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LEARNING MATERIALS DESIGN PATTERN NUMBERS CONTEXT MAKING *KEMPLANG* IN CLASS IX

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Abstract

This study aims to clarify the role of making *kemplang* can help students understand the concept of number patterns, and generate Learning Trajectory. The methodology used in this research is the design of the research by the research subject class IX students of SMP Negeri 2 South Indralaya, Ogan Ilir, South Sumatra. Researchers designing learning activities that sensing, drafting kemplang class simulated using circular paper prepared by the researcher. Exploration proportional situations using everyday life issues are close to students' lives, such as creating *kemplang* can make students more interested in learning mathematics and easily understand the math problems are given. Collecting data in this study using video, observation, written tests, documentation and records during the activity. The results of this study indicate that context *kemplang* and paper-making circles as a model really helps students to understand the concept of a pattern of numbers.

Keywords: pattern numbers, manufacture *Kemplang*, PMRI, design research

Abstrak

Penelitian ini bertujuan untuk menjelaskan peranan pembuatan kemplang dapat membantu siswa dalam memahami konsep pola bilangan, serta menghasilkan Learning Trajectory. Metodologi yang digunakan dalam penelitian ini merupakan desain riset dengan subyek penelitian siswa kelas IX SMP Negeri 2 Indralaya Selatan, Kabupaten Ogan Ilir, Sumatera Selatan. Peneliti merancang kegiatan pembelajaran yang menyenangan, kegiatan penyusunan kemplang disimulasikan dikelas dengan menggunakan kertas lingkaran yang disiapkan oleh peneliti. Ekplorasi situasi propolsional menggunakan masalah kehidupan sehari-hari yang dekat dengan kehidupan siswa, seperti pembuatan kemplang dapat membuat siswa lebih tertarik untuk belajar matematika dan mudah memahami masalah matematika yang diberikan. Pengumpulan data dalam penelitian ini menggunakan video, observasi, tes tertulis, dokumentasi dan catatan selama kegiatan berlangsung. Hasil penelitian ini menunjukkan bahwa konteks pembuatan kemplang dan kertas lingkaran sebagai model benar-benar membantu siswa untuk memahami konsep tentang pola bilangan.

Kata Kunci: pola bilangan, pembuatan Kemplang, PMRI, desain riset

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The pattern of numbers is taught in secondary schools. One of the standard content learned that numbers and operations (number and operations) and algebra (algebra) in which relates to the pattern of numbers (Principles and Standards for School Mathematics in the NCTM, 2000). Pattern numbers closely related to pattern drafting and mathematical structures. Mulligan & Mitchelmore (2009) states that the way mathematical patterns are arranged is known as a structure. A mathematical structure is most often expressed in the form of generalization. The ability of the students to generalize important because it can help in solving mathematical problems such as patterns of numbers. Generalization is the heartbeat of mathematics (Mason, 1996) and generalizations become a very useful idea to do math (van de Walle, 2008). However, there is still a student difficulties in learning patterns of numbers. Namely in terms of student difficulties with the mathematical modeling process starts from a real phenomenon in an attempt to mathematics at the phenomenon that (van de Walle, 2008). Additionally, Sodikin (2010) stated that

the difficulties students on the material pattern of numbers, students' difficulties in finding the desired main idea of the problems and students are also difficult to make a general abstract generalization.

Crackers is a type of dry food that was very popular and loved by almost all levels of society in Indonesia either as a snack or as a side dish taste enhancer flavoring or food. This product is served with fried or baked. Various types of crackers can be found in Indonesia include fish crackers, prawn crackers, crackers *kemplang*, crackers and cracker-crackers *jengkol* other types. *Kemplang* is one type of crackers found in many other places in Palembang and South Sumatra as in South Gerinting Cliffs Village, District of South Indralaya, Ogan Ilir.

South Gerinting Cliffs Village is a village located in the district of South Indralaya, Ogan Ilir who became one of the central *kemplang* producer. South Gerinting Cliffs village situated on the edge of the highway or along the eastern causeway that connects the city to the village South Gerinting Cliff frequently traveled by motor vehicles.

Industrial households in the South Gerinting Cliff have similarities in terms of the manufacturing process *kemplang*, but the difference is the dosage and additives used. In general, all industries in the village *kemplang* Cliffs South Gerinting using fish of the sea and river fish as raw material of production *kemplang*.

The process of drafting *kemplang* to dry in Ogan Ilir especially Cliffs Village South Gerinting help students to build and lead students recognize patterns. *Kemplang* arrangement can be used as a starting point in studying the pattern of numbers. Because of the arrangement of drying kemplang any particular village in the county of Ogan Ilir Cliffs South Gerinting arranged above the square mats and rattan ayaman circle, and from the arrangement shown visible pattern.

