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The Experimentation of Contextual and Realistic Learning Models in terms of Interpersonal Intelligence

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Abstract

The aims of this study is to find out: (1) a better learning model between contextual, realistic or conventional; (2) better learning outcomes between students with high, medium or low interpersonal intelligence; (3) better learning outcomes between students with high, medium or low interpersonal intelligence on each learning model; (4) a better learning model between contextual, realistic or conventional at each level of interpersonal intelligence. This research is using the experimental method. The sampling technique is cluster random sampling. Data collection tools used were questionnaires and tests. The data analysis technique used is the analysis of three-way variance with unequal cells. The results showed that: (1) contextual learning models are better than realistic but provide the same learning outcomes as conventional, while realistic and conventional learning outcomes are equally good; (2) students who have high, medium or low interpersonal intelligence have the same learning outcomes; (3) In each learning model, students with high, medium and low interpersonal intelligence have the same learning outcomes; (4) At each level of interpersonal intelligence, the contextual learning model is better than realistic and conventional.

Keywords: contextual; realistic; interpersonal intelligence.

INTRODUCTION

Development of students' ability to think mathematically is a process of learning mathematics. The process of learning mathematics must provide opportunities to think and reason and build knowledge by involving existing knowledge in problem-solving in the real world (Aizikovitsh-Udi & Amit, 2011). Learning is focused on efforts to train students' ability to think not only to convey the subject matter. Such teaching, giving students the opportunity to build knowledge through mathematical activities (Arsaythamby & Zubainur, 2014), teaching that only conveys information will make students lose motivation and concentration . The low learning outcomes obtained by students will occur if the teaching process is done by only conveying information.

Based on the results of an interview with one of the mathematics studies teachers teaching at the VIII Middle School Cooperative, information was obtained that student learning outcomes on the material surface area and prism volume were less than optimal. The daily test scores that students get for these materials are far from the standards set by the teacher. The average test scores of students on the material surface area and prism volume was 56, while the individual KKM determined was 76. The lack of maximum learning outcomes was due to this material because students still had difficulty in distinguishing between the concept of prism surface area and prism volume.

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Some of the factors that cause the low value of mathematics subject matter are the teaching done by the teacher is still traditional, and the attention of students who are not focused on learning mathematics (Patahuddin, Lowrie, & Dalgarno, 2016). One effort that can be done so that students are able to master the concept of surface area and prism volume is by implementing the learning that invites students to obtain the concept of a prism. By presenting examples of prisms in daily life and designing learning so that students can find their own broad concepts and volume of prisms makes students better able to understand the concept (Huang, Zhang, & Hudson, 2018; Yunianta, Putri, & Kusuma, 2019). For this reason, a learning model is needed that accustoms students to the problems of daily life.

In the world of education, there are several learning models that prioritize the problems of daily life in the learning process. Among them are contextual learning models and realistic mathematics learning. According to Sujana (2014), the contextual learning model is done by linking learning to everyday life so that it makes students have no difficulty in understanding the content of learning. Berns and Sulianto (2008) state that learning with a contextual approach is a learning concept that can help teachers connect subject matter to real situations, and motivate students to make connections between knowledge and its application in daily life in their roles as family members, citizens and workers, thus encouraging their motivation to work hard in applying their learning outcomes.

Contextual learning is a learning system that is based on cognitive, affective and psychomotor research, so the teacher must plan teaching that is suitable for the stage of student development, both regarding student learning groups, facilitating student learning settings, considering the background and diversity of student knowledge, and preparing ways of questioning techniques and the implementation of authentic assessment, so learning leads to an increase in overall student intelligence to be able to solve the problems it faces (Sulianto, 2008). According to Hutagaol (2013), contextual learning focuses more on the relationship between the material students learn with practical uses in everyday life so as to increase student interest in learning. This is also supported by Santoso (2017), which concluded that the contextual learning model could improve students' mathematical understanding. The Contextual Learning Model has been shown to improve students' mathematical problem-solving abilities and self-confidence (Surya, Putri, & Mukhtar, 2017).

