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The Relevance of Learning Routine Processes in the Class to the Multiple Representation Ability of Junior High School Students in Task Solving of the Concept of Fraction in Terms of Gender

Luluk Faridah[1,2], Tatag Yuli Eko Siswono[1], R. Sulaiman[1]
[1] *Postgraduate Program in Mathematics Education,*
State University of Surabaya West Java, Indonesia
[2] *Faculty of Teacher Training and Education,*
Darul 'Ulum Islamic University Lamongan West Java, Indonesia
[1)] *luluk.17070936002@mhs.unesa.ac.id*
[1)] *tatagsiswono@unesa.ac.id*
[1)] *radensulaiman@unesa.ac.id*
[2)] *lulukfaridah@unisda.ac.id*

Abstract: The study aims to describe the relevance of the process of learning routines in the classroom to the multiple representation ability of Junior High School students in solving the fraction concept task in terms of gender. The research method is descriptive with the type of qualitative research. The technique of taking the subject is using the BSRI (Bem Sex-Role Inventory). Data collection techniques are by giving tests and interviews. The results showed that the number of test scores for students' multiple representation ability in grades 7B and 7C in each gender had increased. Of the 32 students in grade 7B, 14 students used visual representations, 9 students used verbal representations, and 9 students used more than two representations, namely visual and verbal. Meanwhile, of the 33 students in grade 7C, 11 students used visual representations, 16 students used verbal representations, and 6 students used more than two representations, namely visual and verbal. This is influenced by the routine process of learning in the classroom, where students in grade 7B use visual methods and grade 7C use verbal methods.
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INTRODUCTION

Representation is one of the process skills needed in learning mathematics (NCTM, 2000). The main purpose of mathematical representation as a process standard in school mathematics, namely: creating and using representations to organize, record and communicate mathematical ideas.

Translating, selecting, and applying mathematical representations to solve problems. Hutagol (2013:87) states "in the process of learning abstract mathematics, the good representation ability is needed, so that abstract mathematics is easier to understand". It is difficult to understand and acquire concepts without using certain representations. For mastering mathematical concepts, there are three things that must be considered, namely: (1) skill to identify a concept with multiple representations; (2) skills to deal flexibly with concepts in certain representation systems; (3) the skill of translating a concept from one representation to another (Lesh, et.al in Gagatsis & Elia, 2005).

The use of multiple representations is very important for the construction process of students' mathematical understanding for the successful completion of mathematical problems. In addition, the routine process of learning in classroom also affects students in solving math problems. For example: students who are usually taught in class how to solve math problems with various representations, if the students are given a math problem they will try to solve the problem according to the way that has been taught. This also happened at SMP Negeri 2 Sukodadi. Grade 7B students in solving math problems tend to use visual representations, whereas grade 7C students use verbal representations. Symbol representation is rarely used when learning mathematics, especially in fractions, and it is clear at grades 7B and 7C, there are not students using symbol representation in solving the assignment of the concept of fraction.

Mathematics learning in schools certainly involves male and female students, there are some opinions that say that male students are quite successful in learning mathematics than female students. Keytel (1998), and Susento (2006) state that the conceptualization process is influenced by gender factors. So that research is still open that reveals the role of gender in studying mathematics, especially certain topics.

THEORITICAL REVIEW

A. Representation

Representation is a mental description/expression of a person's ideas expressed in the form of writing or words, graphics, pictures, tables, diagrams, symbols, equations or mathematical expressions. Representation can be used to explain several important phenomena about children's thinking processes. Davis, et.al (in Janvier, 1987) explain that representation is the person's ideas that are constructed in the mind can be a combination of several things from something written on paper, something that exists in the form of a physical object. The combination can be in the form of symbols, real objects, and mental images. Meanwhile, Kartini (2009: 369) said that representation plays a very important role in helping increase students' understanding of mathematical concepts, improve communication skills, and solve students' mathematical problems. In addition, students' representation can provide information to teachers about how students think about a context or mathematical ideas about patterns and tendencies of students in understanding concepts.

