

**MATHEMATICS LEARNING BASED ON *EXPERIMENTAL LEARNING*  
DESIGN IN FRACTION CONCEPT FOR PGMI STUDENTS**

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**Abstract**

In reality, Fraction is one of a difficult subject in mathematics, to learn as well as to teach its. Most of students have a complex to comprehend the fraction concept and operation. As same as a teacher have a difficult way when they are teach it, they encourage students just to memorize the formula, give some rules to solve and applied. A lot of teacher did not use a manipulative media for enriching their learning. This was a negative impact for teaching and learning, they are not using manipulative media to build fraction concept. Bad affect, students are not interested to learn about the fraction. In this study, researchers applied the Qualitative approach, the aims of this are (1) Analyze and describing systematically about the beginning comprehend of PGMI students about fraction concept, (2) the realization of applying experimental learning and usage manipulative media in fractios. Thus, the outcomes of this research would be the result about the beginning comprehensive student's PGMI about the fraction concept and manipulative media is implemented to teach the fraction. Based on the first data, it can be concluded that PGMI students have a difficult to explain about (1) determine the fraction part of an area (2) teach and explain the concept of fraction for elementary students (3) solving a fractional operation (4) defining a fraction worth (5) usage manipulative media for the concept of fraction.

**Keyword:** *Experimental Learning, Fraction; PGMI Students.*

**Abstrak**

Kenyataan di Sekolah Dasar, Pecahan merupakan salah satu mata pelajaran yang dianggap sulit. Kebanyakan mahasiswa sulit untuk memahami konsep pecahan dan operasinya. Di samping itu, banyak pula guru Sekolah Dasar mengalami kesulitan untuk mengajarkan materi pecahan. Para guru cenderung menggunakan cara yang mekanistik, yaitu memberikan aturan secara langsung untuk dihafal, diingat dan diterapkan. Kebanyakan guru tidak menggunakan alat peraga untuk membangun pengetahuan awal mahasiswa pada konsep tersebut, dan ini berakibat negatif pada proses pembelajaran bagi mahasiswa. Akibatnya, mahasiswa sama sekali tidak tertarik untuk belajar pecahan. Metode penelitian ini menerapkan pendekatan kualitatif, tujuan penelitian ini ialah (1) mengungkapkan, menganalisis dan mendeskripsikan bagaimana pemahaman awal mahasiswa calon guru MI tentang konsep pecahan, (2) realisasi penggunaan desain *experimental learning* dan alat peraga pada konsep pecahan. Hasil Penelitian analisis awal mahasiswa calon guru MI kesulitan dalam menjelaskan (1) memahami pecahan sebagai bagian dari keseluruhan (2) mengajarkan konsep pecahan bagi siswa SD (3) menyelesaikan operasi pecahan (4) menentukan pecahan senilai (5) penggunaan alat peraga pada konsep pecahan.

**Kata Kunci:** *Experimental Learning*, Pecahan; Calon Guru MI

## A. Introduction

The teacher has a main role in the learning process at the primary level, at the basic level students have not realized the importance of learning and they have not been able to think formally. Therefore, the general public often thinks that the success of student learning at the primary level is mostly determined by the role of a teacher.

There are some interpretations of this cases suggested Nahrowi, a teacher is required to develop his profession, namely to realize that his profession demands more competence or ability. As for those related to teacher competencies or abilities, namely: (1) developing personality; (2) master the educational foundation; (3) mastering teaching theory; (4) preparing learning programs; (5) applying a teaching program; (6) assessing teaching and learning processes that have been implemented.<sup>1</sup>

Therefore, in assessing the results from teaching and learning process that must be aimed at the success of 3 aspects, namely cognitive, affective and psychomotor. The primary teachers have a huge responsibility, so that the output produced is accordance with the standards of 3 aspects that have been determined by the government. Teachers who have compatible competencies will produce students who have good competitiveness.

