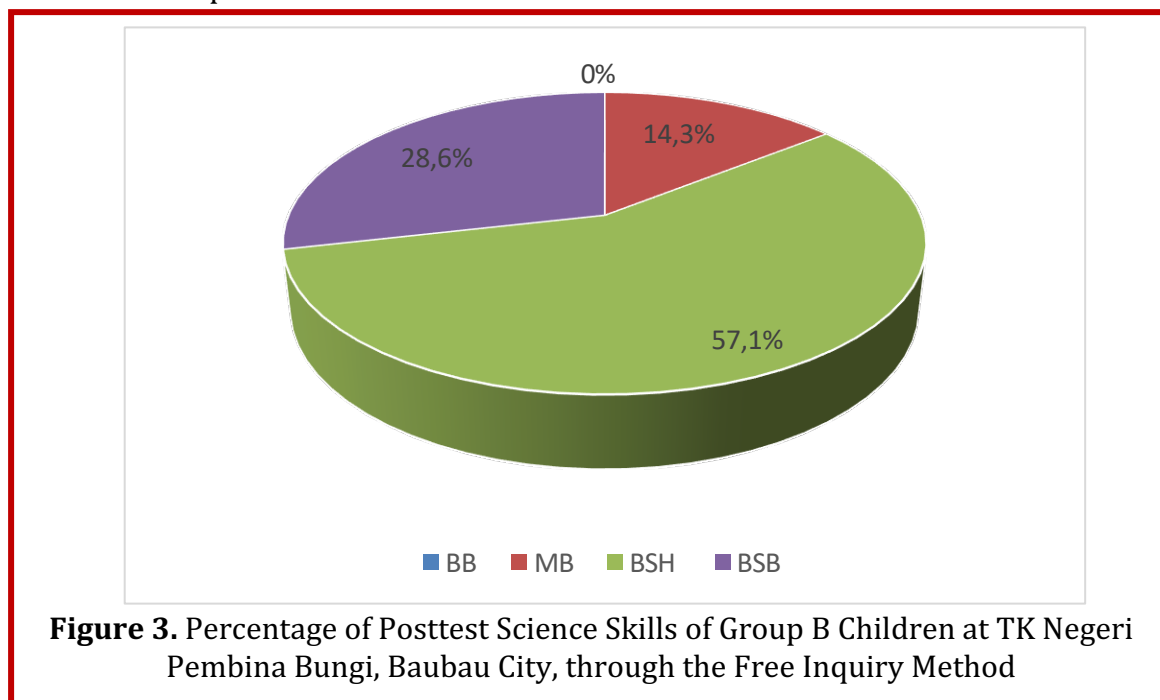
Figure 2. Percentage of Pretest Science Skills of Group B Children at TK Negeri Pembina Bungi, Baubau City

Based on Figure 2, it can be explained that the pretest results of the science skills of group B children at TK Negeri Pembina Bungi show a noticeable variation in developmental levels. The data indicate that a portion of the children were in the category of beginning to develop, which suggests that they were only starting to grasp basic science concepts, such as recognizing colors and relating them to phenomena in their surroundings. Children in this category still required intensive guidance from the teacher to strengthen their understanding, particularly through more structured exploration and experimental activities. Meanwhile, the majority of children were in the category of developing as expected, which demonstrates that most students were able to understand fundamental science concepts more effectively, distinguish between primary and secondary colors, and begin to show initial skills in conducting simple experiments. This condition reveals that although none had reached the level of developing very well, the group B children already possessed strong potential to improve their science skills through the application of appropriate learning approaches. Thus, the pretest results provide a baseline indicating that the free inquiry method has the potential to be an effective strategy for advancing children to higher developmental stages, as it fosters curiosity, active engagement, as well as critical and creative thinking skills from an early age.

2. Posttest Measurement Results

In the implementation of the posttest, the researcher was assisted by the classroom teacher in preparing and completing the observation sheets based on the

changes observed in the students after several learning sessions were conducted during meetings one through four. The children in group B showed great enthusiasm throughout the process, beginning with recognizing the colors of the rainbow, observing how color changes occur, and displaying excitement when discovering the results of mixing two different colors. They were also able to retell the process of the color-change experiment and demonstrated the ability to repeat the experiment independently. The development of each child's science skills after the treatment with the free inquiry method can be seen in the figure below, which presents the posttest results. These findings illustrate the extent to which the free inquiry approach enhanced children's abilities in exploring, experimenting, and understanding basic scientific concepts.



Based on the figure above, it can be concluded that there was an improvement in the science skills of group B children after the treatment using the free inquiry method. In the application of this method, the students were given opportunities to explore independently by conducting experiments such as mixing several primary colors to observe the resulting changes. During these activities, the researcher and teacher acted only as facilitators, monitoring the extent to which the children created and then guiding the process further by asking follow-up questions to the students.

The improvement in the science skills of group B children at TK Negeri Pembina Bungi was evident in their ability to recognize rainbow colors, understand the process of color change, and show enthusiasm when discovering how two different colors combined. The children were also able to retell the experimental process and demonstrate comprehension by repeating the activity to observe color transformations. The results revealed that a portion of the children reached the category of developing very well, while the majority were categorized as developing as expected, and a smaller percentage were in the beginning to develop category. These outcomes show significant progress compared with the pretest results prior to the treatment, indicating that the free inquiry method, implemented through four learning sessions, successfully enhanced children's science skills.

