# INTRODUCTION TO SCIENCE IN EARLY CHILDHOOD WITH COOPERATIVE LEARNING MODEL JIGSAW TYPE ASSISTED WITH CONCRETE OBJECTS

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**ABSTRACT**

*The introduction of science in early childhood is made possible through the teaching of simple concepts and appropriate learning methods. Jigsaw type cooperative learning model can be applied in the introduction of science because the child's age is a social age, children like to work with peers. Concrete objects help children to understand various concepts of science because their cognitive abilities have only just entered the pre-operational stage. This study aims to determine the effectiveness of concrete jigsaw type cooperative learning models assisted in the introduction of science in early childhood. The study was conducted in PAUD Tunas Mekar II Dalung children group B semester 1 of 2019/2020 school year. The research method is a class action with a four-stage procedure, namely: 1) The planning stage, 2) The stage of taking action, 3) The stage of development, 4) The stage of reflection. The study was conducted in two cycles. The data collection method in this study was through observation using rubric guidelines to record data about scientific abilities demonstrated by early childhood. Data on children's scientific ability improvement were analyzed descriptively with the help of assessment instruments. Children's scientific ability at the initial observation of the percentage of completeness was only achieved by 5 children (20.83%), the first cycle was 10 children (41.67%), and the second cycle was 20 children (83.33%). Jigsaw type cooperative learning models assisted with concrete objects can improve science skills in early childhood*

***Keywords:*** *Early Childhood, Introduction to Science, Jigsaw, Concrete Objects*

## INTRODUCTION

Human resources who master adequate science and technology are the main capital of the nation to be able to compete in the global world. Education is an effort so that the nation's children can be equipped with knowledge, skills and develop their potential. Preparing potential nation generations with quality education must begin with early childhood education. Early childhood has characteristics and potential that need to be optimally developed with a variety of stimulation through a variety of activities and learning.

Achievements in the development of learning objectives in early childhood include in the fields of religion and morals, cognitive, language, physical-motor, social emotional, and arts. Cognitive development includes mathematical and scientific abilities. Mathematics and science as subjects that are considered difficult at the next level of education can be introduced to early childhood. Specifically, science can be introduced with simple concepts and are connected with everyday life so that it does not cause scourges as subjects that are difficult to learn.

The introduction of science in early childhood needs to be designed through fun and meaningful activities through appropriate methods. The cooperative learning model can be applied to early childhood education, because this age is often referred to as the social age, that children love to socialize and cooperate with peers. Cooperative learning model is a series of children's learning in certain groups to achieve the learning objectives formulated [1]. This learning model has several types including Student Team

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Achievement Division (STAD), Expert Team (Jigsaw), Group Investigation (Group Investigation), Think Pair Share (TPS), Numbered Head Together (NHT), and Team Games Tournament (TGT). One type of cooperative learning model that can be applied to early childhood is the Jigsaw II type.

Jigsaw type cooperative learning model allows applied to early childhood because in this type of children are divided into several heterogeneous groups, both in ability and sex, so that the nature of the group formed is aligned. Whereas the expert group is chosen from the group of children who have prominent cognitive abilities, so that these children will be able to become a team of experts for the group. This is supported by previous research entitled "The Implementation of Cooperative Learning Models of Jigsaw Type Assisted by Media of Picture Number Cards to Enhance Cognitive Development of Kindergarten Children Widhya Brata Mengwi" [2], showing the average percentage of cognitive development of group B semester students II in Widhya Brata Mengwi Kindergarten in the first cycle of 62.19% was in the low category and the average percentage of cognitive development of children in group B in the second semester in Widhya Brata Mengwi Kindergarten in the second cycle 87.5% were in the high category. Whereas in this study more specifically measured children's scientific abilities through experimental activities assisted by concrete objects in groups.