On the other hand, many problems faced by education today, especially at the basic level include: (1) elementary students in Indonesia have very low competitiveness compared to students from other countries, this is corroborated by results of the PISA in 2015 which shows that Indonesia can only be ranked 69 of 76 countries, the average OECD country is 490, but Indonesia's score is 397 for mathematics. (2) Data from UNICEF 2011 that as many as 2.5 million Indonesian children who are supposed to go to school, honestly, they cannot enjoy education: 600.000 primary school and 1.9 million junior high school (13-15 years), particularly in mathematics.

Moreover, according to Muhsetyo, the reality in elementary schools shows that students have difficulty understanding the fractions and operations. Mostly, students are not comprehending fraction concept. Let make student aware that fraction was a crucial subject to apply for another discipline and in their daily life as well. So, it will indicate

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<sup>1</sup> Nahrowi Adjie, *Pemecahan Masalah Matematika*, (Bandung: UPI Press, 2006), hal. 35.

that its subject must be mastered for each student.<sup>2</sup> According to Tzur and Simon (NCTM) the teacher writes two fractions on the board, '1/7' and '1/5', and ask which one is larger. To the teacher's surprise, most of the students claim that 1/7 is larger because 7 is larger than 5. The teacher wonder how student can lose what they learned the day.<sup>3</sup>

Mathematics has a connection in intellectual, social and emotional progressive for student do in light mathematical experiences, student should know the aims of this subject focus, why their learning mathematics? And also, it's kind of trait to compare and comprehensive one to one correspondence. In addition, many elementary school teachers find it difficult to teach fractions and rational numbers. Teachers tend to use mechanistic methods, like giving some rules to memorize, remember and applying.

The results of the fraction concept test on the final level PGMI students, (1) Students who were prospective elementary school teachers at the final level of 38 students who were given a test on the fraction concept, only 8 students could (1) determine the fraction of an area (2) explain learning fraction concepts for elementary school students (3) performing fraction counting operations (4) determining fractions worth (5) using props for the concept of fractions. Based on these results it can be concluded that the concept of fractions was not understood at all by the elementary school teacher candidates who in the future would teach in elementary school. This has become a bad phenomenon, how can they teach in MI while they do not understand about the mathematical concepts in elementary school, they cannot explain what teaching aids can be used for the concept of fractions. Whereas we know the basic level is the beginning of the formation of new knowledge for students, if students are given the wrong knowledge transfer, then the impact for the next level will experience obstacles.

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<sup>2</sup> Gatot Muhsetyo, *Pembelajaran Matematika SD*. 2004. Dalam Epon Nur'aeni, Dindin Abdul Muiz Lidinillah dan Ayi Sakinatussa'adah, *Model Disain Didaktis Pembagian Pecahan Berbasis Pendidikan Matematika Realistik untuk Mahasiswa Kelas V Sekolah Dasar*, (Tasikmalaya: PGSD UPI Kampus Tasikmalaya. 2012), hal. 1.

<sup>3</sup> Tzur and Simon, National Council of Teachers of Mathematics, 2016, *Journal for Research in Mathematics Education*, January 2016, Vol. 47, Number 1, hal. 64.

There is interpretation of this case have been suggested, firstly, make connections for your students by explaining mathematics concept such as how fraction and numbers as a part of everyday life.

Fraction is one of subject that is very difficult to teach, comprehend as well. Therefore, a teacher must have high skills to understand the concept, so that when he understands for himself, then it will be easily taught to others. This phenomenon was raised by the researcher when the mathematics learning took place, students of elementary school Teacher Candidates were required to be able to apply mathematical concepts in learning process, the reality that occurred when the fractional concept was taught by the students still had difficulty understanding for themselves, what else taught the material to his friends, they were very difficult in making RPP and using props and media to the concept of fractions.

Based on that explanation, there needs to be a real action, which must be done. Both it will be done by the LPTK and Department, the Lecturers. To follow up on the right decision making procedure that can be taken for the solution, so that the Prospective Teachers produced by the UIN Ar-Raniry have professional abilities to compete nationally and internationally level.

