Ability Solving Problem And Think Critical Mathematical Through
Problem based Flipped classroom Help Videos

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Abstract

This research examines about Ability Solving Problem And Think Critical Mathematics through learning models *Problem Based Flipped Classroom with* gender based video assistance .This research was conducted at SMP Negeri 29 Medan.This research is *quasi-experimental*and includes quantitative if research. The research subject is class IX-7 as a class experiment with amount student man 13 person And Woman 18 person, where as For class IX -5 as a class control with boys amount 15 person And Woman 16 person. Instrument Which used in study This is test ability solving problem and test mathematical critical thinking skills in the form of descriptions on congruence material and congruence. Results study show that ability problem solving and students' mathematical critical thinking skills have in creased after the implementation of learning using the *problem learning model based flipped classroom* with the help of learning videos. In learning, students become more motivated For Study. Response student to learning use *problem based flipped classroom* help videos very positive. Students become more enthusiastic in learning mathematics so that the model learning *problem based flipped classroom* help videos learning can made one alternative in learning mathematics in improving abilities problem solving ,critical thinking skills and motivation to learn mathematics when students.

Say Key: *Problem based Flipped classroom* ,Videos Learning, Ability Solving Problem, Ability Think Critical Mathematical

INTRODUCTION

Education is activity planned Which going on lifetime life and needed for man. Education No only happen in school ,but also can happen in family and society. Therefore, education is a shared responsibility between family, public and government. Without education, man will feel difficult and development progress something nation Also will slow down. By Because That, education must leads to the development of human beings who can develop, have quality and are competitive inside own character and morality Which tall.

According to La Hewi and Mu Shaleh (2020: 66) based on the Indonesian state PISA test Stillis a ton order lowin ability science, ability read and problem solving ability and mathematical critical thinking ability. Latest results from PISA 2018 show that still low level ability student–student Indonesia when compared to other countries. Of the 79 participating countries in PISA 2018, it is known Indonesia occupy position 10 bottom from country Which participate. Ability Mathematics with a score of 379 points and is in 73rd position. From the results from this we can see that the ability of Indonesian students to solve questions -questions that require the ability to analyze, give reasons and communicate the min a manner effective, as well as solve And interpret problem in variouss situation is still very lacking. By there fore it is necessary to make efforts to improve performance Indonesia in field mathematics, Wrong only one with increase ability solving problem and thinking ability critical mathematical student.

According to (NCTM, 2000) problem solving is important for the development of science mathematics. Bells, (1978) explain If solving problem mathematics Can make it easier for students to develop their abilities and help when applying ability in Lots circum stances. Butin fact, there is Lots student Which Still difficult for solve problem This. Not yet until maximum ability This Because characteristic abstract mathematics and its processes in class, namely the teacher only explains the material, provide examples because, as well as give question (Amr & Eternal ,2013).

According to Lester (Branca N. A, 1980), students must be proficient in solving problem. Lester emphasizes that problem solving is the essence of mathematics. So teachers should design their lessons to help students acquire these skills.where math problems are generally in the form of questions related to problems contextual. A question become problem student if his students This not own method the solution. This is in accordance with *problem-based flipped classroom* learning is Wrong One model learning Which can reduce capacity activity learning in the classroom by maximizing interaction with each other, namely the teacher, students and their environment so that learning is of higher quality and can improve ability think critical (Widyasarietal.,2021).

The problem-based flipped classroom model is a model that is centered on students in order to increase the effectiveness of learning (Damayanti &Sutama, 2016). Fund a mental features This model is by involving students before class starts, generally with assignments to read, watch videos, or analyze their activities (Lage, Platt &Treglia in Mc. Cullum, 2015) so that students are expected to have related concepts the material taught before being given problems in face-to-face classes. Student with understanding draft Which Good Of course will support ability solving the problem. This supported study (Luftiatuletal.,2021) Which state that *flipped classroom* learning model is effective in order to increase comprehension skills concepts and solving student problems. Besides that, according to Kusnandar (Fikri, 2019) *flipped classroom* is a teaching technique that changes the traditional teaching culture to in form media. For example, Teacher Which explain draft congruence and congruence on board write with learning normal resulted student tend bored. If we apply learning with *a problem based flipped classroom* it will renovating the learning system by recording lessons in video for mso that student can watch it returnin House.

