

Crochet crafts as a context using LSLC in number pattern

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Abstract. The research aims to produce a learning trajectory that can help students understand of number pattern learning by using the context of crochet crafts in 8th grade students. This research was conducted at SMP Negeri 1 Palembang. This research method using design research. The stages of the research carried out consisted of preparation for the experiment, design experiments, and retrospective analysis. Data collection is done through question answers, interviews, video recordings, and photos. In this study, learning was designed and developed based on alleged learning, PMRI, and LSLC. The results of this study indicate that learning pattern numbers using the context of crochet crafts can help students understand numerical patterns and find equations that can be used to find patterns of numbers to n.

Keywords: Design Research, PMRI, LSLC, Number Patterns, Crochet Crafts

1. Introduction

The number pattern is one of the pillars of the 2013 curriculum, one of the eight goals of mathematics learning in junior high school, namely learning using patterns as an alleged problem solving [10]. One of the algebraic standards that must be studied and mastered by students at level 6 to understand the pattern (NCTM One standard of content learned in mathematics is numbers and *operations*) and algebra (*algebra*) in which it deals with number patterns [16]. number is one of the subject matter in class 8 mentioned in the revised 2013 curriculum mathematics syllabus 2018. [11] In addition, based on Permendikbud No. 20 of 2016 concerning competency standards of primary and secondary education graduates stated that the number pattern meets graduation standards. Permendikbud No. 24 of 2016 concerning core competencies and basic competencies also states that number patterns are material that must be achieved. Finally [12] USBN (2017) states that the number pattern is included in the scope of the national standard high school's school exam material lattice first / madrasah tsanawiyah 2017/2018 school year [3], so that the pattern number m is material in learning that must be mastered by students in high school.

Many argue that the number pattern is the mathematical foundation. the pattern is the foundation that the entire subject is built on. From the system of initial calculations for the development of differential calculus to modern mathematical patterns are and are genesis, motivation, and basic knowledge of mathematics [15]. Understanding number patterns is needed so students of all ages can precisely identify and understand various types of patterns and functional relationships in mathematical problems [9]. In addition, learning number patterns can explore abilities students' thinking[1]. This confirms that the number pattern needs to be mastered because it is useful for developing students' thinking abilities.

Based on observations made by Sari, it shows that students still experience errors in working on problems related to number patterns. The difficulties of other students in solving the problem of



number patterns are indicated by the absence of students who are able to write the formula for the term n th for the three questions given. One of the factors that influence the low student learning outcomes, among others, students tend to memorize and do it in the learning process, rather than getting a learning process that runs meaningfully. In the teaching and learning process, there are still many mathematics instructors who teach the procedure without explaining why the procedure is used [19].

Based on Minister of Education Culture Regulation No. 21 of 2016 concerning Standard Content one of the goals of mathematics is so students have the ability to communicate the idea of number patterns clearly, identify patterns and use them to predict and general rules and predictions, and understand concepts of rational numbers with operations and sequences [13]. So that students not only tend to memorize and drill in learning.

The learning that supports the above problem is LSLC. LSLC (*Lesson Study for Learning Community*) is a collaborative process or collaborative learning in which students are divided into several groups and they support each other to make progress for each individual specifically and the achievement of the whole group in general [20]. LSLC is usually organized in two collaborative stages of learning in learning, namely: level *textbook* (*Sharing task*) and further level (*Jumping task*) [17]. *Sharing tasks* are tasks that form tasks within the level of students or students can still achieve to do them [2]. While *Jumping Task* "is a matter of administration / challenging task / are above the level of curriculum demand, where excellence is able to create learning activities among students such as dialogue, interaction and collaboration are effective [18].

Then based on the 2013 curriculum [11] 21st century learning is expected to be implemented. This is to address the demands of an increasingly competitive era. The 21st century learning reflects four things, namely : (*critical thinking skills*), creativity (*creativity*), communication (*communication*), and collaboration (*collaboration*). Therefore a learning approach is needed, namely PMRI because there are similarities between the characteristics of PMRI and some components of the new curriculum. Then it can be said that PMRI is now institutionalized in the 2013 curriculum which is a PMRI sustainability indicator for the future [25]. In the explanation above, there is a problem in the number pattern. This can be facilitated by a learning approach, namely PMRI [7]. in his research entitled analysis of the application of PMRI-based mathematics learning at elementary schools in Bandung city, suggesting that it is expected that IP-PMRI can continue to foster and develop PMRI in pilot schools in the form of developing teaching materials, teaching aids and *workshops* for teachers, thus the teachers will continue to be motivated to apply PMRI in every mathematics learning. So that it can be said that PMRI can also be applied in secondary schools. Besides that PMRI can also be given in all material in learning, including material in number patterns.

