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The Effect of the Application of Realistic Mathematics Education and Motivation to Learning on the Achievements of Learning Mathematics by Kovariabel Numerical Ability During The Covid 19 Pademi Period

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Abstract:- This research aims to find out the effect of the application of realistic mathematics education on the achievement of learning mathematics by kovariabel numerical ability in students of the Bogor Unity Informatics Institute of Strata Management Prodi one this study uses the archetype of The Posttest Only Control Group with numerical ability kovariabel.

Data collection techniques use interviews and questionnaires, while sampling techniques use non probability sampling with a sample count of 90 people. The results showed that the application of realstic mathematics education and conventional learning had a positive and significant effect on student learning achievement through student numerical abilities. This is seen from the results of simple linear regression analysis, multiple linear regression, t test, determination coefficient test, sobel test and line analysis. Numerical ability as a moderator variable mediates between the application of realstic mathematics education to student learning achievement which is partial mediation and numerical ability as a moderator variable that mediates between the application of student realstic mathematics education to student learning achievement which is both full mediation.

Keywords:- *Conventional Learning, Learning Motivation, Numerical Ability, Student Learning Achievement.*

I. INTRODUCTION

Entering the 21st century education must be able to direct students in order to live in new situations that arise in ourselves and our environment. Learning is essentially a process of transactional communication that is reciprocal, to achieve a set goal. Transactional communication is a form of communication that can be accepted, understood, and agreed upon by the relevant parties in the learning process. Lecturers occupy a key and strategic position in creating a conducive, active, creative, effective and enjoyable learning environment to direct students to achieve their learning goals optimally. Therefore, lecturers should be able to position themselves as diseminators, informators, transmitters, transformers, organizers, facilitators, motivators and evaluators for the creation of dynamic and innovative learning processes. Learning is in fact a causal process. Teachers as teachers are the main cause of the student learning process. Therefore, lecturers as central figures should be able to set the right learning strategies so as to encourage productive, active, creative, and effective student learning. The success of achieving learning goals depends a lot on the readiness and way of learning that students do. This way of learning can be done in the form of groups (classical) as well as individuals.

Based on the above reality, learning is needed that can improve the motivation and results of learning mathematics, namely the application of realistic mathematics education. Gravemeijer (in Tarigan 2006;5) states there are 5 stages in the application of realistic mathematics education;

1. The problem solving stage is that students solve problems according to their ability,
2. The reasoning stage is that students are trained to reason in solving problems.
3. The communication stage is that students are expected to communicate the answer. Students also have the right to disingily disagree with their friend's opinion which is considered incompatible with his opinion.
4. Confidence level, students are expected to be able to exercise confidence by conveying their ideas.
5. Representation stage, students gain the freedom to choose the desired form of representation either using concrity objects, models or mathematical emblems to present the process of dissolving the problem done.through which students will find ideas, mathematical concepts through exploration, elaboration and confirmation of contextual problems to stimulate the student's thinking.

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To support the application of realistic mathematics education, adequate numerical skills and motivation are required. Financial and Business mathematics learning related to the use of calculated operations namely summation, subtraction, multiplication and division. Students with high numerical abilities will have problem solving skills, classify, categorize information, work with abstract concepts to know each other's causality, be able to perform controlled experiments, interest in natural events and be able to perform complex mathematical calculations. The high numerical ability of students will affect the results of studying Business and Financial mathematics at the Unitary Informatics Business Institute.

Based on the above description, empirical proof is required through experiments on the effect of realistic mathematics education on the results of learning business and financial mathematics by kovariabel nemerik skills in students of InstItut Business Informatics Unit Bogor 2020/2021.

The purpose of this research is: to find out the effect of realistic mathematics education application on the achievement of learning mathematics Business and Finance by kovariabel numerical ability in students of InstItut Business Informatics Unit Bogor Prodi Management Strata one Class 1B, 1D and 1F this study uses the archetype of The Posttest Only Control Group with numerical ability kovariabel.

➢ *Problem Formulation*

From this background, researchers are interested in conducting research of Students of InstItut Business Informatics Unity Bogor on Business and Financial Course Semester I (one)nyang titled "Application of Ralistic Mathematics Education and motivation to learn the Achievement of Learning Mathematics through Numerical Ability as a Convariable Variable (Case Study of Students of Informatics Business Informatics Unit Bogor West Java Province)". So that it can be formulated the problems in this study are as follows:

1. Is there an influence between the application of conventional mathematics education to student learning achievement?
2. Is there an influence on the application of conventional mathematics education to students' Numerical abilities?
3. Is there any influence of learning motivation on student learning achievement?
4. Is there any influence of learning motivation on students' Numerical abilities?
5. Is there an influence of students' numerical abilities as moderator variables on student learning achievement?
6. Is there an influence on the application of conventional mathematics education to learning achievement through the numerical abilities of students?
7. Is there any influence of learning motivation on student learning achievement through numerical learning skills of students?