In addition to the contextual learning model, the realistic mathematics learning model also emphasizes the problems of daily life in the implementation process (Sumirattana, Makanong, & Thipkong, 2017). The model of realistic mathematics learning in mathematics or Realistic Mathematics Education (RME) is school mathematics that is carried out by placing students' reality and experiences as a starting point for learning. The main idea of realistic mathematics learning is the student should be given the opportunity to rediscover (reinvent) ideas and mathematical concepts with adult guidance through the exploration of a variety of real-world situations and problems or the real world (Usdiyana, Purniati, Yulianti, & Harningsih, 2009). According to Badruddin (2013) realistic mathematics learning is an activity that provides opportunities for students to learn in a real environment by

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involving all aspects and does not rule out the possibility of collaborating with other subjects and using simple media. Based on research conducted by Tampubolon (2016) it was found that the application of realistic mathematics learning models can improve student learning outcomes. Arsaythamby & Zubainur (2014) stated that the implementation of Indonesian Realistic Mathematics Education gave opportunities for students to build their own understanding of the Mathematical teaching aids actively.

The use of learning models is a factor outside of students that influences learning outcomes. In addition to these factors, children's intelligence is from within students and is very important for future learning readiness. Seven forms of intelligence coupled with two aspects of intelligence called multiple intelligences (Ningsih, 2016), which consist of mathematical logic intelligence, linguistic intelligence, visual-spatial intelligence, musical intelligence, kinesthetic intelligence, interpersonal intelligence, intrapersonal intelligence, intelligence naturalist, spiritual intelligence (Suyadi, 2009). Among the eight bits of intelligence, there are two or three bits of intelligence that stand out in the child, the potential that exists must be developed early, including interpersonal intelligence (Ningsih, 2016). According to Wahyuni, Sulaiman, & HR (2016) interpersonal intelligence is the ability to understand and cooperate with others. This intelligence requires the ability to absorb and respond to the moods, behavior, intentions, and desires of others. Someone who has interpersonal intelligence can have compassion and great social responsibility. The development of interpersonal intelligence is very important for children because it will be the basis when children associate with friends and the environment. Research related to interpersonal intelligence, one of which is conducted by Utami (2012) which states that increased interpersonal intelligence can be seen from children who look diligently greeting and smiling at others, can be invited to work together and share, children more respect group opinions and do not impose your own opinion and begin to realize mistakes and apologize if you make a mistake. Interpersonal intelligence influences students' ability in terms of language (Behjat, 2012). Thus, it can also be possible to influence students in learning mathematics.

Based on the explanation, researchers have the initiative to experiment by applying contextual models and realistic mathematics learning on prismatic material in classrooms. VIII Cooperative Middle School in terms of interpersonal intelligence. The novelty of this study is it was conducted with the aim to obtain information about the most appropriate learning models to be applied to students on the material surface area and prism volume. The use of appropriate learning models can optimize learning so as to improve student learning outcomes.

METHODS

The method used in this research is the experimental method. The form of research used is a factorial design extension of true-experimentation and allows the investigation of one or more variables, individually or in interaction or with another (Darmadi, 2011). The term factorial refers to the factor that the design involves several factors. The learning factor has three levels because there are three types of learning, and the interpersonal intelligence factor has three levels. Thus, factorial designs require nine groups, as presented in Table 1.

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Table 1. 3 x 3 Factorial Design

Intelligence Interpersonal	High (b1)	Middle (b2)	Low (b3)
Learning Model			
Contextual (a_1)	a_1b_1	a_1b_2	a_1b_3
Realistic (a_2)	a_2b_1	a_2b_2	a_2b_3
conventional (a_3)	a_3b_1	a_3b_2	a_3b_3

The population in this study were all eighth grade students of Pontianak Cooperative Middle School and in the sample researchers used a random cluster sampling technique collection with the consideration that the sample classes taken were handled by the same teacher, using the same mathematics textbooks, students sitting at the grade level the same, the division of classes there are no superior classes, there are no students living in classes and have never studied the prism-building material at the junior high school level.

