Implementation of Bruner's Theory to Improve Understanding of the Concept of Numbers for Grade I Students at SDN 1 Kepanjen

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Papers received: 13-4-2023; revised: 4-5-2023; accepted: 11-5-2023

Abstract

Understanding the concept is a basic ability that must be possessed by students in understanding mathematics. This study aims to determine the increase in elementary school students' conceptual understanding after applying Bruner's theory in learning mathematics. This type of research is Class Action Research. The research design used was developed by Kemmis and McTaggart where each activity cycle consists of four components, namely planning, implementation of action/treatment, observation, and reflection. The subjects in this study were 25 students of class IA SD Negeri 1 Kepanjen. The research results show that the application of Bruner's learning theory can activate students in learning. Improvement in understanding the ability of the concept occurs in each cycle. At the beginning of the observation, the average number of concept understanding abilities of students was 22.67%, then increased in cycle I by 44%, cycle II by 69.33%, and achieving expectations in cycle III by 88%. The successful application of Bruner's learning theory is also evidenced by the increased mastery of student learning outcomes. At the beginning of the cycle, only 28% of students passed, then increased in cycle I by 48% of students, cycle II by 72% of students, and achieving expectations in cycle III by 92%. Thus, the implementation of Bruner's theory can improve understanding of the concept of numbers in learning mathematics. s learning theory is also evidenced by the increased mastery of student learning outcomes. At the beginning of the cycle, only 28% of students passed, then increased in cycle I by 48% of students, cycle II by 72% of students, and achieving expectations in cycle III by 92%. Thus, the implementation of Bruner's theory can improve understanding of the concept of numbers in learning mathematics. s learning theory is also evidenced by the increased mastery of student learning outcomes. At the beginning of the cycle, only 28% of students passed, then increased in cycle I by 48% of students, cycle II by 72% of students, and achieving expectations in cycle III by 92%. Thus, the implementation of Bruner's theory can improve understanding of the concept of numbers in learning mathematics.

Keywords: *Bruner's theory, conceptual understanding, improvement, mathematics, numbers.*

Abstrak

Pemahaman konsep merupakan suatu dasar kemampuan yang harus dimiliki oleh siswa dalam memahami pelajaran matematika. Penelitian ini bertujuan untuk mengetahui peningkatan pemahaman konsep siswa sekolah dasar setelah diterapkan teori Bruner dalam pembelajaran matematika. Jenis penelitian ini adalah Penelitian Tindakan Kelas (*classroom action research*). Desain penelitian yang digunakan yaitu dikembangkan oleh Kemmis dan Mc Taggart dimana tiap-tiap siklus kegiatan terdiri atas empat komponen yaitu perencanaan (*plan*), pelaksanaan tindakan/perlakuan (*action*), observasi (*observation*), dan refleksi (*reflection*). Subjek dalam penelitian ini yaitu siswa kelas IA SD Negeri 1 Kepanjen yang berjumlah 25 siswa. Hasil penelitian menunjukkan bahwa penerapan teori belajar Bruner dapat mengaktifkan siswa dalam pembelajaran. Peningkatan kemampuan pemahaman konsep terjadi pada setiap siklus. Pada awal observasi, rata-rata kemampuan pemahaman konsep bilangan pada siswa sebesar 22,67%, kemudian meningkat pada siklus I sebesar 44%, siklus II sebesar 69,33%, dan mencapai harapan pada siklus III sebesar 88%. Keberhasilan penerapan teori belajar Bruner juga dibuktikan dengan meningkatnya ketuntasan hasil belajar siswa. Pada awal siklus, hanya sebanyak 28% siswa yang tuntas, kemudian meningkat pada siklus I sebesar 48% siswa, siklus II sebanyak 72% siswa, serta mencapai harapan pada siklus III sebesar 92%. Dengan demikian, implementasi teori Bruner dapat meningkatkan pemahaman konsep bilangan pada pembelajaran matematika.

Kata Kunci: bilangan, matematika, pemahaman konsep, peningkatan, teori Bruner

1. Introduction

Mathematics is a part of science that is very necessary to support the activities of human life (Ariandi, 2016; Wahyuni et al., 2013). Based on this, mathematics is a compulsory subject that is studied at every level of education (Fathani, 2016; Murti et al., 2023; Utami et al., 2018). Mathematics has a longer learning time than other subjects (Sili et al., 2018). However, in teaching mathematics, teachers often use methods that do not activate students so that students are less enthusiastic in participating in learning mathematics (Mahmudah et al., 2021). This makes it difficult for students to understand learning so that the material being studied and its use in life cannot be connected to each other (Rusyda & Sari, 2017). Most students still think that mathematics contains a lot of memorization so that they are only able to memorize the material received (Faelasofi et al., 2015). Therefore learning mathematics needs to be well designed so that it can be effective in understanding concepts to students.