There need to give real action and emphasize to teacher, students and parents as well, that teaching and learning mathematics have played a significant role in the process of education development. Moreover, there was no many achievements, such as student's performance in international Mathematics level. Consequently, teacher has still faced some challenges. They must connect between mathematics and another subject, such as Physics, Economics, Linguistics. Let student know that mathematics was a crucial subject to apply for another discipline. So, it will indicate that its subject must be mastered for each student. According to Freudental, mathematics is the oldest science and 'was easily invented' than other sciences. He was assumed that mathematics should be learned and taught differently. <sup>4</sup>

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<sup>4</sup> Freudenthal, H.. *Revisiting Mathematics Educations: China Lecturers*. (Dordrecht: Kluwer, 1991), hal. 9.

Based on the explanation, the Lecturer has a main role that must have appropriate strategies and learning, so that students can learn effectively and be aware of the learning goals. In terms of the learning process, lecturer activities give the information only direct instruction increasingly, while lecturer-student interactions, student activities to conduct discussions, exploration and investigation related to mathematical ideas showed a decrease. Though learning activities that require students to explore, investigations / discoveries that can train them to get used to high-level thinking.

In fact, as an institution that produces teachers, the learning process in the LPTK must provide changes for prospective teacher students about the atmosphere they will face at school later. The prospective teacher student is not only equipped with teaching techniques that are correct in theory but must have a meaningful learning approach, the occurrence of active learning processes that are able to build a classroom atmosphere that is more enjoyable and meaningful for students.

The concept of mathematics will be well studied if accompanied by doing it. In the process of working, we are required to think critically. In the process of working we are required to think, such as: expressing problems, planning solutions. So that a concept obtained from a learning activity will be more meaningful, not merely given directly without any process to get it first.

## **B. Review of the Literature**

### **Constructivism Theory**

Constructivist philosophy departs from Jean Piaget's theory which considers one's cognitive element as a schema, which is a collection of schemes. According to Nurhadi, "... in the view of constructivism, knowledge grows and develops through experience." So that understanding develops deeper and stronger when it is always tested with new experiences. While Piaget argued that "humans have a structure of knowledge in their brains". Nurhadi Based on this opinion, the same experience for

some people will be interpreted differently by each individual and stored in a different brain.<sup>5</sup>

### **Fraction Concept**

Fraction is a mathematical concept that is very important because its application is so wide, it is widely used in everyday life. According Nahrowi Fractions are numbers between two integers written  $a/b$ , with  $b$  not equal to zero, we call  $a$  numerator and  $b$  is called a denominator.<sup>6</sup>

### **Method and Design**

This study uses descriptive research with a qualitative approach. Sugiyono revealed that qualitative research is suitable for use, especially if the problem is still unclear, the researcher intends to understand deeply a complex social situation, full of meaning. This method is also suitable for constructing complex social phenomena and finding a theory. According to Borg and Gall (1989) in Sugiyono, qualitative research is referred to as new, post-positivistic, discovery, interpretative and qualitative methods.<sup>7</sup>

According to Lincoln and Guba looking at qualitative research as research that is naturalistic, has 2 objectives, (1) describes and expresses, (2) describes and explains.<sup>8</sup>

As in this study attempts to describe systematically about various components and things related to learning mathematics in the concept of fractions, namely expressing, analyzing and describing how the initial understanding of prospective elementary school teacher students about the concept of fractions, the realization of the use of teaching aids in the concept of fractions.

In this study, researchers applied the Qualitative approach, the aims of this are (1) Analyze and describing systematically about the beginning comprehend of PGMI students about fraction concept, (2) the realization of applying experimental learning

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<sup>5</sup> Nurhadi, *Pembelajaran Kontekstual dan Penerapannya dalam KBK*. (Universitas Negeri Malang, 2003), hal. 55.

<sup>6</sup> Nahrowi Adjie, *Pemecahan Masalah Matematika*, (Bandung: UPI Press, 2006), hal. 220.