PMRI or RME is one approach that uses contextual [24]. In RME, the starting point of teaching mathematics must be close to real life for students, which allows them to be immediately involved in contextual situations [23]. So that in PMRI it is necessary to use context in mathematics learning. Context can be cultural, some studies that use cultural contexts include the fabric of the cape context [22], the context of woven crafts [8]. Thus, in this study will use the context of crochet crafts.

RME from PMRI [25] has five characteristics: (1) using real life contexts as a starting point for learning; (2) using the model as a bridge between abstract and real, which helps students learn mathematics at various levels of abstraction; (3) using students' products or strategies as a result of doing mathematics; (4) interaction is very important for learning mathematics between teachers and students, students and students; and (5) the relationship between strands, with other disciplines, and problems that matter in the real world.

Based on what has been stated above it can be said that mathematics learning is not directly given formulas then practice questions. However, learning that should originate from real problems both in everyday life such as the contexts that are around us continues into forms into the general form. Then, it becomes a formal form or formula. So, based on the above, the researchers intend to conduct a study entitled Crochet Crafts as a Context Using LSLC of Number Pattern in Class VIII SMP N 1.

2. Method

This study uses *Design Research* type Validation. The steps of design research according to Gravemeijer & Cobb [5] are (1) the preparation stage (*preliminary design stage*); (2) The pilot phase includes learning *piloting experimental* and *teaching, experiments*, and (3) stages a retrospective analysis (*retrospective analysis*), which analyzes comparing HLT with the actual trajectory of student learning in order to obtain answers to research questions. This research was only conducted at the *preliminary design stage*, while the details of the activities carried out included: (1) Validation with peer groups, namely activities carried out to validate the student worksheet whether it was appropriate in terms of content, constructs, and language; (2) Validation and prediction of answers with the teacher, that is the researcher validates the student worksheet and predicts the answers of students with high, moderate, and low ability with the teacher; (4) Cycle 1, this stage was tested on 8 people consisting of 4 men and 4 women, then divided into 2 groups where each group consisted of 2 men and 2 women. The system used at this stage is the system *Lesson Study*.

3. Result and Discussion

This study uses RME from PMRI [24] which has five characteristics: (1) using real life contexts as a starting point for learning; (2) using models as a bridge between abstract and real, which helps students learn mathematics at various levels of abstraction; (3) using students' products or strategies as a result of doing mathematics; (4) interaction is very important for learning mathematics between teacher and students, students and students; and (5) the relationship between strands, with other disciplines, and meaningful problems in the real world. In addition, it also uses lesson study according to Gravemeijer & Cobb [5] the steps are (1) the preparation stage (*preliminary design stage*); (2) The pilot phase includes learning *piloting experimental* and *teaching, experiments*, and (3) stages a retrospective analysis (*retrospective analysis*), which provides comparison HLT with the actual trajectory of student learning in order to obtain answers to research questions. The system used in this study is Lesson study which is a classroom reform with a focus on learning activities in the form of dialogue, interaction and collaboration among students [19].

Discussion of the details of the activities in this study include the following:

3.1. Preparation and planning

In this table explain the agenda of research implementation, among others:

Table 1. Research implementation agenda

Date	Activities
February 2019	Researcher prepares student worksheet, lesson plan, teacher's instruction, and scoring guidelines about number pattern.
21 st March 2019	Validation and prediction student answer about number pattern with peers.
29 th March 2019	Validation and prediction worksheet answer about number pattern with math teacher.
02 nd April 2019	Small group gives work sheet about number pattern to the small group.

3.2. The researcher prepares student worksheet, lesson plan, teacher's instruction, and scoring guidelines Material

Before preparing the student worksheet, lesson plan, teacher's instructions, and scoring guidelines, the researcher and the teacher discuss the material to be designed. Then, after discussing the material obtained the number pattern that will be carried out in class VIII semester II is a problem about recognizing the number pattern of the crochet craft pattern.

3.3. Validation with peers

The initial activities carried out in this study were student worksheet validation with peers, where the results of the validation provided some improvements shown in the figure below.

