

2022_ARTIKEL 5

by Cecil H

Submission date: 05-Aug-2022 03:18PM (UTC+0700)

Submission ID: 1879075381

File name: ARTIKEL_5.pdf (286.14K)

Word count: 3444

Character count: 18801

Percent Material Learning Design Using Book Arrangement Context for Class V Students

Amy Arimbi^{1,*}, Cecil Hiltrimartin¹

¹ Mathematics Education Department, Universitas Sriwijaya, Palembang, Indonesia
^{*} Corresponding author. Email: amy96b@gmail.com

ABSTRACT

This study aims to produce a learning trajectory to help students understand the concept of percent uses the context of the arrangement of books for class V. This research is based on the PMRI which associated with 2013 curriculum learning. The method used in this research is design research type validation study. This research was conducted in elementary school with involving 8 students of class V. Researchers designed 4 learning activities percent using the context of the book arrangement. This research aims to contribute to the form of: Local Instructional Theory (LIT) about percent material. This research involves in cycle 1 involving 8 students in elementary school. Data were collected through student worksheets, pre-test, post-test, video, and interview. Data were analysed by comparing Hypothetical Learning Trajectory (HLT) and what happens during the learning process. The result of this study shows that through a series of activities that have been carried out help students in learning material percent.

Keywords: Percent, Design Research, Book Structure, PMRI.

1. INTRODUCTION

Percent is one of the materials in learning mathematics its use is very often found in various contexts in everyday life. Big discount an item, charge mobile phone batteries, the process of downloading files from the internet, the composition of the nutritional content of a food, and ethnicity barrier interest is a series of examples of application discount concept that is often found in real life.

Considering the importance of percent material, this topic has been taught from an early age to students in learning mathematics at school. In the Indonesian curriculum percent, it has been taught since 5th grade. With Thus students at the final level of elementary school expected to have understood the concept of percent well and of course able use this concept in solve contextual problems. But reality shows that although students are generally quite familiar with the percent symbol, but still a lot of those who have not been able to finish related problems exactly. Students who have studied percent in the school more or less knows what the percentage is, but they still often have difficulty in percent related problems [1]. Students are not able to take advantage of the experience learn how to solve problems contextual, where they will find difficulty

when faced with non-routine questions or percent questions that use numbers not usual, such as 13%, 27% [2]. According to Van den Hauvel-Panhuizen that many percentage questions in school stated that learning inclined to procedures. Many students can quickly learn what is the correct proportion? through the calculation procedure but they it's hard to explain that percentage alone [1].

One of the main factors causing the difficulty faced by students is the process learning percent itself [3]. It's not uncommon to learn percent done simply by introducing percent as a notation other than decimal or the form fractions per hundred [4] and only focuses on algorithms or routine procedures in completing problems [2]. On the side on the other hand, students' ability to do calculation procedure correctly isn't it is the only absolute indicator real understanding of percent concept [2,5]. With only armed with routine work procedures that taught by the teacher in fact not completely able to make learning meaningful [6].

Percentage is a relationship that based on hundredths; so that percentage represents the relative value of part of a whole and not a value absolute [2,7,8]. by him that, percent learning shouldn't just by

introducing percent as the notation other than fractions and decimals. However, percent need to be introduced to students as a part of 100 parts whole through the context close to students' everyday experiences. Some of the findings of these previous studies signal that it is needed more meaningful learning for bridge students' understanding in understand the concept of percent comprehensively. Meaningful learning can be done by using real situations close to daily life of students [1,9] as well as through the use of concrete teaching aids or various representation models such as percentage bar [1,3,10]. Using the bar in completing problem about percent has several advantages [2,11,12]. Van Galen & Van Erde [1] which states that bar percent can help students see the relationship between the two numbers given for make percent, more than that bar too direct link between percent fractions. Using real problems or context can create mathematical concepts become more meaningful, because of the context presenting abstract mathematical concepts in a form of percentage that is easy for students to understand [13].

10
Realistic Mathematics Education Indonesia, which is an adaptation of Indonesian Realistic Mathematics (RME) [14] is a mathematization-oriented approach everyday experience. Approach This learning focuses on activities based on experience and use of situations students [15] so that expected to be able to create learning meaning. The use of various contexts in percent learning has been studied in several previous studies, such as the design of learning with battery charging context handphone [16], battery laptops [4], fat content in milk [9], repair of damaged roads, rebates, or discounts [17], as well as parking and spectator issues at the stadium [18].

Relevant context is needed real experience of students as a starting point learning. Departing from this, in this study, researchers developed learning trajectory using context arrangement of books to help grade 5 elementary school students in understand the concept of percent. Book order selected as a context because it is based on the situation real so very close to the experience student daily. Besides, there isn't any research that uses a similar context in the percent learning design. Engage experience-based activities through use of context close to students' daily lives are expected to be able to make learning percent more meaning. By linking math with real life, it is hoped that students can construct meaningful knowledge and not just procedural memory. Therefore, this research aims to generate learning trajectories on learning material percent using the context of 15 arrangement of books for fifth graders and know the role of the learning

trajectory in learning material percent using context of book arrangement for Class V.

