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Multimedia Flash Mathematics with Cultural Perspective (Ethnomathematics) to Develop Elementary School Students' Creative Thinking

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Abstract --- The use of technology in learning elementary school mathematics is an inevitable need in the world industrial revolution era 4.0. Flash multimedia with ethnomathematics background contains mathematical contexts in Indonesian cultures which can also provide space for students to explore the answers. The results showed that the flash multimedia that was developed met the appropriate criteria according to the assessment by experts. The students 'responses are very positive because through flash multimedia, students can learn mathematics while knowing culture, while students' creative thinking skills in terms of fleuncy, flexibility, originality are better.

Keyword--- multimedia flash, ethnomathematics, creative thinking ability, learning mathematics, primary school

1. Introduction

The use of technology in improving students' thinking ability in mathematics in the world 4.0 industrial revolution era is an important thing that must be done by the teacher [1]. Research results have proven that learning using technology can improve the mathematical performance of elementary school students [2], [3], [4]. One of the learning technology innovations is flash multimedia. The use of this technology in elementary school mathematics learning enables teachers to link mathematical contexts [4] with students' daily lives and the mathematical context with culture more easily [5]. The study of the use of culture in mathematics learning is called ethnomathematics [6].

Based on the research of literature by researchers, research on flash multimedia with ethnomathematics background is rarely taken [7], [8], [9]. These studies only include the use of mathematics in local cultures of certain regions. Meanwhile, the need for mathematics learning through the availability of flash multimedia that can raise local cultural issues in general in a country is also needed for students and teachers [10], [5], [11].

The use of cultural perspectives on ethnomathematics can also help students to master better thinking skills [12]. The ability to think mandatory that must be possessed by the 21st century is creative and critical thinking [13]. Of these two abilities, creative thinking plays an important role in creating new things in the current digital economy era [14]. Creative thinking becomes an important competency that students need to succeed in social life [15].

For elementary school students who are in the concrete operational phase [16], innovations in mathematics learning by involving cultural elements in technology are needed so that the mathematical image changes, from something boring to enjoyable [17], as well as making this students to more easily explore new mathematical contexts in the surrounding environment more effectively so that students have the ability to think creatively [18]. Therefore, it is important to conduct research to develop mathematical flash multimedia that can facilitate students to learn more easily through local cultures in Indonesia, as well as to train creative thinking skills that are needed in the current world of 4.0 industrial revolution era.

2. Method

This research uses development research methods [19] to develop elementary multimedia flash school mathematics with the perspective of Indonesian cultural backgrounds (ethnomathematics) which are also oriented towards creative thinking. The development model used is ADDIE which consists of Analysis, Design, Development, Implementation, Evaluation [20]. Flash multimedia quality criteria developed are valid, practical, and effective [21].

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The subject of the research was the fifth grade students of Kawedanan State Elementary School (SDN) in Magetan Regency, East Java. The research sample consisted of class A 5th grade as a control class and class B 5th grade as an experimental class totaling 80 students and selected randomly.

To obtain research data, data collection instruments are used as a tool to measure each aspect of product validity, practicality, and product effectiveness [21]. Figure 1 shows the aspects of product development measured, instruments used, and respondents as data sources

Table 1. aspects measured, instruments, respondents

Measured aspects	Instrument	Observed Aspects	Respondents
Product validity	Validation sheet	multimedia flash with Ethnomathematics backgroud	Experts and teachers
Practicality	Observation sheet	The practice of teaching Teachers and students activities	Teachers and students stidents
Effectivity	test	Creative thinking skills	

The data in this study consisted of the assessment results from expert validators, assessment at the time of observation, and the value of students' creative thinking skills. In addition, these data are also supported by perceptions of student and teacher performance through the provision of student response questionnaires and teacher responses to the developed flash multimedia. The effectiveness formula used is t-test as paired variance (2 sided) [22].

The development of flash multimedia is based on indicators of creative thinking abilities which include aspects of fluency, flexibility, elaboration, and originality [23]. Table 2 shows the indicators and activities of creative thinking of students.

Table 2. Indicators and Behavioral Thinking Ability (KBK)

KBK indicator	KBK behavior
Fluency	The to produce many ideas / answers Ability to have broad ideas
Elaboration	The Ability to specify certain details
Flexibility	The ability to produce ideas, answers or questions from different points of view The ability to give different directions of thought
originality	The ability to give unusual answers, other than others that are rarely given

First of all, the development of flash multimedia with an ethnomatics background for creative thinking is done by studying and recognizing cultural products in Indonesia. Cultural products that can be in the form of artifacts, building shapes, traditional games, traditional foods, etc. that can be used in mathematics learning, for example, the Joglo House culture products shown in Figure 1.