➢ *Theory Study:*

1. According to Priansa (2015:132) Motivation comes from the Latin word "movere" which means impulse, drive or force that causes an action or deed. The word "movere" in English, often matched with "motivation" which means the giving of motives, the mooning of motifs, or things that give rise to encouragement or circumstances that give rise to encouragement
2. According to Buzan, numerical/mathematical intelligence is the brain's ability to play magic with the "alphabet" of numbers. One of the mistakes that many children often make when they start learning numbers is to think there are millions, billions and even infinite numbers that they have to learn.
3. It is asserted by Howard Gardner (Uno, 2009: 117) in his book Multiple Intelligences, The Theory in Practice, that there is a mathematical logic to linguistic intelligence. In the mathematical ability of the child analyzes or describes logical reasons, as well as the ability to work out the solution of the problem that arises. Linguistic intelligence is necessary to define and describe it in the form of language.
4. Gardner (Uno, 2009: 117) presents the characteristics of a math-savvy child, at the age of a toddler, a child fond of exploring to satisfy his curiosity such as exploring every corner, observing objects unique to him. Gardner (Uno, 2009: 117) presents the characteristics of a math-savvy child, at the age of a toddler, a child fond of exploring to satisfy his curiosity such as exploring every corner, observing objects unique to him.

The hypothesis models used in this study are as follows:

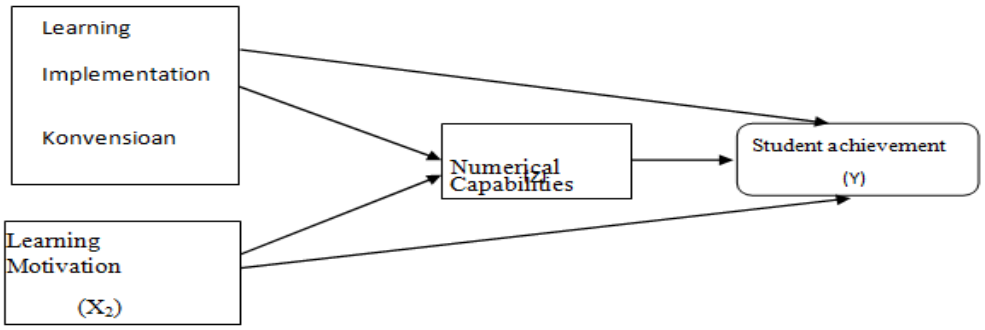

Fig 1:- Research model

Source: Processed and developed for research, 2020

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The hypothesis formulation in this study is as follows:

1. H1: It is suspected that there is an influence between the application of conventional mathematics learning to student learning achievement
2. H2: It is suspected that there is an influence between the application of conventional mathematics learning to the numerical abilities of students
3. H3: It is suspected that there is an influence between learning motivation and student learning achievement.
4. H4: It is suspected that there is an influence between learning motivation and the numerical abilities of students.
5. H5: It is suspected that there is an influence between a student's numerical ability as a Convariable variable to the student's learning achievement.
6. H6: It is suspected that there is an effect of the application of conventional mathematics learning on student learning achievement through the numerical abilities of students.
7. H7: It is suspected that there is a motivational influence of learning on student learning achievement through the numerical abilities of students.

II. METHODS

This research is an experimental study. Experiments were conducted on existing study groups (classes) because researchers were unlikely to change the structure of existing classes. Thus, this research is categorized as pseudo experiments (quasi experiments).

This research design follows the research design of post-test only control group design experiments. Experiment groups are classes that are treated in the form of learning using a relistic mathematical approach, while the control group is a class given the treatment of conventional learning. The study also considered student numerical ability moderator variables that allegedly affect free variables and bound variables, which aim to explain the relationship between one variable and another, which is used to test hypotheses of existing research results. The population in this study is a student of the Unitary Informatics Business Institute of Bogor Province of West Java. Meanwhile, the number of samples in this study was 90 respondents. The sampling technique used is saturated samples, which is the technique of determining samples by taking all populations. The measurement scale uses likert scale, and the instruments used are online questionnaires and cool video interviews because they were conducted during pandemics. This study uses qualitative and quantitative analysis techniques. Quantitative analysis using the SPSS program, by testing the validity and reliability tests, then correlation coefficient tests, simple linear regression tests to determine the influence and direction of each independent variable (X) against dependent variables (Y) and variable moderators (Z), then testing the determination coefficient, and t tests conducted to see how far one independent variable influences individually in describing its dependent variables, then multiple linear regressions to find out how dependent variables are (Y)