To find out whether the population has a balanced learning outcome so that it is feasible to be investigated, a balance test is carried out using the one-way ANOVA test with unequal cells based on students' daily test scores. Before a balance test is performed, the prerequisite test is normality using the Lilliefors test and homogeneity test using Bartlett.

The data collection tools used in the study are data documentation in the form of students 'daily test scores to see the balance of class population, questionnaires are used to determine students' interpersonal intelligence and tests to find out the learning outcomes of VIII grade students of Pontianak Cooperative Middle School. Data analysis techniques in this study began from the balance test using a one-way analysis of variance. Before the prerequisite test is carried out, the normality and homogeneity tests are using Liliefors and Bartlet based on the results of daily tests of students in class VIIIA, VIIIB, VIIIC, and VIIID (Budiyono, 2009). Further testing the hypothesis using three-way analysis of variance test with different cells, previously performed analysis prerequisite test is a test of normality and homogeneity test Liliefors and Bartlet. And if it is necessary to do the next stage of the further post-Anova test using the method, Scheffein which the method Scheffe produces a significant mean difference count at least. This means that the number of average differences in further testing is highly dependent on the dual warranty method used (Budiyono, 2009).

RESULT AND DISCUSSION

This study will reveal differences in learning outcomes between students who are given learning with contextual learning models, realistic and conventional mathematics learning. In addition, it will also reveal interactions between groups of learning models with students' interpersonal intelligence levels. In this study, involving 105 students as research objects. Quantitative research data obtained through students' interpersonal intelligence data and student learning outcomes tests, consisting of 37 students in the Contextual learning group (experimental group I), 33 students in the Realistic mathematics learning group (experimental group II) and 37 students in Conventional learning group (control group). The data in this study include inter-personal intelligence data and test scores (post-test) of student learning outcomes on the subject of building prism in class VIII A, VIII B and VIII C in Pontianak Cooperative Middle School.

Data test scores (post-test) student learning outcomes can be divided into two, namely student test achievement test data based on learning models and student

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learning achievement test scores based on students' interpersonal intelligence presented in Tables 2 and 3 below.

Table 2. Data of test value based learning model

Model	N	$\bar{X}$	S
Contextual	37	76,08	83,52
Realistic	33	75,15	61,70
Conventional	37	71,76	11,06

Table 3. Data of test value based interpersonal intelligence

Interpersonal intelligence	N	$\bar{X}$	S
High	47	74,64	9,27
Middle	39	69,69	8,75
Low	21	68,64	8,93

The following is a description of the test scores of student learning outcomes based on learning models and interpersonal intelligence in Table 4. below.

Table 4. Data description of test value based learning model and interpersonal intelligence

Model	Number of Students	Number of Students for Each Interpersonal Intelligence category				
		High	Middle	Low	$\bar{X}$	$\bar{S}$
Contextual	37	17	16	4	96,62	9,15
Realistic	33	16	12	5		
Conventional	37	14	11	12		

To find out whether the sample has the same initial conditions or not, a balance test is performed. The data used is taken from students' daily test scores in the population. Before the balance test, each population class is first tested whether or not it has a normal distribution and whether it comes from a homogeneous population. Based on the calculation results of the normality and homogeneity test, it was obtained that each of these samples came from populations that were normally distributed and homogeneous. Furthermore, in the balance test using one-way ANOVA with unequal cells obtained that the initial state of the population is in a balanced state.

Furthermore, for hypothesis testing using 3x3 ANOVA test with cells not equal to H_{0A} there is no difference in mathematics learning outcomes between students who use contextual learning models, realistic mathematics learning models and conventional learning on prismatic material; H_{0B} can not be differences in mathematics learning outcomes between students who have high, medium and low interpersonal intelligence on prismatic material; and H_{0AB} there is no interaction between learning models with interpersonal intelligence on student learning outcomes in the prism building material. However, beforehand, the variance prerequisite test was done, namely the normality test and the homogeneity test. The normality tests conducted include the learning outcomes of experimental class I, II, and control class students, as well as the normality test of student learning outcomes with high, medium, and low interpersonal intelligence presented in Table 5 below.