With learning *problem based flipped classroom* i hope _can in crease *self confidence* and student learning out comes, because this model can increase interaction between educators and students and between students and students, time learning in class more effective And efficient, as well as increase ability Study in dependent and is an effective strategy used in maximizing student responsibility explore learning material online so that it supports motivation and interest in produce that understanding maximum (Fedistia&Musdi,2020).

METHODSTUDY

This research method is *a quasi- experimental* Which try for know There is nope difference Because influence "something" Which imposed on subject, that is "student". Type study here is study quantitative and the intended effect is to improve problem solving abilities and ability think critical mathematical from answer results student to ability test solving problem And test ability think critical students.

This study involved two classes that used different treatments. Use one class as the experimental class and the other as the control class. Second class It provides different treatment to determine critical thinking skills mathematics and students' problem solving abilities. The test given is a pre-test.research and post-research tests. The design of this study can be seen in the table below This.

Method study This design *Two Groups Pretest–Postest Design*

Group	Pretest	Treatment	Postest
Class Experiment	T1	X	T2
Class Control	T1	-	T2

Information:

T1:pretest given to class experiment And class control before treatment

T2:postest given to class experiment And class control after treatment

X :learning with *problem based flipped* assisted *classroom* tutorial video.

The sample in this study consisted of two classes, namely the experimental class and the experimental class control taken by *cluster random sampling technique* , namely the group sample technique Which taken in a mannerr and om (random).Matter This done Because ability all class assumed the same or homo geneous. In matter This, sample Which chosen is class IX-7 as Experimental class with 13 male students and female students as much 18 person Class experiment taught with use model learning *Problem Base Flipped Classroom* is assisted by videos while class IX-5 is used as a class control with 15 male students and 16 female students person. Class control taught with use learning normal.

The research procedure is to give a pretest to the sample in the experimental class as well as the control class to determine the ability of students of each class before applied *problem based flipped classroom* .Then the process is in class experiment given a *problem-based flipped classroom learning model* , while the control class still use learning normal. Then done test end to use measure ability each class especially class after use *problem based flipped classroom.* Research in strum entie question description pre test and post test as tool measuring ability. The problem solving test instrument was taken on the instrument that was carried out by (Pudin, 2016) namely 5 description questions. The test instrument has been valid and reliablet all so that with there by instrument proper used. Grill equestion in preparation of the instrument there is under This:

Table 1
Grille Question Solving Problem Mathematical

Indicator	Instrument	No. _grain Question
Inspect adequacy element And finish problem	Test Description	1
Look for alternative solutions and do it counting	Test Description	2
Inspect adequacy elements and formulate problem	Test Description	3
Carry out plan(finish calculation)	Test Description	4
Inspect truth answer	Test Description	5

The level of problem solving ability and mathematical thinking of a student indicated by their scores on the problem-solving ability test. The following is rating guidelines Which used refer son Arikunto (2013).

Table2
Qualification Guidelines Scoring

Mark	Qualification	Information
81–100	A	Verytall
61-80.99	B	Tall
41–60.99	C	Enough
21-40.99	D	Low
0–20.99	E	Verylow

Mark percentage Which obtained from calculation Then categorized as in accordance reluctantly table following.

