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**Design Research Conference**

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**UNIVERSITAS SANATA DHARMA  
YOGYAKARTA, INDONESIA**

**25 - 27 July 2019**

# **Writing Scientific Article:**

**“From Meaningless to be Meaningful “**



**Workshop Writing Ph.D. Proposal and Scientific Article**

**Kadarmas Room, Universitas Sanata Dharma, Yogyakarta, July 27, 2019**



# Rully Charitas Indra Prahmana

**Managing Editor** – Journal on Mathematics Education (Scopus)

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# Introduction

# “Scientific Article”



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*Pedagogika* / Pedagogy  
2016, t. 123, Nr. 3, p. 42–54 / Vol. 123, No. 3, pp. 42–54, 2016



## The Hypothetical Learning Trajectory on Research in Mathematics Education Using Research-Based Learning

Rully Charitas Indra Prahmana<sup>1</sup>, Yaya S. Kusumah<sup>2</sup>

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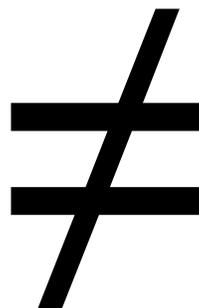
**Abstract.** This study aims to create a learning trajectory on research in mathematics education using design research methodology to enhance research and academic writing skills for pre-service mathematics teachers. The fourteen pre-service mathematics teachers during 5 months period from one higher education institution in Tangerang – Indonesia was collected. The design research method was carried out in three phases: preliminary design phase, teaching experiments phase, and retrospective analysis phase. Initial data analysis of 14 pre-service teachers' research and academic writing skills was conducted in six stages and the learning trajectories on this topic was identified. The fourteen pre-service teachers were divided into 7 groups and research independently to produce seven scientific articles. The six articles were published in the proceedings of *Konferensi Nasional Matematika* (National Congress of Mathematics) XVII 2014 and one article was published in the *Elemen Journal* Vol. 1 No. 1.

**Keywords:** *Research and Academic Writing Skills, Research-Based Learning, Design Research.*

Several studies indicated that undergraduate students faced difficulties in writing thesis, affecting the length of their study (Bangun, Irmeilyana, & Andarini, 2011; Fathonah, Wahyuningsih, & Wahyuningsih, 2011; Firmansyah, 2014; Prahmana, 2014; Santosa, Wiyanarti, & Darmawan, 2009). In Indonesia, undergraduate students are required to write a thesis as part of their research training (*PERMEN No. 49 Tahun 2014*). The completion rate usually takes up 2 to 4 semesters. Limited knowledge of methodology, the capacity of research advi-

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*Pedagogika* / 2016, t. 123, No. 3  
DOI: <http://dx.doi.org/10.15823/p.2016.32>