<sup>7</sup> Sugiyono, *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif dan R & D*, (Bandung: Alfabeta. 2013), hal. 86.

<sup>8</sup> Lincoln. I.S dan Guba, E.G, *Naturalistic Inquiry*, (Beverly Hills, London: Sage Publication, 1985), hal. 223.

and usage manipulative media in fractions. Thus, the outcomes of this research would be the result about the beginning comprehensive student's PGMI about the fraction concept and manipulative media is implemented to teach the fraction.

### C. Research Results and Discussion

#### Mapping Situation Analysis Before Learning

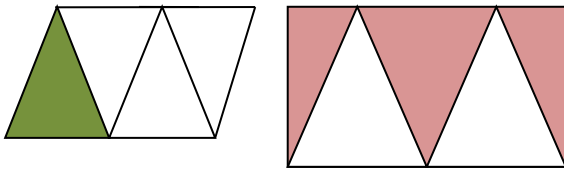
#### Mapping: Fraction Concept

#### Analysis Results

This initial analysis was carried out as an effort to analyze the students' initial experience in teaching fraction material at the MI level. The results of the initial study of students have difficulty in understanding the concept of fractions.

Students find it difficult when given the following questions:

a. Fill in the fractions that correspond to the shaded part in the following image



(a)

(b)

b. Make the following fractional representation:  $\frac{2}{3}$  and  $\frac{6}{7}$

c. Determine a minimum of 4 fractions that are worth the following fractions

a.  $\frac{8}{7}$  b.  $\frac{5}{6}$  c.  $\frac{8}{9}$  d.  $\frac{2}{11}$

d. I shop at the market with Rp. 200,000.00.  $\frac{2}{3}$  Mother's money is used to buy milk,

meat and eggs. The rest, bought vegetables and fruits. How much rupiah do you have to pay to buy vegetables and fruits? Determine the results of the following fraction sum.

1).  $\frac{3}{5} + \frac{1}{8}$       2).  $\frac{5}{9} + \frac{3}{12}$       3).  $3\frac{5}{9} + 4\frac{3}{12}$

e. Is  $\frac{4}{2}$  a fraction?

f. By using props, determine the sum of the following fractions.

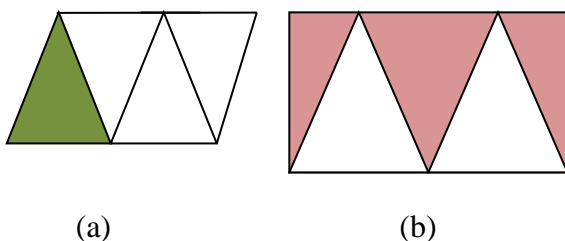
1.  $\frac{2}{5} + \frac{1}{5} = \dots$      2.  $\frac{3}{7} + \frac{2}{7} = \dots$

3.  $\frac{4}{9} + \frac{5}{9} = \dots$      4.  $\frac{10}{15} + \frac{1}{15} = \dots$

The students' answers to the test questions are then analyzed by paying attention to the errors that most appear on the answers given, so that the following things can be described:

1. Students do not understand fractional examples as part of the whole, for example almost all students find it difficult to answer the following questions:

Fill in the fractions that correspond to the shaded part in the following image



Various answers appear, point (a) someone answers  $1, \frac{1}{2}$  ect.

1. Students cannot classify which ones are called fractions which are not, this is seen when given a question, Is  $\frac{4}{2}$  a fraction? Most students answer  $\frac{4}{2}$  is a fraction.
2. Students do not understand what teaching aids should be used to explain the concept of fractions
3. Students do not understand the meaning of the denominator and numerator in the concept of fractions
4. If given a problem-solving problem in a fractional context, students are less able to complete, both in the form of story problems and operations about fractions
5. Students cannot remember how to simplify the denominator, if there are different denominators.
  1. Based on the above it can be concluded that the problems experienced by students are the initial conceptual understanding of very low fractions. So to



overcome this, the researcher tries to apply the constructivism approach, the most important thing in constructivism learning is the students who play an active role in building their knowledge. The learning process is more directed at experimental learning, namely the adaptation of knowledge based on concrete experience, discussion with friends, which becomes a benchmark for the emergence of ideas about the development of a concept.

