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The Use of Fractional Card Media-Based Concept Attainment Models to Improve Understanding of Fractional Concepts

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Article Info

ABSTRACT

Purpose of the study: To find out the application of the Concept Attainment model with the help of fractional card media in increasing understanding of the concept of fractions in class II Ahmad Dahlan Elementary School.

Methodology: The research was conducted at Ahmad Dahlan Elementary School in the even semester of 2018/2019. The research sample was 22 students. Research data obtained through student learning outcomes and observation sheets. Quantitative data were analyzed using descriptive statistics and Qualitative data were analyzed to determine the learning process using the Concept Attainment learning model based on fractional card media.

Main Findings: The results of the study show that the application of the Concept Attainment model assisted by fractional card media can improve understanding of the concept of fractions. By observing the results of understanding the concept of fractions in the first cycle, namely 53.01%, it increased in cycle II to 77.12%. In cycle I the results of the written test evaluation with classical completeness of 63.15% increased in cycle II by 18.66% to 81.81%.

Novelty/Originality of this study: The latest research in this research is to combine the concept learning learning model with fraction card media which is generally not widely used, especially for learning fractions in elementary school mathematics, the benefits for students in this action research will then make it easier for them to face more difficult learning levels in the next class and can become a new teaching idea for teachers to facilitate student understanding.

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1. INTRODUCTION

Education in elementary schools is an effort to educate and create the life of a nation that is pious, loves and proud of the nation and country, is skilled, creative, has good manners and is able to solve problems in their environment [1]–[3]. At the elementary school level, mathematics is a lesson that is so important to learn, because mathematics plays a role in solving problems encountered by students in everyday life [4]. In learning mathematics, students not only know what mathematics is but also understand mathematical concepts and their roles [5]–[7]. Learning will go well if the teacher gives students the opportunity to find concepts from examples of concepts independently but still under the direction of the teacher [8], [9]. Thus students will understand more about the material presented and not easily forget, besides that learning will become more meaningful, and

learning objectives can be achieved. Another factor that causes students to find it difficult to understand learning mathematics is a lack of understanding of mathematical concepts, especially the concept of fractions because the learning model is less varied.

An understanding of a mathematical concept correctly is absolutely necessary for a teacher or prospective teacher before they start teaching their students. Because mathematical concepts are interconnected between previous concepts and concepts to be studied [10], [11]. So if from the start students do not understand the concept of learning mathematics, then in subsequent learning students will find it difficult to understand learning. The Concept Attainment Model or concept achievement model is a learning model that can be used to understand a particular concept [12], [13]. The concept attainment model can make students think critically so that learning becomes active and learning objectives can be achieved and students can find concepts independently but still under the guidance of the teacher [14]. One of the elementary school mathematics learning that requires understanding this concept is fractional material. Fraction is a material that is considered difficult. Fractions have long been described by educational researchers as difficult and challenging material for students in learning mathematics [15], [16]. The role of the teacher and learning media is something that will make learning more meaningful for students.

The media itself is interpreted as a means to convey something or a means to convey a learning material [17], [18]. This is supported by statements [19] and [20] namely "fraction cards are a learning medium that can be used to attract students' interest in learning mathematics". Thus, fraction card media is a means or tool that can be used to convey fractional material to students so that students are more enthusiastic in the learning process [21], [22]. The fraction cards contain pictures of concrete objects that are around students and contain questions that must be done by students, so that learning is more meaningful [23]–[25]. In addition, students can also learn independently about the concept of fractions, because the fractional card has an error handler in the form of an answer. The aim is to instill a more mature concept for elementary school students.