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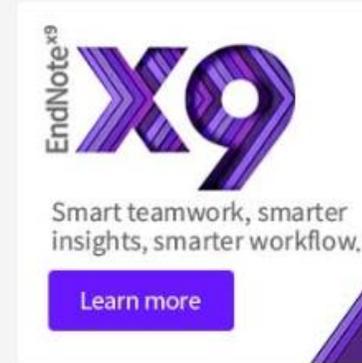
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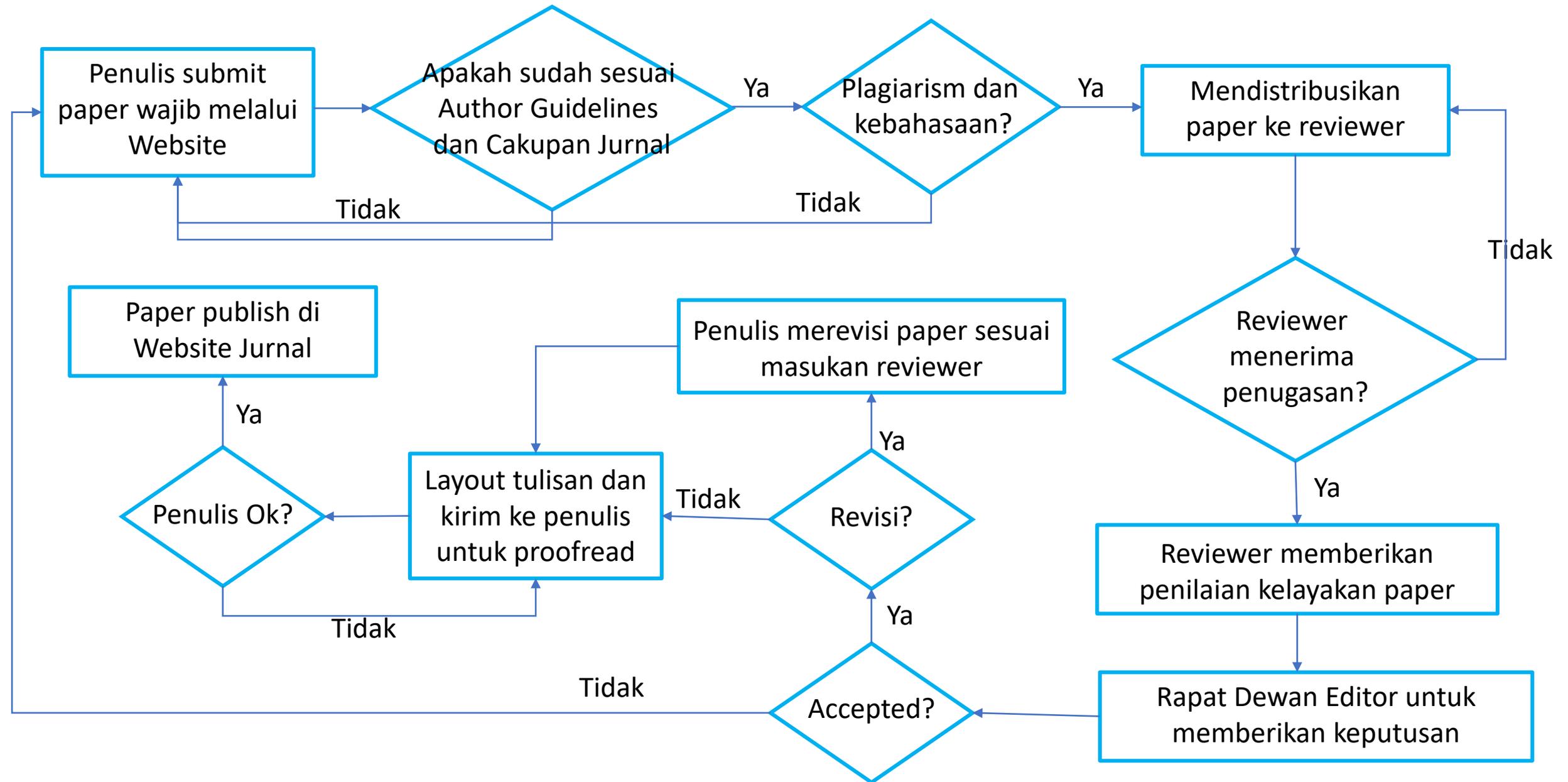


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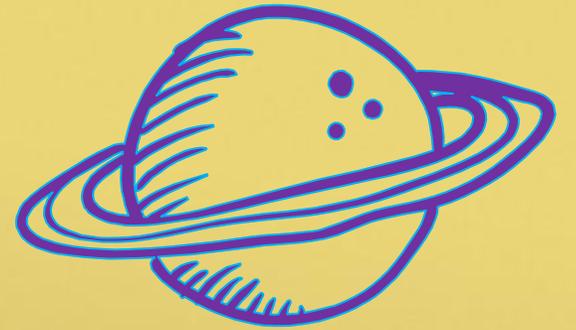
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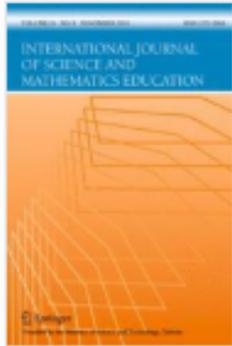
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## Research Article