According to Bruner, learning mathematics involves an understanding of the mathematical concepts and structures contained in the material being studied, as well as tracing the relationship between the concepts and mathematical structures in it (Widyaningrum et al., 2021). In the school context, learning mathematics has many benefits, because it can be directly applied in everyday life. This statement is supported by Arnidha & Fatahillah (2021), which states that focused learning of mathematics can train and develop ways of thinking systematically, logically, critically, and consistently, as well as developing a persistent attitude, confidence, and the ability to use a mathematical mindset so that it can be used to solve problems in everyday life. Thus, mathematics becomes a very important subject in developing and improving students' thinking skills. To improve students' mathematical abilities, it is necessary to focus on five elements, one of which is conceptual understanding and mathematical reasoning, namely the ability to give reasons inductively or deductively to form, defend, and evaluate arguments or think logically (reasoning) (Caesarani et al., 2022; MF Hidayat et al., 2022; Wahyusi & Sinaga, 2021).

Understanding the concept is a basic ability that must be possessed by students in understanding mathematics. According to Al-Mutawah et al. (2019), conceptual understanding has a fundamental role in students' ability to understand mathematics. A good understanding of concepts is very important, because this will help students learn mathematics more easily. Conceptual understanding is very important for students to master because a mature conceptual understanding of students can learn subsequent, more complex mathematical concepts and can perform problem solving in everyday life (Fauzi & Arisetyawan, 2020). In each learning process, it is recommended to place greater emphasis on understanding concepts, so that students have a strong foundation for developing other basic abilities, such as reasoning. However, there are still many students who do not like mathematics, thus preventing them from understanding the concepts in mathematics. In addition, the teacher's learning pattern does not activate students so that learning mathematics seems boring to students.

The low understanding of mathematical concepts at the elementary school level is a serious problem so that mathematics learning can run effectively. The results of research conducted by Melisari et al. (2020) shows that most of the students have low ability to understand mathematical concepts in the solid material and the mistakes made in working on the problems based on Newman's analysis mostly lie in mistakes in understanding the questions, namely as much as 41.17%. This is reinforced by the results of research conducted by Hidayat et al. (2020) which states that the ability to understand students' mathematical concepts in grade 5 elementary school is still low due to the learning method used by the teacher has not activated students and does not involve concrete objects. In addition, research conducted by Nurfauziah et al. (2019) also stated that an increase in the understanding of elementary students' mathematical concepts can occur when learning mathematics involves concrete objects or events that are real.

This phenomenon also occurs in SD Negeri 1 Kepanjen, Malang Regency. Based on the results of interviews with the class 1A teacher, it was stated that the students' learning completeness had not yet reached half of the total number of students. This is because the mistakes made by students when answering questions. This error occurs because students do not understand the concept used to solve the given problem. In addition, based on the results of observations during class 1A, many students made noise during mathematics learning, so they did not really follow the lesson well. In addition, the method used by the teacher is still conventional so that it does not activate students too much and does not make use of concrete objects too much.

One way to overcome student difficulties and challenges faced by teachers in understanding concepts is to utilize learning theory. One stream that can be used is the flow of cognitive psychology. According to Juwantara et al. (2019), cognitive theory is a learning process that provides opportunities for students to develop rational (reasoning) abilities to recognize and understand the material being studied. In addition, cognitive learning theory emphasizes the construction of knowledge by students independently through sensory experience (Efgivia et al., 2021). In cognitive theory, the term information processing is also known where the implications for learning are making learning material memorable for students with certain strategies so that students can remember it for a long time (Swellers, 2020). In other words, cognitive theory does not focus on learning outcomes, but on learning processes that are in accordance with students' perceptions of certain situations, resulting in relative and memorable changes.

There are various views on cognitive theory, one of which is Bruner's learning theory proposed by Jerome S. Bruner. Bruner's theory describes an optimal and creative learning process when the teacher provides opportunities for students to discover concepts, theories, rules, or understanding through relevant examples in everyday life, known as as Discovery Learning (Revelation & Sinaga, 2021). In line with this, Altakhyneh (2019) explained that Bruner's theory can be used as an approach to learning mathematics that allows students to manipulate mathematical concepts easily. By applying Bruner's learning theory, students have the opportunity to increase their understanding of mathematical concepts through their own knowledge, while the teacher's role is to become a facilitator who assists students in manipulating, exploring, and thinking in understanding a mathematical concept.