Research that is relevant to this research is research conducted by [26] regarding the application of the Concept Attainment learning model assisted by colonial documentaries in increasing understanding of the concept of struggle in elementary school students in the 2016/2017 academic year. Classical completeness in cycle II increased. Furthermore, research by [27] regarding the application of the Concepat Attainment learning model increases students' mathematical understanding abilities. The percentage of completeness of student learning outcomes in cycle I was 61.11% and increased in cycle II to 83.04%. Finally by [19] regarding the use of fractional card media can improve students' mathematics learning outcomes regarding understanding the concept of fractions in class III Elementary School Mento Wonogiri in 2011. The increase in student learning outcomes on the initial test is 26,

Based on this, the researcher feels the need for research regarding the use of the Concept Attainment model with the help of Fractional Card Media, especially in grade 2 students who are studying the material. So the purpose of this study was to see how the application of the Concept Attainment model assisted by fractional card media in increasing understanding of the fractional concept in class II Ahmad Dahlan Elementary School.

2.   RESEARCH METHOD

This type of research is survey research. This study uses a quantitative and qualitative approach. Quantitative research is useful for investigating causal hypotheses by comparing one or more groups with a comparison group to see the difference [28], [29]. Qualitative research is the study of the nature of phenomena [30], [31]. This research was conducted at Ahmad Dahlan Elementary School which is located at Jl. Enggano, Handil Jaya, Jelutung, Jambi City. The research was carried out in the even semester of 2018/2019. The research population was students of class II B. The research sample used was 22 students of class II B consisting of 10 male students and 12 female students.

Research data obtained from qualitative and quantitative data. Qualitative data were obtained from observations obtained from learning observation sheets in cycle I and cycle II. Observation or observation is the activity of collecting data to photograph how far the effect of the action has reached the target [32], [33]. Observations in this study aim to collect data in the form of changes in the performance of the learning process regarding the concept of fractions using the Conecpt Attainment learning model. Quantitative data is in the form of student learning outcomes in the cognitive domain regarding students' understanding of concepts obtained from test results at the end of each learning cycle. The data in this study were sourced directly from teachers and class II B students at Ahmad Dahlan Elementary School.

Data analysis techniques in this study used descriptive statistics. Quantitative data obtained from test results were analyzed to determine classical learning completeness and students' learning completeness in each cycle. The criteria for student completeness can be seen in table 1.

Table 1. Student Completeness Criteria	
Success Value	Predicate
85-100	A (Very Good)
70-84	B (Good)
55-69	C (Enough)
40-45	D (Less)
≤39	E (Very Less)

Classical completeness is achieved if students get a minimum score of 69 which will be seen in the evaluation results of each cycle. Based on the individual completeness criteria that have been described, it will be compared to the previous completeness percentage. Then the qualitative data obtained from the observations were analyzed to find out the learning process using the Concept Attainment learning model and the implementation of learning by the teacher and to find out how many students understand the concept of fractions by using the Concept Attainment model based on fractional card media. The criteria for the success rate of implementing the learning model can be seen in table 2.≥ 70%

Table 2. Criteria for Model Implementation Success	
Success Value	Predicate
85-100	A (Very Good)
70-84	B (Good)
55-69	C (Enough)
40-54	D (Less)
≤39	E (Very Less)

This study uses a class action research flow model according to Kemmis and Taggart. Kemmis and Taggart's research model spirals from one cycle to the next. Each cycle in this study consisted of two meetings with the time allocation according to predetermined lesson hours, namely 2 x 35 minutes. Each cycle consists of planning, implementing, observing, and reflecting. The research flow can be seen in Figure 1.
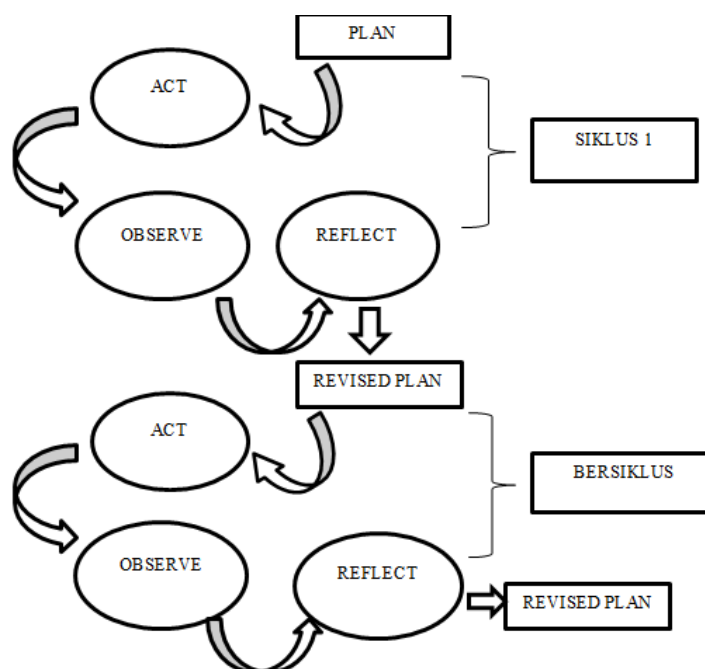