Table3
Category percentage ability think critical

Score Average	Criteria
$0 < x \leq 43.75$	Very low
$43.75 < x \leq 62.50$	Low
$62.50 < x \leq 71.50$	Currently
$71.50 < x \leq 81.25$	Tall
$81.25 < x \leq 100$	Very Tall

(Normaya, 2015: 96)

Data study shaped data quantitative obtained _from results analyze answer student in whole question description Which given. Data quantitative analyzed in order to determine the increase in problem solving abilities and abilities think critical mathematical student with use calculation N-Gains. Criteria N-Gains there is under This:

Table4. Categories Score N-Gains

Mark Ngains	Category
>0.7	Tall
$0.3 \leq g \leq 0.7$	Currently
$g < 0.3$	Low

(Meltzer,2002)

Results And Discussion Study

From results analysis answer on Pretest And Post test question solving problem from 31 student summarized on table following:

Table5
Test results Ability Solution to problem in Class Experiment and Class Control

No	Criteria	Class Experiment		Class Control	
		Pretest	Posttest	Pretest	Posttest
1	Flat -flat	31.87097	83.16129	32.6129	66.6774
2	Standard Deviation	12,091	9,227	10.125	9,339
3	Mark maximum	55	100	55	85
4	Min value	5	5	5	40

Based on the table 5.is known that on class Which apply learning with video-assisted *flipped* classroom had an average of 31.87 before learning. Meanwhile, after learning, it increased to 83.16.Prior to learning, the test results were good for classes that applied learning with problems based flipped classroom and control class that apply regular learning mark completeness Study minimum.

For analyze interaction gender with ability solving problem can we'll see on chart under this:

Figure 1 The interaction of learning models with gender on ability solving problem mathematics. Based on image analysis 1 above can noticed that gender And model learning used in the
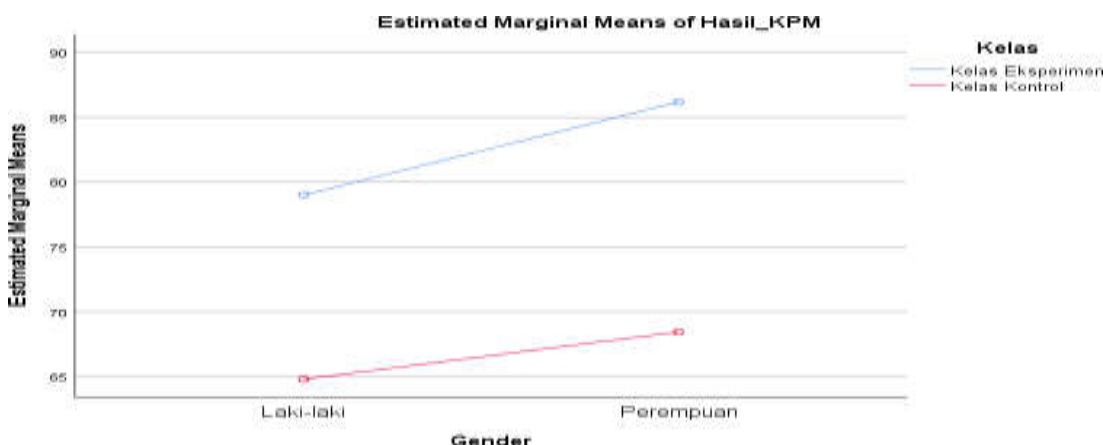
experimental and control classes did not interact withstudents' problem solving abilities. It means problem solving ability students only influenced by model learning Which used.