The learning process that applies Bruner's theory involves inquiry and discovery of concepts, where problem solving is the starting point of learning that must be learned. If students are actively involved in the learning process, especially in discovering basic concepts, then these students will more easily understand the concept (Ashraf, 2020). This will have a positive impact on the understanding of subsequent concepts. This thought is reinforced by Hudojo's views (in Wahyusi & Sinaga, 2021) which states that if students are actively involved in discovering the basic principles of a concept, they will understand the concept better, remember it for a longer period of time, and be able to apply it in different contexts. Therefore, it is hoped that through the application of Bruner's theory in learning mathematics, students' ability to understand mathematical concepts can be improved.

According to Bruner's theory, the learning process involving individual cognitive activity is passed in three stages. This can be implicated in the process of learning mathematics in elementary schools. Wahyusi & Sinaga (2021) suggests that the three stages of Bruner's theory are: 1.) Enactive Stage, where in this stage students are seen directly manipulating objects using real objects or situations, 2.) Iconic Stage, where in this stage students do depiction of manipulated objects by applying/visualizing to concrete objects, and 3.) Symbolic Stage, where at this stage students manipulate symbols or symbols to analyze knowledge in the form of abstract symbols used for understand the next material. Based on this description, it can be concluded that students are directed to learn independently and must be actively involved in understanding and seeking answers regarding certain concepts and principles by utilizing the skills and information they have. This shows that material that has a regular pattern or structure will be easier for students to understand and remember.

The learning process that applies Bruner's learning theory also has four principles of learning and teaching theorems that must be implemented. Hudojo (in Wahyusi & Sinaga, 2021)stated that Bruner's 4 learning theorems, namely: 1.) Construction Theorem, 2.) Notational theorem, 3.) Difference and variation theorem, and 4.) Connectivity Theorem. These theorems are principles used by teachers to help increase students' understanding of mathematical concepts. When students engage in understanding mathematical concepts, it is necessary to apply the construction theorem to design groupings of understanding by providing students with concrete objects that they can manipulate. It is intended that students can easily get ideas, ideas, and principles from the material being studied through the information they have. Furthermore, notational theorems direct students to express or represent concepts in the form of formulas, symbols, tables, pictures, or other mathematical equations that can be used in solving problems. This theorem aims to enable students to express concepts visually and symbolically. Contrast and variation theorems stress the importance of providing a variety of examples that satisfy the concept being taught. The goal is that students do not misinterpret the concepts being studied. Finally, the connectivity theorem directs students to connect their conceptual understanding with other related or relevant concepts. The goal is that students do not misinterpret the concepts being studied. Finally, the connectivity theorem directs students to connect their conceptual understanding with other related or relevant concepts. The goal is that students do not misinterpret the concepts being studied. Finally, the connectivity theorem directs students to connect their conceptual understanding with other related or relevant concepts.

Bruner's theory can be used as an alternative learning model that is applied in increasing understanding of mathematical concepts in elementary school students. Previous research conducted by Hatip & Setiawan (2021) states that in practice, students learn through active engagement through concepts and principles. Teachers encourage students to gain experience by engaging in activities that allow them to discover concepts and principles for themselves. Thus, students can discover and understand concepts independently. The results of these studies are strengthened by research conducted by Lestari (2017) which states that as many as 97% of students get increased learning outcomes through the application of Bruner's theory in learning mathematics. In addition, research from Altakhyneh (2019), stated that this theory can improve the mathematical communication skills of students with disabilities. This theory can also be applied in learning media, which according to research results Wayan et al. (2020) revealed that learning media based on Bruner's theory can improve understanding of concepts so that it has an impact on increasing learning outcomes. The results of these studies prove that the application of Bruner's theory has a very positive impact, especially in learning mathematics.

Based on the description above, research was conducted on the implementation of Bruner's theory in increasing understanding of the concept of numbers in learning mathematics in elementary schools. This study aims to determine the increase in elementary school students' conceptual understanding after applying Bruner's theory in learning mathematics. It is hoped that with the application of Bruner's theory, students will not get bored in learning mathematics and can increase their understanding of concepts that will have an impact on their learning outcomes. Top of Form

2. Method

This research was conducted at Kepanjen 1 Public Elementary School, Malang Regency in the even semester of the 2022/2023 Academic Year. The subjects in the study were 25 class IA students at SD Negeri 1 Kepanjen Malang Regency, Academic Year 2022/2023, consisting of 15 male students and 10 female students. The object of this research is to increase the ability to understand mathematical concepts of class IA students in learning mathematics with the topic of numbers by applying Bruner's learning theory. The data collection techniques in this study are tests, observation, and documentation. The test is used to determine the increase in the value of students' understanding of mathematical concepts. Observations are used to determine potential and initial problems. Documentation is used to determine the values collected and used as research data.

