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Submission date: 24-Jun-2023 02:53PM (UTC+0700)

Submission ID: 2121786004

File name: P13.pdf (911.84K)

Word count: 2526

Character count: 14185

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To cite this article: S W Permatasari and Darmawijoyo 2020 *J. Phys.: Conf. Ser.* **1480** 012021

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Students' worksheet in number multiplication learning using lined-up context in the second grade

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Abstract. The aim of this study is to produce Students' Worksheet in Multiplication Learning using lined-up contexts with Indonesia's Realistic Mathematics Education (PMRI) approach that is valid, practical and has a potential effect. This research was a development research using Design Research with Development Study type. This research went through 2 stages, namely the Preliminary stage consisted of analysis, design, and the formative evaluation stage consisted of self evaluation, expert review, one to one, small group, and field tests. Worksheet prototype I is review in stage of expert review and one to one then become prototype II. Worksheet prototype II is review in small group. Finally worksheet is ready to test the students in stage field test. The results of students' worksheet had valid, practical characteristics, and had a potential effect in multiplication learning.

1. Introduction

A number is an idea, or an abstraction, that represents a quantity [1]. Learning numbers in basic level is very important to learn the other topic because learning numbers mean understand notation and symbol that students can development their understanding in solving a problem. Learning numbers tend to an understanding of the notation, symbols, and the other forms that they represent (number of reference) so it can support students' thinking and understanding, to solve their problems [2].

Multiplication is one of the lessons in the second grade in Indonesia. Multiplication is important to teach, because it is the basis of mathematical calculations. This is in line with statement [3] "Basic multiplication facts are considered to be foundational for further advancement in mathematics, they form the basis for multi-digit multiplication learning, fractions, ratios, divisions, and decimals". If the students do not understand the basic of multiplication, they will get difficulty to learn other learning. The concept of multiplication is the repetitive addition. Therefore, the prerequisite ability which must be possessed by students before learning multiplication is the mastery of addition.

Learning multiplication is focusing with table [4]. In research [5] to students in Indonesia found that 60% from 42 students is hard to memorizing multiplication table. This is because they don't understand the concept of multiplication itself. Multiplication as repeated addition [6]. Multiplication concept as repeated addition had to emphasized in junior high school. But in research [7] students has trouble to blast the multiplication as repeated addition. Students need experience mathematics and achieve concept of mathematics [8]. The introduction of multiplication operations should start with the real context, so students can make models by manipulating and counting all the given object [9]. Using context helps students to build their knowledge because they can use their experiences to connect with the problem that they solve.



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There are three models of the form of multiplication operations, those are the sets model, the rectangular model, and the number line model [9]. However, multiplication is not only those models, but also an important context because context represents the various multiplication structures [10]. Rectangular model such as arrangements are the key of multiplication for elementary school students [7]. This model encourages students to see multiplication as a binary operation with rows and columns as input. At first, students are not aware of the arrangement of this rectangular model will be related to multiplication. To connect the rectangular model to multiplication, students need to understand that the addition of rows and columns is same. To represent the form of this rectangular model, so lined-up can be used as a context in multiplication learning, where the form of lined-up is often found in many activities such as flag ceremonies, lined-up before entering the classroom, and many more. Students can also get to know the rows and columns of this lined-up context.

However, rectangular model as learning strategy in understanding multiplication concept is rarely used in Indonesia. Many researches about multiplication by using sets model. As done by researcher [11] using the context of the rubber game called "Yeye" as an innovation in learning mathematic using games with multiplication concept. The other researcher [12] using the context of traditional food in Palembang. They both using sets model of multiplication concept. According to researcher [7], this rectangular model can used an innovation in mathematical learning that can connect the concept of multiplication, which is repeated addition and can express it.

2. Method

This research method was design research with development study type [13]. The researcher developed students' worksheet in the learning of multiplication using lined-up context with a valid and practical PMRI approach and testing the effectiveness of the product. The subjects of this study were the second grade students of SDN 25 Betung which had 25 students. The development of students' worksheet consisted of two stages those are: the preliminary stage and the prototyping stage using formative evaluation [14].

