



Course review horay-based bamboo dancing in 21st century learning: How can we assess students' mathematical creative thinking?

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Abstract

Education in the 21st-century era can provide students with learning experiences that influence individual growth. This study aimed to determine the effect of integrating the Bamboo Dance learning model and Course Review Horay on students' mathematical creative thinking. The design of this study was quasi-experimental. Data collection instruments were open-ended test questions of mathematical creative thinking. The normality test and the homogeneity test were used as the analysis techniques. The hypothetical testing was performed using one-way ANOVA and Scheffe's method. The results of the analysis showed that the data were normally distributed and homogeneous. As a result of applying the Bamboo Dance learning model integrated with Course Review Horay, the students' mathematical creative thinking was better than the conventional learning model. The Bamboo Dance Model can provide information equally. The Course Review Horay's learning model can make students happy during the learning. This research implies that lecturers can apply BD-CRH as an alternative in improving students' mathematical creative thinking.

INTRODUCTION

Education in the industrial revolution era can provide students with learning experiences. Learning experiences can influence an individual's growth in the environment (Cantor et al., 2019; Capel et al., 2019; Duerden & Witt, 2010), in harmony between society, nature, and character (Ruihong, 2007; Ruyadi, 2010; Sukmawan & Nurmansyah, 2014; Yuanpei, 2005). Good education in a country can impact competent human beings (Komarudin, 2017; Magier-Lakomy & Rozkwitalska, 2013; Pantić & Wubbels, 2010). Education can provide experience for every human being an important role in the assessment (Ibrahim, 2015; Komarudin et al., 2020; Suherman et al., 2018; Vidákovich, 2014). This experience can be gained through learning. Through the learning process (Andriani et al., 2019; Darling-Hammond et al., 2020; Hayashi et al., 2020; Siregar et al., 2020; Vickers et al., 2015), humans can develop and progress (Efendi et al., 2019; Hakim, 2016; Purwanti et al., 2016; Syazali et al., 2019), be prosperous, and happy. They pointed out that learning in the 21st century is important to increasing creative thinking students in mathematics. Furthermore, this learning is most essential in schools and life going forward.

One effort to educate the nation's life is to improve schools' existing components (Andriani et al., 2019; Hartinah et al., 2019; Hasanah et al., 2019). One of the components is

creative educators (Anggoro, Efendi, et al., 2019; Huda et al., 2019; Kamandoko & Suherman, 2017) and innovation in the learning process, such as in the selection of learning models to be applied (Huang et al., 2015; Kozma, 2008; Ruihong, 2007; Sudarsana, 2016). Educators who have the motivation to develop learning methods will create new learning models (Fauzi et al., 2017; Komariyah & Syam, 2016; Marcus, 2014). Students do not need to experience boredom, and their knowledge could be improved instead (Berk, 2010; Permatasari et al., 2018; Putra & Anggraini, 2016; San Pedro et al., 2013).

The right learning model can create a pleasant learning atmosphere (Andriani et al., 2019; Hardianto, 2005; Hasanah et al., 2019; Huda et al., 2020; Irwandani, 2015; Sumarni, 2015), arouse interest (Jiang et al., 2016), attitudes, and creativity in delivering their arguments (Haase & Lautenschläger, 2011; Kennedy & Miceli, 2010; Komarudin et al., 2014) so that students' mathematical creative thinking could be improved (Damayanti et al., 2019; Fatah et al., 2016; Gumanti et al., 2018). Creative thinking is one of the mathematical skills that must be mastered in learning mathematics (Malmia et al., 2019; Purwanti et al., 2016; Septiyana & Pujiastuti, 2018; Tamrin et al., 2018).