This type of research is Class Action Research. Classroom action research is a study conducted on actual problems faced by educators through observing the learning process. The purpose of this research is to identify these problems and take corrective actions to improve learning practices in a more professional manner (Hyun et al., 2020). Classroom Action Research (CAR) is action research that is applied to improve and develop or reflect educators in learning both in terms of practice, understanding of learning and situations in implementation (Nasirun et al., 2021).

The research design used was developed by Kemmis and Mc Taggart where each activity cycle consists of four components, namely planning (plan), implementation of action / treatment, observation, and reflection (Ilham, 2021). In Kemmis & McTaggart the components of acting and observing are combined. This is based on the fact that the implementation of actions and observations cannot be separated. These two activities are activities carried out at the same time. The four components in the Kemmis & McTaggart model are seen as a cycle, in this case it is a round of activities consisting of planning, observing and reflecting. Based on this reflection, a plan for improvement, action/treatment and observation and reflection is then prepared, and so on. The number of cycles depends on the problem being solved (Ilham, 2021). In this study, the cycle will stop if more than 75% of students have a good category of understanding the concept. The research design can be described in the flowchart as follows.

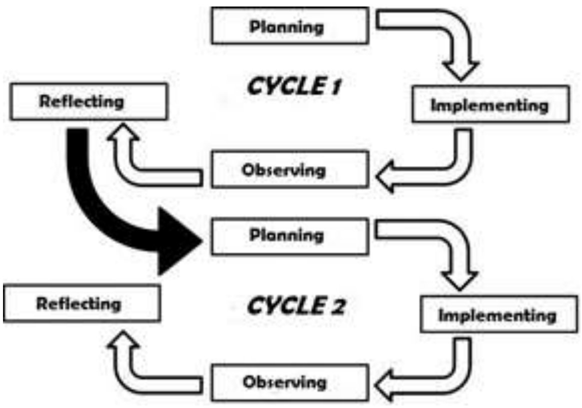

Figure 1. Classroom Action Research Flowchart
(Source : Ilham, 2021)

The data analysis technique used in this study is a quantitative descriptive analysis technique. Quantitative data analysis is used to determine how much the ability of students' understanding of concepts has increased after the action. There are three indicators in understanding concepts, namely students can restate a concept, give examples and non-examples, and apply concepts in problem solving. The analysis carried out comes from observational data on students' activities in learning mathematics with Bruner's theory to improve understanding of the concept of numbers. From the results of the research that has been carried out, it can be calculated using the formula proposed by Ngalim Purwanto (in Nurwita, 2020) namely as follows.

$$NP = \frac{R}{SM} \times 100$$

NP : The percentage value sought or expected
R : Raw scores obtained by students
SM : Maximum score

From the percentage results obtained then categorized based on the criteria of Wahyusi & Sinaga (2021) which can be presented as follows.

Table 1. Categorization of students' conceptual understanding values

Value Interval (%)	Category
93 - 100	Very good
84 – 92	Good
75 – 83	Enough
<75	Not enough

3. Results and Discussion

3.1 Results

The implementation of Bruner's theory to increase the understanding of mathematical concepts in class I students of SD Negeri 1 Kepanjen has been carried out and has succeeded in increasing the understanding of mathematical concepts with 4 actions which are divided into 1 pre-cycle activity and 3 main cycle activities. The research results can be described as follows.

3.1.1 Implementation of Bruner's Learning Theory in Learning Mathematics

Bruner's learning theory is an alternative that can be used to improve understanding of concepts in learning mathematics. In its implementation, 4 learning activity meetings were carried out with details of 1 pre-cycle activity and 3 main cycle activities. All activities in the cycle utilize Bruner's theory which is used as a learning model in mathematics learning carried out in class IA students at SD Negeri 1 Kepanjen. At the first meeting, learning math numbers was carried out with addition material 1-20. At the second meeting, learning math numbers was carried out with subtraction 1-20 material. At the third meeting, the learning of number mathematics was carried out with the addition and subtraction of three numbers. Final,

Each cycle activity is carried out by planning, acting and observing, and reflecting. After completing all the stages in the cycle, the cycle is repeated until it meets the expected completeness percentage. At the planning stage, the preparation of learning tools in the form of teaching modules and their accessories, preparation of learning resources and media, preparation of facilities and infrastructure, and coordination with class IA teachers to carry out collaborative learning activities. In the action and observation stages, the learning process has been carried out using Bruner's learning theory in increasing students' understanding of mathematical concepts. This activity consists of opening, core and closing activities where active involvement of students has been sought in discovering and understanding concepts independently through the discovery activities carried out. At the reflection stage, a reflection has been made on the learning that has been done. In this stage, follow-up planning is also carried out which can be carried out in the next cycle with the aim of achieving an understanding of the concept with the expected percentage. All learning activities are carried out with Bruner's stages, namely the enactive, iconic, and symbolic stages.