3. Result and Discussion

At this stage, the researcher discussed about the results of the students' worksheet development in the learning of number multiplication using the lined-up context which was described at several stages of the study. In the Preliminary stage, researcher firstly analysed the ability of students, curriculum, and materials. Then, the researcher designed students' worksheet in the learning of number multiplication using lined-up context with PMRI approach called by prototype I. In the Formative Evaluation stage, the researcher did a validation to several experts, those are Dr. Somakim, M.Pd. (FKIP lecturer in mathematics education study program at Sriwijaya University), Dr. Rully Charitas Indra Prahmana, S.Si. M.Pd. (FKIP lecturer in mathematics education study program at Ahmad Dahlan University Yogyakarta), Eka Fitri Puspa Sari, M.Pd. (FKIP lecturer in mathematics education study program at PGRI Palembang University), Chika Rahayu, M.Pd. (FKIP lecturer in mathematics education study program at STKIP Pagar Alam) and one to one to 3 students.

From this expert review and one to one, students' worksheet developed and stated valid became prototype 2. After that, the researcher conducted students' worksheet trial to 4 students in one group. This stage was called small group. At the small group stage, students worked and discussed working on students' worksheet provided. While working on students' worksheet, the students did not have difficulties. They only occasionally asked questions to make sure their answers were correct as requested by students' worksheet or not. The purpose of piloting this students' worksheet at the small group stage was to get the practicality of students' worksheet developed. Then, students' worksheet which did not have a change would be tested to the field test stage.

At the field test stage, students' worksheet prototype 3 which has been stated valid and practical was implemented in the learning process. Learning was carried out for 1 meeting, which is July 18th, 2019 which involved 25 students of the second grade of SDN 25 Betung and a model teacher who taught the class. Learning had run for 105 minutes or 3 hours. The purpose of this field test was to find out the potential effects of using students' worksheet which have been developed in the learning of number

multiplication using PMRI approach. Potential effect which was intended consisted of students' reactions in the form of students' activeness and attitudes in participating the learning, comments or students' responses to the use of students' worksheet and the students' mathematical potential, namely the ability of the understanding the concepts and skills. To find out these potential effects, data were obtained through analysis of the observation's results, document analysis (students' worksheet), and interviews.

In the learning process, students worked in groups. The groups of students were determined by the teacher and researcher in which one group consisted of 5-6 people so that it had 5 groups. The division of groups was based on considerations and suggestions from the teacher in accordance with the ability of students. In one group consisted of high-ability students, medium-ability students, and low-ability students. In learning activities, researcher observed activities during the learning's process. Previously, students had been informed to form 5 groups that had been determined before by researcher and teacher. The following is an explanation of the stages of PMRI applied in the developed students' worksheet when applied in the field test.

3.1. Using Context

In the learning of number multiplication, researcher used lined-up context. This context was provided in the learning video before working on students' worksheet and during working on students' worksheet. While showing the video, it was assisted by a model teacher who displayed the video in front of the class using in-focus. In addition, in students' worksheet which was done by students, there were lined-up photos provided so that students were easier to work on students' worksheet.



Figure 1. Lined-up context on students' worksheet.

Figure 1 showed that lined-up context used in students' worksheet in multiplication learning with PMRI approach in which PMRI started with a context that can be known by students in their daily lives. Lined-up context was chosen because it represented a multiplication learning using rectangular model and students were already familiar with this context as an activity that was often found at school.

3.2. Using Aid

The aids used for multiplication learning were pin and styrofoam which would be used by students on working on students' worksheet. Students were asked to make a representation of the lined-up form displayed in the lined-up video of each team, starting from team A, B, C, and D with pin pinned to the styrofoam.



Figure 2. The Results of Students' Working through Aids.

Figure 2 showed that the results of students' working through aids that represented lined-up. It can be seen that all groups could make line from the pin well. All results were correct in accordance with the line displayed in the video presented. In addition, researcher also provided other aids used to do questions on students' worksheet that is "Color Pin Team".