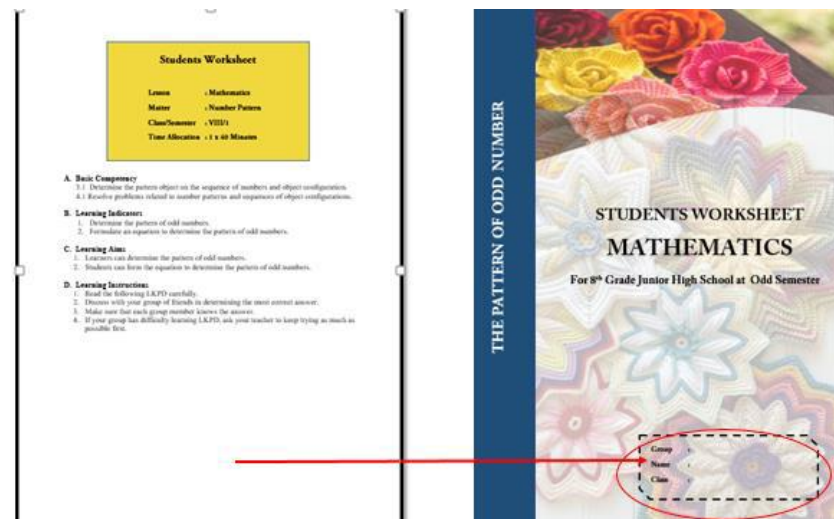


Figure 1. Adding a front page and placing an identity on the front page

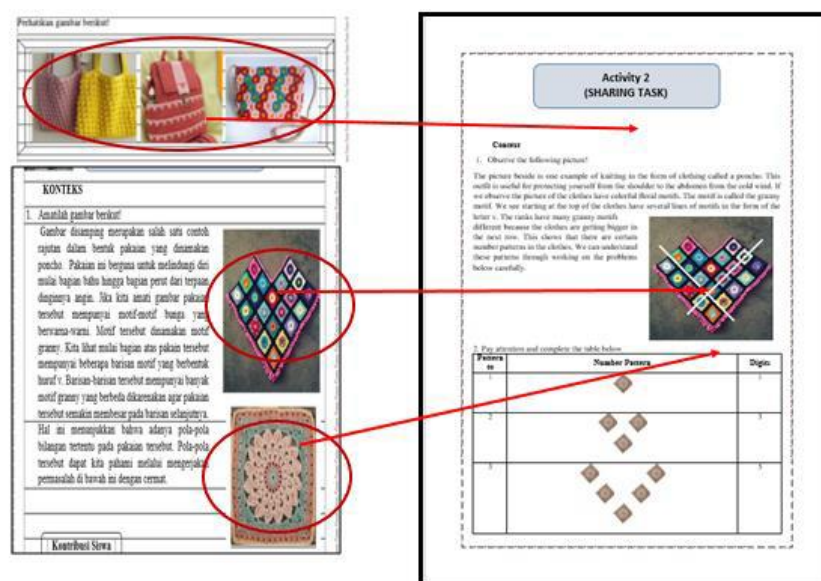


Figure 2 Improvements to activities

The picture above shows that activity 1 needs to replace photos of crochet crafts with video making and the results of crochet crafts. In addition, provide an explanatory line in the photo to show which motifs to use, as well as eliminate the craft motif because it is not used to show the pattern of the crochet craft motif..

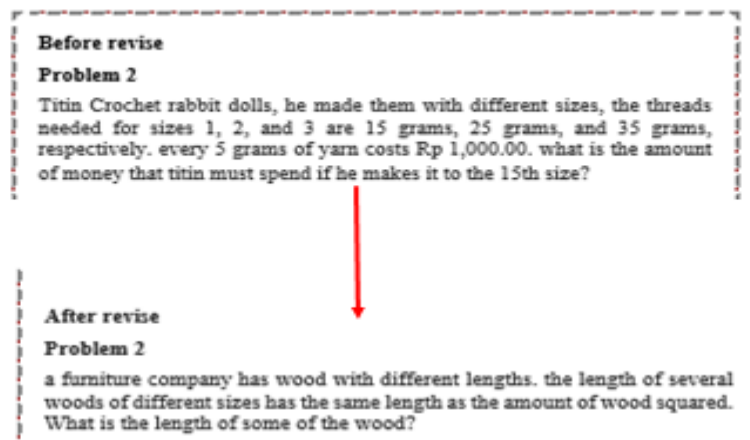


Figure 3 Addition of questions to activity 3

The picture above shows that colleagues suggest adding one item about the number pattern, so that the number of questions becomes 2 items.

