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ABSTRACT

Every ethnic group has various shapes, sizes, and cultural patterns that are interesting to study. Incorporating cultural elements in learning mathematics as the representation of ethnomatematics is helpful to introduce cultural values to the younger generation implicitly. The combination of technology and ethnomatematics for creating learning media should be tried because it contain a positive values for attracting students' learning interest. This study purposes to develop ethnomatematics-based flipbook in circle material at VIII grade of junior high school. The results show that ethnomatemics-based flipbook is appropriate to apply. The validation result of material experts is 80%, validation of media experts is 77%, and from the student questionnaire responses is 74%.

INTRODUCTION

In the era of industrial revolution 4.0, education must be oriented to technological development. Everything in education not only learning media but also learning process have to utilize technology. However, technological development also have a negative impact for Indonesian, one of the impacts is cultural degradation. Technology degrades the culture by generalizing it becomes a global cultures(Rais, et al., 2018). Therefore, incorporating cultural values into learning process is needed to prevent the degradation.

Cultural values can be cultivated in the family, society, and educational sectors (Mahendra, 2017). In educational sectors, teacher can insert the cultural values to let the students recognize and know more about their culture. Culture-based learning is a learning that prioritizes student activities with various cultural backgrounds and integrate the culture into the material (Sardjiyo & Pannen, 2005). Culture-based learning focus on emphasis the integrated understanding rather than depth understanding (Putri, 2017). Students’ integrated understanding connects between mathematic and cultural elements so that the learning process becomes more meaningful and enjoyable. In addition, integrated concept helps
students to solve contextual problems easier because they are supported by comprehensive knowledge and understanding.

In mathematics, culture-based learning can be linked to ethno-mathematics. Ethnomatematics is a special method used by certain cultural groups or community in mathematical activities (Rachmawati, 2012). In this case, the mathematical activity is the process of translating the form of contextual problems into abstract mathematics or vice versa. Implementing the concept of ethnomatematics in the learning process will increase students' interest in learning because it provides new insights and experiences. Then it implicitly improve student learning outcomes. This is in line with Uloko's research in (Putri, 2017) he found that the key success of Japanese and Chinese in mathematics learning is incorporating ethnomatematics. Therefore, it can be said that ethnomatematics is effective using for studying mathematics.

Besides, adequate learning media is also one of the factors to gain students interest. In the era of the industrial revolution 4.0, every educator must be accustomed to implementing the use of technology in the learning process. One technology-based media that is easy to use and provides an interesting learning atmosphere is the use of flipbook learning media. Using the flipbook can create more interesting learning atmosphere because it can provide a dynamic page switching effect since it is equipped with audio and visuals. In addition, flipbooks are very easy to use so they can be applied at every level of education. So that the use of flipbooks not only attract students' interests but also improve student learning outcomes. Haryanti & Saputro (2016) found that the learning students' outcomes using the flipbook module are better than students who do not use the flipbook module.

Technology not only has positive impact but also has negative side. Therefore, we must not reject technology or take it for granted but we need to filter the impacts to keep the crucial values. Then, this study tries to combine technology elements and cultural elements assumed are contradictive. Due to technology may cause cultural degradation; ethnomatematics-based flipbook can be a solution to utilize technology for introducing the cultural values.

Based on the description above, it can be concluded that the purpose of this study is to develop Flipbook Based on Ethnomatematics in circle material. Circle material was chosen to facilitate students in visualizing the elements in the circle, as well as adjusting to the chosen cultural elements, namely culinary culture in Malay Lingga which generally shaped like a circle. The significant of this research is to provide a different experience in the learning process. Students will gain an understanding of the concept of circle material through an introduction to the culinary culture that exists in the Malay Lingga.

**METHODOLOGY**

This research using descriptive approach and the type of this research is Research and Development (R&D). Research and Development (R&D) is research that is used to produce a particular product, and test the effectiveness of the product Sugiyono in (Haryati, 2012). Before creating a product, an analysis of the product is needed and the product must be tested to know it can be used effectively or not. This research uses 4D model to develop the learning media. There are four phases in this research namely define, design, development, and disseminate.

