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Problem-Based Learning–Buginese Cultural Knowledge Model—Case Study: Teaching Mathematics at Junior High School

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Abstract

This study aims to determine the differences in learning output by using Problem Based Model combines with the "Buginese" Local Cultural Knowledge. (PBL-Culture) It is also explores the students activities in learning mathematics subject by using PBL-Culture Models. This research is using Mixed Methods approach that combined quantitative and qualitative methods and Sequential Explanatory Design (SED) Models that implemented at junior high school, at Bone Regency in South Sulawesi Province. The results of this study stated that Firstly, Junior high student learning outputs has increased significantly after being taught by using the PBL-Culture Models Secondly, the learning activities output showed that students have high attitude in the *siri'*, *pesse'*, *sipatuo-sipatokkong* categories after teach by using PBL-Culture, meanwhile, medium attitude in the *siri'*, *sipatuo-sipatokkong* categories for non experimental classes. However at *pesse'* categories, the models shows difficulties in learning and solving problems Moreover the result also showed that students has a low ability at *siri'* categories depends on the situation given by the teacher and the situation surrounding environment.

Keywords: problem based models, mathematics, cultural based models

1. Background

Indonesian is currently facing two major challenges in education system, namely government programs in education decentralization and globalization that is going to happen in 2020. Both of these challenges have to be passed and prepared by all education stakeholders in Indonesia. The key to success in the face this challenges is to improve the quality of human resources, Indonesian through education (Muslich, 2010).

On the other hand, the fact shows different conditions, the local communities in Indonesia. The local community facing and experiencing moral degradation that caused by lack of local wisdom has not been teach from the one generation to the next generation , the phenomenon can be observed from a lot of social conflicts in the community livelihoods especially at the school/ As can be seen also a lot of demonstration that tend to be anarchists, and the widespread violence in many area, and there are high number of students has been involved with violence, drugs and fights among students (Talib et al., 2009). Negative behavior is also seen from students of Junior high school in Indonesia in learning activities for examples: there are big number students who believe that cheating on tests is not problems, the use of language and words that are not appropriate in between the learning process and distrust in working on the problems that has been given by the teachers.

Based on research at Harvard University United States, it turns out that the success of students is not determined solely by their knowledge and technical abilities (hard skills), but rather by the ability to manage themselves and others (soft skills). This study also reveals, success is determined only approximately 20 percent by the hard skills and the remaining 80 percent by soft skills. Even the most successful people in the world could succeed because of the ability to support more soft skills than hard skills. This suggests that the quality of education students are very important character to be improved (Sudrajat, 2010).

Furthermore, National Education Goals stated that students should be able to improve their knowledge, attitudes, and ability on one hand and they also should have comparative advantages and competitive advantages in facing the era of globalization. Teacher as an educators in this regard should be able to apply a model that can integrate high curiosity character (exploratory), creative, critical, dare to try, sure can do (self-efficacy), honest, responsible for duties, cooperation, discipline, hard work, able to organize themselves, cooperate with others and reflection to achieve the goal (self-regulatory), as mandated by the National Education System (Education Law)

no. 20 of 2003 Article 3 (Hasan, 2010).

By focusing at mathematics subjects, the mental activity for students in this subject is needed to be improved in conjunction with their cognitive activity. Human cognitive activities can only take place in the social and cultural environment when it has ability to adopt their cultural behavior. Experts assert that constructivist mathematics culture bound and filled with the values of the inventor/user of mathematics in the context of their culture. According to Vygotsky indicates that development cannot be separated from its social and cultural context, so the only way to explore the mental processes is through understanding Vygotsky's concept of mediation that made a Breakthrough in our understanding of learners 'development' (Eun, 2008, p. 136; Shabani, Khatib, & Ebadi, 2010, p. 238; Talib et al., 2010, p. 93).

Cognitive development and the value of human has an affective interaction if the learner can only adapt their cognitive ability through the social-cultural context of each individual especially in the Buginess community particularly in adopting the Buginess culture in the learning process. Each learning activity required an interaction of teaching, better interaction in-between students, student Interaction with the teacher and student interactions with other learning devices (Suradi, 2005; Yackel, Cobb, & Wood, 1991; Atweh, Bleicher, & Cooper, 1998; Jones & Thornton, 1993). Therefore this research will determine differences in learning output by using Problem Based Model combines with Cultural Knowledge.(PBL-Culture) It is also explores the students activities in process of learning mathematics subject by using PBL-Culture Models, and how the students' response to this model.