The field facts show that students' mathematical abilities need to be improved (Maarif, 2016; Rany et al., 2020; Shodikin, 2015; Suherman et al., 2020). The students also feel bored in class (Daschmann et al., 2014; Kristin, 2016; Yasin et al., 2020). This problem can be minimized by applying a fun learning model yet places more emphasis on the concept of thinking (Anggoro, Agustina, et al., 2019; Diez-Olivan et al., 2019; Ismanto et al., 2019). The learning model applied was Bamboo Dance (BD) learning model combined with Course Review Horay (CRH). The Bamboo Dance learning model is a learning model that can make students more active (Isnaini et al., 2019; Novitasari, 2017a). The Bamboo Dance learning model encourages students to share information in pairs within a short time regularly. This model was selected since it can make students more active and increase their concept of thinking.

Some previous studies have shown that the Bamboo Dance learning model can evenly distribute information to all students through their respective pairs in a short and concurrent time (Chao et al., 2019; Fiyany, 2018; Novitasari, 2017b), the CRH learning model can improve learning including teacher's skills, students' activities, and students' learning outcomes (Kasna et al., 2015; Muhandaz et al., 2018; Suryani et al., 2016), students are more active, and teachers are only as facilitators, dynamists, and mentors in learning activities (Prameswari et al., 2017). Also, CRH can increase interaction among students in the learning process (Hermawan et al., 2018; Lapatta et al., 2015; Wahyudi & Tripuspitaningrum, 2018; Wardani et al., 2019). This cooperative learning model is expected to significantly increase learning activities and outcomes (Anggraeny, 2018; Faradita, 2018; Fauzi et al., 2019; Lince, 2016; Marhadi et al., 2018a; Meganingtyas et al., 2019; Putri et al., 2018).

Concerning previous studies, this research novelty lies in integrating the Bamboo Dance learning model and Course Review Horay learning model to measure cognitive abilities in mathematical creative thinking. The research will explain the Course Review Horay-based Bamboo Dance learning model (BD-CRH) on the students' mathematical creative thinking.

METHODS

The method employed was a quantitative method of quasi-experimental design. The population of this study was drawn from grade 7 (N=160) students in Indonesia. The sampling technique used was simple random sampling with randomized class techniques. Experimental class 1 was treated with the BD-CRH learning model, while experiment class 2 was treated with the Bamboo Dance learning model. The control class was treated with the learning model commonly used at school.

The data of the study was collected through tests of mathematical creative thinking. The test was open-ended questions of triangle material. The indicators of mathematical creative thinking are as follows (Ningsih et al., 2017):

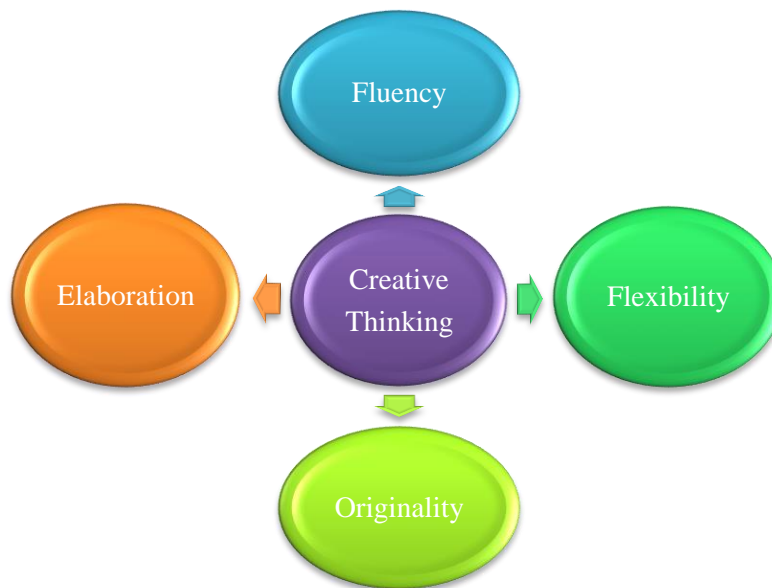


Figure 1. The Indicators of Mathematical Creative Thinking

The Bamboo Dance integrated with Course Review Horay's learning steps are as follows:

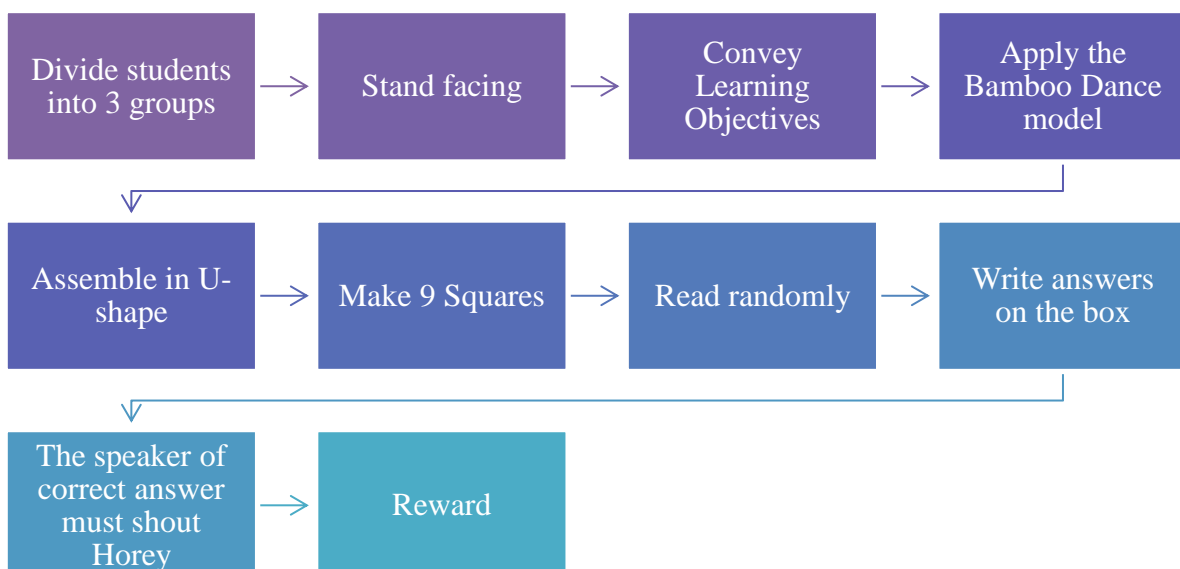


Figure 2. The Bamboo Dance integrating Course Review Horay Learning Model

The prerequisite tests performed were the normality and homogeneity tests, while one-way ANOVA was appropriate to the hypothetical test performed.

RESULTS AND DISCUSSION

The study results revealed the influence of BD-CRH on mathematical creative thinking. The data collected were taken through pretest and posttest tests, both from the experimental class and the control class. The highest value (X_{max}) and the lowest value (X_{min}) in all three classes were sought as well as the central tendency including the mean (\bar{x}) and standard deviation. Here is the summary of the mathematical creative thinking was taken by pretest and posttest.

Table 2. Description of Mathematical Creative Thinking Results

Class	pretest				posttest			
	x_{max}	x_{min}	\bar{x}	St.Dev	x_{max}	x_{min}	\bar{x}	St.Dev
Experiment1	85.50	50.30	75.73	10.57	90.00	66.00	83.44	4.77
Experiment2	78.00	40.50	65.48	7.748	85.00	64.00	82.53	4.92
Control	60.50	40.00	54.54	10.12	78.00	54.00	76.41	5.23

Concerning Table 2, it can be seen that the results were different between pretest and posttest. The highest post-testing score was obtained by the experimental class 1, while the control class obtained the lowest score. The following is the graphic of the pretest and posttest scores on mathematical creative thinking.