# Learning Fraction using the Context of Pipettes for Seventh-Grade Deaf-Mute Student

Anisa Fatkhul JANNAH<sup>1</sup> & Rully Charitas Indra PRAHMANA<sup>2</sup>

International Journal  
(Indexed by Scopus)



[International Journal of Science and Mathematics Education](#)

pp 1–25 | [Cite as](#)

## How the Same Flowers Grow in Different Soils? The Implementation of Realistic Mathematics Education in Utrecht and Jakarta Classrooms

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Shintia Revina , Frederick Koon Shing Leung

International Journal  
(Indexed by Scopus)

# ABSTRACT AND KEYWORDS

**Abstrak** yang fokus pada **tujuan**,  
**metode**, **instrument**, dan **hasil**  
**penelitian**

**Keywords** yang  
merepresentasikan artikel kita

## **Abstract**

The deaf-mute students have limited communication and knowledge, which result in their limitations in learning mathematics. This study aims to determine the development of the deaf-mute student in learning mathematics, especially about a fraction. The research method used is the Single Subject Research (SSR) by implementing the Indonesia Realistic Mathematics Education (IRME) approach by using the context of pipettes. The research subject consisted of one deaf-mute-male student in seventh grade at the special education public school 2 in Bantul, Indonesia who got handling in the learning process using IRME approach. The research subject was purposively chosen based on the character of a research subject who have difficulty in understanding the topic of the fraction. The research subject received eight treatments, three meetings for the baseline phase and five meetings for the intervention phase, during approximately two months. This research instrument uses videos to see the learning process and when students work on the given problems, photos to refer the results of student work, and written test in worksheets to get the data on student's work. The data analysis technique used is analyzed in conditions and between conditions with A-B research design to describe the development of student who has special characteristic in the fraction learning process. The research results show that the implementation of IRME approach using the pipette context can improve the understanding of fraction concepts and the learning outcomes of the deaf-mute student.

### **Keywords:**

Indonesia realistic mathematics education approach, deaf-mute student, fraction, single subject research

# INTRODUCTION

Fokus pada **mengapa** dan **urgensi** penelitian ini dilakukan yang didukung oleh **penelitian sebelumnya** yang relevan, **theoretical framework**, dan **tujuan penelitian**

## **Introduction**

One of the physical abnormalities in children is deafness that has barriers in communication because of weak hearing, resulting in limited mastery of language and knowledge (Cole & Flexer, 2015; Schick et al., 2007). Several indicators show that a child experiences hearing problems, namely not responding when spoken to, cannot speak clearly, often presses the ear, requests that the information conveyed be repeated, and the ability to speak very slowly (Thompson, 2010). Therefore, deaf student educators must be explicitly aware of the child's ability factors (Lang & Steely, 2003; Kritzer, 2009; Colin et al., 2007). Gottardis et al. (2011) argues that deaf students lag behind their hearing peers in mathematics. Thus, there needs to be increased attention and encouragement to reform mathematics in deaf education (Pagliaro, 1998; Adler et al., 2014). On the other hands, it is of great importance that deaf children have adequate access to mathematical thinking, but unfortunately, most deaf children show a severe delay in mathematics learning that has been persistent over many years (Nunes, 2014). So, deaf-mute students have limited communication and knowledge, which results in lagging behind their hearing peers in learning mathematics.