Figure 1. a traditionl javanese (Joglo) house

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The joglo house can be used in mathematics learning by identifying the characteristics of the building (as a 3-dimensional space) and determining the volume of the joglo house roof. Through the space abstraction, students will try to develop their own models to solve problems. at this stage, students' creative thinking skills will be built. In addition, students will get to know the culture that might have been forgotten given the technological developments that are increasingly accelerating.

The initial display of flash multimedia displays cultural products by providing brief information or information related to the history of the culture, so that students can recognize the culture presented. In addition, each flash multimedia display is given Basic Competency and Competency Standards, creative thinking material, questions and tests, so that the learning process can be directed and run in accordance with the stated goals.

Figure 1. Competence standard and basic competence

Figure 3. page 1 exercise on 3-D space (Rumah Joglo)

Figure 2. 3-dimentional space material (Rumah Joglo)

Figure 4. Page 2 3-D space exercise (Rumah Joglo)

The following table shows the assesment result of the sxpert regarding media eligibility which was developed using the creteria of format, content, and [22].

Table 2. Validation results on Multimedia Flash

Aspects	Validator				
	1	2	3	4	5
Format	4.2	4.6	4.8	4.2	4.2
Content	4.8	3.4	3.8	4.6	4.6
Language	4.4	3.8	4.6	4.4	3.6
Mean	4.5	3.9	4.4	4.4	4.1

The validation process of flash multimedia was developed by 5 people consisting of 3 experts from academics in their respective fields and 2 elementary school mathematics teachers. Table 2 shows that the average rating of validator I is 4.5, validator II is 3.9, validator III and IV are 4.4, and validator V is 4.1. The

average total of the five validator assessments is 4.3. If categorized, the assessment of the five validators is in very good criteria. Based on these results, it can be concluded that flash multimedia is appropriate to be used in mathematics learning.

Flash multimedia is categorized as practical if it is applied in the field and the minimum level of compliance is included in a good category [21]. In this study, multimedia flash is said to be practical if the teacher's activities and student activities are on good or very good criteria. Teacher responses and student responses are in good or very good criteria.

Observation data on teacher activity was obtained through observing activities carried out by teachers when using multimedia flash in learning. Assessment was done by observing the teacher at each meeting. Observations were made by trained observers so that they could use the observation sheet correctly. Teacher activity can be seen in the graph in Figure 5 below.

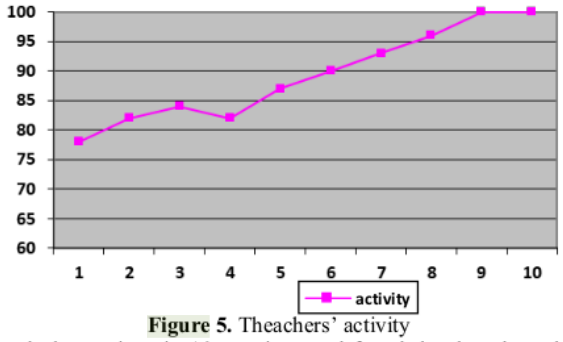

Figure 5. Theachers' activity

The Observer conducted observations in 10 meetings and found that based on the criteria that had been established, the ability of teachers to manage classes was categorized as very good. Observations of activities at the first meeting were 78%, the second meeting was 82%, the third meeting was 84%, the fourth meeting was 82%, the fifth meeting was 87%, the sixth meeting was 90%, the seventh meeting is 93%, the seventh meeting was 96%, the ninth meeting was 100% and it reached the 10th meeting at 100%.

Student activity data is related to activities when students are actively involved in learning using flash multimedia. Observation of student activities is carried out in each meeting (10 meetings). At each meeting, observers observe the activities carried out during the learning process. Based on observations, it can be said that there is an increase in activity at each meeting. This shows that multimedia flash is not only interesting but also attractive because it makes students actively involved in doing mathematical activities that incorporate cultural elements in mathematics learning. Student activity can be seen in the graphics in Figure 6 below.

