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Differences in Numeration Literacy Abilities and Interest in Using PBL and Cognitive Growth Learning Models in Primary School Students

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ABSTRACT

It would discuss differences in the numeracy literacy abilities of students who are taught using PBL and students who are taught using the cognitive growth learning model and Differences in students' learning interest in PBL model with students taught using the cognitive growth learning model. The research method is used a quasi-experiment which aim to see the differences. The result show that there is actually no difference in the knowledge formation process carried out in PBL and Cognitive Growth learning, students are required to be more active in the learning process and the learning model is the main effect that influence the increase in students' literacy skills and learning interest.

KEYWORDS

cognitive growth learning model; PBL; Numeration Literacy abilities

INTRODUCTION

There are various ways to develop numeracy literacy skills, one way to introduce numeracy literacy to elementary school students is through reading story books related to mathematical concepts, such as addition, measurement and geometry. These books can foster interest and help students understand mathematical concepts in a fun way. Research results (Ekowati et al., 2019; Suswandari, 2018) introduce numeracy literacy to students for fifteen minutes by reading other text books. Educational and Cultural Ministry (Menteri Pendidikan dan Kebudayaan Indoenesia, 2016) explained that one of the numeracy literacy cultural activities contained in the curriculum regulations is reading non-learning books related to mathematical concepts for 15 minutes before study time starts and students are required to write a summary of the book they have read.

The application of learning that is meaningful and able to involve students more actively and is the right choice for numeracy literacy skills for elementary school students, namely PBL and the Cognitive Growth learning model. These both models are learning that connects students' abilities to the maximum in identifying, exploring and managing until knowledge is discovered by itself. The both models explain to students to not only be able to work on the problems given, but students are also urged to be able to relate the knowledge they have got. Therefore, teachers must be able to provide sufficient time, as well as provide opportunities for students to collaborate with other students in completing the tasks given (Kementerian Pendidikan dan Kebudayaan, 2017).

It involves students in learning that encourages full student activity to work on the problems given independently by building their knowledge and understanding (Saputro et al., 2019; Yandhari et al., 2019). By implementing the PBL, it is able to encourage students to learn, involve students actively in learning, be able to work together, and have various experiences, skills and ideas to be able to give the solution together (Ashri, D. N., & Pujiastuti, H., 2021; Fauzia, 2018).

Meanwhile, the Cognitive Growth is it that uses several questions to direct students in acquiring a concept. The teacher gives problems in line with the students' level of thinking. Based on the problem given, students will discuss to find the concept. It is centered on students' cognitive development. Joyce & Weil (1980) say that it requires giving assignments to students, then observing how students interact with the assignment, and providing responses related to the interactions implemented by learners. It uses the Cognitive Growth one, the educators just gave a guide and facilitate the facilitators to teach the learners in discovering concepts, procedures, and so on.

The observations of primary school 5th grade students at SDN 7 Langsa, the average mathematics score for the students was 65. These results indicate is still low. Students experience difficulty in solving mathematical problems, students didn't understand enough in mathematical symbol form and students also find it difficult to determine the initial steps that must be taken from the information stated in the problem. These also showed that the students were not used to working on numeracy questions because the information about the questions was not well understood, and the questions that were distributed were also questions that they rarely encountered when learning at school took place. Some students are reluctant (lazy) during the mathematics learning process.

That students still find it difficult to solve questions related to everyday life. Where these questions relate to apply number concepts, arithmetic operations, and the ability to interpret information in the student's environment. Students are not interested in participating in the learning being carried out. So, it is important to find out more about the numeracy literacy abilities and interests of primary school 5th grade students at SDN 7 Langsa using PBL and Cognitive Growth.

RESEARCH METHODS

This research is a quasi-experiment which aims to see the differences in numeracy literacy abilities and learning interest in students who receive learning using the Problem Based Learning model and students who receive learning using the Cognitive Growth model. In quasi-experiments it is not possible to control all external variables that influence the course of the experiment. This research was carried out at SD Negeri 7 Langsa, precisely on Jalan Panglima Polem, Kampung Jawa, Langsa City. The research was carried out in the odd semester of the 2023/2024 academic year. The population in this study were all 5th grade students at SD Negeri 7 Langsa. Because the population only consists of two classes, the sample was taken from all class V students of SD Negeri 7 Langsa in 2 classes, so that the sample is a sample of the population, namely students in class V-a and V-b. Students in class V-a apply the Problem Based Learning model, while students in class V-b apply the Cognitive Growth learning model.