Figure 1. Research Flow

3.   RESULTS AND DISCUSSION

As a result of the researcher's collaboration with the class teacher, the action to be taken is to apply the concept attainment model assisted by fractional card media. The Concept Attainment model can make students able to find a more mature understanding of the concept with the guidance of the teacher. Uno in [34] states that "Concept Achievement Learning Model is a learning model that aims to help students understand a particular concept". Thus, researchers collaborate with class teachers to make the Concept Attainment model an alternative

learning model that can improve understanding of the concept of fractions. In addition to using the Concept Attainment model, researchers also use fractional cards to support the learning process. Because basically students in elementary schools need concrete objects to better understand the material being taught. The researcher applied the Concept Attainment model assisted by fractional card media to increase understanding of the concept of fractions in class IIB Ahmad Dahlan Elementary School, Jambi city by showing a table containing examples of the concept of fractions. From this example the teacher explains the concept of right and wrong. Then after that students are asked to distinguish the properties and characteristics of the concept. Students explain the definition of fractions and non-fractions. The researcher applied the Concept Attainment model assisted by fractional card media to increase understanding of the concept of fractions in class IIB Ahmad Dahlan Elementary School, Jambi city by showing a table containing examples of the concept of fractions. From this example the teacher explains the concept of right and wrong. Then after that students are asked to distinguish the properties and characteristics of the concept. Students explain the definition of fractions and non-fractions. The researcher applied the Concept Attainment model assisted by fractional card media to increase understanding of the concept of fractions in class IIB Ahmad Dahlan Elementary School, Jambi city by showing a table containing examples of the concept of fractions. From this example the teacher explains the concept of right and wrong. Then after that students are asked to distinguish the properties and characteristics of the concept. Students explain the definition of fractions and non-fractions.

The next step is to test the achievement of the concept. The teacher shows examples of fractions that are not labeled, with Yes and No marks. Then students identify examples of these fractions which are included in fractions and which are not. After identifying examples of fractions, students restate what is meant by fractions. After that students give examples of fractions other than those explained by the teacher. In the analysis stage of thinking strategies, students are divided into 4 groups. One group consists of 5-6 students. Each group discussed fractions 1/2 and 1/3 and provided examples, after which the group representatives presented the results of their discussions. After that the teacher and students confirm the answers that have been presented. Students correct answers and collect answers. After that the teacher gives an explanation as reinforcement of the material. The thinking strategy analysis stage is the last step of the Attainment Concept Model. These steps are in accordance with Joyce in [35] namely "(1) Presentation of data and identification of concepts, (2) Testing of achievement of concepts and (3) Analysis of thinking strategies".

The research was conducted by observing teachers and students during the learning process using the Concept Attainment model based on fractional card media. Observation of students' conceptual understanding and written tests were used to determine students' understanding of fractional concepts after being given action in the form of applying the Concept Attainment model assisted by fractional card media. Before taking action, the researcher first carried out pre-action activities. The pre-action implementation was carried out to determine students' initial understanding of the concept of fractions before taking action. Obtaining pre-action data was obtained from the results of observation and pretest. The pre-test results of students' pre-action understanding of concepts can be seen in table 3.