2. The alternative strategies offered to overcome the misconceptions of concepts in fraction material are: (1) prioritizing learning that is real in the relevant context. (2) prioritizing the process, (3) instilling learning in the context of social experience, (4) learning is done in an effort to construct experience. The first goal in the development of the fraction concept begins with learning that is real and context that is appropriate to the child's experience. Then do the process in expressing new ideas, and explain problem solving in the context of social experience, namely expressing something from previous experience.
3. Based on the results of conceptual error analysis that has been carried out in the previous stage, a solution that can be used in terms of learning development in understanding the concept of fractional material, which refers to the objectives that must be achieved by prospective MI teacher students in learning fractions, as reported in the syllabus below this:

Explain the concept of fractions as part of the whole

4. Explain the meaning of fractions worth
5. Performing the same or different fraction operations
6. Representing worth of fractions using image / concrete media
7. Complete solving problems related to fractions in everyday life

Experimental learning design, a design designed using several methods related to constructivism approach, namely active learning, problem solving, which is accompanied by an understanding of the concept of fractions by using teaching aids and learning based on solving story problems. The following will be described in experimental learning design.

Expected student activities and responses

## The First Meeting

### 1. Making students active

Team formation and direct learning involvement

Helping students become more familiar with each other or create a spirit of cooperation and interdependence. (Students are expected to be motivated by the process of collaboration in groups, they will solve the problems faced and solve with class discussion)

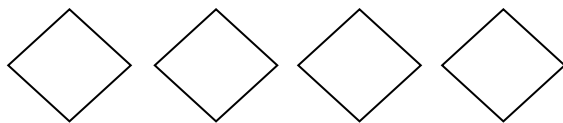
Simultaneous assessment

Learning about the students' attitudes, knowledge and initial experiences about the concept of fractions, this is done at the beginning of learning, students will be asked about the initial experience of the fraction concept as part of the whole, by displaying several media images that students are required to interpret the differences in each picture of the fraction. Students are required to divide the whole form from fractions by finding more than 1 method. (Students are expected to be able to solve problems related to fraction sharing, can find more than one method)

### 2. Helping students gain knowledge, skills and attitudes actively

1. The process of learning a full class: teaching led by a lecturer that stimulates all students, is given a picture but not shaded which area represents the fraction, which is only given a complete picture, which students are then required to determine the fraction given.

Divide the following buildings into four equal parts in different ways. Then color one part of the wake



1. Class discussion, there will be dialogue and debate from the answers of each group, so that (students are expected to submit statements, ask for explanations, from the answers of other groups).
2. Collaborative learning activities; independent; teaching by classmates, Active learning activities and skills development; here are required to find creative ideas to find the right form of fractions and students are expected to be able to make simple teaching aids from paper, drawing media to train their skill skills.

### Second Meeting

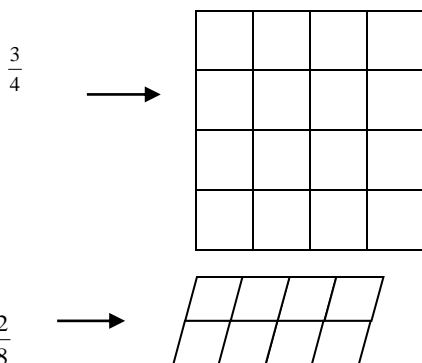
Activities at the second meeting were designed so that students better understand the concept of Value Fractions and also understand how to teach it to MI students. The design is expected to stimulate students to be skilled in using props to prove fractions worth.

