The Effectiveness of Cultural Context-Based Mathematics Student Worksheets (Lks) Toward Elementary School Students Learning Outcomes

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Abstract. This study is aimed at: (1) revealing the contribution of cultural context-based mathematics student worksheets (LKS) towards elementary school students' learning outcomes, (2) uncovering the effectiveness of the worksheets towards the students' learning outcomes. This study was a quantitative study with an experimental design. The population of this study was fourth-year students of elementary school students of SD Negeri 06 Salatiga academic year 2018/2019. The sampling technique applied in this study was saturation sampling, meaning that all populations were sampled. In terms of data collection techniques, this study employed learning outcomes tests and documentation. The findings of this study indicated that (1) cultural context-based mathematics student worksheets had a significant effect on elementary school students' learning outcomes. 2) The worksheets were more effective than the conventional ones in improving students' learning outcomes. The findings were confirmed by the results of the t test= -8.165 with a significance value (p) of 0,000 and the average of learning outcomes after the determined student worksheets were utilized, it was higher than using the conventional one (83, 50> 64.25). In terms of learning mastery, a conclusion was drawn that the learning mastery by utilizing a cultural context-based mathematics student worksheets is better than using the conventional one which is 80%> 45%.

Keywords: Culture; Efectiveness; Student Worksheets; Contextual; Mathematics.

INTRODUCTION

Indonesia has been widely well-known as a diverse nation that is rich in terms of culture. Therefore it is very feasible to support the improvement of the education sector quality. However, the lack of understanding in viewing culture in learning activities often dissociates culture and education as two different things. Besides, education is practically inseparable from culture. If this thought happens continuously, the next generation of the nation may experience a serious identity crisis. To prevent it, an innovation must be done to integrate education with culture in the learning process. This speculation exactly complies the mandate of the 2013 curriculum which states that compiling and developing all learning activities (Hussain, Mkpojiogu, & Mohmad Kamal, 2016) must regard the principles of preparation and development that includes cultural background, norms, familial influence (Lashari & Lashari, 2017), values, and the students' surrounding environment.

Besides, national education also has a fundamental objective that is to develop the character of the Indonesian nation to the students, as well as they, knew in developing science and technology and culture (Law No. 12 of 1954 article 4). Whereas in Law No. 20 of 2003 concerning the National Education System states that national education intends to develop capabilities and shape the character and civilization of a dignified nation in the context of the intellectual life of the nation. This means education is not merely a process of transferring knowledge from teachers to students but also a means of the process of internalizing the character of the Indonesian nation and cultural insights (Suastra, Tika, & Kariasa, 2011).

The process of implementing education to achieve educational goals highly depends on the curriculum, where it contains planning, implementation, and evaluation (Humaid., 2019). This is further elaborated in detail in Permendiknas (Minister of National Education Regulation) No. 41 of 2007 concerning the Standards of Process, which regulate learning planning processes that require educators in the education unit to develop lesson plans. One element in the learning implementation plan is the learning device. A student worksheet is one component of a learning device that is often used by teachers, so the role of student worksheet becomes very essential.

In reality, the available mathematics worksheet is currently far from the goal of national education. Existing student worksheets solely emphasize the mastery of students' cognitive abilities and technological advancements, so mathematics learning becomes meaningless (Rusydi, 2014). Moreover, it causes students to become unfamiliar with the culture of their nation.

Indeed education and culture have an important role in fostering the noble values of the nation. It has an impact on the development and character building within the students. Education and culture is something that cannot be separated in everyday life since education includes the basic needs of every individual in society and so is the culture itself, therefore it becomes a whole and a comprehensive unit that applies in a society (Wijayanto, 2017, p. 80). Culture-based learning is learning that allows teachers and students to actively participate based on cultures they have already acquainted, so that optimal learning outcomes can be obtained (Pannen, 2005).

Therefore, this study is more focused on developing teaching materials in the form of Student Worksheets (LKS) through integrating cultural elements in mathematics that are more contextual. The development of teaching materials is expected to be an alternative solution in learning mathematics for elementary school students. The Student Worksheet that is developed contains cultural elements that are closely related to mathematics learning to create meaningful and contextual learning for students.

The Student Worksheet itself contains information and instructions in the form of instructions from the teacher to students to be active in learning activities in the form of work, practice, or in the form of application of learning outcomes. Besides, these worksheets can be used as a means to assist and facilitate the learning process such as assisting teachers in guiding and directing their students in finding concepts through independent and group activities. The worksheet can also be used as a means to develop skills in the learning process and be scientific to increase student success in achieving learning goals (Sagita, 2016).