Table 3. Pretest Students' Concept Understanding Pretest Results

Success Value	Predicate	The number of students	Average	Lowest Value	The highest score	Completeness Percentage
85-100	A (Very Good)	1				
70-84	B (Good)	5				
55-69	C (Enough)	5	57,14	40	90	28.57%
40-54	D (Less)	10				
≤39	E (Very Less)	0				
Amount		21				

Based on Table 3, the mean for students' understanding of the concept of fractions is 57.14. The pretest results showed that out of 21 students only 6 students or (28.57%) students achieved the KKM. This shows that the learning outcomes are not yet optimal which indicates the low understanding of students' concepts. The low understanding of the concept of fractions must be immediately given action, so that the understanding of the concept of fractions in class II B Ahmad Dahlan Elementary School Jambi City increases. So the researcher chose an alternative learning model that could increase students' understanding of the concept of fractions by using the Concept Attainment model assisted by fraction card media. The Concept Attainment model is a learning model that emphasizes the attainment of a concept.

3.1. Cycle I

Research cycle I consisted of two meetings with two Basic Competencies, namely KD 3.7 Explaining fractions $\frac{1}{2}, \frac{1}{3},$ and $\frac{1}{4},$ using concrete objects in everyday life and KD 4.7 Presenting fractions $\frac{1}{2}, \frac{1}{3},$ and $\frac{1}{4}$ which corresponds to parts of a whole concrete object in everyday life. Implementation of this action through four stages, namely planning, implementation, observation and reflection. The recapitulation of the results of the written test for understanding the concept of cycle I fractions can be seen in table 4 and 5.

Table 4. Cycle I Evaluation Score

Amount	1460	
Average	76,84	
Maximum	100	Enough
Minimum	30	
Completeness Percentage	57,89%	

Table 5. Recapitulation of Written Test Results for Understanding the Concept of Cycle I Fractions

Success Value	Predicate	The number of students	Percentage
85-100	A (Very Good)	9	47,36
70-84	B (Good)	3	15.78
55-69	C (Enough)	2	10.52
40-54	D (Less)	4	21.05
≤39	E (Very Less)	1	5,26
Amount		19	100

Written test data were then analyzed for completeness of classical learning outcomes of at least 70% of the number of students who scored 69 and above.

$$KK = \frac{12}{19} \times 100\% = 63{,}15\%$$

Then the classical completeness in the first cycle is 63.15% or only 12 students complete, thus in the first cycle the target of classical completeness has not reached 70% with a score of ≥ 69. In order for this target to be fulfilled, it will be continued with another cycle. II. The results of the written test of understanding the concept have been analyzed, then an analysis of the observation results is carried out. The results of observing the understanding of the concept in cycle I can be seen in table 6.

Table 6. Recapitulation of Observation Results for Understanding the Concept of Cycle I Fractions

Success Value	Predicate	Number of students (Meeting I)	Percentage (Meeting I)	Number of students (Meeting II)	Percentage (Meeting II)
85-100	A (Very Good)	0		0	
70-84	B (Good)	0		3	
55-69	C (Enough)	10	48.80	7	57.23%
40-54	D (Less)	7		8	
≤39	E (Very Less)	4		1	
Amount		21		19	

Based on the observation results of the first cycle of the first meeting, it can be seen that the number of students is 21 students with a percentage of 48.80%. In the observation of the first cycle of the second meeting, it can be seen that the number of students is 19 students with a percentage of 57.23%. It can be seen that the number of students at meeting I and meeting II differed as well as the percentage values. The number of students at the first meeting was more than the second meeting, but the percentage of the first meeting was lower than the second meeting. This can be interpreted that some of the students are able to master the concept, but only a small number can express the concept.