Fractions involve complex problems for students (Warsito et al., 2019; Fitri & Prahmana, 2019). The implementation of Single Subject Research (SSR) can describe the increase in fractional counting operations for fifth grade deaf students through realistic mathematics approach (Ramadhani & Tarsidi, 2017). In line with that, Warsito et al. (2019) state that with realistic mathematics learning principles, context becomes an integral part of embedding the concept of fractions. Understanding fractions is a fundamental mathematical skill, so students need to know where the fractions are in the number line (Mousley & Kelly, 2018; Fazio et al., 2016; Fitri & Prahmana, 2019). Seeing many researchers who apply realistic learning, the use of pipette contexts can make it easier for deaf-mute students to understand the concept of fractions on a number line.

# RESEARCH METHOD

Metode penelitian fokus pada menceritakan **tahapan penelitian** secara detail, **subjek** dan **instrument penelitian** yang digunakan (termasuk tahapan menentukan dan pembuatannya)

## **2. Method**

This study investigated the formative assessment practices in Science education in relation to the enhancement of student learning. The sample comprised of three teachers and 114 students at the Year 9 to 11 levels at one of the private secondary schools in Brunei Darussalam. The teachers were selected purposefully so that they can contribute specific knowledge about the topic of the study. On the other hand, the students were randomly chosen with the use of cluster sampling based on their subject teachers. All participants were made aware of the study and they were willing to participate.

The study was carried out in three phases, namely: classroom observations, dissemination of the teacher/student self-reflection surveys and individual interviews. Mixed quantitative and qualitative methods were employed to investigate the topic presented in this paper. In the first two phases, a quantitative method was applied to develop an assessment tool for classroom observation and subsequently in developing the survey. For the classroom observations of the first phase, the lessons were observed in order to determine if the teachers were indeed consistently practicing the formative assessment. In the second phase, two surveys were performed to validate the classroom observations with the participants' perceptions. In the final phase, applications of the qualitative method from the recorded structured interviews were done with the teachers to explicate the survey results. Descriptive statistics was used to describe the quantitative data gathered from the classroom observations and surveys. And finally, thematic analysis was employed to present the qualitative data that emerged from the individual interviews.

## **2. Method**

The method used in this research is descriptive research which describes the misconception of seventh-grade students in solving the fraction problems [19]. The research procedure consists of three phases: the preparation, implementation, and data analysis. In preparation phase, the researcher collects fraction problems from examination tests. There are 10 fraction problems that should be solved by students. The researcher gives instructions to students to answer the questions on the worksheet. Students also not suggested to erased their wrong answer. They just need to cross it out. So, the researcher can find out the way of students thinking. Lastly, the researcher analysis the students' answers to detect and describe the mistake made by students. This research was conducted in SMP Negeri 1 Piyungan, Bantul, Yogyakarta. The research subjects were 30 students of class VII-D consist of 14 male and 16 female students. The subjects were chosen based on the consideration that students had studied fractions at this level.

## RESULT

Hasil penelitian harus ditampilkan  
**secara menarik** dalam bentuk  
**grafik, diagram, dan foto-foto**  
yang relevan

- Setiap hal yang ditampilkan WAJIB di rujuk dalam tulisan -

When given the exercise questions, the students answered the questions individually, because the teachers did not require students to work in groups. In general, most students were not directly able to do the questions. Only a small group of students could do it. Although they could not do questions, the students tended to be passive and did not try to ask the teachers and other students. Students in the group only copied the answers of teachers or other students. The activities of students who studied mathematics in some schools in Manokwari are shown in Figure 1.



Figure 1: Some of the activities of students who studied mathematics in Manokwari, West Papua.

This research was conducted for eight days, in the baseline phase, there were three sessions, and the intervention phase was done in 5 sessions. The time or duration of the implementation of the intervention phase measurement is different for each course, according to the conditions of the student. The dependent variable in this study is the ability of the student to solve problems related to fractions. Furthermore, the independent variable is the use of the pipette context to see student learning outcomes. The student learning outcomes in this study are in Table 1.