#### 1. Making students active

Team formation and direct learning involvement

Students are asked to sit in groups and will be given problems related to the concept of fractions as part of the whole. Lecturers who act also as researchers will provide problems that will arouse student exploration.

Shrink the image below, so it shows the following fractional values:



*(Students are expected to be motivated by the process of collaboration in groups, they will be able to find many ways to shading the image and can conclude that the activity carried out is to find fractions worth)*

#### Simultaneous assessment

Students will be asked about the initial experience of the concept of fractions worth, by displaying several image media and students are required to help gaining knowledge, skills and attitudes actively

##### 1. The process of learning a full class:

Lecturers give cardboard with 4 colors, red, blue, yellow and green. The length of the paper tape as a unit is made 36 cm because it has many factors. As for the length of colored paper made varies. For example, 18 cm to represent and, 9 cm to represent, etc.

2. Class discussion, there will be dialogue and debate from the answers of each group, so that (students are expected to submit statements, ask for explanations, from the answers of other groups)

Next, students are expected to have an idea to compare different pieces of color paper that have the same length (eg 1 paper with two yellow papers).

##### 3. Collaborative learning activities; independent; teaching by classmates.

Look for some alternative answers to the problems given using the media provided such as: paper, ribbon, color. Then it was demanded cooperation between classmates.

4. Active learning activities and skills development; here it is required to find creative ideas to find the right fraction of the form and students are expected to be able to use simple media from paper, ribbon, rope etc., then interpret it in the form of images to train their skill skills.

### **Third Meeting**

#### 1. Making students active

Team formation and direct learning involvement

Students are asked to sit in groups and will be given problems related to the concept of simplifying fractions as part of the whole. Lecturers who act also as researchers will provide problems that will arouse student exploration.

#### Simultaneous assessment

Lecturers display several media images that students are required to interpret the following picture differences:



What is the connection between giving the picture by simplifying fractions

Helping students to gain knowledge, skills and attitudes actively

1. The process of learning a full class:
2. Class discussion, there will be dialogue and debate from the answers of each group, so that (students are expected to submit statements, ask for explanations, from the answers of other groups)
3. Collaborative learning activities; independent; teaching by classmates,  
At this stage each group can come up with an interesting idea how to simplify fractions.
4. Active learning activities and skills development; here it is required to find creative ideas to find the correct form of fractions and then make it in a mathematical model, students are expected to be able to make simple teaching aids related to simplifying fractions.

#### **Fourth Meeting**

At the fourth meeting students will follow the learning to add and subtract fractions. The learning steps applied remain the same as the previous meeting.

1. Students will be given problems: add and subtract the same denominations.
2. Students are also required to use concrete media in describing the concept.
3. Students are given story problems related to solving sums and reducing fractions.
4. Students will carry out activities to explain how to complete the addition and reduce the denomination of the same denomination.

Analysis of Experimental Learning Design in Learning Activities

Observation Result Description

In this study, researchers tried to apply several things that had been designed beforehand in the MI Mathematics Learning MK 1. During the learning process

researchers collected information related to Experimental Learning Design conducted. The results of the observations are described below:

The first meeting

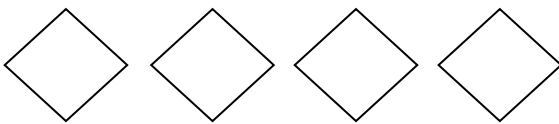
Students are grouped heterogeneously and direct involvement of learning occurs, given problems in fraction concepts about explaining fractions as part of the whole. Lecturers provide activities to explore students' initial knowledge of the concept of fractions:

Lecturers give papers to students, then they are required to divide them into four equal parts

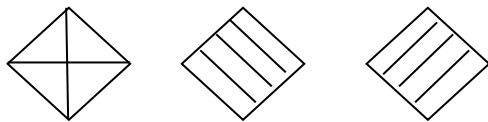
If the paper is divided into four equal parts, each part is a fraction or part of one paper as a whole. It is expected that students can understand that "one piece of paper is one of four parts or simply called  $\frac{1}{4}$ ".