Based on the implementation of the learning process with the Concept Attainment model assisted by fractional card media to the observation stage, it can be observed that the ability to understand the concept of fractional understanding of the Concept Attainment model assisted by fractional card media increased by 8.43%, namely at meeting 1 of 48.80% at meeting II to 57.23% evaluation results in cycle I with classical completeness of 63.15%. There are still deficiencies in meeting 1 and meeting II. Based on observations of the learning process on fractional material 1/2, 1/3, and 1/4 using the Concept Attainment Model assisted by fractional card media, it is quite good even though there are drawbacks.

3.2. Cycle II

At the stage of cycle II, the researcher designed learning to be two meetings with KD 3.7 Explaining fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ using concrete objects in everyday life and KD 4.7 Presenting fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ which correspond to the part of the whole of a concrete object in everyday life. At this first meeting students were given material about fractions, namely about fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ using fraction card media. And in the second meeting with material on fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$ as well as distinguishing between fractions and non-fractions using the Concept Attainment model assisted by fractional card media. The materials in these two meetings were the same, but the indicators and objectives were different. Where in cycle II meeting 1 understand and state fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$, while in meeting 2 namely determining and stating the parts of fractions $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{4}$. The recapitulation of the results of the written test for understanding the concept of cycle I fractions can be seen in table 7 and 8.

Table 7. Cycle II Evaluation Score

Amount	1790	
Average	81,36	
Maximum	100	Very Good
Minimum	60	
Completeness Percentage	81,81%	

Table 8. Recapitulation of Written Test Results for Understanding the Concept of Cycle II Fractions

Success Value	Predicate	The number of students	Percentage
85-100	A (Very Good)	10	45,45
70-84	B (Good)	8	36,36
55-69	C (Enough)	4	18,18
40-54	D (Less)	0	0
≤39	E (Very Less)	0	0
Amount		22	100

With written test data in the learning process analyzed using a classical learning completeness analysis of at least 70% of the number of students who scored 69 and above.

$$KK = \frac{18}{22} \times 100\% = 81,81\%$$

The classical completeness obtained in the second cycle was 81.81% , this indicated that the second cycle had met the target of classical completeness, namely 70%. Then the action will be stopped because it has met the target to be achieved. The results of the written test of understanding the concept have been analyzed, then an analysis of the observation results is carried out. The results of observing the understanding of the concept in cycle I can be seen in table 9.

Table 9. Recapitulation of Observation Results for Understanding the Concept of Cycle II Fractions

Success Value	Predicate	Number of students (Meeting I)	Percentage (Meeting I)	Number of students (Meeting II)	Percentage (Meeting II)
85-100	A (Very Good)	5		8	
70-84	B (Good)	6		10	
55-69	C (Enough)	9	73.57%	4	80.68%
40-54	D (Less)	2		0	
≤39	E (Very Less)	0		0	
Amount		22		22	

Based on the observation results of the second cycle of the first meeting, it can be seen that the number of students is 22 students with a percentage of 73.57%. From these data it can be interpreted that some of the students have been able to master the concept, but there are some students who are still unable to present the concept. In the observation of the second cycle of the second meeting, it can be seen that the number of students is 22 students with a percentage of 80.68%. It can be seen that the number of students at meeting I and meeting II were the same but obtained different percentage values. The percentage value of the first meeting is lower than the second meeting. This can be interpreted that the completeness criteria have been achieved with classical

completeness at the second meeting, namely 80.68%. The results of observations and written test results in cycle II showed that the actions in cycle II went well. There is an increased understanding of the concept of fractions.

3.3. Comparison of Action Results Between Cycles
Comparison of the results of cycle I and cycle II tests can be seen in table 10.