The drying process *kemplang* arrangement in Ogan Ilir especially Cliffs village Gerinting help students to build and lead students recognize patterns. *Kemplang* arrangement can be used as a starting point in studying the pattern of numbers. Because of the arrangement of drying kemplang existing village in the county of Ogan Ilir especially arranged above Tebing gerinting square mats and rattan ayaman circle, and from the arrangement shown the visible pattern.

One approach to learning mathematics are suitable for use in teaching mathematics with regard to context or situation is Realistic Mathematics Approach Indonesia (PMRI). Therefore, the composition of which is a form of drying kemplang often they find every day suitable as a starting point for understanding the learning material number pattern. Researchers present a number of learning patterns through PMRI approach by utilizing the manufacturing kemplang as context. Therefore, by looking at the importance of studying patterns of numbers, the role of teaching materials, the importance of learning to build understanding of science by the students, and the results of previous studies researchers interested in conducting research with the title "Design Patterns Numbers Learning Content Creation Context Kemplang in Class IX SMP"

The formulation of the problem of the introduction is: "What is the role of making kemplang can help students understand the concept of a pattern of numbers in class IX students of SMP and how Learning Trajectory (LT) for learning activities?" And this study aims to discuss the role of making use of the context of kemplang can assist students in understanding the concept of number patterns.

METHOD

Subjects of this study consisted of 31 students and a teacher of IX1 SMP Negeri 2 Indralaya Selatan Ogan Ilir. This study implemented in February to March 2016. The method of this study is design research that consists of three

main steps, such as: preparing for the experiment, design experiment, and retrospective analysis (Gravemeijer and Cobb, 2006: 19). In the preparing for the experiment, researchers conducted reviewed some literatures and designed a Hypothetical Learning trajectory (HLT), which consists of learning objectives, learning activities, and conjecture of students' thinking. In the design experiment, the researchers tested HLT in 2 phases, pilot experiment and teaching experiment. During the design experiment, data were collected through interviews, observation, testing, documentation, and field notes. Afterwards, the collected data were analyzed in a retrospective analysis by the HLT as a reference.

RESULTS AND DISCUSSION

This research resulted in the trajectory of learning in the learning patterns of numbers by using the drying arrangement kemplang in class IX SMP. Activities in the learning process, namely 1) to know how the preparation kemplang to dry, 2) prepare a paper circle and painted, 3) determine a lot of paper circle on the pattern of the 1st, 2nd, 3rd and so on as well as determine the rules, 4) determine the formula of the-n.

The first activity aims to explore the knowledge students how to prepare kemplang to dry. The series of events in this activity begins teacher greetings, inquire about the situation of students, then teachers deliver material which will be studied at the meeting this time, the material sequence of numbers. The teacher displaying the video on the composition of the drying kemplang. From the earlier video students to recall their activities that are often seen in the neighborhood of the results seen several ways kemplang preparation for drying.

Answer students on activities 1 show that students are familiar with various forms of preparation kemplang way to dry, it is because in addition to information from the displayed video had some students are also almost daily see such activities around the neighborhood.

Once students know how to prepare kemplang to dry, then the activity of two students prepare a paper circle and cardboard that has been given by the teacher (teacher model), students in groups prepare a paper circle on the cardboard resemble the activities arrange. Kemplang to dry on the displayed video, they discuss what form they choose to create order. Here are the results from the preparation of paper circles done by the students on the problem number 2.

Figure 1. Structure of paper circles from several groups

After arranging the learning loop paper followed by painting a picture of the composition of the paper circle which they set earlier on the sheet that has been provided by using colored markers. And on the portrait, students determine the pattern to-1, pattern 2, pattern 3 and so on. Here are the results of the drawings made by students who resembles the composition of the paper circle.

Figure 2. students painting paper arrangement circle

In the third activity, this activity aims to define the elements of numbers much paper circle pattern on the pattern of the 1st, 2nd, 3rd and so on, as well as determine the rules that form of the pattern. Of Question 3 had they had painted, in this activity they determine how much paper a circle formed of each pattern, then once they know a lot of painting circles arranged in each pattern, the students define a rule that is formed from the pattern so that they can determine the numbers The next of the rules. Based on the answers of students that we show below shows all the groups could correctly answer these problems, students can determine the rules of the pattern of numbers which they set in the previous activity. Here are the results of the students' answers to the problem number 4 on 3 activity.

Figure 3. the results of the students' answers no 4

Further to Question 5 on LAS student response in answering this question very well, this is because they have found a pattern of rules that they form, so to determine the next three numbers they can do.

Figure 4. The results of students' answers to question no. 5

Activity 4 begins with teachers show back through the scanner results show students' answers on the activity of two in each group. Furthermore, students begin working LAS 4 in group activities. The purpose of this activity is to determine the four functional relationship tribes in the sequence of numbers or in other words, find the nth sequence of numbers.