Then proceed with activity 2:

Lecturers submit the following problems, divide the following structures into four equal parts in different ways. Then color one part of the wake

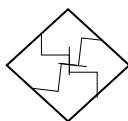


Results Student observations only divide the build in the following 2 models:



Then the students shaded one of the parts.

It's rare for students to find the following form:

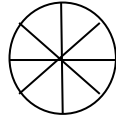


Each team only found 3 models and no one found other models.

Then the Lecturer gives questions to explore the experience, skills of students

Lecture : "How to show fractions  $\frac{1}{8}$  for MI students? Show me using materials around the environment?"

Student : (Discussing between group friends). Can be proven using paper, namely: draw a circle, which is then divided into eight parts



a large circle image that is divided into 8 equal parts with shaded parts. The number of shaded parts shows the value of "numerator" while the number of all parts in the circle shows the value "denominator".

Lecture : Give an example, a circle with 2 shaded parts while the number of all parts is 8 so that the image shows the fraction of the value  $\frac{2}{8}$ .

The students are then asked to explain the magnitude of the fractions shown by the subsequent pictures. Other teams were asked to respond to the answers given by their friends. Students are also asked to make and shear some other shapes (such as square, hexagon or other shapes) to show the value of various fractions using Origami paper

Second meeting

Students are grouped heterogeneously and there is a direct involvement of learning, given problems in the concept of fractions worth. Lecturers provide activities to explore students' initial knowledge of the concept of fractions worth:

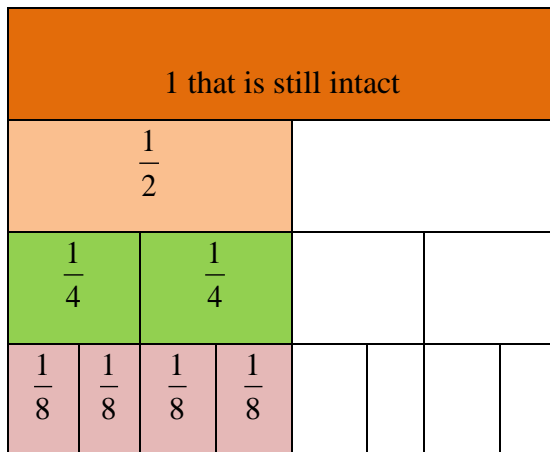
Activity 1

Lecturers give cardboard with 4 colors, red, blue, yellow and green. The length of the paper tape as a unit is made 36 cm because it has many factors. As for the length of colored paper made varies. For example 18 cm to represent  $\frac{1}{2}$  or,  $\frac{2}{4}$ , 9 cm to represent,  $\frac{1}{4}$ , and others.

Students compare different pieces of color that have the same length (for instance: 1 paper with two yellow papers).

Students compare different pieces of color that have the same length (eg 1 paper with two yellow papers).

The model produced by students doing several experiments using color paper



Lecture : What can you conclude about the fractions represented by the shaded areas?

Student : Because the length of the shaded area is the same, the fractions are the same size

Lecture : “Yes, right! So,  $\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$ . These three equal fractions are said to be equal

The lecturer instructs the students to conclude that the papers are the same length, so the fractional value shown by each of the paper of a different color is the same or has the same value.

**Third meeting**

The lecturer gave the following problem

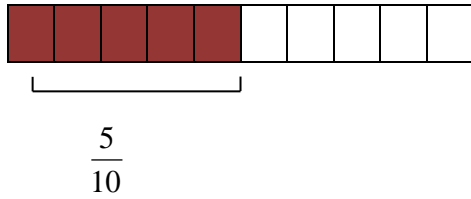
Ayu’s cloth is divided into 10 parts with five shaded sections, while Furqan cloth is divided into 12 parts with eight shaded sections.

- a. What fraction is indicated by the shaded part of Ayu and Furqan cloth’s?
- b. What is the simplest form of these fractions?