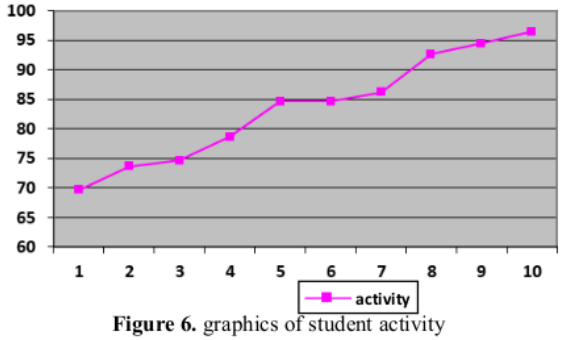

Figure 6. graphics of student activity

Based on the observations, each student activity meeting was in good criteria, namely 69.6% at the first meeting, 73.6% at the second meeting, 74.6% at the third meeting, 78.6% at the fourth meeting, 84.6% at the fifth meeting, 84.6% at the sixth meeting, 86.2% at the seventh meeting, 92.6% at the eighth meeting, 94.4% at the nineth meeting and it reached the 10th meeting at 96,6%.

Practical data of flash multimedia is used to obtain information that the flash multimedia developed meets the principle of ease to be applied by the teacher [21]. This data was obtained through a questionnaire filled out by the teacher when learning finished using flash multimedia. Positive teacher response as one indicator of

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practical multimedia flash. Based on the calculation, it was found that the average percentage of teacher's positive response was 97.14%.

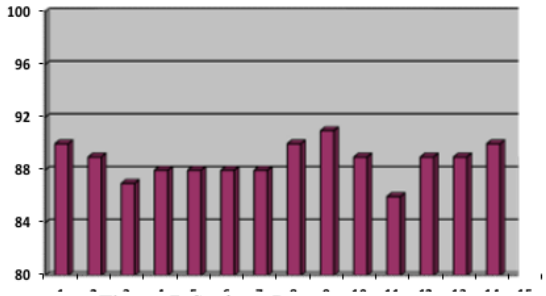

Figure 7. Students Response

In addition to the teacher's response, the indicator of the practicality of the learning device is also seen based on the level of student positivity. Students are given a questionnaire with 15 statement items. From the results of student responses after using flash multimedia, the average positive response obtained is 89.73, which means that the results are in very good criteria. From the results of these calculations, it can be concluded that the developed flash multimedia is in practical criteria.

To find out the effectiveness of multimedia flash, the researcher compared the average class taught with flash multimedia and control class, data analysis ability of creative thinking class taught without flash multimedia using t-test. Comparison of the value of the creative thinking ability of the experimental class and the control class can be seen in Figure 7 as follows.

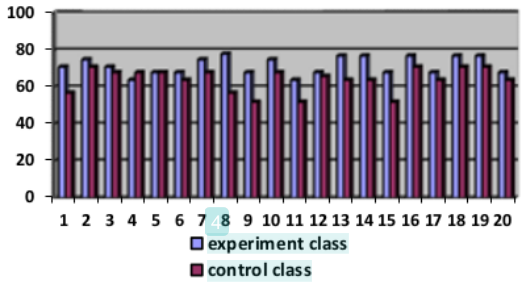

Figure 8. The comparison of creative thinking level between experiment and control class

Based on the results of calculations, the researcher found that the number t-test = 4.2331, which was then compared with the number t-table with degrees of freedom (dk) = n - 1 with α = 5% for one-sided test (one tail test). T-table = 1.697. Because t-test = 4.2331> t-table 1.697 then H0 is rejected. Or in other words, the average ability of creative thinking classes taught with multimedia flash is better than the control class.

The involvement of cultural perspectives in the current curriculum has become an inseparable fundamental [24] in mathematics education. The implementation of flash multimedia set in ethnomathematics in learning has a direct impact on the meaningfulness and relevance of knowledge with local cultural elements [4], [12]. A learning process that emphasizes a cultural perspective can help teachers associate material that is better taught with the real-world situation of primary school students [25], [26] and encourage students to make connections between their knowledge through the cultural context and their application in their lives as member of the community [27], [28], so that the creativity of elementary school students is easier to develop in terms of fluency, flexibility, originality.

3. Conclusions

The development of flash multimedia set in ethnomathematics to increase the creativity of elementary school students have fulfilled valid criteria based on expert judgment, practical to be applied in learning, and effective to improve students' creative thinking skills. Students' creative thinking abilities include fluency, flexibility,

elaboration, and originality. Flash multimedia that is developed is feasible based on the results of expert evaluation with an overall score of 4.3 overall, so that the media is valid for use in learning. In addition, flash multimedia also meets the practical criteria based on the results of the teacher's repon and the student's response to the flash multimedia. Teachers and students give very positive responses, activities in learning are also very good. The test results of the ability to think creatively using flash multimedia is better than learning without using flash multimedia. Flash multimedia set in ethnomathematics can facilitate students to learn mathematics more flexibly, in accordance with Indonesian cultural context, related to everyday life, making students explore mathematical creative ideas more easily.

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