2. Research Methods

This research is a Mix Methods that combine quantitative and qualitative research and combine with Sequential Explanatory Design Model. This research was conducted at Junior high school, at Bone Regency South Sulawesi Province. The population of this research is all the eighth grade students of junior high school 3 in year 2012/2013, amounting to 224 people spread over 8 parallel classes. Sampling technique in this study is using purposive sampling methods followed by the determination of research subjects by using the deepest interview. This determination of the result is based on learning achievement test results after treatment and tailored to the mathematical subject of class VII semester of the school year 2012/2013. The next set of categories of high ability, medium and low based on the categorization according Suradi (2005). Research instruments, in the form of (i) the learning achievement test, (ii) the student activity sheets, (iii) student questionnaire responses (iv) the guidelines for the interview. Quantitative data were analyzed by using descriptive statistics and inferential statistical analysis and calculation of quantitative data used application program SPSS version 20.0 statistical analysis, while qualitative data used for the analysis of models of Miles and Huberman. Observation of student activities using instruments LOAS, analyzed and described with reference to the criteria for the achievement of the ideal time student activity (modified from Widyaningsih , 2010).

2.1 Hypothesis Statistics

The hypothesis in this study was "There are differences in student output achievement before and after being taught with a problem-based learning model with the Buginese culture".

3. Results

3.1 Linkage between Buginees Cultural Aspects in Problem Based Learning Models

In phase-1, Buginese Cultural aspects are involved *siri'andsipatuo-sipatokkong* categories. In this phase the student's knowledge relating to the material to be covered materials that developed by improving students attitudes in the class rooms by introducing cultural aspect, so that students are not empty. This is in line with the constructivist theory.

In phase-2, Buginese Cultural aspects involved is *siri'*, *sipatuo-sipatokkong* and *pesse'* categories. Students construct knowledge in groups led by a chairman of class rooms. *Siri'* aspect in this phase is the responsibility of the individual, *sipatuo-sipatokkong* aspect lies in cooperation aspects, and *pesse'* aspect lies in providing assistance to members of the group requires. Associated with goal-construct the knowledge, it is clearly supported by constructivist theory. Construction is being carried out in groups is supported by Vygotsky's theory. In addition, a portion of the construction of knowledge is achieved through a process of discovery that is consistent with the theory of Bruner.

In phase-3, Buginese Cultural aspects are involved such as the phase-3 is *siri'*, *sipatuo-sipatokkong* and *Pesse*. In this phase, the specific activities of the group are the percentage of teacher assistance as necessary in line with Vygotsky's theory of ZPD.

In phase-4, Buginese Cultural aspects involved that *siri'*, *sipatuo-sipatokkong* and *Pesse*. Here the teacher's role is more dominant, however, knowledge is formed by students with the guidance of a teacher. This is in line with the constructivist theory.

Phase-5; Cultural aspects are involved, namely Buginese *siri'*, *sipatuo-sipatokkong* and *Pesse* is to analyze and evaluate the problem-solving process. This is in line with the constructivist theory.

3.2 Description of Student Achievement

Descriptive analysis related to student learning achievement obtained through learning achievement tests show that the average value of learning achievement of students prior to the implementation of the PBL-Culture Models is 33.57 with a standard deviation of 11.21. Based on the categorization of the Ministry of National Education (2003) of which there are 28 students, 18 students (64.28 %) were in the category of very less and 10 other students (35.72 %) were in the poor category while no students who are at category of medium, high and very high. While the average value of learning achievement of students after implementation of the PBL-Culture Model is 80.71 with a standard deviation of 9.88. Based on the categorization of the Ministry of National Education (2003), of which there are 28 students, 7 students (25%) were in the moderate category, 19 students (67.86%) were in the high category and 2 other students (7.14%) at the high category and no longer in the category of students who are less and less so.