2. METHOD

In this study, researchers using the design research type method validation studies. Design research aims to increase Local Instructional Theory (LIT) in collaboration with researchers and teachers to enhance the best learning [19]. LIT includes temporary and presumptive learning activities anticipating learning process how students think and understand which may develop during activity learning takes place in the classroom [20]. Gravemeijer & Cobb [6] define three stages in designing research, namely: (a) preparing for experiment, (b) The design experiment, and (c) retrospective analysis. At the stage of preparing for the experiment (research preparation), researcher conduct a literature review on the material percent, the use of PMRI as an approach learning. In addition, the researchers additionally investigated students' preliminary abilities with the aid of using doing interview a few students for understand the volume to which students recognize concerning the gaining knowledge of prerequisite material. The outcomes are used to layout a collection of gaining knowledge of activities that include alleged gaining knowledge of trajectory (Hypothetical Learning Trajectory). HLT designed to be dynamic in order that a cyclic process which can alternate and increase in the course of the design experiment procedure. The HLT has been further developed implemented at the design stage experiment. This report focuses on the stages pilot experiment and retrospective analysis as part of a series of design research which is implemented.

The 2nd stage of the design experiment (trial design) particularly the first cycle (pilot experiments). Eight students with heterogeneous ability (two students with ability high, four students with mild ability, and two low ability students) are involved in the first cycle (pilot experiment), at this stage the researcher acts as a teacher. Result of c 16 first used to revise HLT version beginning. The 3rd stage is retrospective analysis, data obtained from the pilot experiment stage analysed, the results of the analysis are used to develop design on activity next lesson.HLT as compared with student studying activities that absolutely to answer the system studies problem. The reason of retrospective evaluation in preferred is for increase Local Instructional Theory (LIT).

Data collection is accomplished thru numerous matters together with observation, making video recordings of occasions in elegance and institution

paintings, accumulating paintings college students, giving pre-check and post-check, and interview college students. Designed HLT then as compared with the mastering trajectory real college students all through implementation mastering to be analysed retrospective whether college students take a look at or now no longer study from what has been designed withinside the mastering series. Data evaluation accompanied via way of means of researchers and supervisors for enhance validity and reliability. Validity accomplished to look the high-satisfactory of the batch information affecting withdrawal end of this research. Reliability describes the research completed in order that an end may be drawn.

3. RESULTS AND DISCUSSION

This lesson is designed for generate learning trajectories in learning material percent using the context of the arrangement of books to help students.

To know the preliminary ability research students carried out interviews with students who're studies subjects. Other than that, Researchers offer a pre-test for decide students' preliminary abilities. Results pretest showed that few students still do not recognize the prerequisite material of percentage is a fraction. After knowing students' preliminary abilities from the pretest results, the first cycle turned into carried out, particularly the pilot experiment stage. At these stage 8 students (divided into 2 groups, each group is heterogeneous) participating and researchers as model teachers. Each student is given a Student Activity Sheet which includes sequence activities.

3.1. Activity 1: Introduction to the Context of Book Arrangements

In this activity, students are given the opportunity to explore phenomena in everyday life related to the context of the arrangement of books, students are asked to recognize the arrangement of books. And the result is that all fifth-grade students know the arrangement of books. The following is activity 1 contained in the LAS, which can be seen in Figure 1.



Figure 1 Activity 1 on student activity sheet

3.2. Activity 2: Recognize the form of percent

In this activity, it shows the problems given are related to recognizing the form of percent. In this activity, students are expected to be able to recognize the form of percent. The following problems that exist in activity 2 can be seen in Figure 2.



Figure 2 Activity 2 on student activity sheet

Figure 2 shows the problems given related to recognizing the form of percent. Students are asked to calculate the shaded square of the entire square so that it can determine the percent shape of the square. When students are asked to work on the problem of activity 2 on the Student Activity Sheet in groups, most students can answer the questions correctly. This can be seen from one of the students' answers in Figure 3.

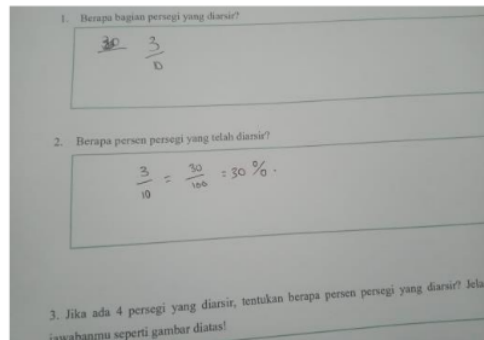


Figure 3 Student answers from activity 2

Based on Figure 3 shows that students can answer questions correctly. This shows that students are familiar with the form of percent and in accordance with the HLT that has been made. After the students finished doing activity 2 the teacher asked the students to discuss. Students are asked to write down the answers of each group on the answer sheet provided.