**One of the student results representation**



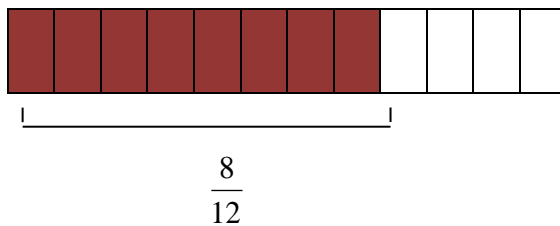
Ayu



This is The simple form from  $\frac{5}{10}$  :

$$\frac{5:5}{10:5} = \frac{1}{2}$$

Furqan



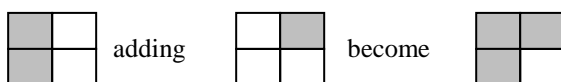
This is the simple form from  $\frac{8}{12}$  :

$$\frac{8:4}{12:4} = \frac{2}{3}$$

The lecturer provides guidance that there is a link between looking for other fractions of equal value and simplifying fractions. Guiding students to find other fractions that are equal to a fraction is by multiplying the numerator and denominator of the fraction by the same number, while the way to simplify fractions is by dividing the numerator and denominator by the same number

#### Fourth Meeting

The lecturer illustrates a picture in power points related to the operation of adding the same denominated fraction.



Mathematics symbol:

$$\frac{2}{4} + \frac{1}{4} = \frac{\dots}{\dots}$$

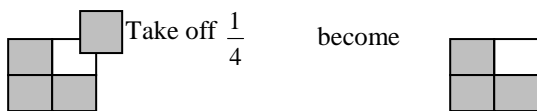
Begin learning by asking questions like the following:

1. How much is the fraction value from the first picture?
2. From the second picture, how much is the value of the fraction?

Giving the opportunity to answer and express their opinions and give students the opportunity to respond the opinions of other students.

(Students are expected to conclude that if the value of the first fraction is combined with the value of the second fraction, the results will be obtained. Students find that the operation of the sum of the denominated fraction is carried out only by adding up the numerators while the denominator is not added up (fixed).

Then the lecturer illustrates a picture in power points related to the reduction operation of the denominated fraction.



Begin learning by asking questions like the following:

1. How much is the fraction value from the first picture?
2. From the second picture, how much is the value of the fraction?

Lecturers give word problems.

Gina makes  $\frac{1}{4}$  a liter of orange juice. Meanwhile, Lili makes  $\frac{3}{8}$  more liters than Gina's juice. How much orange juice do Lili and Gina make?

The student answers.

**Lecture** : What can you conclude from word problems?

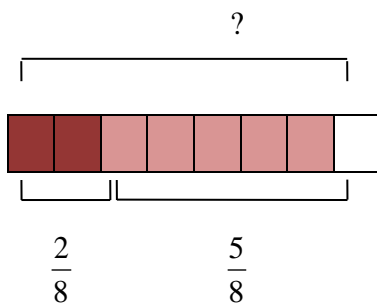
**Student** : First part we find the amount of juice made by Lili.

From the problem, it is known that Lili makes  $\frac{3}{8}$  more liters than Gina's juice. So:

$$\frac{1}{4} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$$

**Lecture** : try interpreting using image

**Student** : Lili makes  $\frac{5}{8}$  liter juice



From the diagram we found  $\frac{7}{8}$

**Lecture** : Describing in a mathematical model

**Student** :  $\frac{1}{4} + \frac{3}{8} = \frac{2}{8} + \frac{3}{8} = \frac{5}{8}$

$$\frac{1}{4} + \frac{5}{8} = \frac{2}{8} + \frac{5}{8}$$

$$= \frac{7}{8}$$

### Conclusion

Based on the results of the learning carried out, students look enthusiastic when learning takes place using a constructivist approach based on experimental learning design, because the problem is solved by doing activities (experiments) first assisted by concrete media, so that students' conceptual understanding of fraction material can be understood more easily.

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