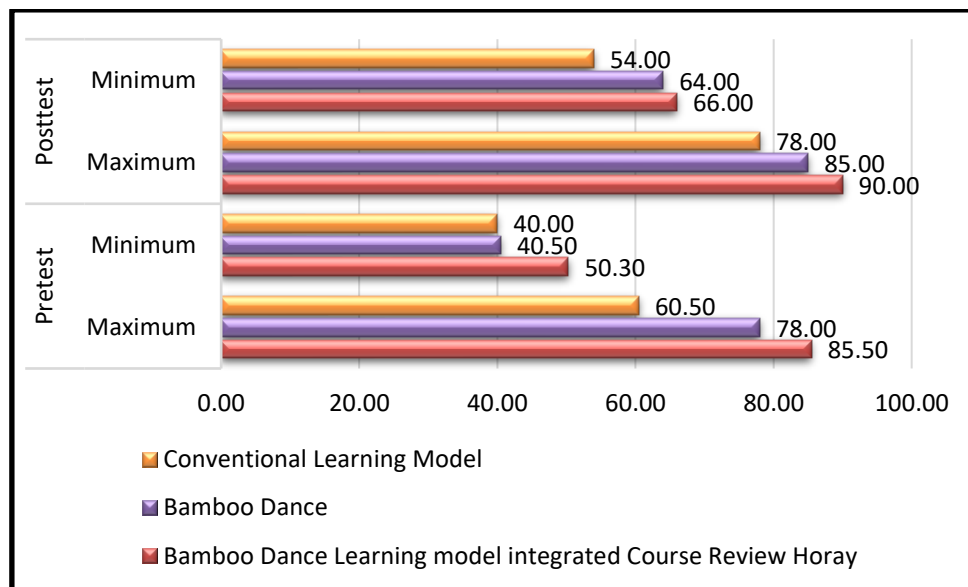


Figure 3. The Pretest and Posttest Scores on Mathematical Creative Thinking

Figure 3 illustrates the maximum and minimum scores of the pretest and posttest in three different classes. These data indicate a significant increase in students' mathematical creative thinking after implementing Bamboo Dance integrated with Course Review Horay in the experimental class 1, Bamboo Dance model in the experimental class 2, and the school's model in the control class. The following are the data of mathematical creative thinking that is normally distributed and homogeneous.

Table 3. The Data of Normality Test on Mathematical Creative Thinking

Class	$\bar{\chi}$	$L_{observed}$	$L_{critical}$
BD-CRH	83.44	0.152	
Bamboo Dance	82.53	0.155	0.159
Conventional Learning Model	76.41	0.129	

Table 3 shows that the data was normally distributed based on the tests performed in three classes. Furthermore, a homogeneity test was carried out as displayed in Table 4.

Table 4. The Data of Homogeneity Test on Mathematical Creative Thinking

Class	Dk	si^2	$Dk.si^2$	$Logsi^2$	$Dk.Logsi^2$
BD-CRH	31	20.791	644.530	1.318	40.858
Bamboo Dance	31	28.153	872.728	1.450	44.950
Conventional Learning Model	31	15.216	471.696	1.182	36.642

Table 4 shows that the data have the same variance. Furthermore, the research hypothesis was tested using a one-way ANOVA test. The data can be seen in Table 5.

Table 5. The Results of ANOVA Test

JKG	KTG	KTK	$F_{observed}$	$F_{critical}$
5656.156	60.819	492.792	8.103	2.703

Based on Table 5, $F_{observed} \geq F_{critical}$. Students' average score with the BD-CRH differs from the other learning applications. The BD-CRH learning model and the conventional model influences the students' mathematical creative thinking. To see which model affects dominantly, a double compatibility test was performed using Scheffe's method.