3.3 Description of Student Activity in PBL Model of Buginese Culture

Analysis of the results of observations is seen from student activity during the four meetings. Table 1 shows the results of the analysis of observations of student activity PBL Buginese culture models in two sample groups:

Table 1. The Average percentage of time the student activity PBL-Buginese culture group

Categories of student activity	Meeting				Average	Criteria
	1	2	3	4		
K1	19.00	20.00	20.00	20.00	19.75	13.75 – 23.75
K2	32.00	29.00	31.00	30.00	30.50	26.25 – 36.25
K3	18.00	22.00	19.00	22.00	20.25	13.75 – 23.75
K4	3.00	3.00	5.00	3.00	3.50	1.25 – 11.25
K5	13.00	15.00	13.00	14.00	13.75	13.75 – 23.75
K6	10.00	9.00	10.00	10.00	9.75	1.25 – 11.25
K7	5.00	2.00	2.00	1.00	2.50	0 – 5
Total	100	100	100	100	100	

Table 2. Average percentage of time the student activity PBL-Culture Models group 4

Categories of student activity	Meeting				Average	Criteria
	1	2	3	4		
K1	20.00	20.00	20.00	20.00	20.00	13.75 – 23.75
K2	29.00	27.00	30.00	31.00	29.25	26.25 – 36.25
K3	21.00	23.00	21.00	22.00	21.75	13.75 – 23.75
K4	3.00	3.00	5.00	3.00	3.50	1.25 – 11.25
K5	14.00	14.00	14.00	14.00	14.00	13.75 – 23.75
K6	9.00	10.00	10.00	10.00	9.75	1.25 – 11.25
K7	4.00	3.00	0.00	0.00	1.75	0 – 5
Total	100	100	100	100	100	

Based on the analysis of data in the table above, the category of student activity (K1), (K2), (K3), (K4) and (K5) which is a core activity in PBL-Culture Models meets the tolerance interval of time achieving the ideal(PWI).

Thus, the ideal activity for students concluded PBL-Culture Models is meet the criteria that has been assign by the Minister of Education.

3.4 Description of Student Responses PBL-Culture Models

Based on analysis of student response data (attached) obtained in response to the students' learning component PBL-Culture Models is 98.22% said 'happy', and 98.81% said 'new'. Student responses on the language used in the student book, worksheets, and tests of learning achievement is 96.43% said 'clear', 100% of students consider their learning progress after the implementation of the PBL-Culture Models, 100 % interest in the application of the PBL-Culture Models, 100% agree with the application of the PBL-Culture Models and 100% say interesting for the application of the PBL-Culture Models.

3.5 Testing Hypothesis

Based on the results of t-test with SPSS 20.0 p values obtained in table (Look At Sig. (2-tailed)) is 0.000, meaning the value of $p \geq 0.05$. Thus the hypothesis H0 is rejected or accepted, which means there are H1 student achievement differences before and after being taught with PBL-Culture Models.

Table 3. The results of t-test

Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRETEST–POSTTEST	-47,14286	6,86221	1,29684	-49,80374	-44,48197	-36,352	27	,000

4. Discussion

In general, student achievement has increased significantly based on the results of the data analysis. More specifically the authors look at the differences of learning achievement based on ability level. Students with high ability to subject of ANA test scores before the application is 55, after the application of the PBL-Culture Models the test score increase significantly t to 95,with an increase of 40 points. Similarly, the subject HAR of 50 to 90 means also increased 40 points. Student 's ability to subject the WSH was also increased from 50 to 85 has increased 35 points, while the subject of the RIS has increased 45 points from 40 to 85. While low ability students to the subject of the UVD has increased 45 points, from 20 to 65 , subject FIT has increased 45 points from 25 to 70.

As can be seen in this improvement of three abilities above was moderate ability and low ability increased significantly to match and even exceed the high scores. This suggests that the better student achievement, high ability students are getting smarter, student ability and low ability was also improved academic achievement "approaching" the ability of students who are smarter. This suggests that the involvement of the cultural aspects of Buginese either *siri'* or motivation for achievement student achievement, *pesse* and *sipatuo-sipatokkong* in problem-based learning model affect student achievement, especially the learning of mathematics.

4.1 Exploration Activity in PBL-Culture Models

Based on observations and interviews about student activities above can be presented in tabular form as follows:

Table 4. Student Activities based on the level of ability

No	Aspect	Level			
		Low Ability (LA)	Medium Ability (MA)	High Ability (HA)	Conclusion
1	*Siri'*				

	siri'masiri'(achievement motivation)	Good	Excellent	Excellent	A seriousness level students in learning is dependent on the teacher's situation, environment. While the students' level of MA, HA does have an innate motivation.
	Matinulunarululaku-laku (A job well done)	Excellent	Excellent	Excellent	Giving a task/problem set by the teacher for all levels demonstrate a commitment and responsibility to complete the task as well as possible individually or in groups.
	c. *Mammenasarideceng atuwongnge* (The desire for a good value)	Excellent	Excellent	Excellent	The desire of students to get good scores of seriousness and activity showed great motivation to learn, pay attention to the teacher's explanation, completing the task in accordance with the specified time.
	d. *Lempuk* (honest)	Good	Excellent	Excellent	Activity level students demonstrated HA and MA shows honesty, trying to answer exam questions in accordance with the capabilities, but at the level of LA sometimes take shortcuts (cheating on exams), has the desire to obtain a good value destroying roads *siri'*(honest).
	e. *Mappesona ri dewata seuae* (surrender to God Almighty)	Excellent	Excellent	Excellent	Allshowed activity levels will be into pray every learning and test execution with expectations given the smoothness and easiness at the time of the exam.
	f. *Getteng* (stead fast belief that true/commitment)	Excellent	Excellent	Excellent	Shown great commitment to learning at all levels of visible readiness to learn, trying to resolve the problem on an individual work sheet although the level at the beginning of the meeting has not been maximized.
2.	*Pesse*				
	a. *Sibaliparirilalengattuntukengpaddissengengsibawarilalengjamajamang* (Helping friends who have difficulty in learning and task)	Good	Excellent	Excellent	All levels *pesse*' basically had the attitude 'to help his friend who had difficulty in learning, students HA be happy to help a friend who both learning difficulties and tasks to the level of the MA and LA, MA also helps his students when it has more capabilities. But at the level of MA only help her for the things that they can.
	b. *Napainrengisibawan naruparupannaripakemagguru* (Friends lend equipment in learning)	Excellent	Excellent	Excellent	All levels of students have a sense of *Pesse'* when looking at the others require learning tools (ruler, tipe-x, pens, and other learning tools).

3.	*Sipatuo- sipatokkong*				
	a. *Napariatiwipappanes sanaguruesibawasilo nna)* (Pay attention to the teacher's explanation or friends)	Less	Excellent	Excellent	Noting his explanation of both teachers and visible for alllevels, even at the beginning of the meeting LA and MA students sometimes do not pay attention to his teachers as did when doing a presentation, due to other activities such as chatting and her disturbing.
	b. *Naengkalingaipappa ngajanagurue* (Listen to and follow the advice of teachers)	Excellent	Excellent	Excellent	All levels of students to listen to and follow the advice given by the teacher, at the beginning of the preliminary phase, the phase of the coreactivities and closing phases.
	c. *Makkutanairiguruena sabagaumakkeade* (Ask or answer questions in a polite way)	Excellent	Excellent	Excellent	All levels of students ask and answer questions in a way that is respectful of teachers, according to the capabilities.
	d. *Sibalipangararipalla wangennatomasseddi e* (The existence of communication between groups)	Excellent	Excellent	Excellent	All students establish communication between members of the group, with good discussion and mutual respect opinions. It appears from the student activities undertaken and supported by the results of the interview.
	e. *Punnaiwisipa' asseddingeng* (It has the feeling of togetherness)	Excellent	Excellent	Excellent	Since the start until the end of the study, all students showed togetherness, the task given by the teacher (in the form of LKS) solved together in a group. *Sipatuo sipatokkong* all levels are excellent. This is also supported by the results of the interview.

4.2 Students' Response to the Application of the PBL-Culture Models

In general, good argues, students feel happy and exercising new learning component, students found the language used in the student book, the content of the LKS, has clear meaning and improving learning achievement test, students feel there is progress and interest after learning mathematics in context of Buginese culture and improving this model in the subject of mathematics.

5. Conclusion

Junior high student achievement has increased significantly before and after being taught by using the PBL-Culture Models. The results of this research shows that students can achieve good attitudes and high ability in their performance in the learning process and output by using PBL-Culture Models that consist of several categories such as: *siri'*, *pesse'*, *sipatuo-sipatokkong* is high in experiment class that using PBL-Culture Model, medium abilities also have the attitude *siri'*, *sipatuo-sipatokkong* but *pesse'* help her difficulties in learning and solving problems in LKS extent their can, also has a low ability attitude *siri'* depends on the situation given by the teacher and the situation surrounding environment. Students' response to the application of the PBL-Buginese culture model is generally well argued. Students feel happy and new learning component, students found the language used in the book the student, the content of the LKS, and clear learning achievement test, students feel

there is progress and interest after learning mathematics PBL-Buginese culture model and agree with PBL-Buginese culture if the model is applied in learning mathematics.

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