Based on the description stated above, the purpose of this study is to reveal the effectiveness of cultural context-based mathematics student worksheets (LKS) towards elementary school students' learning outcomes.

THEORETICAL REVIEW

Cultural Context-Based Mathematics Learning

Mathematics is one of the basic sciences that continue to develop throughout the world. Each country has a different culture (culture) of each, thus allowing differences in the development of mathematics in line with the development of local culture. Culture-based learning itself is a learning activity that allows teachers and students to actively participate based on the culture they already recognize so that optimal learning outcomes can be obtained (Pannen, 2005).

The learning process itself can be carried out anywhere, regardless of the place or situation. School is one of the places or locations where a person can obtain education and culture. The role of schools, in this case, is more as a place for the process of civilization, because by going to school students can be guided to achieve intelligence academically, form characteristics, and develop knowledge skills and traditions that exist in a cultural community. This statement is in line with the notions of culture according to Tyler (1871) "a complex whole which includes knowledge, belief art, law, morals, customs, and any other capabilities and habits acquired by man as a member of society".

Accordingly, when culture is integrated with education it will become indispensable for developing the potential that exists within the students. In this case one of the basic subjects that can be integrated with people's culture is mathematics. The combination of these two things is known as ethnomathematics which is an interdisciplinary study of the relationship between mathematics and culture. Ethnomathematics study can be said as a study that examines a group of people in a particular culture to understand, express, and use concepts and practices and can be described as something mathematical. This is exactly in line with Barton's theory which states that "Ethnomathematics is a field of study which examines the way people from other cultures understand, articulate and use concepts and practices which are from their culture and which the researcher describes as mathematical" (Barton, 1994).

According to Francois (2012), the expansion of ethnomathematics itself must be closely related to the cultural diversity of students and the practice of mathematics in daily activities. This means that ethnomathematics brings mathematics closer to the student's environment because ethnomathematics is implicitly a program or activity that delivers values in mathematics and mathematics education. Furhter D'Ambrosio (2006) added that the use of ethnomathematics in learning activities must be used as a means of supporting solidarity and collaboration between students. The main purpose of ethnomathematics, in this case, is to create a society that is free from attitudes of barbarity, arrogance,

intolerance, discrimination, injustice, bigotry, and hatred. So that it is expected that through ethnomathematics a sense of peace can be realized.

In general, ethnomathematics can be achieved as a study examining the relationship between mathematics and culture. The success of the Japanese and Chinese countries in learning mathematics is because they applied ethnomathematics in their mathematics learning (Kurumeh, 2004). This was also stated by Abiam et al (2016: 7), "Ethnomathematics is not only more effective and superior; it is one approach that can enhance classroom instructional delivery in primary schools".

The former or existing mathematics can be enriched with the idea of ethnomathematics. Therefore the development of ethnomathematics has been widely studied it is immensely possible that mathematics can be taught simply by referring to the local culture. According to Bishop (1994b), mathematics is a form of culture. As a form of culture, mathematics has been integrated with all aspects of people's lives in various areas. Furthermore, Pinxten (1994) states that the nature of mathematics is a symbolic technology that emerges from environmental skills or cultural activities. Therefore a person's mathematical ability is influenced by his cultural background based on what is seen and felt. Culture itself will influence an individual's behavior and play a large role in the ability of individual understanding, including in learning mathematics (Bishop, 1991).

Based on the description of the various theories above, it can be concluded that to create a meaningful mathematics learning experience, the teacher must be able to start the learning process from concepts that are already recognized by the students as well as the existing culture around them. This effort aims to enable students to actively construct their mathematical knowledge. Through learning culture-based mathematics, this can improve students' understanding at the level of theories and concepts based on the culture they recognize. Thus the understanding of mathematical concepts obtained from these cultures can be meaningful and always inherent among the students.

Student Worksheets (LKS)

According to Prastowo (2014: 269), Student worksheets are a teaching material that has been packaged in such a way that students are expected to be able to study any subject independently. Worksheets can also mean a printed teaching material in the form of sheets of paper containing material, summaries, and instructions for the implementation of learning tasks students must do, both theoretically or practically, which refers to the basic competencies students must achieve and their use depends on the other teaching material.

Learning Outcomes

Learning outcomes are all abilities possessed by students after obtaining material through the learning process (Sudjana 2009). Based on the view of sociocultural theorists, James (2006) states that learning outcomes are understandings obtained from interactions between learners and the surrounding social environment. Whereas in general learning outcomes are interpreted as something that is obtained by students through a learning process that results in improvements in cognitive, affective, and psychomotor abilities that are continuous and dynamic and can be measured and observed.