## METHODS

This research design uses action research defined as any systematic research carried out by teachers, education providers, counseling teachers / educational advisers, or others who have an interest and interest in the learning process or environment (PBM) with the aim of gathering information about how the school works, how to teach teachers, and how their children learn [3]. In general, the version of the action research process consists of a four-stage procedure (as also described in Chart 3.1), namely:

1. The planning stage
2. Stage of action
3. Development stage
4. Reflection stage

The action research model starts with a main problem or theme. These models include observation or supervision of existing practices, followed by collection and synthesis of information with data. Finally, certain actions are taken, which then serve as a foundation for the next stage of research [3]. This process is described as a process of "observation-act-observation-adjustment", and then repeat it. The process of action research, with its cyclical and spiral character.

### Method of Collecting Data

Data collection methods used in this study are through observation. The process of collecting data through this observation technique uses a rubric guide to record data about the social-emotional abilities shown by children in concrete object-assisted science experiment activities with a Jigsaw II type cooperative learning model. Observations can be carried out with observation guidelines (format, checklist), field notes, daily journals, class activities, depictions of interactions in, electronic recording devices or class mapping. The recording process can be assisted by using instruments.

### Data Analysis Method

Data on increasing children's scientific abilities were analyzed descriptively, namely by observing the activities carried out by children with the help of assessment instruments. The success of children in improving science abilities is categorized into five categories, namely very less, less, enough, good and very good. How to calculate it is to find an average, at least meet the good categories. Activities that arise during the learning process in relation to the implementation of actions can be calculated with the guidance of observations carried out. The level of children's scientific ability can be

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determined by comparing the percentage of mastery into the conversion to the five-scale Benchmark Reference Assessment (PAP), which is listed in the following Table 1.

**Table 1. Conversion Guidelines for National Benchmark Reference Assessment**

| Percentage of Mastery | Category | Mastery |
|---|---|---|
| **90 - 100** | Very high | Completed |
| **80 - 89** | Height | Completed |
| **65 - 79** | | Completed |
| **55 - 64** | Low | Not Completed |
| **00 - 54** | Very low | Not Completed |

Source: Agung, 2014 [4]

The criterion for success in this study is to increase children's scientific ability through a concrete object-type Jigsaw II cooperative learning model. Indicators of success in this study if at least 80% of the number of students meet the criteria of being.

## FINDINGS AND DISCUSSIONS

In the initial stages of this study observations were made of children's scientific abilities while following the conventional learning process. It is known that early childhood scientific abilities are still low. The percentage of completeness was only achieved by 5 children (20.83%), with a moderate category. as many as 4 children (16.67%) and high category achieved 1 (0.42%), there are still 19 children (79.17%) still in the low and very low categories. Then it needs to be given a follow-up as an effort to develop scientific abilities in early childhood, namely through the type of Jigsaw II cooperative learning model assisted by concrete objects.

**Cycle I**

1. Planning

Preparation for the first cycle includes the Weekly Activity Plan (RKM), Daily Activity Plan (RKH), learning scenarios, learning media, science monitoring instruments and the science ability assessment rubric. Weekly Activity Plans (RKM), Daily Community Plans (RKH), and learning scenarios are designed and arranged according to the themes used in Tunas Mekar I PAUD, Dalung. Cycle I was planned for 2 times science experiment activities assisted by concrete objects, each activity was carried out based on a learning scenario. The research process uses the method of observation at each meeting to assess the level of children's scientific ability.

2. Implementation of Actions

Cycle I was carried out in accordance with prepared learning scenarios. Efforts were given to improve science skills in early childhood, namely through the application of Jigsawa II type cooperative learning models assisted by concrete objects in the learning process.

3. Results of Monitoring Children's Science Capabilities

Improving children's scientific abilities is done through the application of Jigsaw II type cooperative learning models. In detail the results of observations of science ability with the application of Jigsaw II type cooperative learning models in cycle I can be considered in Table 2, which indicates an increase in completeness of early childhood science abilities in Cycle I. This is indicated by the total completeness of 12 children (50%).