If two or more of its independent variables (X) are up and down, as well as the sobel test or Sobel test which is a test to find out if the relationship through a mediation variable is significantly capable as a mediator in the relationship. So the researchers tried to use the Test sobel to find out how far the mediation of the intervening variable (Z) together could affect its dependent variable (Y). Where Sobel test uses z test with the following formula:

$$z = \frac{ab}{\sqrt{(b^2SE_a^2) + (a^2SE_b^2)}}$$

Where:
a = variable regression coefficient independent of variable mediation.
b = regression coefficient of variable mediation against dependent variables.
S a = standart error of estimation of the influence of independent variables on mediation variables.
SE b= standart error of estimation of the effect of mediation variables on dependent variables.

III. RESULT AND DISCUSSION

Researchers to obtain the results of this study using several data analysis include: correlation coefficient test, simple linear regression test, determination coefficient, multiple linear regression test and significance test. Based on the results of the tests that have been conducted at the Unitary Informatics Business Institute of Bogor West Java Province, the following results are obtained:

No	Hypothesis Test	Correlation	Denomination	t/ F count	Hypothetical description
1.	Conventional learning on student learning achievement	0,685	46,64%	8,986	Ha accepted
2	Conventional learning of numerical abilities	0,517	27,44%	5,836	Ha accepted
3	Learning Motivation On Student Learning Achievement	0,293	8,74%	2,942	Ha accepted
4	Learning motivation towards numerical abilities	0,408	16,66%	4,281	Ha accepted
5	Numerical ability to learn achievements	0,630	39,20%	7,682	Ha accepted
6	Conventional Learning student's learning achievements through numerical ability	0,752	56,74%	3,574	Ha accepted
7	Learning motivation for student learning achievement	0,628	39,22%	3,604	Ha accepted

Table. 1:- research results

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Based on Table 1, it can be noted that the results of the t test (partial significance test) and the sobel test (simultaneous or joint significance test) indicate that:

1. Conventional learning has an influence on student learning achievement where t scores count (8,986) > t table (1,986) so that the hypothesis is accepted.
2. Conventional learning has an influence on the numerical abilities of students, where t scores count (5,836) > t table (1,986) so that the hypothesis is accepted.
3. The motivation of learning has an influence on the learning achievement of students where t scores count (2,942) > t table (1,986) so that the hypothesis is accepted.
4. Learning motivation has an influence on numerical ability where t count value (4,281) >t table (1,986)
5. The numerical ability of students has an influence on the student's learning achievement where the t-count score (7,682) >t table (1,986) so that the hypothesis is accepted
6. Conventional learning has an influence on student learning achievement through numerical ability where the t calculated score (3,574) > t table (1,986) so that the hypothesis is accepted
7. Learning motivation has an influence on student learning achievement through numerical ability where the t count score (3,604) > t table (1,986) so that the hypothesis is accepted

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.045	1.614		1.887	.063
	TotalX1	.812	.091	.683	8.990	.000

Table 2. Students' Conventional Learning Regression Test Results on Student Learning Achievement

a. Dependent Variable:totally

Based on Table 2 it can be noted that the regression coefficient value for the Student Learning Motivation variable is worth a positive value of 0.812. This indicates that the motivation variable of learning has a positive relationship with Student Learning Achievement, which can be said to be the better Conventional Learning of Students, the better the level of Student Learning Achievement.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.697	1.384		4.849	.000
	TotalX1	.452	.077	.519	5.832	.000

Table 3. Student's Conventional Learning Regression Test Results on Student Numerical Abilities

a. Dependent Variable: totalz

Based on Table 3 it can be noted that the regression coefficient value for a student's conventional learner variable is positive at 0.452. This indicates that the variables of conventional learners of students have a positive relationship with numerical ability, which can be said to be the better conventional learning of students, hence the higher the level of numerical ability of students.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.727	1.942		6.042	.000
	totalX2	.373	.127	.294	2.938	.004

Table 4. Regression Test Results Of Learning Motivation against Student Learning Achievement

a. Dependent Variable: totally

Based on Table 4 it can be noted that the regression coefficient value for learning motivation variables is positive at 0.373. This indicates that the variable work discipline has a positive relationship with student learning achievement, which can be said to be the better the motivation of learning, then the better the level of student learning achievement.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.937	1.351		6.596	.000
	totalX2	.378	.086	.407	4.283	.000