Table 5. The Analyze of Normality Test

Group	L_{obs}	L_{table}	Decision
Experiment I	0,1207	0,159	Accept H_0
Experiment II	0,1317	0,159	Accept H_0
Control	0,1394	0,161	Accept H_0
High	0,1131	0,173	Accept H_0
Middle	1,0877	0,142	Accept H_0
Low	0,1547	0,168	Accept H_0

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Based on table 5, it is shown that the price of Lobs for each source does not exceed L table. Thus, the decision was H_0 is accepted for each source. So it can be concluded that each sample group came from a normally distributed population. To find out if the sample comes from a homogeneous population, a homogeneous test is used. Homogeneity test used in this study is the Bartlett test with a significance level of 0.05. The Bartlett test is used to test the homogeneity between rows, namely Contextual, Realistic and conventional learning, and between columns, namely groups of students with high, medium, and low interpersonal intelligence. The results of homogeneity test calculations are presented in Table 6 below.

Table 6. Result of Homogenity test Analysis

Group	X^2_{0bs}	X^2_{tabel}	Decision
Learning Models	0,158	5,99	Accept H_0
Interpersonal Intelligence	0,086	5,99	Accept H_0

Based on Table 6 shows that the statistical value of contextual, realistic and conventional learning value = 0.158 <$X_{2;0.05;2}$ = 5.991 then H_0 accepted. This means that all three classes are homogeneous. Test statistical value of interpersonal intelligence groups of students with high, medium, and low is = 0.086 <$X_{2;0.05;\ 2}$ = 5.991 then H_0 is accepted so that we can conclude these three groups homogeneously.

To test the hypothesis, the two-way ANOVA test is used with unequal cells. The significance level criterion is 0.05, so the null hypothesis (H_0) is rejected. Before conducting the two-way ANOVA test with unequal cells, the normality and homogeneity of variance tests are first performed. The test results showed that the study sample group came from populations with normal distribution and homogeneous variance. Therefore, to test the research hypothesis, the two-way ANOVA test is used with unequal cells. A summary of the results of the two way anava test with unequal cells is presented in the Table 7 below.

Table 7. Summary of Two-Way Variance Analysis

Source	JK	dK	RK	F_{obs}	F_{table}	P	Conclusion
Model (A)	770,78	2	385,39	6,14	3,11	< 0,05	Reject H_0
Interpersonal Intelligence (B)	240,07	2	120,03	1,76	3,11	>0,05	Accept H_0
Interaction (AB)	231,58	4	57,89	0,81	2,48	>0,05	Accept H_0
Galat	1267,88	100	12,68				
Total	2510,29	103	-	-	-	-	-

Based on table 7, it was found that H_{0A} was rejected, which means that there are differences in mathematics learning outcomes between students who use the contextual learning model, realistic mathematics learning models and conventional learning on the prism building material. Furthermore, H_{0B} is accepted, which means that there can be no difference in mathematics learning outcomes between students who have high, medium, and low interpersonal intelligence on the prism chamber material. The last one obtained by H_{0AB} is accepted; this means there is no interaction between the learning model with interpersonal intelligence on student learning outcomes in the prism building material.

As a follow-up to the ANOVA, a double comparison test is carried out using the Scheffe

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method with a significance level of 0.05. The goal is to find out the different mean for each pair of rows, each pair of columns and each pair of cells. From ANOVA two unequal cell paths summarized in Table 7 shows that H_{0A} is rejected. This means that there are differences in student learning outcomes in the three learning models in the prism space material. Because there are three learning models (contextual, realistic and conventional), it is necessary to do a double comparison test between lines to determine the significance of the differences in the three learning models given to students on the prism building material. After calculating by the method Scheffe, the results of the double row comparison test are summarized in the following table 8.