In the first phase, needs analysis is carried out to determine the development requirements. The analysis is carried out, namely curriculum analysis, material analysis, and media analysis. The three analyzes were carried out through literature study because the
situation did not allow it to go directly to the field. In the curriculum analysis, an analysis is made related to the objectives and indicators of learning, as well as to establish material that matches the research objectives. The analysis of the material phase recognizes the concepts of learning material and its relationship with ethnomatematics. Finally, the media analysis is carried out by prioritizing the use of technology, is easily applied, and can be distributed online.

The second stage consists of formats selection, initial design, and design/preparation. The choice of format is done by selecting the appropriate initial format for the flipbook display that supports the use of Malay Lingga culinary images. The initial design is done by arranging the draft based on its components. Then the draft is made in the design stage of the design.

The development phase is expert validation and product trials. The finished product is submitted to the expert to validate the content of the material and media. Before testing the students, the product is revised according to the directions of the material expert validator and the media expert validator. Product trials are conducted online for students and alumni are respondents of the questionnaires. After the products are valid, effective, practical then it distributes to the students that called disseminate stage.

The technique of data collection in this study is distributing questionnaire to the students. The questionnaires were modified from Natasya & Izzati. The validation in this study included validation of media and material. The aspects in validating media included the benefits of the media, media design, and media navigation/operations. While the aspects in validating the material are the suitability of the learning objectives, the quality of the material, the presentation of material, and the presentation of self-evaluation. The answer of each statement on the validation sheet contains of five which are very good, good, medium, not good, and not very good (Natasya & Izzati, 2020).

The collected data from questionnaire are analyzed using qualitative descriptive techniques. And summated of rating data analysis techniques to see the feasibility of products made based on the results of the validation. Descriptive analysis is a technique that describes and interprets data that has been collected by giving attention and recording as much as possible on the aspects studied in order to obtain a general description of the actual situation (Arywiantari, et al., 2015).

Student response was processed using the method of successive interval (MSI) which is helped by Excel. While the data from the results of the validation are calculated using the formula:

\[
\text{Percentase} = \frac{\text{Sum of score}}{\text{Maks. score}} \times 100\%
\]

The criteria for classification of percentage results as follows:

<table>
<thead>
<tr>
<th>Table 1. Percentage criteria</th>
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<tbody>
<tr>
<td>Percentage</td>
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<tr>
<td>-----------</td>
</tr>
<tr>
<td>0% - 20%</td>
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<tr>
<td>21% - 40%</td>
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<tr>
<td>41% - 60%</td>
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<tr>
<td>61% - 80%</td>
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<td>81% - 100%</td>
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</tbody>
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Source: (Riduwan, 2009)

RESULT AND DISCUSSION

In general, ethnomatemics-based flipbooks have 4 main parts, namely: cover, instructional objectives, learning material, and evaluation. The cover is designed by
displaying the Malay Lingga culinary picture which is the essence of this research. Instructional objectives section contains the basic competencies, indicators of achievement, and learning objectives constructed based on the 2013 curriculum. Displaying the instructional objectives will help teacher and students adjust the learning material to be studied it easier for educators.

![Figure 1. (a) Display cover, (b) Display instructional objectives](image1)

Learning material described based on the instructional goals that have been set. In addition, it is also considered how far the learning material will be given. The explanation of the learning material is also adjusted to the ethnomathematics that will be used because each picture used is a Malay Lingga culinary picture. In this section also included information about the culinary presented.

![Figure 2. (a) Display of learning material, (b) Display of cultural knowledge](image2)

In each topic, tests will be given in the form of descriptive questions as an evaluation. It aims to measure the cognitive achievement of the students after using ethnomathematics-based flipbooks. At the bottom of the flipbook there are also display supporting tools such as search, bookmarks, audio player, full view, and zoom out / in. In the audio player tool, the researchers added audio to each Malay Lingga culinary image using the Malay Lingga dialect. So, to know about the culture, students can directly hear from the native speaker.
Flipbook Ethnomatematics based has been validated by 2 experts, namely material experts and media experts. The percentage of validation results are 80% and 77% respectively and are in the criteria to be used as a learning media in the VIII grade circle material in junior high school. However, despite this ethnomatematics-based flipbook also goes through a revision phase in accordance with the direction of the material experts and media experts. The following will be shown some of the results of revisions from experts as a discussion.