3.2 Discussion

The results of the instrument trial measurement demonstrate that the tools used in this study fulfilled the requirements of validity, reliability, normality, and homogeneity. The validity test confirmed that all six items exceeded the critical r value, indicating that each item was capable of accurately measuring the intended construct, namely children's science skills. The reliability test also yielded a Cronbach's Alpha value of 0.689, surpassing the minimum threshold of 0.6, which shows that the instrument had good internal consistency and could provide stable measurements when used repeatedly. These findings collectively suggest that the instrument was both appropriate and dependable for assessing children's scientific abilities before and after the implementation of the free inquiry method. The confirmation of validity and reliability is crucial, as it ensures that the measurement reflects the actual abilities of the children rather than external or irrelevant factors, thereby strengthening the credibility of the research results. In addition, the normality and homogeneity tests reinforced the robustness of the data for further statistical analysis. Both pretest and posttest data were found to be normally distributed, with significance values well above the threshold, indicating that the data met the assumptions required for parametric tests. Similarly, the homogeneity test showed that the variance in both pretest and posttest scores was consistent, confirming that the sample groups shared similar characteristics. Meeting these assumptions allows the application of more powerful statistical techniques such as the paired sample t -test, thereby increasing the accuracy and validity of the conclusions drawn from the study. Overall, the results of these preliminary tests provide strong evidence that the research was conducted on a solid methodological foundation, and they justify the use of the free inquiry method as a reliable approach to improving the science skills of early childhood learners.

The implementation of the free inquiry method in this study was systematically designed to provide children with opportunities to actively engage in exploration and experimentation. Coordination with the principal and classroom teachers ensured that the research process was well-supported and aligned with the school's instructional practices. Careful planning of learning scenarios allowed the activities to be structured yet flexible, enabling children to develop science skills in a natural and meaningful way. The pretest conducted at the beginning served as a baseline to assess the children's initial understanding of colors, which provided a clear reference point for evaluating the impact of the intervention. Through hands-on activities such as identifying colors using origami paper and coloring tools, children's readiness and prior knowledge could be observed in detail. The subsequent treatments, carried out across four sessions, highlighted the core principles of the free inquiry method by encouraging independence, creativity, and curiosity. Activities such as singing the rainbow song, classifying primary and secondary colors, and experimenting with color mixing allowed children to learn through discovery and direct experience. The posttest conducted at the end of the intervention captured the improvements in children's science skills, particularly in their ability to recognize, differentiate, and explain color changes. The process also showed how children's enthusiasm, storytelling ability, and willingness to repeat experiments reflected deeper understanding and skill development. These outcomes underline the effectiveness of the free inquiry method as a pedagogical approach that not only improves children's scientific knowledge but also fosters critical and creative thinking from an early age.

The results of the pretest demonstrated that the science skills of group B children at TK Negeri Pembina Bungi were still at a developing stage, with variations across categories. A portion of the children were classified as beginning to develop, which reflected their limited understanding of basic concepts such as recognizing colors and associating them with natural phenomena. The majority of children, however, fell into the category of developing as expected, showing that they had already acquired a foundational knowledge of primary and secondary colors and could begin to engage in simple experiments. Although none of the children had yet reached the category of developing very well, the results indicated strong potential for improvement when provided with more systematic guidance. This baseline assessment underscored the need for a more innovative and child-centered learning approach to optimize children's science abilities, laying the groundwork for the introduction of the free inquiry method. The posttest results revealed significant improvement in the children's science skills after four learning sessions using the free inquiry method. Many children demonstrated enthusiasm and active engagement in activities such as recognizing rainbow colors, experimenting with mixing primary colors, and retelling the steps of their experiments. The data showed that a notable portion of the children had advanced to the category of developing very well, while the majority remained in the category of developing as expected, and only a small number were still at the beginning to develop stage. This progression highlighted the effectiveness of the free inquiry approach, as it provided opportunities for independent exploration, encouraged curiosity, and strengthened both understanding and practical application of science concepts. The positive outcomes not only confirmed the potential of this method in enhancing early childhood science skills but also illustrated its role in fostering creativity, critical thinking, and confidence in learning through discovery.

4. Conclusion

Based on the findings of this study, it can be concluded that the pretest results of group B children at TK Negeri Pembina Bungi showed that a portion of the students were in the category of beginning to develop, while the majority were in the category of developing as expected. This indicates that, prior to the treatment, the children's science skills were still in the early stages and required further support to strengthen their understanding of basic scientific concepts such as recognizing colors and conducting simple experiments. After the application of the free inquiry method, the posttest results demonstrated significant improvement. A considerable proportion of children reached the category of developing very well, while the majority continued to develop as expected, and only a small number remained in the beginning to develop category. These findings highlight that the free inquiry method was effective in enhancing the science skills of early childhood learners, as it encouraged exploration, experimentation, and active participation, ultimately leading to meaningful improvements in their scientific understanding.

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