Table 5. Regression Test Results Motivation to Learn Numerical Abilities of Students

a. Dependent Variable: totalZ

Based on Table 5 it can be noted that the regression coefficient value for learning motivation variables is positive at 0.378. This indicates that the motivational variable of learning has a positive relationship with the numerical ability of the student, which can be said to be the better the motivation of learning, then the higher the level of numerical ability of the student.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.813	1.656		2.902	.006
	TotalZ	.886	.113	.627	7.677	.000

Table 6. Student's Numerical Regression Test Results on Student Learning Achievement

a. Dependent Variable: totally

Based on Table 6 it can be noted that the regression coefficient value for a student's numerical ability variable is positive at 0.886. This indicates that the variable numerical ability of the student has a positive relationship with the student's learning achievement, which can be said the higher the student's numerical ability, the better the level of student learning achievement.

IV. CONCLUSION

1. The effect of students' conventional learning variables on student achievement variables, based on data analysis and hypothesis testing I did in this study, it is known that:

1) Conventional student learning has an influence on student achievement where t grades count (8,986) > t table (1,986) so that the hypothesis is accepted.
2) It is known that the regression coefficient value for student conventional learning variables is positive at 0.811. This indicates that the variable conventional learning of students has a positive relationship with student achievement, which can be said the better conventional learning of students, then the better the level of student achievement.

2. The influence of students' conventional learning variables on numerical ability variables, based on data analysis and hypothesis testing conducted in this study, it is known that:

1) Conventional student learning has an influence on numerical ability, where the t value counts (5,836) t table (1,986) so the hypothesis is accepted.
2) It is known that the regression coefficient value for student conventional learning variables is positive at 0.452. This indicates that the variables of conventional learning students have a positive relationship with the numerical abilities of students, which can be said to be the better conventional learning of students, hence the higher the level of numerical ability of students.

3. The influence of learning motivation variables onstudent achievement variables, based on data analysis and hypothesis testing conducted in this study, it is known that:

1) The motivation of learning has an influence on student achievement where t scores count (2,942) > t table (1,986) so that the hypothesis is accepted.
2) It is known that the regression coefficient value for the Motivation learning variable is positive at 0.373. This indicates that the motivation variable of learning has a positive relationship with student achievement, which can be said to be the better the motivation of learning, then the better the level of student achievement.

4. The influence of motivational variables on numerical ability variables, based on data analysis and hypothesis testing conducted in this study, it is known that:

1) Learning motivation has an influence on numerical ability where the t count value (4,281) >t table (1,986)
2) It is known that the regression coefficient value for the Motivation learning variable is positive at 0.378. This indicates that the motivation variable of learning has a positive relationship with numerical ability, which can be said the better the learning motivation, then the higher the level of numerical ability of students.

5. The influence of numerical ability variables on student learning achievement variables, based on data analysis and hypothesis testing conducted in this study, it is known that:

1) The numerical ability of students has an influence on the student's learning achievement where the t count score (7,682) > t table (1,986) so that the hypothesis is accepted.
2) It is known that the regression coefficient value for student numerical ability variables is positive at 0.886. This indicates that the variable numerical ability of the student has a positive relationship with the student's learning achievement, which can be said the higher the student's numerical ability, the better the level of student learning achievement.

6. The influence of conventional student learning variables on student learning achievement variables, based on data analysis and hypothesis testing conducted in this study, it is known that: Conventional learning of students has an influence on student learning achievement through the numerical ability of students where the t score is calculated (3,574) > t table (1,986) so that the hypothesis is accepted.

7. The influence of student learning motivation variables on student learning achievement variables, based on data analysis and hypothesis testing conducted in this study, it is known that: The motivation of student learning has an influence on student learning achievement through the numerical ability of students where the t score is calculated (3,603) > t table (1,986) so that the hypothesis is accepted.

ACKNOWLEDGMENTS

Based on the results of the Discussion and hypothesis testing I did, it can be summed up as follows.

1. There are differences in math learning outcomes between students who follow a realistic mathematical approach and students who follow conventional learning models. The results of studying student mathematics that follow a realistic mathematics approach are higher than the study results of students who follow conventional learning models. The qualifications of the results of studying mathematics that follow a realistic mathematical approach are at a very high category, while the study results of students who follow conventional learning models are at a high category.
2. There are differences in math learning outcomes between students who follow a realistic mathematical approach with a student who follows the kovariabel of controlled spatial ability.
3. There is a contribution of spatial ability to the results of studying mathematics students.

Based on the above findings it can beconcluded that the implementation of realistic mathematical approaches affects students' math learning outcomes both before and after being controlled.

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