Activities begin creating a model of the form to paint the unit circle as a representation of the configuration of the paper circles have been discovered earlier, and then calculate the amount of each

constituent unit circle pattern thus obtained sequence of numbers. Furthermore, a strategy for finding the nth term the sequence of numbers. Students in groups outlining the number pattern obtained in the previous exercise. Decomposition of the numbers 2, 4, 6, 8, 10 which was obtained with the 5 on the previous activities produce a pattern of the n = 2n can be seen in Figure 5.

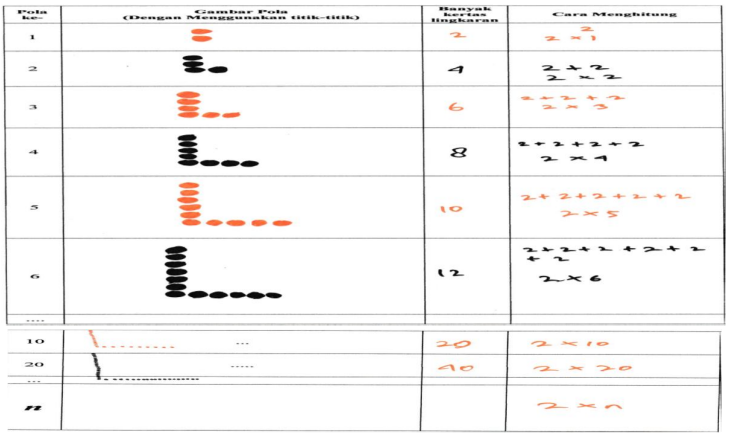

Figure 5. Strategy reduction in group number 5

From the decomposition of the above, a group of 5 illustrates the composition of the paper circle in every scarcity based sequence number obtained previously 2, 4, 6, 8, 10 and then continued by outlining the numbers in each of the patterns, students write the number corresponding to the decomposition of numbers in every step of the pattern, namely pattern to-1 = 2, pattern-2 = 2 + 2 = 2x2, the pattern of all 3 = 2 + 2 + 2 = 2x3, the pattern of all 4 = 2 + 2 + 2 + 2 = 2x4, the pattern of the 5th = 2 + 2 + 2 + 2 + 2 = 2x5 and so on in order to obtain the pattern of the n = 2 xn = 2n.

Based on the pattern of the n obtained, students can determine the pattern to-50 with substitute n = 50 on the pattern of the n (Un) obtained as in Figure 6.

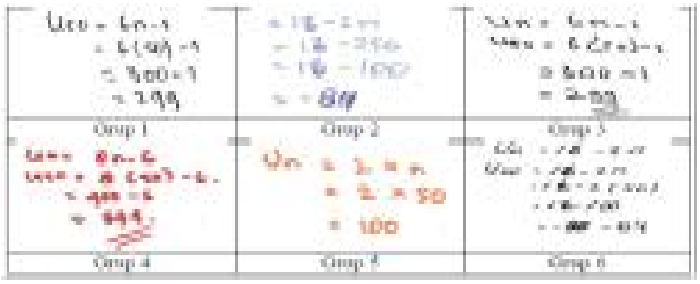

Figure 6. Each group response to question no. 4 activity

From 6, the students' understanding on the activity of four views of the ability of students to describe a pattern for determination nth pattern. Students then write the decomposition pattern outlines their number. furthermore, students determine which strategy is counting on every pattern in order to obtain the n-th pattern of the sequence of numbers. In addition, students can also determine the rate / specific pattern from the pattern of the n-th known. This is consistent with the predicted researchers conjecture.

Based on learning the track which has been designed and carried out by the researchers, the trajectory of learning to understand the concept of numbers pattern includes four learning activities that have been carried out on the process of learning in students. Furthermore, in this study based on the implementation PMRI in designing any learning activity that shows how PMRI characteristics form the basis for each activity.

From the results of the above, it can be concluded that the knowledge and ability of students' understanding of patterns of numbers have increased. This is consistent with the statement of Hadi (2005) that learning with real problems (realistic) make students more interested and excited to learn mathematics and showed an increase learning outcomes are quite satisfactory.

CONCLUSION

Based on the results and discussion that has been described, manufacture kemplang as the context has an important role to generate trajectories of students in the learning patterns of numbers in class IX SMP. Learning trajectory generated in this study are the trajectories of learning through which students through activities that explore the drying arrangement kemplang, arrange patterns using circles and painted paper, outlining the pattern and pattern number. Weave patterns of activity using paper circle, students produce a sequence of numbers later so students can determine the next number of the sequence of numbers and define the rules. In the last activity, students to describe the composition of the paper circle to determine the pattern of all n. The results of this study showed that of the activities undertaken to help students understand the pattern of numbers in class IX SMP.

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