This research involved two sample classes that were selected and used as experimental classes. The research design used was Pretest Posttest Control Group Design. Data collection techniques refer to the methods or methods used to collect relevant and accurate information in a study. In this research, the data collection technique is by administering tests and non-tests. Students' initial ability tests can be used to determine the equality between experimental group I, namely learning with the PBL model and experimental group II, namely learning with the cognitive growth model before being given treatment.

This numeracy literacy ability test uses mathematical problem-solving questions that link student test results with indicators of numeracy literacy ability. To determine students' interest in learning, this research used a questionnaire with statements that can measure interest in learning. These statements are made based on indicators of learning interest. Questionnaires will be given to the two experimental classes after carrying out a numeracy

literacy test. The questionnaire used contained the answer choices "STS = Strongly Disagree", "TS = Disagree", "S = Agree", "SS = Strongly Agree".

RESULTS AND DISCUSSION

Students' Initial Mathematics Ability

Table 1. Initial Mathematics Ability Results

Class	N	Maximum Value	Minimum Value	Mean	Standard Deviation
Experiment 1	20	53,33	13,33	30,33	11,54
Experiment 2	20	46,67	13,33	29,66	9,04

In experimental class 1, the highest score was 53.33 and the lowest was 13.33, while in experimental class 2, the highest score was 46.67 and the lowest was 13.33. The calculated average is 30.33 for experimental class 1 and 29.66 for experimental class 2. It can be seen that the average scores obtained by experimental class 1 and experimental 2 are not much different so that it can be obtained that the average KAM (Kemampuan Awal Matematika/ Math First Ability) score for each the experimental class is relatively the same. This fulfills the requirements for being given different treatment to each experimental class.

In the theory of meaningful learning, the importance of students' initial mathematical abilities is explained by Ausubel 1978 (Dahar, 2011) that the knowledge that students already have influences student learning outcomes. So, to create a meaningful learning process, that is by linking new material with existing knowledge. KAM test is used to determine student groups based on high, medium and low initial abilities. KAM grouping is also used to answer problems related to numeracy literacy abilities and learning interests of students who are given Problem Based Learning (PBL) and Cognitive Growth (CG) lessons.

Students gain new knowledge using the knowledge and experience they already have. The things that have been learned will be used when solving or facing new things. So, that students got good point in the result subject when they worked the mathematics ability test first to be able to reach what abilities, skills and competencies students have acquired before taking part in the lesson. In this way, it is hoped that students' vastness of knowledge, experience and abilities that will be used in subsequent learning will increase or improve the students' numeracy literacy skills.

Learning Model

Based on this research hypothesis, namely:

Ho : There is no difference in the numeracy literacy abilities of students who are given the Problem Based Learning model and students who are given the Cognitive Growth learning model.

Ha : There is a difference in the numeracy literacy abilities of students who are given the Problem Based Learning model and students who are given the Cognitive Growth learning model.

Statistical Hypothesis:

H(o) :$\mu_1=\mu_2$

Ha :$\mu_1\neq\mu_2$

As a basis for decision making for the t-test of two independent samples based on the comparison of t count with t table, namely as follows:

If the calculated t value > t table then H_o is rejected and if the calculated t value ≤ t table then Ho is accepted.
The results of the t-test statistical analysis using the SPSS program are shown in table 4.5 as follows:

Table 2. T-Test Results of Students' Numeracy Literacy Ability

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Numeracy Literacy Skills	Equal variances assumed	,016	,900	1,208	38	,234	3,66700	3,03489	-2,47682	9,81082
	Equal variances not assumed			1,208	37,754	,234	3,66700	3,03489	-2,47813	9,81213

The analysis results listed in table 2, for decision making it is necessary to know Value of t_{table} uses the interpolation formula. The results of calculating the t table value using the interpolation formula obtained 2.02. Meanwhile, the Sig value. (2-tailed) of 0.23. Because the Sig value. (2-tailed) < t table value, then H_o is accepted. This means that there is no difference in the numeracy literacy abilities of students who are provided PBL 1 and Cognitive Growth learning.

It influences students' numeracy literacy abilities and students' interest in learning. It contributes to increasing students' numeracy literacy skills. So, the stages in Problem Based Learning are really applied in learning to get optimal results, namely increasing students' numeracy literacy skills. It includes: (1) Orienting the problem, (2) Organizing, (3) Guiding individual and group investigations, (4) Developing and presenting results, (5) Analyzing and evaluating the process and results of problem solving. Meanwhile, its stage consists of three stages, namely: (1) Providing problems that are appropriate to the individual's mental development stage, (2) Asking questions about the problems presented so that students carry out investigations to obtain information/obtain the necessary information, (3) Integration of problems from simple problems to complex problems.