In the enactive stage, students manipulate objects using real objects or situations directly. At this stage learning is carried out by utilizing concrete objects around students, namely ice cream sticks, candy, and marbles. In their activities, students count with the help of concrete media provided by the teacher. After that, variations on giving concrete objects were carried out so that students could think as a concept discovery process. Student activities are of course guided by the teacher and adapted to the learning material.

At the iconic stage, students depict manipulated objects by applying/visualizing them to concrete objects. At this stage learning is done by utilizing the media pictures made by the students themselves as well as the pictures presented by the teacher. After students can count with the help of concrete objects directly, students are asked to visualize it in the form of pictures. Thus, it is hoped that students can think semi-concretely through these pictures and can understand the concept of numbers according to the learning material. After making the pictures independently, the pictures are presented by the teacher as a deepening of mathematical concepts and can be a provision for the next stage.

At the symbolic stage, students manipulate symbols or symbols to analyze knowledge in the form of abstract symbols that are used to understand the next material. At this stage, students have been able to use numbers without the help of concrete objects, so that at this stage variations of learning have been carried out with games. The games that were carried out included guessing numbers, jumping number cards, and snakes and ladders related to the number material at the meeting. This is done so that learning is more varied and does not make students feel bored, so students can understand and apply the concepts they get through activities for the next material as well as in solving everyday life problems.

3.1.2 Ability to Understand Students' Initial Concepts

Based on the results of the initial test on pre-cycle activities, it was found that the students' ability to understand the concept of numbers was still low. The data can be presented in the table as follows.

Table 2. Description of the Initial Ability to Understand the Concept of Numbers

Value Intervals	Category	Level of Understanding of the Concept of Each Indicator			Completeness of learning outcomes
		Restating a concept	Give examples and non-examples	Applying concepts in problem solving	
93 - 100	Very good	1	4	2	3
84 - 92	Good	3	4	3	4
75 - 83	Enough	5	6	7	2
<75	Not enough	17	11	13	16
Completed student		4	8	5	7
Percentage		16%	32%	20%	28%
Percentage average		22.67%			

Based on the results of the students' initial tests, it was found that the students' ability to understand the concept of numbers was still relatively low. This is evidenced by the test results showing that the average percentage level of conceptual understanding is still 22.67%. This percentage is still far less than the expected figure of 75% of all students. The level of students' understanding of concepts based on each indicator, in the first indicator there were still 4 students (16%) who could restate a concept well. In the second indicator there are still as many as 8 students (32%) who can give good examples and not examples. In the third indicator there are still 5 students (20%) who can apply the concept in problem solving well.

At the first meeting, the learning of number mathematics was carried out with the addition of numbers 1-20. As for the completeness of student learning outcomes, out of a total of 25 students, there are still 7 students (28%) who have achieved completeness, while there are 18 students (72%) who have not achieved classical completeness with good criteria. The results of this initial test become a reflection and reference in giving action and preparing learning scenarios by applying Bruner's learning theory to learning mathematics that involves students directly in cycle I to improve students' ability to understand number concepts.

3.1.3 Ability to Understand Concepts in Cycle I

Based on the results of tests on cycle I activities, data was obtained that students' ability to understand number concepts could increase compared to pre-cycle activities. The data can be presented in the table as follows.

Table 3. Description of the Criteria for the Ability to Understand the Concept of Numbers in Cycle I

Value Intervals	Category	Level of Understanding of the Concept of Each Indicator			Completeness of learning outcomes
		Restating a concept	Give examples and non-examples	Applying concepts in problem solving	
93 - 100	Very good	3	6	5	5
84 - 92	Good	5	9	5	7
75 - 83	Enough	6	5	8	4
<75	Not enough	11	5	7	9
Completed student		8	15	10	12
Percentage		32%	60%	40%	48%
Percentage average		44%			

Based on the test results at the end of cycle I, it was found that students' ability to understand the concept of numbers could increase. This is evidenced by the test results showing that the average percentage of the ability to understand the concept is 44%. However, this percentage is still far below the expected figure of 75% of all students. The level of students' understanding of concepts based on each indicator, in the first indicator there are still as many as 8 students (32%) who can restate a concept well. In the second indicator there are still as many as 15 students (60%) who can give good examples and not examples. In the third indicator there are still as many as 10 students (40%) who can apply the concept in problem solving well.

