Student’s response to realistic mathematics learning with the context of Palembang songket

K Febriani¹, Somakim¹, dan J Araiku¹*
¹Mathematics Education Department, Universitas Sriwijaya, Palembang, South Sumatra, Indonesia

*Corresponding author’s email: jeriaraiku@fkip.unsri.ac.id

Abstract. This study aims to see students’ responses to mathematics learning with the context of Palembang songket motifs. The subjects of this study were Songket and 31 students from SMPN 9 Palembang. This research is a descriptive study. The instruments used are questionnaires, interviews, and documentation. The results show that students’ responses toward the learning of realistic mathematics using the Palembang songket context are positive, indicated by students’ satisfaction of 81.4%, activity of 88%, learning sophistication of 88.5%, and 75.6% of the students stated that the instruction was beneficial for mathematical modeling and awareness. Hence, it is suggested that the need for realistic mathematics learning using cultural contexts is carried out in the classroom to support students interpreting concepts and interpreting mathematics learning, and making learning mathematics more enjoyable.

1. Introduction
Learning is the interaction between stimulus and response. Stimulus is what stimulates learning activities such as thoughts, feelings, or other things that are captured by the senses, while the response is a reaction that is raised by students when learning in the form of thoughts, feelings, or movements or actions [1]. Mathematics is one branch of science that has an important role in human life and the development of science and technology [2], one of which is having a role in solving everyday problems [3]. The weakness of students in learning mathematics is that students cannot connect mathematical concepts with their daily experiences [4]. One of the difficulties of these students is reflected in the mistakes students make in transforming geometry [5-7]. This is because it is too focused on the procedure of learning mathematics without having anything to do with the meaning, understanding, or application of the mathematical concept [5, 8].

Mathematics must be connected with reality, and be in an environment that is understood by students so that it can bring up human values and facilitate the process of learning mathematics [9]. Mathematics is studied not as a closed system, but mathematics as a human activity [10 - 12]. So that learning using the context of real-life students provides meaningfulness in learning mathematics [13 - 15]. In Indonesia, Realistic Mathematics Learning (RME) was adapted into Indonesian Realistic Mathematics Learning (IRME) as the development of approaches in mathematics learning [16]. Research on educational practices in Indonesia to improve the quality of students in learning mathematics is by providing context-based task [17]. Kemendikbud states that one alternative to improve the quality of mathematics education is by developing mathematics learning based on constructivism, this thought is based on the principle that mathematics is a cultural product that is the result of social construction and as a means of solving cultural problems [18].
Palembang's cultural heritage is famous for its songket. The motifs of the Palembang songket generally consist of three kinds, namely plant motifs, geometric motifs, and mixed motifs between plants and geometries [19, 20]. Geometric motifs and the process of weaving songket by silk threads and gold threads forming symmetrical patterns shows that there are several mathematical concepts that have long been applied in Palembang culture. The concept of reflection contained in the *Nago Besaung* songket motif and the translational concept contained in the *Berante* songket motif, so that the songket motif used as the context in learning in this study was the *Nago Besaung* motif and the *Berante* motif.

Realistic mathematics learning on transformation material shows that there are positive responses given by students [21-23]. So that realistic mathematics learning was chosen as a stimulus in the learning process in this study to see student responses. Based on this background, the authors are interested in conducting research that aims to find out how students respond to realistic mathematics learning with the context of Palembang songket motifs.

2. Method

This research is a descriptive study. The instruments used are questionnaires and interviews. The subjects of this study were SMPN 9 Palembang students. The questionnaire is used to see students' responses, and interviews are used to find out the reason for the response.

The study was conducted in class IX.2 with a total of 31 students. Learning is done with two meetings, where the first meeting, learning about the material transformation of reflection and the second meeting about the material transformation of translation. At the end of the meeting, students were given a questionnaire about students' responses to the learning that had been done. Then students are chosen to be interviewed based on the results of a questionnaire analysis. After the data is collected, then the data is reduced, analysed, and presented in tables, scores, and descriptions.

3. Result and Discussion

The results of this study describe student responses to mathematics learning with the Palembang songket motif, namely the *Nago Besaung* motif and the *Berante* motif. The *Nago Besaung* songket motif contained the concept of reflection and the *Berante* songket motif contained the concept of translation.

![Figure 1](image-url). Concept of transformation geometry in Palembang songket motif.

Figure 1 illustrates the transformation found in the *Nago Besaung* songket motif and the *Berante* motif. The concept of reflection is contained in the *Nago Besaung* songket motif wherein this motif depicts a pair of dragons facing symmetrically with each other once we place the symmetrical axis, and the distance of the dragon image (a) to the symmetry line is the same as the distance of the symmetry line to its shadow (a') i.e. coincide [18]. Whereas the concept of translation is contained in the *Berante* motif, where this motif focuses on the form of chains connecting one flower to another. The flowers have the same shape and size, translating so many units towards the diagonal to obtain a', a'', a''', and
so on. Previous research also shows that there are concepts of geometry transformation contained in cultural heritage [24 - 26].

The results of this study indicate that realistic mathematics learning with the context of the Palembang songket motif gets positive responses from students. This can be seen from the results of questionnaire analysis and interviews regarding student responses. The instrument used to collect students’ response is questionnaire and interview. There are 4 main aspects of response with total of 15 questions, which are student’s response on satisfaction, activity, sophistication, and benefit.