Learning outcomes can be a benchmark for the learning process to measure the success of a student in learning. This is in line with the viewpoint of Slamet (2003) which states that learning outcomes are behaviors that occur on an ongoing basis and are dynamic. Meanwhile, according to Dimyati and Mudjiono (2002), they revealed that learning outcomes are a peak of a student's learning process.

Anderson & Karthwol (2001) who conducted some improvements on Bloom's taxonomic explains that the formulation of learning outcomes is divided into two dimensions, namely the dimensions of cognitive processes and the dimensions of knowledge. Cognitive process classification according to Karthwol is divided into six categories, namely remembering, understanding, applying, analyzing, evaluating, and creating. Meanwhile, the dimensions of knowledge are classified into four categories, namely factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge.

In general, based on the above definition, learning outcomes in this study are defined as the results obtained by students through examinations and assignments. Thereinafter the exam scores were obtained from posttest material. Whereas the assignment score is obtained from the assignments given by the teacher. The obtained scores are then analyzed to determine the effectiveness of cultural context-based mathematics student worksheets towards students' learning outcomes.

RESEARCH METHOD

This research was conducted at SD Negeri 06 Kota Salatiga. This type of research approach is quantitative research by applying an experimental design. Experimental research according to Sugiyono (2015) and Hussain et al,. (2016b) is a research method employed to demonstrate the effectiveness of certain treatments on something else under controlled conditions. The study was conducted through utilizing new learning media in the form of dakon used to help calculate the factor tree that is generally run by teachers traditionally by retaining multiplication and division operation.

This research was conducted by using paired samples with different treatments. The population of this study was all fourth-year students of SD Negeri 06 Kota Salatiga in the Academic Year 2018/2019 with a sample of 20 students. Samples were taken by using a saturated sampling technique. This technique is a sampling technique when all members of the population are used as samples. This is done if the observed population number is relatively small or less than 30 people (Sugiyono, 2015).

This study involved two variables, namely the independent variable and the dependent variable. The independent variables in this study were cultural context-based mathematics student worksheets and conventional worksheet while the dependent variable in this study was student mathematics learning outcomes. While the data collection techniques and instruments used in this study were in the form of student learning outcomes test scores. Besides, documentation was carried out to collect data on the number and names of fourth-year students at SD Negeri 06 Kota Salatiga as well as documentation of photographs of the learning activities.

Prior to the research instrument was employed, the instrument testing including a content validity test and a reliability test was carried out to ensure the instrument's appropriateness. After that the trial was conducted, then a prerequisite test was carried out which includes a normality test and a homogeneity test. This test aimed to find out whether the trial data were normally distributed or not and to find out the homogeneity of the data variations of the involved research subjects. To test data normality Liliefors test was applied while for the homogeneity Levene test was employed. Meanwhile, the Paired Sample T-Test was applied to test the research hypothesis.

FINDINGS AND DISCUSSION

The Contribution of Cultural Context-based Mathematics Student Worksheets (LKS) towards Elementary School Students' Learning Outcomes

The research activity was begun by conducting a research instrument test in the form of a learning achievement test at SD Negeri Mangunsari 01 Kota Salatiga. Based on the results of the test data processing with the instrument validity testing techniques using expert judgment, it was found that there were 25 items that were declared valid and feasible to be used with only minor revisions out of the entire 35 items given.

Meanwhile, the results of the reliability test from the learning achievement test were declared to be reliable and feasible to be used as research instruments. This was based on the results of the calculation of the reliability test of the mathematics learning achievement test which demonstrated a value of 0.873 at a significance level of 5% and a r_{table} = 0.423. Based on the test criteria statistically pointed out that the value of $r_{calculate} > r_{table}$ was 0.873> 0.423. Since the requirements were met, the instrument was highly feasible to conduct this research. After the results of the questionnaire were collected, one more time the prerequisite test analysis including the normality test and homogeneity test was carried out.

Data normality test aims to determine the distribution of research data whether the data obtained are normally distributed or not. The normality test used in this study is the Liliefors test with a significance level of 5% and is said to have a normal distribution if $L_{calculate} < L_{table}$. Based on the calculation, it is obtained the value of the $L_{calculate}$ normality test results for learning outcomes in mathematics using a culture-based worksheet of 0.020. At the 5% significance level, the L_{table} value of 0.190 was obtained. So statistically the $L_{calculate}$ value< L_{table} is 0.020 <0.190, and the value of p> α is 0.200> 0.05. Whereas, for the $L_{calculate}$ value of mathematics learning outcomes by using conventional student worksheets obtained a value of 0.116 at a significance level of 5% with a L_{table} value of 0.190. So statistically it can be concluded that the $L_{calculate}$ value< L_{table} is 0.116 <0.190 and the value of p> α is 0.200> 0.05. So as a whole it can be ascertained that the data from this study are normally distributed.