At the second meeting, the learning of number mathematics was carried out with the material for subtracting numbers 1-20. As for the completeness of student learning outcomes, out of a total of 25 students, there are still 12 students (48%) who have achieved completeness, while there are 13 students (52%) who have not achieved classical completeness with good criteria. The results of these tests become a reflection and reference in giving action and preparing more varied learning scenarios by applying Bruner's learning theory to learning mathematics that involves students directly in cycle II to further improve the ability to understand the concept of numbers in students according to the expected achievements.

3.1.4 Ability to Understand Concepts in Cycle II

Based on test results in cycle II activities, data was obtained that students' ability to understand number concepts increased quite significantly compared to cycle I. The data can be presented in the following table.

Table 4. Description of the Criteria for the Ability to Understand the Concept of Numbers in Cycle II

Value Intervals	Category	Level of Understanding of the Concept of Each Indicator			Completeness of learning outcomes
		Restating a concept	Give examples and non-examples	Applying concepts in problem solving	
93 - 100	Very good	6	13	7	10
84 - 92	Good	10	8	8	8
75 - 83	Enough	5	2	5	3
<75	Not enough	4	2	5	4
Completed student		16	21	15	18
Percentage		64%	84%	60%	72%
Percentage average		69.33%			

Based on the test results at the end of cycle II, it was found that students' ability to understand the concept of numbers increased quite significantly. This is evidenced by the test results showing that the average percentage of the level of ability to understand the concept is 69.33%. However, this percentage is still less than the expected figure of 75% of all students. The level of students' understanding of concepts based on each indicator, in the first indicator there were 16 students (64%) who could restate a concept well. In the second indicator, there were 21 students (84%) who could give good examples and non-examples. In the third indicator, there were 15 students (60%) who could apply the concept in problem solving well.

At the third meeting, the learning of number mathematics was carried out with addition and subtraction material involving three numbers. As for the completeness of student learning outcomes, out of a total of 25 students, there were 18 students (72%) who had achieved completeness, while there were 7 students (28%) who had not achieved classical completeness with good criteria. The results of these tests become a reflection and reference in giving action and preparing more varied learning scenarios by applying Bruner's learning theory to learning mathematics that involves students directly in cycle II to further improve the ability to understand the concept of numbers in students according to the expected achievements.

3.1.5 Ability to Understand Concepts in Cycle III

Based on the results of tests on cycle III activities, data was obtained that students' ability to understand number concepts could increase compared to cycle II and had reached the expected percentage of numbers. The data can be presented in the table as follows.

Table 5. Description of the Criteria for the Ability to Understand the Concept of Numbers in Cycle III

Value Intervals	Category	Level of Understanding of the Concept of Each Indicator			Completeness of learning outcomes
		Restating a concept	Give examples and non-examples	Applying concepts in problem solving	
93 - 100	Very good	10	15	10	11
84 - 92	Good	11	8	12	12
75 - 83	Enough	2	1	1	0
<75	Not enough	2	1	2	2
Completed student		21	23	22	23
Percentage		84%	92%	88%	92%
Percentage average			88%		

Based on the test results at the end of cycle III, it was found that students' ability to understand the concept of numbers increased and reached the expected percentage of numbers. This is evidenced by the test results showing that the average percentage of the level of ability to understand the concept is 88%. This percentage figure has exceeded the expected figure of 75% of all students. The level of students' understanding of concepts based on each indicator, in the first indicator there were already 21 students (84%) who could restate a concept well. In the second indicator, there were 23 students (92%) who could give good examples and non-examples. In the third indicator, there were 22 students (88%) who were able to apply the concept in problem solving well.

At the fourth meeting, numbers were taught in mathematics with large numbers up to 100. As for the completeness of student learning outcomes, out of a total of 25 students, there were 23 students (92%) who had achieved completeness, while there were 2 students (8%) who had not achieved completeness. classic with good criteria. After further investigation, it turned out that the two children had delays in learning so that they could be categorized as slow learners so that the next teacher could provide more intensive assistance than other students. This becomes a reflection of the learning that is carried out next. At the end of this cycle, it was proven that Bruner's learning theory could be implemented to improve students' understanding of mathematical concepts.