**Table 1.**

*Student Result*

Phase	Implementation Date	Score
Baseline (A)	19 March 2019	24
	20 March 2019	28
	21 March 2019	26
Intervention (B)	25 March 2019	84
	26 March 2019	84
	27 March 2019	100
	01 April 2019	84
	02 April 2019	90

Figure 1 shows that students can perform fractional counting operations. Students know the concept of fractions division. Students also convert the mixed fraction into ordinary fraction well. However, students were wrong in rewriting the components of the problem. Students should write  $2\frac{1}{2}$ , not  $2\frac{1}{4}$ . Because of that, students cannot solve the problem correctly [7, 12-14]. So, students must concentrate and reading the question carefully.

9. Hasil dari  $3\frac{1}{4} : 2\frac{3}{4} + 2\frac{1}{2}$  adalah ...

Penyelesaian:

$$3\frac{1}{4} : 2\frac{3}{4} + 2\frac{1}{2} = 3\frac{19}{44}$$

$$\frac{13}{4} : \frac{11}{4} = \frac{13}{4} \times \frac{4}{11} = \frac{52}{44} = 1\frac{8}{44} + 2\frac{1}{2} =$$

$$\frac{8+11}{44} = 3\frac{19}{44}$$

**Figure 1** Rewriting the component of the problem carelessly

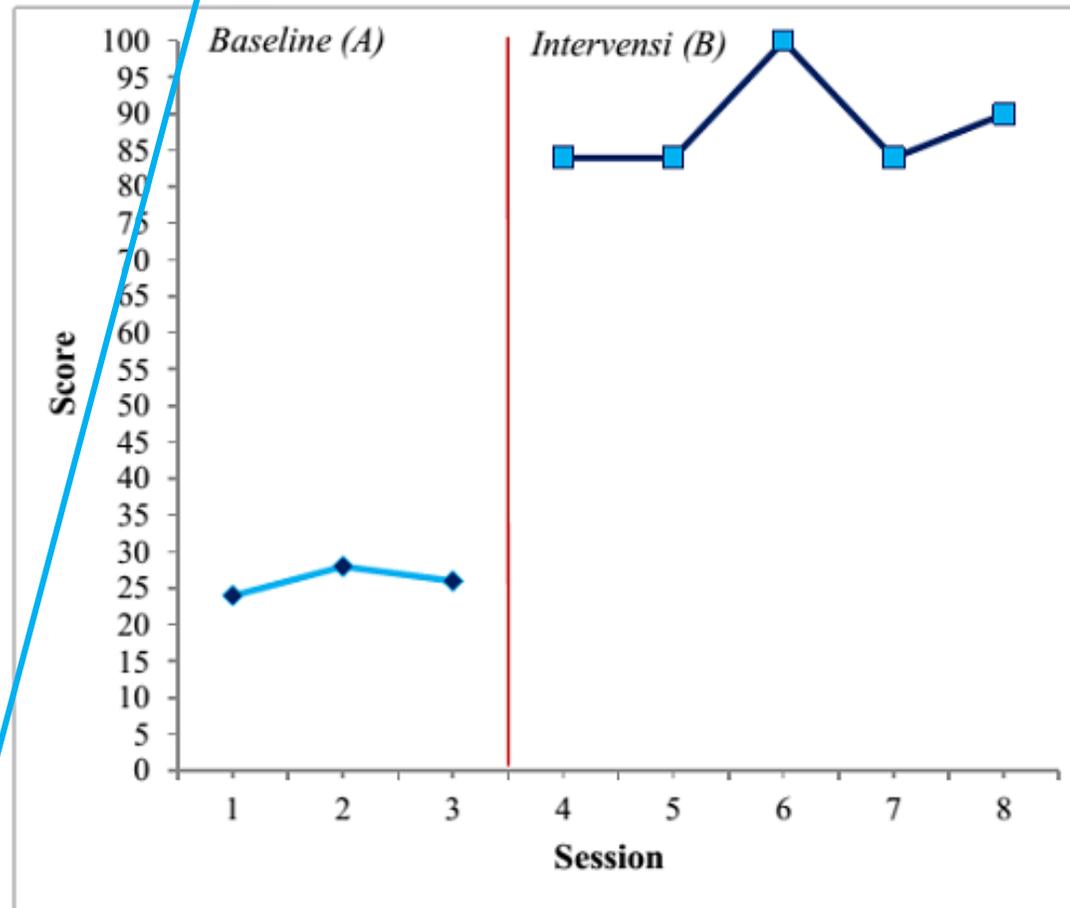
Few of the characteristics mentioned from the key strategies [10] were observed during the lesson observations. The formative assessment activity for each teacher are reported in Table 2, which gives the overall report based on the five key strategies adapted from the framework [5, p 113].