In this study, representation is a mental description/expression of a person's ideas in various visual forms (pictures, diagrams, graphics, or tables), symbolic (mathematical statements, mathematical equations or symbols) and verbal (written text and words) as an effort to show the understanding and solve problems encountered**.**

B. Forms of Representation

In general, the representation is divided into two, namely: external and internal representation. The physical form of mathematical ideas can be shown by external representation. Symbolic, verbal (written), and visual (schematic and pictorial) representations are examples of external representation. While internal representation is a process of thinking about mathematics that assumes someone acts on the idea (Goldin, 2002). Internal representations are in a person's mentality so they cannot be observed. A person's external representation depends on the individual's internal representation in interpreting. When someone is dealing with something he faces, there will be a reciprocal relationship between internal and external representations. In this study, researchers will examine the external representation of students'. Due to the representation can be communicated to other people and can be observed because it is created from experience and can be taken from observation. An example of a connection between internal representation and external representations is for example the teacher asking students to give examples of fraction ¾ with various approaches in different contexts, then students explain different methods. Some students may present using pictures, diagrams, while other students present with symbolic or mathematical notation and other students may interpret it as the result of the division of 3 divided by 4, with the context (external representation) that makes a difference in students' minds.

C. Multiple Representation

In this study, what is meant by multiple representations is the expression of one's ideas to symbolize, to describe and refer to the same mathematical entity indifferent forms visually, verbally, and symbolically.
Visual forms can be pictures, diagrams, graphics, or tables. Verbal can be written text and words. While the symbol form can be math equations or symbols.

According to Ainsworth (1999) multiple representations have three main functions, namely: (1) As a complement that contains information on cognitive processes.
(2) As a limiting interpretation so that there are no errors between representations. (3) As the development of a deeper understanding.

D. Gender

Gender is a self-concept of personal identity as a male or female (Baron, 2000: 188). Santrock (2003:365) says that gender and sex differences lie in terms of dimensions. The biological dimension refers to sex (gender). While the gender dimension refers to socio-cultural. Furthermore, Hilary (1993) reveals that gender is "cultural expectations for women and men as cultural expectations for men and women. For example, men are really considered male, mighty, strong, rational, and women, for example, are gentle, beautiful, emotional, and motherly (Fakih, 1999). Stake & Eisele (2010) say that gender roles consist of *masculine*, *feminine*, *androgyny*, and *undifferentiated*.

RESEARCH METHOD

The research method is descriptive with the type of qualitative research. The subjects in this study were students of SMP Negeri 2 Sukodadi Lamongan class 7B, totaling 32 students, and 7C, totaling 33 students. The process of selecting subjects to determine a particular gender using the BSRI (Bem Sex-Role Inventory) questionnaire developed by BemSL (1974). This questionnaire is to find out whether students have the same gender *masculine*, *feminine*, *androgyny* (a combination of masculine and feminine), or *undifferentiated* (indistinguishable). The data collection technique is by giving multiple representation ability tests on solving the fraction concept task on all research subjects. After that, interviews were held to further reveal the students' multiple representation process.

RESULTS AND DISCUSSION

A. Analysis of Gender Questionnaire Data

After analyzing the gender questionnaire of 65 students, the following data were obtained.

Table 1. Result of the Gender Questionnaire

Gender	Class B (Student)	Class C (Student)
Masculine	7	11
Feminine	8	3
Androgynous	6	8
Undifferentiated	11	11
Total	**32**	**33**

B. Data Analysis of Multiple Representation Ability Test for Each Gender

Table2. Multiple Representation Ability Test Results in Solving the Concept of Fractions for Each Gender (7B)

Gender	**Lots of Students**	**Total of Test Score**		**Percentage**
		A	**B**	**The number o students**
Masculine	7	425	500	21.9%
Feminine	8	525	650	25.0%
Androgynous	6	400	500	18.7%
Undifferentiated	11	600	675	34.4%
Total	**32**	**1.950**	**2.325**	**100%**

Based on Table2, the ability of multiple representation in each gender can be described as follows:

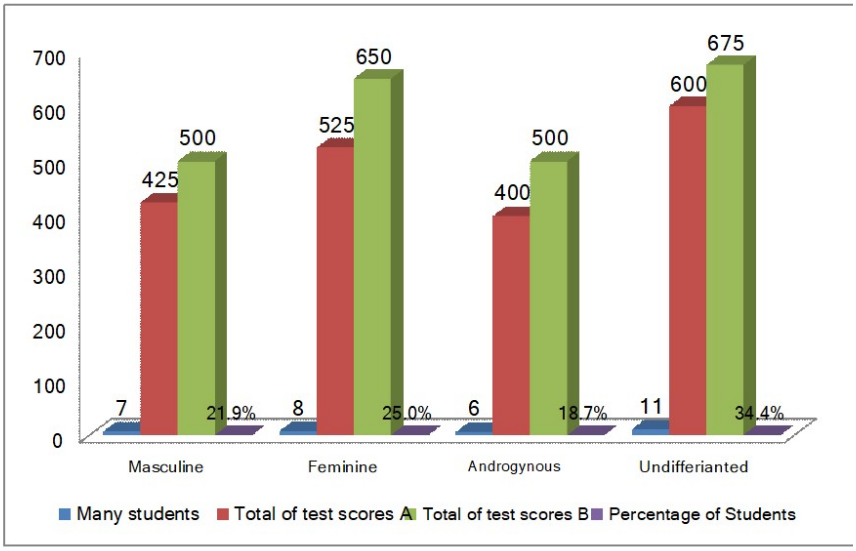

Figure 1. Multiple Representation Ability Bar Chart on Each Gender

From Table 2 and Figure 1, it can be seen that the multiple representation abilities of each gender for grade 7B are: the total of test scores of 7 masculine students for question A = 425, and for question B=500.Total of test scores of 8 feminine students for question A = 525, and for question B = 650. Total of test scores of 6 students *androgynous* for question A= 400, and for question B =500.

Total of test scores of 11 *undifferentiated* students for questions A = 600, and questions B = 675. This means that the number of students' double representation ability test scores for each gender has increased.

Table3. Test Results of Multiple Representation Ability on Fractional Task Solving for Each Gender (7C)

Gender	Lots of Students	Total of Test Score		Percentage of The number of students
		A	B	
Masculine	11	500	500	33,3%
Feminine	3	100	125	9,1%
Androgynous	8	200	400	24,3%
Undifferentiated	11	375	475	33,3%
Total	**33**	**1.175**	**1.500**	**100%**

Based on Table 3, the ability of multiple representation in each gender can be described as follows:

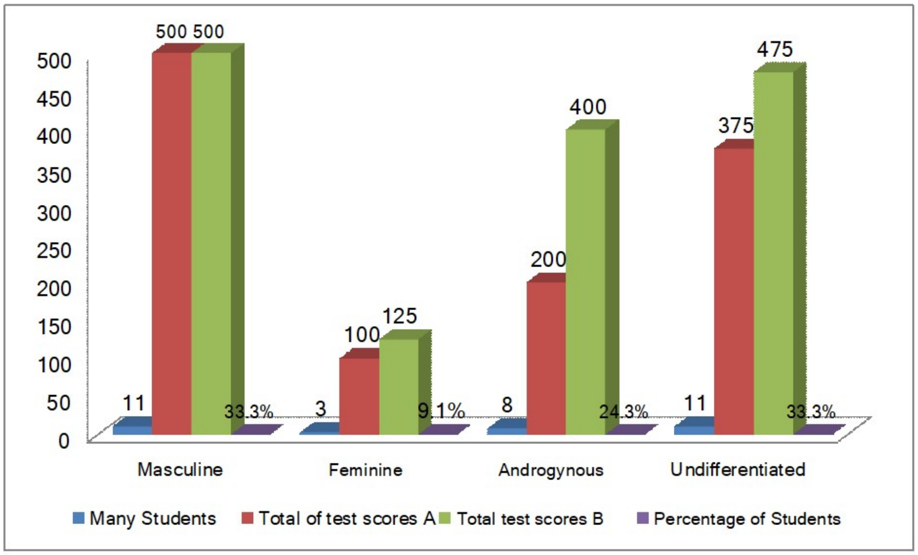

Figure 2. Multiple Representation Ability Bar Chart On Each Gender

From Table 3 and Figure 2, it can be seen that the multiple representation abilities of each gender for grade 7C are: the total of test scores of 11 masculine students for question A = 500, and for question B = 500. Total of test scores of 3 feminine students for question A=100, and for question B = 125. Total of test scores of 8 androgynous students for question A=200, and for question B=400. Total of test scores of 11 undifferentiated students for item A = 375, and item B = 475. This means that the number of students' double representation ability test scores for each gender has increased.

C. Data Analysis of Multiple Representation Ability Tests for Each Indicator

Table4. Test Result of Multiple Representation Ability in Solving Fractional Tasks for Each Indicator (7B)

Gender	Lots of Student	Visual		Verbal		Symbolic		Visuals and Verbal	
		A	B	A	B	A	B	A	B
Masculine	7	3	3	2	2			2	2
Feminine	8	3	3	3	3			2	2
Androgynous	6	2	2	1	1			3	3
Undifferentiated	11	6	6	3	3			2	2
Total	**32**	**14**	**14**	**9**	**9**			**9**	**9**

Based on Table 4, the ability of multiple representation for each indicator can be described as follows:

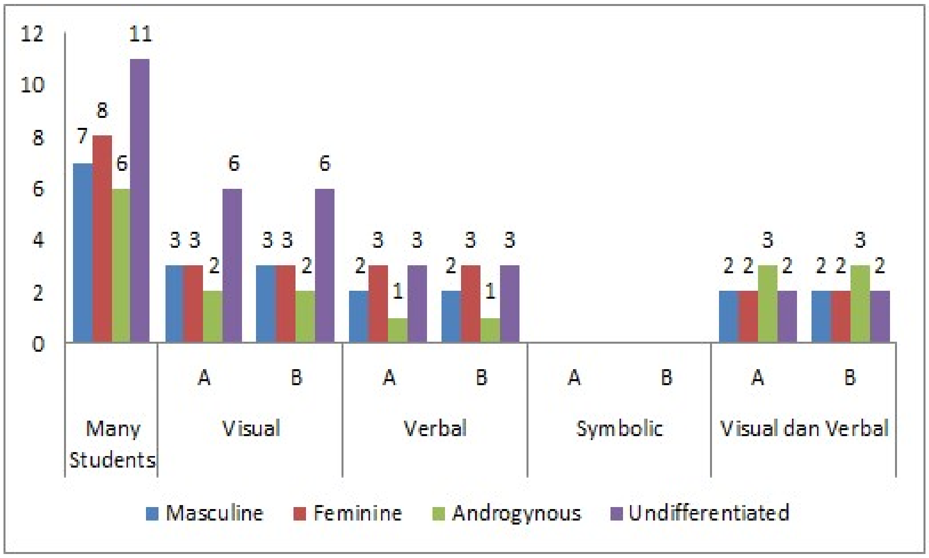

Figure 3. Multiple Representation Ability Test Bar Chart In Solving Tasks Concept Fractions of Each Indicator

From Table 4 and Figure 3, it can be seen that the ability of multiple representations in solving the task of each indicator for class 7B for the types of questions A and B are: out of 11 masculine students (3 students use visual representations, 2 students use verbal representations, 2 students use more than one representation, namely visual and verbal representations). From 8 feminine students (3 students use visual representations, 3 students use verbal representations, 2 students use more than one representation, namely visual and verbal representations).From 6 androgynous students (2 students use visual representations, 1 student uses verbal representations, 3 students use more than one representation, namely visual and verbal representations). This is out of 11 undifferentiated students (6 students use visual representation 3 students use verbal representations, 2 students use more than one representation, namely visual and verbal representations). Of the 32 students in grade 7B (14 students used visual representations, 9 students used verbal representations, 9 students used visual and verbal representations).