3.2 Discussion

3.2.1 Increasing the ability to understand the concept of numbers

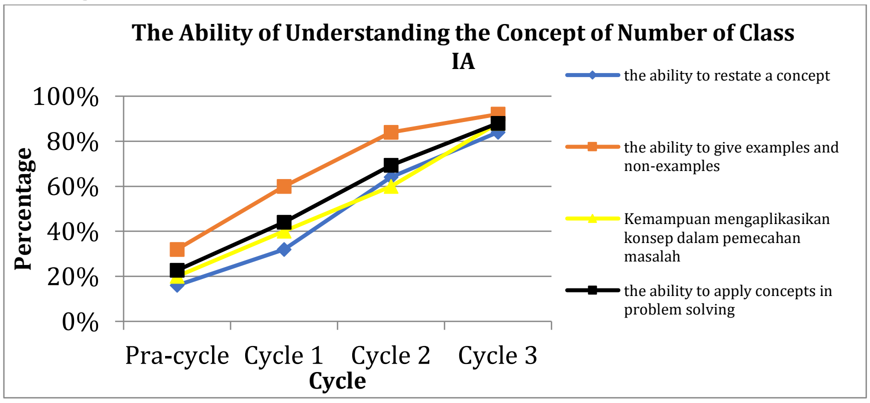

Figure 2. Diagram of Increasing the Ability to Understand the Concept of Numbers

Based on the diagram above, it shows that there is an increase in students' understanding of the concept of numbers after being given action in the form of learning by implementing Bruner's theory 4 times with 1 pre-cycle and 3 main cycles. The increase occurred significantly in the second cycle and the third cycle so that in the end it fulfilled the expected target, namely 88% of students had fulfilled all three indicators in understanding the concept of numbers in a good category. The increase is reinforced by the statement Aditya & Solihah (2021) that Bruner's learning theory can activate students more and help students to recognize and understand the concepts of the material as a whole and more deeply.Tampubolon (2018) also revealed that learning by applying Bruner's theory can increase student activity in learning. Furthermore,Surya et al. (2017) states that student learning activeness will have a positive effect on students' mathematical problem solving abilities.

Students' understanding of the concept of numbers increases due to learning that is carried out in stages starting from the concrete to the abstract according to the stages in Bruner's theory. In line with the statement of Hanik (2017) which states that learning mathematics should be taught gradually from the concrete to the abstract so that it can provide understanding to students. This is in accordance with Piaget's theory, that during elementary school age, students' cognitive abilities are still in the concrete operational stage, so understanding concepts must start from concrete objects first (Nabila, 2021). Thus, students will be trained in thinking, so that they have a critical and creative mindset and can solve the problems they experience (Setiadi & Elmawati, 2019). In addition, variations in learning with games make students not feel bored in learning so that they can actively discover and understand mathematical concepts through activities that they experience independently. This is in accordance with the statement of Kurniawan (2015) which states that the characteristics of elementary school age children are still happy to move and like to play games.

The ability to understand students' concepts is measured using three indicators, namely the ability to restate a concept, provide examples and non-examples, and be able to apply concepts in problem solving. In restating a concept, it can be seen in the activities of students when visualizing concrete objects given by the teacher. In addition, students can restate arithmetic operations obtained from the game process. In giving examples and non-examples, students have been able to provide arithmetic operations that they made themselves and were able to determine the results correctly. In addition, students are also presented with open questions to practice their critical thinking skills. In applying the concept, students are presented with story questions related to everyday life problems. Students can describe it in the form of mathematical sentences and can solve the problems presented by the teacher. With these three indicators, students' understanding of numbers is getting better. A good understanding of the concept will certainly have a positive impact on student learning outcomes (Dewi & Lestari, 2020; Susanto et al., 2020).