**Table 2.** Details of the overall report for the two observed teachers.

Formative Assessment Activity	TA	TB
(AN1) Clarifies learning goals by specifying sub-goals or success criteria	✓	✓
(AN2) Clarifies relevant mathematical procedures as learning goals by specifying sub-goals or success criteria	✓	×
(AN3) In oral and written communications, the teacher emphasises learning as a goal in contrast to completing a task	✓	×
(AN4) Clarifies relevant mathematical communications as learning goals by specifying sub-goals or success criteria, in most cases using rubrics	×	×
(AN5) Teacher uses mini-whiteboards to produce evidence of students learning	✓	×
(AN6) Teacher uses exit passes to produce evidence of students learning	×	×
(AN7) Teacher uses tests to produce evidence of students learning	✓	✓
(AN8) Encourage students to ask questions and allow students to inform their misconceptions	✓	×
(AN9) Teacher uses feedback	✓	✓
(AN10) Provides more thoughtful feedback	×	×
(AN11) Gives students comments instead of grades	✓	×
(AN12) Encourages students to help each other	✓	×
(AN13) Provides students with the descriptions of how to act as a resource for one another	×	×
(AN14) Provides students with the descriptions of how to regulate their learning	×	×
(AN15) Provides students with descriptions of how to handle situations when they do not know to solve tasks	×	×
(AN16) Organises activities for students to monitor and evaluate their use of time.	×	×

Note 1: KS1 = AN1, AN2, AN3 & AN4; KS2 = AN5, AN6, AN7 & AN8; KS3 = AN9, AN10 & AN11; KS4 = AN12 & AN13; KS5 = AN14, AN15 & AN16. Note 2: KS denotes Key Strategy; AN denotes Activity Number; TA denotes Teacher A and TB denotes Teacher B

Table 1 shows the measurement of scores obtained by students in solving problems in fractions. It is seen that in the initial condition or baseline phase, the score received is deficient, while in the intervention phase, it increases, as presented in graphical form in Figure 1.



**Figure 1.**

*The Visual Data of Baseline Phase and Intervention Phase*

# DISCUSSION

Pembahasan penelitian HARUS fokus membahas

**hasil penelitian** dengan

**dibandingkan** dengan **literature** yang

relevan dan ditutup dengan **posisi**

**penelitian** dibandingkan hasil penelitian

sebelumnya

students sort the numerator from the highest to the lowest. To find multiplier numbers so that the denominator is the same, students use LCM on all three denominators in each fraction. The result of the LCM, also as the multiplier number in the numerator. LCM is one of the best ways to solve fraction operations that have different denominators by using the its result as a multiplier number for the numerator and denominator of the fraction (Avcu, 2018; Cramer et al., 2002; Fazio et al., 2016; Khairunnisak et al., 2012; Siegler et al., 2011), especially for deaf-mute student (Markey et al., 2003; Misquitta, 2011).