Table 6. The Results of the Scheffe's Test

Treatment	Paired\Treatment	$F_{observed}$	$F_{critical}$	α
1	$(\bar{X}_1 - \bar{X}_2)^2$	0.352	2.703	
2	$(\bar{X}_1 - \bar{X}_3)^2$	13.997	2.703	0.05
3	$(\bar{X}_2 - \bar{X}_3)^2$	9.870	2,703	

Regarding Table 6, in treatment 1, there is no difference between the Bamboo Dance learning model integrated with Review Courses Horay compared to the Bamboo Dance model. In treatment 2, there is a significant difference between the Bamboo Dance learning model integrated with Review Courses Horay and conventional learning. In treatment 3, there is a significant influence between the Bamboo Dance learning model and conventional dance models.

These results are due to the Bamboo Dance learning model's nature. The students understand concepts with a clear learning structure, allowing them to exchange information briefly and regularly (Sutarna & Kusdiana, 2018). It provides students opportunities to process information and improves their thinking of the concept (Dewi, 2016).

The Bamboo Dance learning model makes students more active (Fauzi et al., 2017) because it can evenly distribute the material. This material can be conveyed well because of the repeated delivery of material by fellow friends in turn. Furthermore, the Course Review Horay learning model can make students enjoy because they can practice questions about the material that has been conveyed in the Bamboo Dance learning model by playing games (Fauzi et al., 2017; Rohman & Susiolo, 2017). Furthermore, it makes students become more interested and understand the material. It means that in line with the results of research conducted by Dessy

Aanggraini that the Course Review Horay learning model can increase students' activities, learning outcomes, and teachers' skills (Marhadi et al., 2018a; Triyana et al., 2019).

Based on the analysis results, the marginal mean obtained from applying the Bamboo Dance learning model integrated with Course Review Horay was 83.719, while the marginal mean for applying the Bamboo Dance learning model was 82.531. These results show that the Bamboo Dance learning model's marginal mean integrated with Course Review Horay is greater than the Bamboo Dance model.

The Bamboo Dance learning model is said to be better because students can exchange experiences with each other in the learning process (Sutarna & Kusdiana, 2018), increase collaboration among students (Chao et al., 2019), and increase tolerance among fellow students (Rohartati, 2019). It can be seen that the Bamboo Dance learning model integrated with Course Review Horay is better. Furthermore, in these learning models, students will be divided into three groups as random groups. Regarding a grouping that a teacher then gives treatment, the next steps are to face and convey learning objectives. In this step, the students doing some work together for their group.

Regarding the learning model steps, the members of groups do not have to be three. It can be less or more according to class conditions. The next step is dividing each group into two parts then make them stand face-to-face. Students sit on the sidelines of the bench or in front of the class. In the next step, the groups form U shape. Each group makes 9 boxes where each box is made of 10 papers to write the answers. Furthermore, read out the questions randomly and ask students to write answers on the paper. If the answer is correct, then it is obligatory to show the chants of each winning group. The score is calculated from the correct answers. Finally, giving rewards to the group that wins or gets the highest score.

The significant results are that students play an active role in learning activities during the learning process. This Bamboo Dance learning model makes students more involved because they have to face each other and transfer the learning materials. This material can be conveyed well because of the delivery of material repeatedly by fellow friends in turn. Rahayu and Istiani state that learning bamboo dance provides sharing of information simultaneously with various partners quickly (Rahayu & Istiani, 2019).

The Course Review Horay learning model is fun because the students practice questions about the material that has been conveyed in the Bamboo Dance learning model. It makes students more interested in understanding the material. The statement is in line with the results of research conducted by Marhadi et al. that applying for the Course Review Horay learning model can increase students' activity, learning outcomes, and teachers' skills (Marhadi et al., 2018b). The Course Review Horay approach can be lively and fun because the students must shout when they win the round.

CONCLUSIONS

Based on the study results, the Bamboo Dance learning model integrated with Course Review Horay on mathematical creative thinking is better than the Bamboo Dance learning model on the mathematical concepts. Furthermore, this model can be a solution to make students more active during the learning process.

AUTHOR CONTRIBUTIONS STATEMENT

S is the research drafter. Meanwhile, KL & MR are instrument manufacturers. BK & K is a research data taker.

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