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**Table 2. Child Science Ability Data in Cycle I**

| No | Subject | Indicators of Early Childhood Science | | | | Amount | Average | Percentage | Category | Completeness |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | | | | | |
| 1 | A | 3 | 3 | 3 | 3 | 12 | 3,00 | 60,00 | Low | Not Complete |
| 2 | B | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 3 | C | 4 | 3 | 3 | 4 | 14 | 3,50 | 70,00 | Medium | Complete |
| 4 | D | 3 | 2 | 3 | 2 | 10 | 2,50 | 50,00 | Very Low | Not Complete |
| 5 | E | 4 | 4 | 4 | 5 | 17 | 4,25 | 85,00 | High | Complete |
| 6 | F | 3 | 3 | 3 | 3 | 12 | 3,00 | 60,00 | Low | Not Complete |
| 7 | G | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 8 | H | 3 | 3 | 3 | 4 | 13 | 3,25 | 65,00 | Medium | Complete |
| 9 | I | 3 | 2 | 2 | 3 | 10 | 2,50 | 50,00 | Very Low | Not Complete |
| 10 | J | 4 | 4 | 4 | 4 | 16 | 4,00 | 80,00 | High | Complete |
| 11 | K | 4 | 3 | 4 | 4 | 15 | 3,75 | 75,00 | Medium | Complete |
| 12 | L | 4 | 3 | 2 | 4 | 13 | 3,25 | 65,00 | Medium | Complete |
| 13 | M | 4 | 4 | 4 | 4 | 16 | 4,00 | 80,00 | High | Complete |
| 14 | N | 2 | 2 | 2 | 3 | 9 | 2,25 | 45,00 | Very Low | Not Complete |
| 15 | O | 4 | 4 | 4 | 4 | 16 | 4,00 | 80,00 | High | Complete |
| 16 | P | 2 | 2 | 2 | 3 | 9 | 2,25 | 45,00 | Very Low | Not Complete |
| 17 | Q | 3 | 2 | 3 | 3 | 11 | 2,75 | 55,00 | Low | Not Complete |
| 18 | R | 3 | 3 | 2 | 2 | 10 | 2,50 | 50,00 | Very Low | Not Complete |
| 19 | S | 4 | 3 | 4 | 4 | 15 | 3,75 | 75,00 | Medium | Complete |
| 20 | T | 2 | 2 | 2 | 2 | 8 | 2,00 | 40,00 | Very Low | Not Complete |
| 21 | U | 3 | 3 | 2 | 3 | 11 | 2,75 | 55,00 | Low | Not Complete |
| 22 | V | 2 | 2 | 2 | 2 | 8 | 2,00 | 40,00 | Very Low | Not Complete |
| 23 | W | 3 | 3 | 3 | 4 | 13 | 3,25 | 65,00 | Medium | Complete |
| 24 | X | 3 | 3 | 3 | 3 | 12 | 3,00 | 60,00 | Low | Not Complete |
| Min | | | | | | | | 40,00 | | |
| max | | | | | | | | 85,00 | | |
| mean | | | | | | | | 61,67 | | |
| median | | | | | | | | 62,50 | | |
| modus | | | | | | | | 65 | | |
| standar dev | | | | | | | | 13,242444 | | |

4. Development and Reflection

The monitoring results as described above show that in general the Science abilities of PAUD Tunas Mekar I Dalung children have increased. This is shown from changes in children's scientific abilities at the time of initial observation with the implementation of cycle I. In the following diagram shows the percentage of mastery of science abilities at the initial observation and cycle 1.