3.2.2 Improvement of Mathematics Learning Outcomes

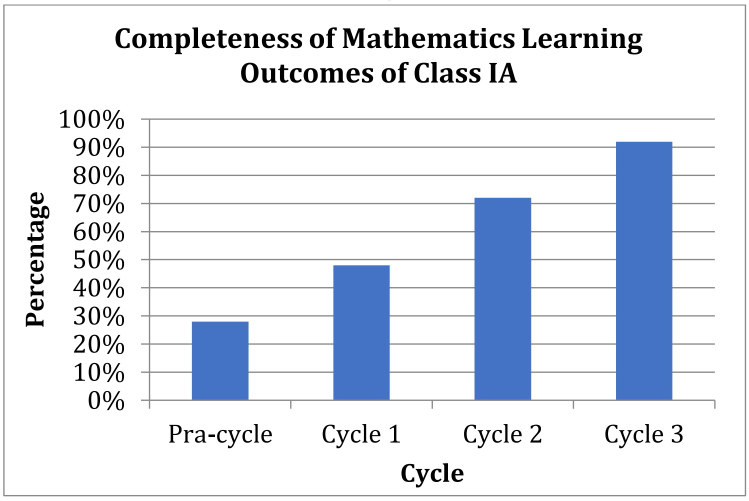

Figure 3. Diagram of Increasing Completeness in Mathematics Learning Outcomes

Based on the diagram above, it shows that there is an increase in the completeness of students' mathematics learning outcomes. This is the impact of understanding the concept that is owned after the learning process. Significant increase occurred from the second cycle and the third cycle. Student learning outcomes do not only depend on their individual abilities, but also depend on the learning process. Some students have high ability and motivation in learning, so they are able to achieve good learning outcomes independently. However, good individual learning outcomes for a number of students with high individual factors do not reflect the overall quality of learning. Learning is considered effective when the percentage of students who achieve learning mastery quantitatively matches the conditions of students and the infrastructure available at school. In this case, the Minimum Completeness Criteria (KKM) is used as an indicator. The implementation of Jerome Bruner's theory cycle shows that the KKM score set for SDN 1 Kepanjen has been reached in the third cycle. The completeness of students according to the KKM continues to increase in each cycle. This increase in mastery can also be compared with the level of mastery before the application of Jerome Bruner's Theory. Thus, the application of Bruner's theory in learning mathematics can improve students' learning outcomes in mathematics. These results are reinforced by research conducted by Minimum Completeness Criteria (KKM) is used as an indicator. The implementation of Jerome Bruner's theory cycle shows that the KKM score set for SDN 1 Kepanjen has been reached in the third cycle. The completeness of students according to the KKM continues to increase in each cycle. This increase in mastery can also be compared with the level of mastery before the application of Jerome Bruner's Theory. Thus, the application of Bruner's theory in learning mathematics can improve students' learning outcomes in mathematics. These results are reinforced by research conducted by Minimum Completeness Criteria (KKM) is used as an indicator. The implementation of Jerome Bruner's theory cycle shows that the KKM score set for SDN 1 Kepanjen has been reached in the third cycle. The completeness of students according to the KKM continues to increase in each cycle. This increase in mastery can also be compared with the level of mastery before the application of Jerome Bruner's Theory. Thus, the application of Bruner's theory in learning mathematics can improve students' learning outcomes in mathematics. These results are reinforced by research conducted by This increase in mastery can also be compared with the level of mastery before the application of Jerome Bruner's Theory. Thus, the application of Bruner's theory in learning mathematics can improve students' learning outcomes in mathematics. These results are reinforced by research conducted by This increase in mastery can also be compared with the level of mastery before the application of Jerome Bruner's Theory. Thus, the application of Bruner's theory in learning mathematics can improve students' learning outcomes in mathematics. These results are reinforced by research conducted by Ningsih et al. (2020), which states that the application of Bruner's theory can increase student activity and teacher activity so that it can support students in learning and have an impact on improving learning outcomes.

4. Conclusion

Based on the results of the research and discussion, it can be concluded that through the application of Bruner's learning theory with the enactive, iconic and symbolic stages it can improve the understanding of the concept of numbers in class IA students at SD Negeri 1 Kepanjen. The successful application of Bruner's learning theory can be seen from the learning process which activates students more and students can learn in stages, starting from the concrete to the abstract. Improvement in understanding the ability of the concept occurs in each cycle. At the beginning of the observation, the average number concept understanding ability of students was 22.67%, then increased in cycle I by 44%, cycle II by 69.33%, and achieving expectations in cycle III by 88%. The successful application of Bruner's learning theory is also evidenced by the increased mastery of student learning outcomes. At the start of the cycle, only 28% of students completed, then increased in cycle I by 48% of students, cycle II by 72% of students, and achieved expectations in cycle III by 92%. Thus, it can be concluded that the implementation of Bruner's theory can improve understanding of the concept of numbers in learning mathematics. The results of this study can be an alternative for educators to apply Bruner's learning theory in learning mathematics. In its application, learning variations are needed so that students do not feel bored. The results of this study can be an alternative for educators to apply Bruner's learning theory in learning mathematics. In its application, learning variations are needed so that students do not feel bored. The results of this study can be an alternative for educators to apply Bruner's learning theory in learning mathematics. In its application, learning variations are needed so that students do not feel bored.

Aknowledgement

A big thank you goes to SD Negeri 1 Kepanjen which has provided facilities to support this research. In addition, thanks to all parties who have provided assistance and support to the completion of this research.

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