Before the teacher divides the students into several groups first. This is because the Problem Based Learning and Cognitive Growth learning stages orient students towards discussion or a system of working together to solve a problem. So, each group has a sense of responsibility so that students are able to construct their own knowledge in solving the problems given. Students are given LKPD when learning takes place. With this LKPD, students are given the opportunity to be actively creative in order to reach solutions through group discussions.

In Problem Based Learning and Cognitive Growth learning, the teacher acts as a facilitator who conveys the learning objectives, explains the logistics required and the basic competencies that must be achieved. The teacher monitors the group to see whether they can work on the LKPD given and helps them if they have difficulty interacting in the group. The next role of the teacher is to build students' knowledge/skills to collect appropriate information, carry out observations to solve problems. During the learning process, sometimes students are still confused about solving problems, so the teacher's role is very crucial in guiding students to get the solutions from events.

Based on the portrayal of these two lessons, there's actually no contrast within the information arrangement prepare carried out. In Issue Based Learning and Cognitive Development learning, students are required to be more dynamic within the learning handle. This, as communicated by Schmidt, Savery, and Duffy (Rusman, 2014), based on

constructivism hypothesis, has the taking after characteristics: (1) Understanding gotten from interaction with issue scenarios and learning situations, (2) Battle with issues and forms Issue request makes cognitive discord that invigorates learning. (3) Information happens through a collaborative prepare of social transaction and assessment of mindfulness of a point of see. So, it can be concluded that understudies are required to be able to carry out tests in understanding the given issues.

Numeracy Literacy Ability

This ANOVA statistical test was carried out to see the interaction between the learning model applied and students' KAM in students' numeracy literacy abilities. The hypothesis proposed is as follows;

H_o: There is no interaction between the learning model (Problem Based Learning and Cognitive Growth) and initial mathematics abilities in determining students' numeracy literacy abilities.

H_a: There is an interaction between learning models (Problem Based Learning and Cognitive Growth) and mathematical abilities in determining numeracy literacy abilities.

Statistical Hypothesis:

H_oAB:$(\alpha\beta)_{ij}=0$, for each i = 1, 2 and j = 1, 2, 3

H_aAB:$(\alpha\beta)_{ij}\neq 0$, there is at least one $(\alpha\beta)_{ij}\neq 0$; i = 1, 2 and j = 1, 2, 3

The calculation results using the SPSS program are presented in table 3 as follows:

Table 3. ANOVA Test Results for Numeracy Literacy Ability

Tests of Between-Subjects Effects

Dependent Variable: Numeracy Literacy Ability

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3136,216[a]	3	1045,405	30,857	,000
Intercept	26005,537	1	26005,537	767,604	,000
Class	6,337	1	6,337	,187	,669
KAM	3072,737	1	3072,737	90,698	,000
Class * KAM	57,143	1	57,143	1,687	,206
Error	813,092	24	33,879		
Total	29954,845	28			
Corrected Total	3949,308	27			

a. R Squared = ,794 (Adjusted R Squared = ,768)

It can be seen that the class factor with KAM obtained a Sig value (p-value) is 0.20. Because the Sig value (p-value) > 0.05 then reject H_a and accept H_o. This means that there is no interaction between Problem Based Learning and Cognitive Growth and mathematical abilities in determining students' numeracy literacy abilities.

Numeracy proficiency capacity is an individual's capacity to get it, utilize and decipher numbers, images and numbers in daily life. Usually in understanding with the pointers of numeracy proficiency aptitudes (Han, et al., 2017), specifically: (1) Utilizing some kinds of numbers and symbols related to operations in logarithmic shape to illuminate issues within the context of daily life, (2) Analyzing data (charts, tables, charts, graphs, etc.), (3) Translate the comes about of the examination to form expectations and make choices. The students' numeracy proficiency capacities gotten from the inquire about comes about were at that point analyzed to depict the numeracy proficiency capacities of understudies in classes instructed utilizing the Issue Based Learning and Cognitive Development.

Based on the inquire about comes about, it was found that there was no noteworthy contrast between understudies who were instructed utilizing the Issue Based Learning show and understudies who were instructed utilizing the Cognitive Development learning show.