Table 10. Comparison of Cycle I and Cycle II test results

Observed Aspects	Pretest Value	Cycle I Value	Cycle II Value
The highest score	90	100	100
Lowest Value	40	30	60
Average	57,14	76,84	81.36

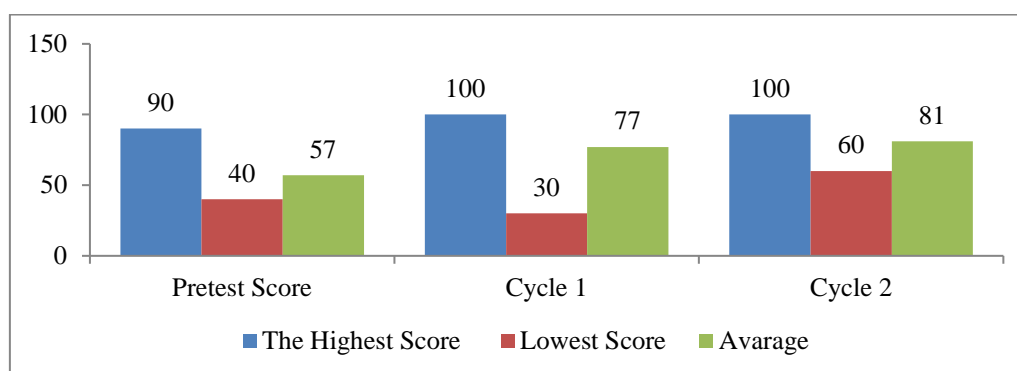In the form of a diagram can be seen in Figure 2.

Figure 2. Diagram of Comparison of Cycle I and Cycle II Test Results

Based on table 10 and figure 2, it can be stated that the students' scores during the pretest, cycle I and cycle II have increased. The average value in this class during the pretest was 57.14 while in cycle I it was 76.84 and in cycle II it had increased by 4.53 so that in cycle II it became 81.36. The results of the research in cycle II have met the criteria for research success, namely a minimum class average of 69. Apart from that, there has been an improvement in the learning process, classical completeness obtained in the second cycle of 81.81%, this shows that cycle II has meet the target to be achieved with a classical completeness target of 70%. So it does not proceed to the next cycle.

A comparison of the results of the two cycles of tests has been carried out, then a comparison of the results of the observations of cycle I and cycle II was carried out. Comparison of the results of observations of the ability to understand the concept of fractions in cycle I and cycle II can be seen in table 11.

Table 11. Comparison of Cycle I and Cycle II test results

No.	The aspect that Hedead	Pre Cycle	Cycle I		Cycle II	
			Pertemuan 1	Pertemuan 2	Pertemuan I	Pertemuan 2
1	Jujust Score	140	1025	1087.5	1618.75	1,775
2	Percentage	39.77%	48.80%	57.23%	73.57%	80.68%
	Total Each Cycle	39.77%	53.01%		77.12%	

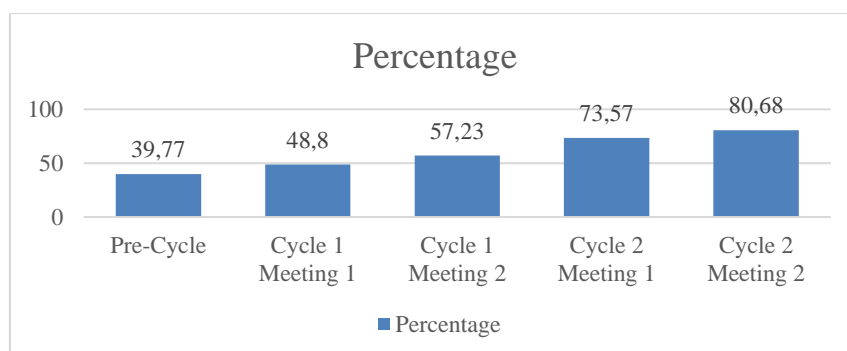In the form of a diagram can be seen in Figure 3.

Figure 3. Diagram of Comparison of Observation Values for Cycle I and Cycle II

Based on table 11 and figure 3, it can be stated that in the pre-cycle the results of observations regarding understanding of the concept were equal to 39.77% and experienced an increase in cycle I, in cycle I the results of observations concerning understanding the concept of fractions were equal to 53.01% at meeting 1 of 48.80% and experienced an increase in the second meeting of 8.42 so that it became 57.23% with the results of a written test with classical completeness of 63.15%. In cycle II the results of observations regarding the understanding of the concept of fractions are equal to 77.12%. at the first meeting it was 73.57% and it increased at the second meeting by 7.11% so that it became 80.68% with a written test result with 81.81% classical completeness. At every meeting between cycle I and cycle II there was an increase. So understanding the concept of this fraction increases.