It is recommended by material experts to insert a circle image that makes all the elements that exist in the circle. In addition, revisions were made related to learning objectives, clarity of definition so that they were easily understood, as well as questions that could measure student understanding. Meanwhile, for media experts, it is suggested that each element of the circle use a culinary image typical of Malay Lingga. The revision results appear in the following figure.
After being revised, further testing is conducted on students. After using the ethnomatematics-based flipbook, students are asked to fill in the prepared questionnaire responses. Based on the results of data processing from the response questionnaire using the successive interval method obtained a percentage of 74% with a feasible category. So overall from the results of the validation of the material experts, media experts, and student response questionnaires, ethnomatematic-based flipbooks get decent results for use as learning media.

The students' responses to ethnomatematics-based flipbooks indicate positive responses. This is shown by the ten questionnaire statements which get a good scale response (4) and very good scale (5). The results of the questionnaire are displayed in pie charts below.

As displayed in Figure 6(a), the first statement by “s” quoted as I understand the use of ethnomatematics-based flipbooks on circle material gets 46% categorized as good, and 38% categorized as moderate. This is in accordance with the designs that are made to be easily used by the students. The display is also made as simple as possible in order to not make students bored. For the second statement (see Figure 6(b)), the clarity of material description on ethnomatematics-based flipbooks gets 23% which is very good, and 31% which is also good. This means that more than half of the research objects admit that the description of the material on ethnomatematics-based flipbooks is very clear and it helps them understand the
material easier.

Moving to Figure 7(a), the third statement about the clarity of the language used in the description of the material gets 23% categorized as very good, and 38% categorized as good. It can be said that more than half of the research objects feel that this assist them to understand the material due to the clarity of the language used. To add, as shown in Figure 7(b), the fourth statement by “p” claimed that the choice of background color and ethnomatematics-based flipbook writing on the circle material is appropriate and suitable. This means that the statement has a very good response from the students. Meanwhile, only 23% of the students feel the use of color in the background and writing inappropriate.

The fifth statement is about the image used to clarify the contents of the material. In the fifth statement, the picture used is a typical Malay Lingga culinary image that resembles a circle such as ganti susu cake, kacau tepung cake, apam cake, keripik sagu lenggang and keripik sagu bakar. As seen in Figure 8(a), only 8% of the students feel that the use of typical Malay Lingga culinary images did not support the contents of the material. The sixth statement is closely related to the fifth statement which is related to development flipbook ethnomatematics based. The sixth statement is quoted as With the ethnomatematics-based flipbook on circle material, it can add to my knowledge and insight on the matter of the circle and culture of the Malay Lingga. As displayed in Figure 8(b), 54% of students responded with very good scale to this statement, 23% of students has response of good scale, and 15% give response as medium scale. This indicates that almost all research objects declare the usage of flipbook based on ethnomatematics could increase their knowledge of the culture used, particularly the typical Malay cuisine of Lingga.
In Figure 9(a), the seventh statement is related to the attractiveness of learning media. Learning media must be designed as attractive as possible so that it could increase the students' motivation or enthusiasm to learn. Based on the response questionnaire shown in Figure 9(b), 54% of students feel interested to the display flipbook ethnomatematics based. Moreover, the learning media also increase students' motivation or enthusiasm to learn and makes students easy to understand the contents of the material presented. This is supported by the data of questionnaire response number 8 which said I became more aware of the circle material after using ethnomatematics-based flipbooks on circle material. This indicates a very positive response from the students in which 15 % students give 5 scale and 34% students give 4 scale.

As presented in Figure 10(a), the ninth statement quoted as by using the ethnomatematics-based flipbook on circle material, I can improve my understanding of circle material gets a very good scale response which has 23% and a good scale which has 38%. The last, the tenth statement is about the beauty of learning media which is presented with the concept of ethnomatematics. As shown in Figure 10(b), 15% of students gave a very good scale, and 46% of students gave a good scale. Therefore, it could be concluded that the development of ethnomatematics-based flipbooks is successful to raise students’ attention to learn.

CONCLUSION
Based on the results of the ethnomatematics-based flipbook development process, the percentage of eligibility was 80% from the material experts, 77% from the media experts, and 74% from the student questionnaire responses. All the three results are included in the feasible category. So it can be concluded that the ethnomatematics-based flipbook on circle material in class VIII of junior high school is suitable to be used as a learning media.
REFERENCES