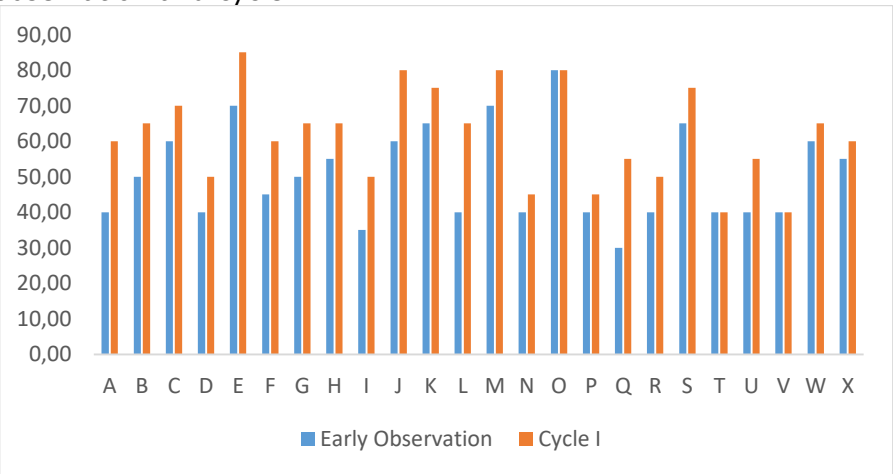


**Figure 1. Graph Comparison of Early Childhood Science Abilities in Early Observation and Cycle I**

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In the picture above, we can see an increase in children's scientific abilities. At the time of initial observation, only 5 children (20.83%) achieved completeness. After participating in learning with the Jigsaw II cooperative learning model, there was an increase in completeness by 12 children (50%) in the medium and high categories. While 12 children have not been completed (50%) are still in the very low category as many as 6 children and 6 children in the low category.

Based on the results of reflection and the obstacles encountered, it is necessary to make efforts to optimize the supporting factors for the implementation of the first cycle, the second cycle needs to be carried out with consideration of the percentage of completeness of children's scientific ability has not reached 80% and the need for some improvement of activities so that the obstacles in the first cycle can handled well and children's scientific abilities in cycle II can be improved.

**Cycle II**

1. Planning

Preparation in cycle II as well as cycle I includes the Weekly Activity Plan (RKM), Daily Activity Plan (RKH), learning scenarios, learning media, science monitoring instruments and rubric of science ability assessment rubrics. Weekly Activity Plans (RKM), Daily Community Plans (RKH), and learning scenarios are designed and arranged in accordance with the theme used at Tunas Mekar II Dalung Kindergarten. Cycle II is planned for 2 science project activities, each activity is carried out based on a learning scenario. The research process uses the method of observation at each meeting to assess the level of children's scientific ability.

2. Implementation of Actions

The implementation of the second cycle action is carried out in accordance with the prepared learning scenario. Efforts are given to improve science skills in early childhood, namely through the application of Jigsawa II type cooperative learning models assisted by concrete objects in the learning process.

3. Results of Monitoring Children's Science Capabilities

Based on the results of the first cycle, in general there is an increase in the ability of science in early childhood, but there are still children who have low categories. So as to improve cognitive abilities of early childhood, the application of Jigsaw II type cooperative learning models resumed in cycle II. Next in the picture the learning process is shown by the Jigsaw II type of cooperative learning model in cycle II. In detail the acquisition of observations on the cognitive abilities of early childhood in cycle II can be considered in the Table 3. In the table, regarding the level of completeness of the ability of science of each child in Cycle II, seen an increase after participating in the learning process with a type of Jigsaw II cooperative learning model. This is indicated by the increasing number of completeness of cognitive abilities of early childhood, which is 20 children (83.33%). Four children (16.66%) still have not reached the specified level of completeness.

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**Table 3. Child Science Ability Data in Cycle II**