After the data normality test had been fulfilled, the next step was to test the homogeneity of the variance of the data of the research subjects involved through the homogeneity test. The Levene test study was employed to test homogeneity. Based on the calculation results, the significance value of the data was 0.227 with an F value of 0.174 and a F_{table} of 4.10 at a significance level of 5%. So statistically it

can be drawn a conclusion that the data of learning outcomes with culture-based worksheets and conventional worksheets has a homogeneous variance because the value of p> α is 0.227> 0.05 and the value of $F_{calculate} < F_{table}$ is 0.174 <. 4.10.

After both prerequisites of analysis namely the normality test and the homogeneity test were carried out, then the research hypothesis test was conducted. Hypothesis testing in this study employed the Paired T-Test. Based on these test results; the t-value of -8,165 with a significance value (p) of 0,000 was obtained. At a significance level of 5%, the t_{table} value of -2.093 was obtained. Thus, the significance value of p <α is 0,000 <0.05 and the value of $t_{calculate} < t_{table}$ was -8,165 <-2,093. Therefore it can be concluded that H0 was rejected and accepted H1 namely "the cultural context-based mathematics student worksheets influence the elementary school mathematics learning outcomes".

The research findings obtained are consistent with that of Satyawati (2012) who concluded that the results of learning mathematics using student worksheets had better learning outcomes than the conventional one. Similar results were also confirmed by (Diani, 2016) who concluded that the learning process by using a scientific approach with the help of student worksheets affects students' physics learning subject outcomes more than the former one.

The Effectiveness of the Worksheets towards the Elementary School Students' Learning Outcomes.

Based on the findings of the study, in improving mathematics learning outcomes of elementary school students, learning by using cultural context-based mathematics student worksheets is more effective than the conventional one. This is manivested by the results of the measurement of the average value or score (mean). Mathematics learning outcomes by using conventional worksheets only obtain an average value of 64.25 while the average value (mean) of learning outcomes by using cultural context-based mathematics student worksheets succeeded in obtaining an average value of 83.50 (83.50> 64.25) then it is obviously that the students' mathematics learning outcomes by using cultural context-based mathematics student worksheets are higher than learning outcomes using the conventional one. Further the comparison of the average learning outcomes can be seen in the following bar chart.
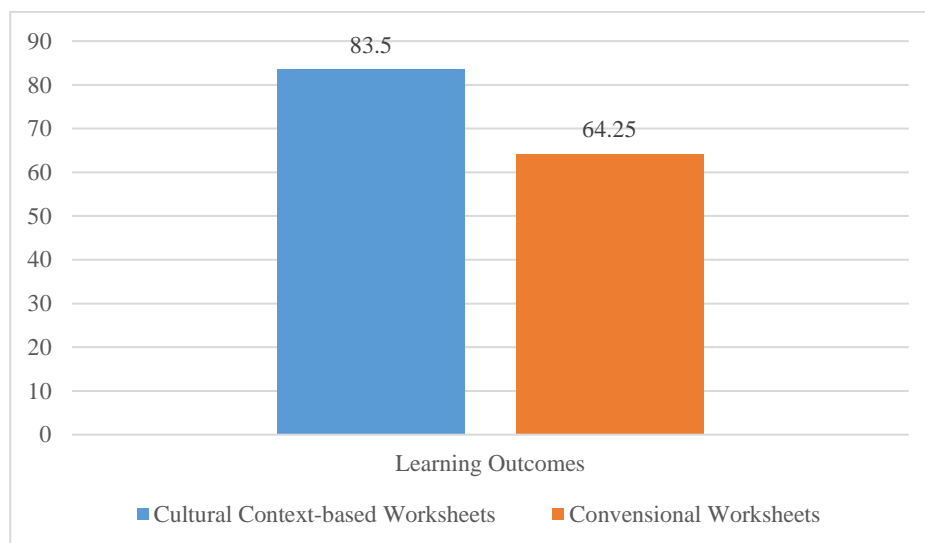

Figure 1

Figure 1 demonstrates that there are significant differences in the scores of student learning outcomes. Learning activity that uses cultural context-based mathematics student worksheets gets higher average learning outcomes compared to the average learning outcomes of students who only use the conventional worksheets. These indicate that through this learning media that has been developed, students can better understand mathematical concepts better than those who only use conventional worksheets. By integrating the culture existing around students, the process of learning mathematics will be more easily accepted and fun. Furthermore, students can easily apply the principles of mathematics in everyday life.