The results obtained by students in the intervention phase, showed an understanding of the fraction concept after giving the context of the pipette and fraction board based on the IRME approach in fraction learning. Thus, the IRME approach is able to improve student learning outcomes in fraction material. In accordance with previous researchers that the use of the Indonesia Realistic Mathematics Approach (IRME) has helped students understand the concept of sequential fractions (Fauzan et al., 2002; Putri & Zulkardi, 2017; Shanty et al., 2011). However, the use of concrete materials alone, i.e. the context of pipette, does not guarantee successful acquisition of mathematical concepts (Brown et al., 2009). Sarama and Clements (2009) argue that the main weakness of the context manipulative is that students can act in a way that is personally meaningful but not meaningful in the field of mathematics. They found that virtual manipulatives offer a potential solution because there is a limited set of possible actions that students can perform on them. An entirely different theoretical framework for understanding why realistic concrete materials may hinder learning: Realistic concrete materials may sometimes do too much of the work for learners (Martin, 2009). Finally, Brown et al. (2009) suggest that educators must clearly and consistently link the concrete materials with appropriate symbol systems. In order for knowledge to be transferred from concrete topics, students must understand that they do not learn about a new system isolated from mathematics; rather, they use the concrete materials to develop new knowledge and understanding of the symbol system in which they usually work.

Handwritten student work on a fraction board. At the top, the student lists prime factors for denominators: 7 (14), 2, 4, 6, 8, 10, 12, 14, 10, 20, 30 (14), 5, 10, 15, 20, 25, 30, 35 (10), 8, 16, 24, 32 (10).

The main task is: "Susunlah pecahan berikut dalam urutan turun!" (Arrange the following fractions in descending order!).

Part a:  $\frac{4}{7}, \frac{1}{2}, \frac{3}{7}$ . The student has written a red '5' next to it.

Part b:  $\frac{4}{5}, \frac{5}{8}, \frac{7}{10}$ .

Below the task, the student has written: "Translate in English: Please, arrange in descending order of each following fractions:"

On the left side, the student shows conversion work:
   
 $\frac{4}{7} \xrightarrow{4 \times 2} \frac{8}{14}$ 
  
 $\frac{1}{2} \xrightarrow{1 \times 7} \frac{7}{14}$ 
  
 $\frac{3}{7} \xrightarrow{3 \times 2} \frac{6}{14}$

On the right side, the student shows LCM calculations:
   
 $7 \times 2 = 14$ 
  
 $10 \times 4 = 40$ 
  
 $5 \times 8 = 40$ 
  
 $8 \times 5 = 40$

At the bottom left, the student has written:  $\frac{4}{7} > \frac{1}{2} > \frac{3}{7}$ .

**Figure 13.**  
Result of Student's Work in the Intervention Phase 4

# CONCLUSION

Kesimpulan HANYA fokus pada **hasil penelitian** yang **menjawab rumusan masalah** yang diajukan

- Sebaiknya maksimal 1 paragraph saja -

## **Conclusion**

The role of the pipette context in the introduction of the concept of fractions can make it easier for deaf-mute student to solve a problem related to fractions. The development of deaf-mute students in fraction learning through the pipette context based on the PMRI approach can improve for his learning outcomes. The small size of the research subject and the single subject research methodology are limitations to reduce the generalization of the research results. Therefore, the researcher recommends that the pipette context could be implemented in the class with randomly sampling with the big size of the research subject, so that that the result could be generalized. On the other hands, the researcher suggests that another researcher can develop the learning activities using another context to help the deaf-mute students in learning another topic in mathematics.

# ACKNOWLEDGMENT

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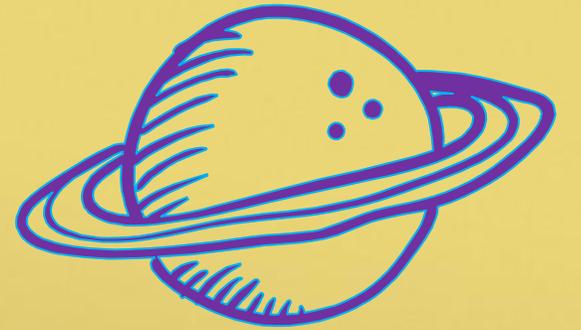
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