Student Learning Interests

A person who can focus on training with happiness and sincerity is basically a connection between the self and an external condition that influences the self. The more grounded a feeling, the more it creates a sense of curiosity (Susanto, 2016), intrigued is a drive inside an individual or a figure that makes intrigued or consideration viably, which causes the choice of an object or action that's productive, agreeable and over time will bring fulfillment to him.

The average for the mathematics learning interest test, namely in the class that received PBL learning, was 84.13. Meanwhile, the class that received CG learning obtained an average of 83.46. It can be concluded that there is no significant difference between the interest in learning mathematics of students who are taught using Problem Based Learning and the interest in learning mathematics of students who are taught using the Cognitive Growth. In principle, there is no difference between these two models. Both models are discovery learning models by solving a problem that makes students build their knowledge. Hosnan (2014) states that in discovery learning students are encouraged to learn on their own through active engagement with concepts and principles. Because these two lessons have almost the same character, the results obtained are not much different. Therefore, students' learning interest from the two models is not significantly different.

To determine students' interest in learning, they are given a test in the form of a questionnaire which is carried out after the learning process has been carried out. The student interest in learning questionnaire consisted of 25 questions with 4 indicator dimensions, namely: 1) enjoyment; 2) student interest; 3) student attention; 4) student involvement. The test was carried out by 40 students who were divided into two learning groups, namely the first group using it was consisting of 20 students and the second group using the Cognitive Growth model consisting of 20 students.

The summary of the hypothesis test results appears in Table 4 as follows:

Tabel 4. Recapitulation of Research Hypothesis Test Results on Numeracy Literacy Abilities and Students' Interest in Learning

No	Research Hypothesis	Ho Testing	Hypothesis Test Results
1	There are differences in the numeracy literacy abilities of students who are given the Problem Based Learning learning model and students who are given the Cognitive Growth learning model.	H_o diterima	This means that there is no difference in the numeracy literacy abilities of students who are given the Problem Based Learning learning model and students who are given the Cognitive Growth learning model.
2	There is a difference between the learning interest of students who receive Problem Based Learning learning and students who receive Cognitive Growth learning.	H_o diterima	There is no difference between the learning interest of students who receive Problem Based Learning learning and students who receive Cognitive Growth learning.
3	There is an interaction between learning models	H_o diterima	There is no interaction between learning models

	(Problem Based Learning and Cognitive Growth) and mathematical abilities in determining numeracy literacy abilities.		(Problem Based Learning and Cognitive Growth) and mathematical abilities in determining students' numeracy literacy abilities.
4	There is an interaction between learning models (Problem Based Learning and Cognitive Growth) and students' learning interests.	H_o diterima	There is no interaction between learning models (Problem Based Learning and Cognitive Growth) and students' interest in learning.

In testing the hypothesis, to analyze whether there is a simultaneous impact between the two independent variables (learning model and KAM) on numeracy literacy skills. According to Kerlinger (2002) interaction is the collaboration of two or more independent variables in influencing a dependent variable. In other words, interaction is the influence of an independent variable on a dependent variable which depends on the level or levels of other independent variables.

Based on hypothesis testing, it was found that the Sig value for learning*KAM was 0.20, which is more than 0.05, so reject H_a and accept H_o. This means that there is no interaction between these both ones (Problem Based Learning and Cognitive Growth) and mathematical abilities in determining students' numeracy literacy abilities. Likewise, with the interaction test between the these ones and students' interest in learning, the result was that they rejected H_a and accepted H_o. This means that there is no interaction between these ones (Problem Based Learning and Cognitive Growth) and students' learning interest.

Based on the research results, it can be concluded that the results obtained from this research were influenced by separate independent variables which were significant in influencing the dependent variable, namely KAM and the learning model had a separate influence on students' numeracy literacy abilities and interest in learning. KAM affects numeracy literacy skills but is not significant so KAM only functions as a grouping of students. Meanwhile, the learning model is the main effect that influences the increase in students' literacy skills and learning interest.

CONCLUSIONS

Based on the results of data analysis and research findings during learning, several conclusions were obtained. These conclusions are as follows:

1. There is no significant difference between the numeracy literacy abilities of students who were given the Problem Based Learning learning model and students who were given the Cognitive Growth learning model.
2. There is no significant difference between the learning interest of students who receive Problem Based Learning learning and students who receive Cognitive Growth learning.
3. There is no interaction between learning models (Problem Based Learning and Cognitive Growth) and mathematical abilities in determining students' numeracy literacy abilities.
4. There is no interaction between the learning model (Problem Based Learning and Cognitive Growth) and students' learning interest.

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