Tests of Between-Subjects Effects
Dependent Variables: Results_KPM

Source	Type III sum Of Squares	df	Means Square	F	Sig.
Corrected Model	4701.759 [a]	3	1567.253	19,420	.000
Intercepts	340327332	1	340327332	4216977	.000
Class	3896388	1	3896388	48,280	.000
Gender	446,138	1	446,138	5,528	022
Class* Gender	47,603	1	47,603	.590	.446
Error	4680838	58	80704		
Total	357383000	62			
Corrected Total	9382597	61			

a. R Square d=.501(Adjusted R Square d=.475)

Results Ability Test Think Critical Mathematical Student On Class Experiment And Control Class

Table 6
Results Ability Test Think Critical Mathematical Student On Experiment Class And Class Control

No	Criteria	Class Experiment		Class Control	
		Pretest	Posttest	Pretest	Posttest
1	Flat -flat	32.65	84.06	32,10	65,65

2	Standard Deviation	9,597	9.125	12.023	11,476
3	Mark maximum	55	100	55	85
4	Min value	5	55	5	40

Based on the table 6 noted that on class who apply learning with video-assisted *problem-based flipped classrooms* had an average of 32.65 before learning. Where as after study, increased become 84.06.

Prior to learning, the test results were good for classes that applied learning with *problems based flipped classroom* and control class that apply regular learning mark completeness Study minimum.
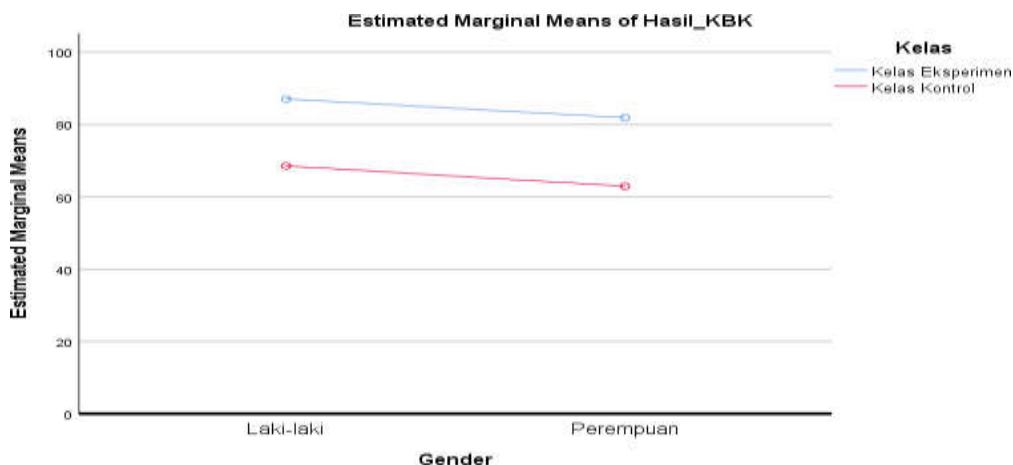

Figure 2 .The interaction of learning models with gender on thinking skills critical student mathematics.

In figure 2 in above it can be seen that gender with a learning model that used in the experimental and control classes did not interact with critical thinking skills student mathematics. This means that students' problem solving abilities are only influenced by model learning Which used.

Post Hoc Tests of Between-Subjects Effects

Dependent Variables: Results_KBK

Source	Type III Sum of Squares	df	Means Square	F	Sig.
Corrected Model	5704.322 [a]	3	1901,441	18,370	.000
Intercepts	344979.169	1	344979.169	3332926	.000
Class	5373.203	1	5373.203	51,912	.000
Gender	444,464	1	444,464	4,294	043
Class* Gender	.636	1	.636	006	.938
Error	6003372	58	103,506		
Total	359109000	62			
Corrected Total	11707694	61			

a.R Square d=.487 (Adjusted R Square d=.461)

Table7. Calculation Results of N-Gain Score for Problem Solving Ability

Referring to the N-Gain Value in percent (%) and the Descriptive output table above, so We can make a table test calculation results N-Gain score as follows:

	Class	N	Means	std.Deviation	d. Error Means
N_Gain_Score	Class Experiment	31	76.0123	11.89200	2.13587
	Class Control	31	50.1819	14.04531	2.52261