Table 8. Summary of Comparison of means tests

H_0	F_{obs}	$2F_{0,05;2,83}$	P
$\mu_1 = \mu_2$	13,88	(2)(3,11) = 6,22	< 0,05
$\mu_1 = \mu_3$	2,66	(2)(3,11) = 6,22	>0,05
$\mu_2 = \mu_3$	4,26	(2)(3,11) = 6,22	>0,05

Based on the results of post-ANOVA further test calculations in table 8 it can be concluded that: (1) H_{01-2} rejected so that there are differences in student learning outcomes between contextual learning models with realistic mathematics learning models; (2) H_{01-3} is accepted so that there is no difference in student learning outcomes between contextual learning models and conventional learning models; (3) H_{02-3} is accepted so that there are no differences in student learning outcomes between realistic mathematics learning models and conventional learning models. From table 7, it is obtained that H_{0B} is accepted, meaning that there are no differences in learning outcomes of students who have high, medium and low interpersonal intelligence on the prism chamber material, so there is no need for a comparative test between columns. The following is presented the mean score of student learning outcomes in Table 9 below.

Table 9. Score of Mean

Model	Interpersonal Intelligence			Marginal mean
	High	Middle	Low	
Contextual	95,33	73,07	72,50	80,30
Realistic	82,92	54,68	62,00	66,57
Conventional	83,07	73,18	59,23	71,82
Marginal mean	87,10	67,97	64,57	

Based on table 8 it is found that there are differences in student learning outcomes between contextual learning models with realistic mathematics learning models, and see based on the comparison of marginal averages in table 9 it can be concluded that the contextual learning models provide better learning outcomes than realistic mathematics learning models. Unlike the case with contextual and conventional learning models provide equally good learning outcomes. This also applies to realistic and conventional mathematics learning models. The results of this study are in line with research conducted by Damayanti & Afriansyah (2018) who concluded that the mathematical representation ability of students who get learning model Contextual Teaching and Learning is better than students who get a learning model Problem-Based learning. The results of the study Surya et al. (2017) that increasing problem-solving abilities and self-confidence students' are better than expository learning. And because H_{0B} is accepted, it implies that students with high interpersonal intelligence categories will have the same learning outcomes as students who have interpersonal intelligence learning moderate or low mathematics. The results of this study are in line with research conducted by Susiaty, Mardiyana, & Saputro

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(2016) concluding that students with high, medium, or low interpersonal intelligence have the same mathematics learning achievement. This is also supported by DeNevers (2014) that there is a weak relationship between interpersonal intelligence and problem-based learning.

This can be made possible due to the lack of seriousness of the students when filling out the questionnaire, for example, students completing questionnaires quickly without being thorough and understanding the sentences in the questionnaire and students filling out questionnaires at their own pace without regard to their personality. Another reason is that many students do not understand the purpose of the questions in the questionnaire filling sheet so that it fills up carelessly, which causes many to fill mistakenly in the questionnaire.

CONCLUSION

Based on a theoretical study and supported by analysis of variance and referring to the problem formulation that has been described, it can be concluded several things as follows: (1) contextual learning models provide better learning outcomes than realistic mathematics learning but provide the same learning outcomes with learning models conventional, whereas realistic and conventional mathematics learning provides equally good learning outcomes; (2) students who have high, medium or low interpersonal intelligence have the same learning outcomes; (3) In each learning model, students who have high, medium or low interpersonal intelligence have the same learning outcomes; (4) At each level of interpersonal intelligence, the contextual learning model provides better learning outcomes than realistic mathematics learning but provides the same learning outcomes as conventional learning models, while realistic and conventional mathematics learning provides equally good learning outcomes. Subsequent research suggested that students be sure to fill out the questionnaire in earnest. In addition, the instrument used has certainly been tested for validity by experts in the field concerned. This is done to ensure that the tools for data retrieval are tested for validity so that the data obtained is truly valid.

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