Table 5. Multiple Representation Ability Test Results in Solving Fractional Tasks for Each Indicator (7C)

Gender	Lots of Students	Visual		Verbal		Symbolic		Visuals and Verbal	
		A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
Masculine Feminine Androgynous	11 3 8	3 2 3	3 2 3	6 1 3	6 1 3			2 2	2 2
Undifferentiated	11	3	3	6	6			2	2
Total	**33**	**11**	**11**	**16**	**16**			**6**	**6**

Based on Table 5, the ability of multiple representation on each indicator can be described as follows:

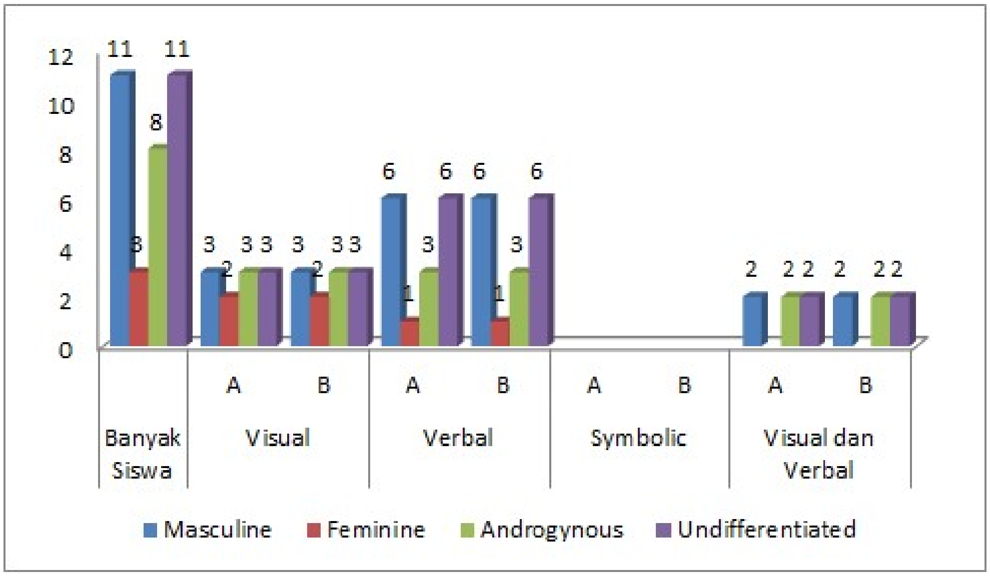

Figure 4. Bar Chart of Multiple Representation Ability Test In Solving Tasks Concept Fractions of Each Indicator

From Table 5 and Figure 4, it can be seen that the ability of multiple representations in solving the task of each indicator for class 7C for the types of questions A and B are: out of 11 masculine students (3 students use visual representations, 6 students use verbal representations, 2 students use more than one representation, namely visual and verbal representations). From 3 feminine students (2 students use visual representation, 1 student uses verbal representations. From 8 androgynous students (3 students use visual representations, 3 students use verbal representations, 2 students use more than one representation, namely visual and verbal representations). Out of 11 undifferentiated students (3 students use visual representations, 6 students use verbal representations, 2 students use more than one representation, namely visual and verbal representations). Of the 33 students in grade 7C (11 students use visual representations, 16 students use verbal representations, 6 students use visual and verbal representations).

CONCLUSION

Based on the results and discussion, the conclusions obtained are:(1) the number of test scores for the multiple representation ability of students in grades 7B and 7C in each gender has increased, (2) students in grade 7B in solving problems mostly use visual representations, while grade 7C uses verbal representations. This is influenced by the routine process of learning in the classroom, where grade 7B students are accustomed to being taught using visual methods, and grade 7C using verbal methods.
The following are suggestions related to research, namely that the routine process of learning in class is taught with various representations. The use of multiple representations is very important for the construction process of students' mathematical understanding for the successful completion of mathematical problems.

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