From the table above , it is known that the average value (Mean) of N-Gain_Percent for the Control Classis 50.1819 or if it is rounded up to 50.18%. So based on the tablethe category of interpretation of the effectiveness of the N-Gain value (%) above, it can be concluded that use model learning normal (on control class) not enough effective For improve problem solving skills in material mathematics subjects Congruence and congruence in class IX students of SMP Negeri 29 Medan Tahun Lesson 2022/2023. Based on statistical calculation son students' critical thinking skills it was found that the average N-Gain was 76.64% or in the high category, while the control class was found to have an average of 50.04. This shows if there is an increase in students' critical thinking skills after using model learning *problem based flipped classroom.*

Discussion

The pretest value of mathematical problem solving abilities was carried out for both classes sample that is experimental class and class control evenly–flat respectively–respectively class based on type gender ie on class student experiment man–man own flat –flat 44,605 while on average Woman 47,692. This data shows that the average value– average girl more big compared to the average value of men. In the control class, the average value of men is at pretest that is as big 45,769 and flat- flat female 44,736.DataThis show that mark average _ _man–man more big compared to with value flat–flat Woman.

Based on mark post test on class experiment, mark flat–flat man–man as big 81,518 Where more big than mark flat- flat women of 78.947.On control class mark flat–flat boy _ _69.03 and greater compared to with value flat–flat big girl 67.50. Mark average _ _whole post test class experiment that is 80 And mark post test class control that is 69,39 temporary te *calculated F* value > *F table* is 4.20 > 4.0 which indicates that there is a significant influence between model learning Which used to ability solving problem student. On table test ANAVA can also seen that value significance between learning and ability problem solving of 0.02 <0.05, meaning that there is a significant influence between learning with ability solving problem mathematics student.

Big influence can seen from big flat–flat second class Where difference flat–flat class experiment through pretest and post test more big than difference flat–flat class control. Mark the average of the experimental class with the learning model *problem based flipped classroom* video assisted increase from 45.85 to 80.0 with an increase of 74 percent, while the average– average control class with learning normal as big 45,15 become 68,125 with enhancement 50 percent .If seen based on enhancement flat -average ability solving problem student, influence learning with learning *Problem Base Flipped classroom* more Good rather than learning normal.

Results study This show that in learning mathematics new fangled *problem based flipped classroom* can increase ability student. *Problem-Based* Models *Flipped Classroom* helps students with heterogeneous student comprehension abilities. For students who have problems understanding the material can see the learning video again so that students' conceptual understanding can be formed. This is according to Purwanti's research (2015) if perception student on result learning become positive with videos learning. Matter This according to Johnson's opinion (Maolidah et al., 2017). In addition, Schultz (Julinar & Yusuf,2019) students also consider *the flipped learning* model to be more flexible in use time Study they. This confirm that *problem based flipped classroom* can become an alternative in teaching because it makes students more in dependent in learning. Students who get *problem based flipped classroom learning* produce think krtits mathematical And motivation Study Which more Good compared

use ordinary learning. These results are also in accordance with the research hypothesis, that there is the effect of *problem-based flipped classroom* learning on improving abilities solving problem and think critical mathematical (Widyasarietal.,2021).

According to Betty Love (Alfina et al., 2021) stated that, " *Flipped Classroom*is a new learning paradigm which was originally in the form of screen casts, video recordings learning that allows students to learn outside the classroom, while in the classroom used For activity *active Learning, Problem based Learning* (PBL) And Practice learning ".Based on opinion para expertin on, researcher con clude that *Problem based Flipped classroom*is something model learning Which used For minimize instruction with the teacher and maximize one-on-one interaction because of this model teach students to be more active in independent learning because the material will be studied at home and task will done in class.

Conclusion

From the results research can in the knot that if _use model learning *problem based flipped classroom*in a manner can significantly improve students' ability to solve problems and think mathematical critical. The benefits of this research are conveyed that to improve can use the learning model thus *problem based flipped classroom*it can be rightas an alternative for learning Which can improve understanding problem solving and students' mathematical critical thinking.

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