3.4 Validation with the teacher

After conducting validation with colleagues and has been corrected by the researcher, then do the second activity, namely validation and prediction of answers with the teacher. At this stage there are several improvements with the teacher, one of which is to add one more problem to the third activity and to the other problems is enough to be used in the next activity. At the prediction of the answers of students the ability of high and low height with the teacher is mostly the same as the predictions of researchers. Some improvements to student worksheet on activity 2 are shown in the figure below.

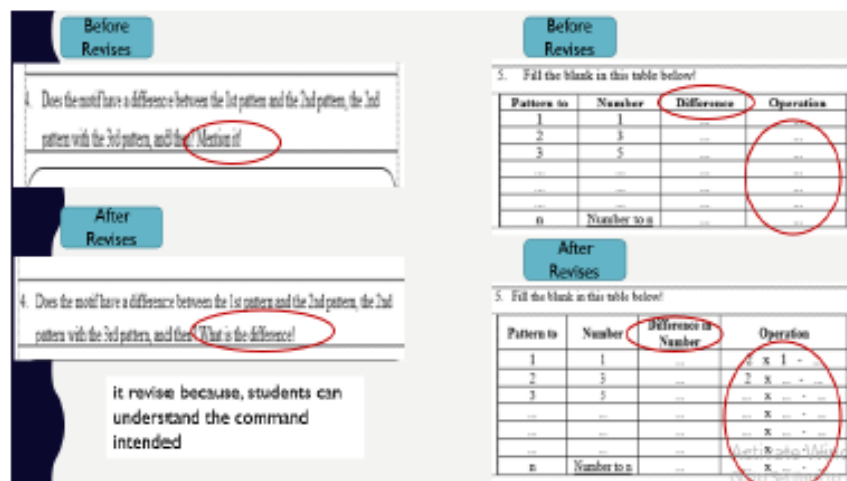


Figure 4. Improvement of student worksheet on activity 2

In the picture above, it is explained that there are some improvements to activity 2, among others, namely clarifying the purpose of the word mentioned in how much is the difference and giving an initial form to the operation so that it is easily understood by students.

3.5 Small Group

The last activity is small group, at this stage carried out on 8 students consisting of 4 male students and 4 female students where the learning provided has used the LSLC system. Student worksheet contains about activity 1, activity 2, and activity 3. Activity 1 contains the problem of the initial knowledge of crochet craft given in the video presentation made by the researcher. So students know what crochet crafts are. In activity 2 the problems 1 and 4 indicate that all students are able to work on the problems given. The activities of 2 problems 2, 3, and 5 still have students answering incorrectly. However, the problems given are still the category of jumping task questions because most students are able to solve them. At this stage, students recognize patterns in crochet crafts where students are directed to work on questions from drawing sketches of patterns made in tables, looking for differences, numbers or next line terms, then finding the possible equation of the numbers. Some students still find it difficult to find the equation. In activity 3, students are still having trouble finding a solution to problem 1 or problem 2. Even though students have several students able to do it. And problems in activity 3 can still be used, even though there are some words that need to be improved so that students are easy to understand the problems given.



Figure 5. Learning process at small group

The reseacher oponed the lesson and informed the matter about the number pattern using cochet crafts. Thobey teaches Alifa, how to do problem in activity 2. Alifa smiles after knowing the problem and say thank you to Thobey



Figure 6. Learning process at small group

Based on the pictures, that show the expressions of student when they worked students worksheet. When discused the answer between teacher and students, Alifa advanced to work problem 5 activity 2. During learning in small group, students pay attention to their respective student worksheet and there are some students who have difficulty. However, another friend taught his friend who did not understand the problems at the student worksheet. Students who ask for help say the word "teach me" and students who are asked for help are not reluctant to provide assistance. Students who are taught say thank you and look happy on the student's face.

4. Conclusion

The use of crochet crafts in learning number patterns can help students understand the pattern of numbers. Students recognize the motives for crochet crafts as a starting point for finding number patterns by sketching patterns, then finding the relationship between the number of motives. students write down the number of motifs illustrated, it helps students find equations that state the relationship of sequential differences in terms, sequential numbers of numbers, and the remainder of the reduction in difference times and tribal sequences of numbers in the term to find the formula for the nth term.

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