3.1. Students’ response on satisfaction

From Figure 2, it can be seen that all students excited to learn with songket context. Furthermore, learning with songket context is memorable to them. This is because the context used is something that is very recognizable by students, so it will be easier to interpret the learning and is very inherent in students' memories [11, 13]. On the other hand, apart from the excitement, 4 students confuse and a student stated very confuse about the instruction. This confusion happens because learning with culture is basically something new for them. Therefore, it needs adjustment in order to get used to some specific model or method of instruction [16]. Furthermore, since the instruction used songket motive as the base of the transformation, they were having trouble determining the image through image properties. However, deeper interview stated that by putting the concept into context, it made them easier to understand. Hence, it is important to sustainably integrate real-world context in mathematics lessons in order to reduce its abstraction by contextualizing the concepts so that mathematics learning is easier to understand and more meaningful.

![Figure 2. Students’ responses toward satisfaction.](image)

For the aspect of happiness, 24 students agree, yet one student disagrees with the statement. The reason he felt unhappy is that at the beginning he couldn’t see the shape of the dragon clearly. However, as time goes, he could see the motive clearly. In the aspect of boringness, 24 students enjoyed the learning process and one student felt bored. This student stated that the instruction is too complicated since he used to direct learning where they just handed some mathematics formulas and then apply those formulas with some numbers.

3.2. Students’ response on the activity

Based on Figure 3, it can be seen that all students stated that they prepare themselves when the learning process is about to start and they paid attention when the teacher explained the material. They were also responsive during the instruction. They actively involved in delivering ideas in the group phase, class discussion, as well as giving responses to the teacher’s and classmate’s questions. The positive attitude towards this instruction is because learning using songket is something new for them, they are curious and interested in how mathematics learning is related to songket. They never thought before that songket contained mathematical concepts in it. When students play an active role in discussions in the learning process, the learning will be meaningful to them [15]. This shows the use of context leads to meaningful learning.
3.3. Student’s response towards sophistication
Figure 4 shows students’ responses to these aspects if learning using the songket context is a new experience for them. For novelty, 24 students agreed that new instructions were for them and also to get new knowledge, while each statement contained one student who disagreed. Based on an interview, this student experienced learning with songket in primary school but in different materials.

3.4. Student’s response towards the benefit
Figure 5 shows that 24 students agreed that they often modelled/connected mathematics learning with real things in everyday life. On the other hand, one student disagrees with the statement since she didn’t realize how important mathematics in real life and to solve real-world problems. Therefore, learning mathematics realistically is very important to make students aware of the role of mathematics in real-life situations. This statement also validated with students’ response to mathematical awareness, where all of the subjects agreed that learning mathematics with songket context make them realize the connection between mathematics and real culture. The effect is that 21 students would love to do similar
learning using cultural contexts, while 4 students stated the opposite. They prefer direct learning since it's simpler to just implement the certain formula to find an answer.

Students' understanding of the material is also changed. There are only 6 out of 25 students agreed that their understanding of the material stays the same. The reason being is that they still faced an obstacle when determining the shape and position of the image from the transformation without using any formula. However, most students like learning to use cultural context for direct learning. While using direct implementation of a particular formula may give an immediate result on the coordinate, but the position and the shape of the image is not something that the students aware.

Questionnaire student responses were analysed using a Likert scale with four alternative answers, namely strongly agree, agree, disagree, and strongly disagree [27]. The analysis was carried out by determining the interval score of the student response categories. Table 1 is the score interval of the student response categories.

Table 1. Score interval and student response category.

| Score Interval  | Interval Category                        | Response Category |
|-----------------|------------------------------------------|-------------------|
| 25 - 43.75      | Minimum score ≤ x ≤ quartile 1           | Very Negative     |
| 43.75 - 62.5    | quartile 1 ≤ x ≤ median                  | Negative          |
| 62.5 - 81.25    | median ≤ x ≤ quartile 2                 | Positive          |
| 81.25 – 100     | quartile 2 ≤ x ≤ maximum score           | Very Positive     |

Based on the score interval of the student response categories above, the results obtained by the student response category are based on the average score of the student response questionnaire. The results of the analysis of student response are summarized in Table 2.

Table 2. Analysis of student response.

| Response aspect | Percentage | Response category |
|-----------------|------------|-------------------|
| Satisfaction    | 81.4       | Very positive     |
| Activity        | 88         | Very positive     |
| Sophistication  | 88.5       | Very positive     |
| Benefit         | 75.6       | Positive          |

Table 2 shows that for the aspect of satisfaction, the average student gave a response in the very positive response category that students were satisfied with the learning of realistic mathematics of transformation material using the context of the Palembang songket motif. For the aspect of activity, realistic mathematic learning using the Palembang songket context shows that students play an active role in the learning process as seen from the statements of students who gave very positive responses to these aspects. This is in line with previous research conducted that with Realistic Mathematics Educational makes students play an active role [28 - 30].

For the new experience aspect, the average student gives a response that is included in the very positive response category, meaning that realistic mathematics learning of transformation material using the context of the Palembang songket motif is a new experience for students. And for the beneficial aspect, the average student gives a response that is included in the positive response category, meaning that realistic mathematics learning using the context of the Palembang songket motif is beneficial for students. The results of this study are in line with previous research which shows that realistic mathematics learning of transformation material using the local cultural context gets positive responses from students [21 - 23].

4. Conclusion

Realistic mathematics learning in the context of Palembang songket motifs gets a dominant positive response from students. This can be seen from the results of this study that students expressed feeling happy and excited about this learning. Realistic mathematics learning activities using the songket context make students play an active role in the learning process because learning is new to students seen from
students’ interests and students’ active roles. However, there are some students who prefer to use the formula directly because it is easier for him to get answers when using the formula. That makes students unable to interpret the concept, and only memorizes the formula. Therefore the application of realistic mathematics learning is needed to be able to help students interpret mathematical concepts more easily.

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