Based on the research that was carried out in cycle I and cycle II, it can be concluded that there was an increased understanding of the concept of fractions which was improved using the Concept Attainment model assisted by class II B fractional card media at Ahmad Dahlan Elementary School Jambi City. Efforts to increase the understanding of the concept of fractions carried out by the teacher consist of four stages, namely planning, action, observation and reflection. In the first cycle the results of observations regarding the understanding of the concept of fractions were 53.01%, at the first meeting it was 48.80% and there was an increase in the second meeting which was 8.44% so that it became 57.23% with written test results with classical completeness 63 .15%. In cycle II the results of observations regarding the understanding of the concept of fractions were 77.12%, at meeting 1 it was 73.57% and experienced an increase at meeting II namely 7, 11% so that it becomes 80.68% and the results of the written test with classical completeness are 81.81%. At each meeting between cycle I and cycle II there was an increase. So understanding the concept of this fraction increases.

In the first cycle the results of observations regarding the understanding of the concept of fractions were 53.01% at the first meeting of 48.80% and an increase in the second meeting of 8.43% so that it became 57.23% with written test results with classical completeness 63, 15%. In this cycle, there are still deficiencies in observing teacher activities and student activities using the Concept Attainment model assisted by fractional card media, namely: The teacher has not conveyed the learning objectives at the second meeting in the preliminary activities. The cause of this is that the teacher does not master the class and there is still material that has not been mastered. At the first meeting there were still students who paid less attention to the teacher's explanation. and when his friends presented the results of the discussion there were still many students who were noisy and did not pay attention to it. In the first cycle of meeting 2 students still had difficulty in expressing a concept. In cycle II the results of observations regarding the understanding of the concept of fractions were 77.12%, at meeting 1 was 73.57% and experienced an increase in meeting II which was 7.11% so that it became 80.68% with the results of the student's written test exceeding the criteria success, so the cycle can be stopped. students have exceeded the success criteria, so the cycle can be stopped. In this second cycle, the results of observations on teacher activity used the Concept Attainment model assisted by fractional card media, namely the teacher emphasized more on giving examples, and students were given more opportunities to express their opinions. so the cycle can be stopped. students have exceeded the success criteria, so the cycle can be stopped. In this second cycle, the results of observations on teacher activity used the Concept Attainment model assisted by fractional card media, namely the teacher emphasized more on giving examples, and students were given more opportunities to express their opinions. so the cycle can be stopped. students have exceeded the success criteria, so the cycle can be stopped. In this second cycle, the results of observations on teacher activity used the Concept Attainment model assisted by fractional card media, namely the teacher emphasized more on giving examples, and students were given more opportunities to express their opinions.

The research that is currently being carried out by researchers is to complement the relevant research that has existed before. This research discusses in more depth and detail and provides updates that have not been carried out by previous studies. Previous research only focused on applying the concept attainment model to Social Studies and Mathematics learning and was generally separated and not integrated with the learning media used by current research and started at grade III level, while this study focused on learning Mathematics fraction material which is generally known to be difficult for primary school children to understand.

4. CONCLUSION

The low understanding of the concept of fractions is a problem in this study. Factors causing students' low understanding of the concept of fractions are the limited variations in the use of learning models and the limited learning media available. As a form of problem solving the researcher conducted a class action survey research using the Concept Attainment Model assisted by fractional card media. Based on the percentage of action achievements from the results of observations from cycle I to cycle II, students have experienced an increase in their understanding of the concept of fractions. Student learning outcomes are categorized as complete individually achieving a score of ≥ 69 for 18 people and student learning outcomes are said to be complete classically if they reach $\geq 70\%$ of the total number of students or in the good category as much as 81.81%.

ACKNOWLADGEMENT

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