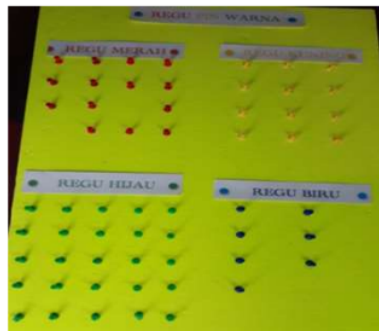


Figure 3. Colour pin team.

Figure 3 showed that the aids used in answering students' worksheet on Activity 4, in which students were asked to find which line of team that represented the requirements of multiplication using the rectangle model. Since multiplication is a repetitive addition, so the addition on the rectangle model was the addition of pins' line which had the same number for each line. Pins' line which had these requirements were yellow team and green team because each line had the same number, yellow team number 3 and green team number 5 for each line.

3.3. Students' Contribution

Students' working in number multiplication learning using lined-up context with PMRI approach invited students to contribute in learning. Figure 4 showed that the contribution of students in working on the aids requested in students' worksheet. They worked together in groups to make pins' line on the styrofoam. Moreover, they also contributed in answering the questions contained in the students' worksheet.



Figure 4. Students' contribution.

3.4. Interactivity

Interactivity can be seen from the interaction of the students in working on the students' worksheet well by reading it. Students read the questions from students' worksheet and answered these questions.

3.5. Intertwining

Intertwining is a link between concepts in mathematics which are interrelated to each other. This link means the link between the concept of multiplication and addition in which multiplication is defined as repetitive addition.

4. Conclusion

Based on the results of the study conducted toward the second grade students of SDN 25 Betung, students' worksheet in number multiplication learning using lined-up context with PMRI approach had a potential effect on multiplication learning.

5. Acknowledgments

The researchers would like to thank the parties involved in helping the success of this study. Universitas Sriwijaya for full support in this study and SDN 25 Betung for the consent of becoming research subject.

6. References

- [1] Dolk M, Fosnot 2001 *Young Mathematicians at Work; Constructing Multiplication and Division* (USA: Heinemann)
- [2] NCTM 2000 *Standards and principles in school mathematics: an overview* (NCTM: Reston, Virginia)
- [3] Wong M, Evans D 2007 *Mathematical Education Research Journal* **19** 89
- [4] Heuvel-Panhuizen V M 2001 *Realistic Mathematics Education as Work in Progress* online: http://www.fisme.science.uu.nl/staff/marjah/documents/Marja_Work-in-progress.pdf
- [5] Armanto D 2002 *Teaching multiplication and Division Realistically in Indonesian Primary Schools: a Prototype of Local Instructional Theory* Doctoral Dissertation (Enschede: University of Twente)
- [6] Kroesbergen E H and Lewt J E H V 2002 *Instructional Science* **30** 361
- [7] Tasman, Hertog, Zulkardi and Hartono Y 2011 *JME* **2** 185
- [8] Freudenthal H 1991 *Revisiting Mathematics Education* (Dordrecht, The Netherlands: Kluwer Academic)
- [9] Walle V J.A 2006 *Matematika Sekolah Dasar dan Menengah Jilid 1* (Jakarta: Erlangga)
- [10] Barmby P, Harries T and Steve H 2008 *Educ Stud Math* **70** 217
- [11] Armanto D 2008 *Jurnal Pendidikan PARADIKMA* **1** 14
- [12] Lesh R and Lehrer R 2003 *An International Journal* **5** 109

- [13] Plomp and Nieven 2007 An Introduction to Educational Design Research online: https://ris.utwente.nl/ws/portalfiles/portal/14472302/Introduction_20to_20education_20design_20research.pdf
- [14] Zulkardi 2002 *Developing a Learning Environment on Realistic Mathematics Education for Indonesian Student Teacher* Thesis (PrinPartners Ipskamp-Enschede: University of Twente The Netherlands)

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