| No | Subject | Indicators of Early Childhood Science | | | | Amount | Average | Percentage | Category | Completeness |
|---|---|---|---|---|---|---|---|---|---|---|
| | | A | B | C | D | | | | | |
| 1 | A | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 2 | B | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 3 | C | 4 | 3 | 3 | 4 | 14 | 3,50 | 70,00 | Medium | Complete |
| 4 | D | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 5 | E | 4 | 4 | 4 | 5 | 17 | 4,25 | 85,00 | High | Complete |
| 6 | F | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 7 | G | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 8 | H | 4 | 3 | 3 | 4 | 14 | 3,50 | 70,00 | Medium | Complete |
| 9 | I | 4 | 3 | 2 | 3 | 12 | 3,00 | 60,00 | Low | Not Complete |
| 10 | J | 4 | 4 | 4 | 4 | 16 | 4,00 | 80,00 | High | Complete |
| 11 | K | 4 | 3 | 4 | 4 | 15 | 3,75 | 75,00 | Medium | Complete |
| 12 | L | 4 | 3 | 2 | 4 | 13 | 3,25 | 65,00 | Medium | Complete |
| 13 | M | 4 | 4 | 4 | 4 | 16 | 4,00 | 80,00 | High | Complete |
| 14 | N | 3 | 3 | 2 | 3 | 11 | 2,75 | 55,00 | Low | Not Complete |
| 15 | O | 4 | 4 | 4 | 4 | 16 | 4,00 | 80,00 | High | Complete |
| 16 | P | 4 | 3 | 2 | 4 | 13 | 3,25 | 65,00 | Medium | Complete |
| 17 | Q | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 18 | R | 3 | 3 | 2 | 2 | 10 | 2,50 | 50,00 | Very Low | Not Complete |
| 19 | S | 4 | 3 | 4 | 4 | 15 | 3,75 | 75,00 | Medium | Complete |
| 20 | T | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 21 | U | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| 22 | V | 2 | 2 | 2 | 2 | 8 | 2,00 | 40,00 | Very Low | Not Complete |
| 23 | W | 3 | 3 | 3 | 4 | 13 | 3,25 | 65,00 | Medium | Complete |
| 24 | X | 4 | 3 | 3 | 3 | 13 | 3,25 | 65,00 | Medium | Complete |
| Min | | | | | | | | 40,00 | | |
| max | | | | | | | | 85,00 | | |
| mean | | | | | | | | 66,67 | | |
| median | | | | | | | | 65,00 | | |
| modus | | | | | | | | 65 | | |
| standar dev | | | | | | | | 9,854007 | | |

4. Development and Reflection

The results of monitoring of the activities of the second cycle of children's cognitive abilities have increased significantly as shown in the following figure 2.

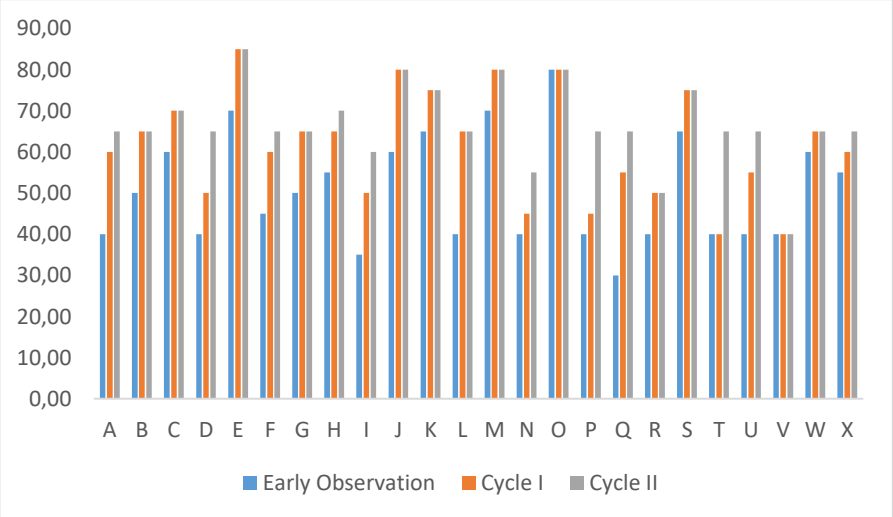


**Figure 2. Graph Comparison of Early Childhood Science Abilities in Cycle I and Cycle II**

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Completeness of children's scientific ability has reached 83.33% (an increase of 33.33%) from the first cycle that is as many as 20 children have reached mastery in the category of medium (16 children) and high (4 children), leaving 2 children in the low category and 2 children so that the percentage of mastery of unfinished mathematical abilities (16.67%). When compared to the first cycle there were 7 children in the low to moderate category, 2 children in the very low category increased to the medium category, 3 children in the medium category increased to the high category, 4 children in the high category and 8 children in the medium category were in the very category same. Based on the category of children's cognitive abilities can be seen in comparison from initial observations, cycle I and cycle II, as in the following figure.