3.3. Activity 3: Determine the percentage of available objects that are less than 100

In this activity, the problems on the Student Activity Sheet are given using a bar model that shows the number of squares that are less than 100. In this activity, students are expected to be able to understand the concept of percent by using the bar model. From some of the students' answers, students can determine the percent of the problems given correctly according to the initial HLT. This can be seen from one of the students' answers on figure 4.

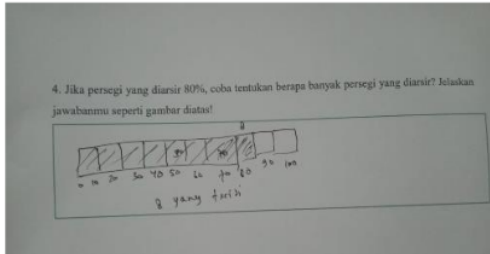


Figure 4 Student answers from activity 3

3.4. Activity 4: Solving percent problems in daily life

In this activity, problems in everyday life related to percent material are given. In this activity, students are expected to be able to solve problems in everyday life related to percent material. Here are the students' answers in Figure 5 and Figure 6.

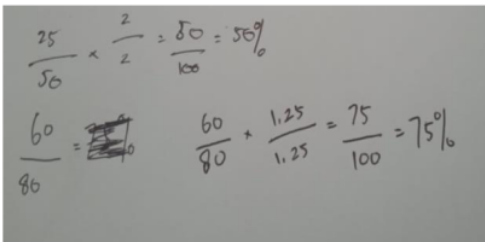


Figure 5 Student answers from activity 4

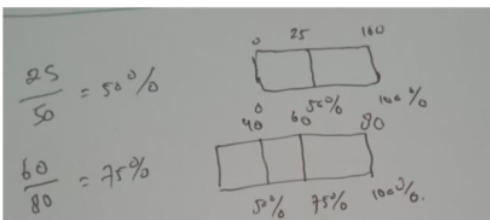


Figure 6 Student answers from activity 4

In Figure 5, the answers of students who use formal form of mathematics to solve problems. However, in figure 6, students complete the problems that exist in

activity 4 continue to use the bar model. The student draws a bar model that represents the parts of the percent.

3.5. Retrospective Analysis

The first problem given shows that students have learned in accordance with the HLT that has been designed. Shows that students can recognize book context. For the second problem, shows that students have known percent form of the boxes in the arrangement of books. For the third problem, students have able to use the bar model with the number available items are less than 100. For the fourth problem, students are able solve everyday problems related to percent. Where is the result shows that some students have use formal form of mathematics and there are some other students still use bar model to solve the problem. The implementation of learning and learning has been according to the designed HLT. Results Research on experimental pilots obtained shows that Learning Trajectory is the process during the learning takes place in accordance with the HLT that has been designed.

Based on the design of the learning trajectory that has been designed and implemented Previously, there were 4 learning activities percent in cycle 1. Series of these activities include; Activity 1: Introduction to Context Book Arrangement; Activity 2: Recognize shapes percent of the boxes in the book arrangement; Activity 3: Determine the percentage of objects that available which are less than 100; and Activity 4: Solving problems percent in everyday life.

A collection of sports which have been carried out the use of the technique PMRI suggests how the characteristics PMRI is the idea for the studying technique in each activity. (a) Use of contexts for exploration phenomenologist (Use of context) is the primary characteristic in which studying activities start with contextual problems which are regularly encountered with the aid of using college students as an experience-primarily totally based pastime. Context utilized in every activity is something possible with the aid of using college students so that scholars can apprehend trouble without problems this is context seat at the train. (b) Use of models for mathematical idea production A collection of activities which have been carried out the usage of the technique PMRI suggests how the characteristics PMRI is the idea for the gaining knowledge of technique in each activity. (c) Use of students' creations and contribution student contributions) those characteristics may be visible in at some point of the gaining knowledge of manner percentage of a given set of activities. Teacher appreciates student contributions in the learning process both in activities groups and individuals. Learning become more meaningful one of them because a variety of answers and strategies appear different solutions from

each group and individuals. (d) Student activities and interactivity on the learning process (Interactivity). Student on pilot This experiment is very collaborative so that learning can run well. (e) Intertwining mathematics concepts, aspects, and units (Linkedness). In designing This percentage getting to know can't be separated from the connection with different materials, namely: fraction concept. (Model Usage) new model usage is a form of off model of learning the concept of percent which is the referential stage levels. By using the inner bar model bridge students' understanding of the abstract towards real can help students' understanding in learning percentage.

3 **4. CONCLUSION**

Based at the results and discussion has been defined previously, then it is able to be concluded Learning Trajectory (LT) learning percent with using the PMRI approach in the context of the book arrangement implemented in this study has helped students understand the concept percent. Based on the learning process that has been implemented, a sequence of activities assists college students recognize the concept of percentage.

ACKNOWLEDGMENTS

The researcher would like to thank Mrs. Cecil Hiltrimartin, Ph.D as supervisor for the support, help and guidance that has been given.

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