In addition to finding the average value of learning outcomes, it can also be seen the degree of mastery learning of students to see the effectiveness of the experimental class (using cultural context-based mathematics student worksheets) compared to the control class (conventional worksheets). A

minimum mastery learning criterion (KKM) at SD Negeri 06 Salatiga on mathematics subjects is 75. Based on the test result of the learning outcomes, there were 16 students or with the percentage of mastery learning reached 80.00 % of the experimental group who got more than 75 or passed. On the other hand, there were only 9 students or with only 45% completeness of the controlled group who got more than 75 or passed. Further, the comparison of the percentage of mastery learning outcomes can be seen in the following bar chart:
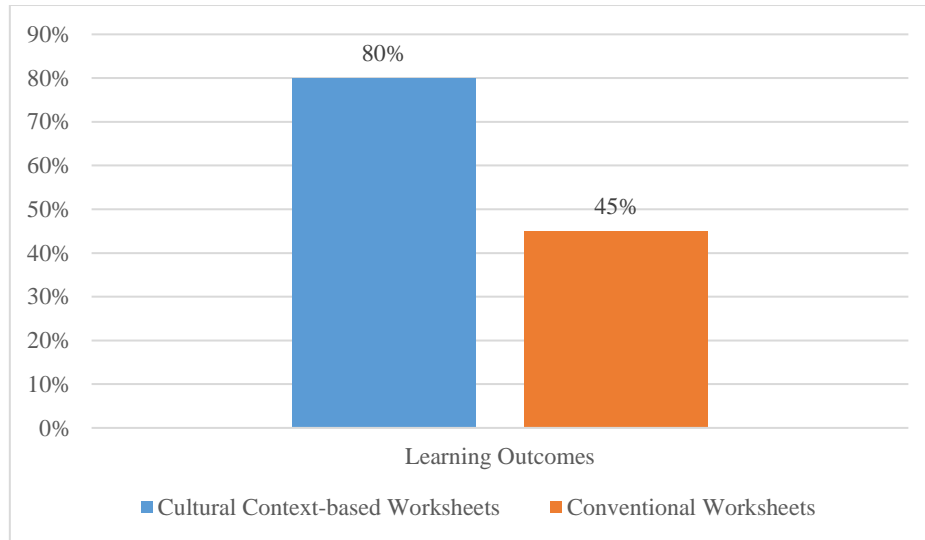
Figure 2

Figure 2 demonstrates that the percentage of mastery learning outcomes of students who use cultural context-based mathematics student worksheets has a higher percentage of mastery learning compared to the percentage of mastery learning outcomes of students who use the conventional worksheets. Thus the use of cultural context-based mathematics student worksheets can help optimize the ability of students to get grades above the minimum mastery learning.

Based on the findings of the discussion above, it can be concluded that the hypothesis is proven to be accepted. Where the cultural context-based mathematics student worksheet is more effective to improve learning outcomes and the percentage of students' completeness compared to the conventional worksheet.

CONCLUSION AND SUGGESTION

Based on the findings of the research and discussion section above, the following conclusions are obtained; a) $t_{calculate}$ = -8,165 with data significance value (p) of 0,000. So that the $t_{calculate}$ = -8,165 < t_{table} = -2,093 and the significance value (p) 0,000 <0.05, then H0 is rejected and H1 is accepted. Therefore it can be concluded that "cultural context-based mathematics student worksheets influence elementary school mathematics learning outcomes". B) the average (mean) of mathematics learning outcomes by using conventional worksheets obtained a mean value of 64.25 while the average (mean) of learning outcomes by using cultural context-based mathematics student worksheets obtained an average value of 83.50 (83.50> 64.25 Thus it can be concluded that the results of students learning mathematics using cultural context-based worksheets is higher than the learning outcomes with conventional worksheets c) the number of students who passed minimum mastery learning criterion in the experimental group is 16 students or 80.00%. Whereas in the control group there were only 9 students or 45% passed. From these findings, it can be concluded that learning by using cultural context-based mathematics student worksheets are more effective in improving students learning outcomes and percentage of students completeness compared to using conventional LKS worksheets in terms of the mathematics learning outcomes of elementary school students.

Based on the conclusions above, several suggestions are given for the school principal to be always providing motivation, monitoring and evaluating teachers and especially mathematics teachers who should be motivated to use the recommended worksheets.

DEDICATION

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