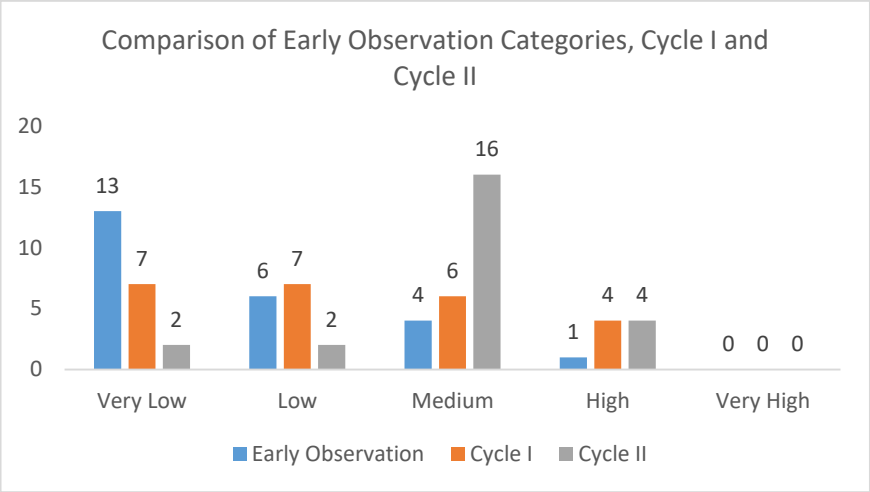


**Figure 3. Graph of Early Childhood Science Capability Categories, Cycle I and Cycle II**

The application jigsaw II type cooperative learning models assisted with concrete objects can improve early childhood science abilities. This can be seen from the development of abilities, from the time of initial observation to the end of cycle II. In Figure 5.3 below, we can observe a comparison chart of cognitive abilities of early childhood from the initial observation to the second cycle.

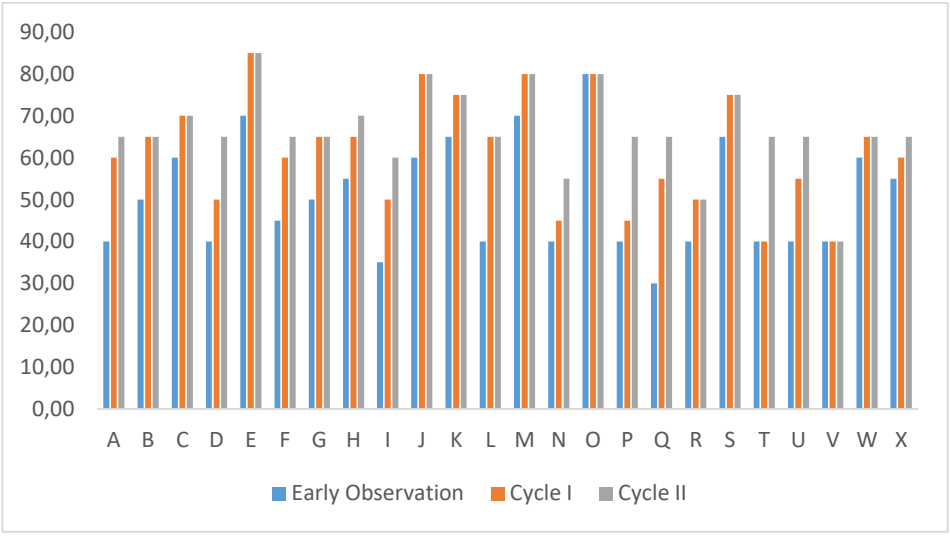


**Figure 4. Graphic Comparison of Early Childhood Science Abilities in Early Observation, Cycle I, and Cycle II**

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In the graph, it can be seen that there is an increase in early childhood science abilities, before and after participating in learning with the Jigsaw II type cooperative learning model. It also affects the increased completeness of early childhood science abilities.

## CONCLUSION

The results showed an increase in children's scientific abilities that were analyzed descriptively with the help of assessment instruments. Children's scientific ability at the initial observation of the percentage of completeness was only achieved by 5 children (20.83%), the first cycle was 10 children (41.67%), and the second cycle was 20 children (83.33%). Jigsaw type cooperative learning models assisted with concrete objects can improve science skills in early childhood. The Jigsaw II type of cooperative learning model in this study is limited to only knowing improvements to children's scientific abilities, without regard to other variables or levels of other developmental achievements. For the sake of the perfection of this research it is recommended to conduct further research by involving other variables such as language skills, social emotional, motor, creativity and others.

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