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THE EFFECT OF PROBLEM BASED INSTRUCTION MODEL USING TELEGRAM QUIZ BOT ON STUDENTS' LEARNING MOTIVATION

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ABSTRACT

This research is a quantitative research with the quasi experimental research type. The population in this study were all Semester V students of the Mathematics Education Department (TMTK) IAIN Kerinci and the samples were 30 students of VA class through purposive sampling technique. Data collection techniques used in this study were observation sheets and questionnaires. The purpose of this study was to find out how the application of the Problem Based Instruction (PBI) learning model using Telegram Quiz Bot, to find out how the students' mathematics learning motivation, and to find out how the relationship between the PBI learning model using the Telegram Quiz Bot and the students' mathematics learning motivation. The findings show that the use of the PBI learning model using Telegram Quiz Bot in the VA class obtained an average value of 3.1 which is included in the "Good" category. The mathematics learning motivation before applying the PBI learning model using Telegram Quiz Bot has an average value of 57.30 so that it is included in the "less good" category and the results for the average value of the mathematics learning motivation after applying the PBI learning model using Telegram Quiz Bot is 81.33 in the "very good" category. There is a significant effect between the application of the PBI learning model using Telegram Quiz Bot and students' mathematics learning motivation in the VA class of 0.607 which is included in the "strong" category.
Keywords: Problem Based Instruction, Telegram Quiz Bot, Mathematics' Learning Motivation

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PRELIMINARY

In the era of globalization, lecturers must realize that technology existing resources must be utilized to help the growth of student's learning motivation especially in mathematics. According to (Nasution et al, 2021), students who have a positive motivation will be have a strong sense of confidence and feel challenged to solve problems though they are not well-mastered. The fact is motivation learning in mathematics learning in Indonesian education is still not enough. This is proven by the results of the rating rating

from the Programme for International Student Assessment (PISA) in 2018, which stated Indonesia is ranked 72nd out of 78 countries (Schleicher, 2019).

The field report show that the learning mathematics are not so encouraging. The results of the author's observations while being a lecturer in the Capita Selecta Mathematics course showed that students were not enthusiastic during lectures. During the face to face learning, the lectures only use conventional learning model. The students looked unenthusiastic. Lectures are boring because they repeat material that has been taught in high school. Later we were using the Whatsapp application as a lecture aid during the online lectures. The assignments given are not immediately checked on the same day. In fact, the value of a learner achievement can be considered as motivation indirectly to other learners because motivation is considered a the driving force that exists within oneself to be able to learn. As disclosed Mc. Donal (in Sardiman, 2020), motivation is change energy in a person which is marked by the appearance of "feeling" and preceded by a response to the existence of a goal.

The recent study by in Azizah & Fadlikah (2023) said that at the moment to solve math problem, students not enough motivated for solve it. Sodikin (2022) said that the two factors, namely the motivational factors of students (internal factors) and the learning model factors used by teachers (external factors), can overcome the lowerness of students achieve problems. By giving good motivation to students before learning and using appropriate learning, it is hoped that students can learn mathematics more actively and fun.

To overcome the existing problems about the lowerness of our students' motivation, the lecturer as a researcher must take the main step to determine the suitable learning model and an appropriate tools. The use of mixed learning or a hybrid learning is very suitable for the learning styles of the millennial generation and z-generation, and provides opportunities for students to take advantage of the use of information technology to conduct big data-based information searches (Nasution & Siregar, 2019). A suitable application of a learning model and tools that will increase the students' mathematics learning motivation. Nasution, Gunawan & Yulia (2019) said that the Problem Based Instruction model is expected to be able to grow up the classroom atmosphere, more fun, increase the cooperative activities in groups and motivate students to participate in the class actively. Then Siregar (2021) said that the Telegram Quiz Bot is an attractive choice for teachers to facilitate teaching and learning activities to give a positive impact on student motivation. So, we decided to apply the Problem Based Instruction (PBI) learning

model with using the application of the Telegram's Quiz Bot in order to help our students' motivation in learning mathematics on the Capita Selecta Mathematics Course.

The Problem Based Instruction model is one of the learning models that is able to help students to be able to think critically because in the Problem Based Instruction learning model, the lecturer only gives instructions to students to solve a problem. As Al-Tabany (2017) says that Problem Based Instruction is a learning in which students solve real problems so that students can develop their own knowledge, develop skills, and develop a higher self-confidence. The lecturer guides students to describe the stages of problem solving and provides examples of the use of skills and strategies needed so that assignments can be completed then the lecturer creates a class atmosphere that is flexible and oriented towards inquiry efforts by students (Yulia, Gunawan & Nasution, 2020). Al-Tabany (2017) said the learning steps using the Problem Based Instruction model is student orientation, organizing students to study, guiding individual as well as group investigations, develop and present the work and analyze and evaluate the problem-solving process.

The Telegram Quiz Bot is an application feature provided by Telegram. While lecture materials provided foundational factual knowledge, the examination questions placed in Telegram Quiz Bot. The questions may required higher-order thinking from students. The quiz has one correct answer and an optional explanation which makes it ideal for educational purposes. Recent studies found that the Telegram Quiz Bot can improve students' outcomes (Ahmadin, Palenewen & Akhmad, 2021; Rasiban, 2021; Muniroh, Rizdania & Aisyah, 2022; Pratama & Prastyaningrum, 2019; Pereira, 2016). Alcayde-Garcia et. al (2019) showed their study result of the immediate understanding or attentiveness of the teacher's explanation through the Telegram Quiz Bot. The Systemic literature reviewed by Citrawati (2021) found that the Telegram Quiz Bot positively contributed to creating an enjoyable and stress-free learning environment for promoting students' motivation. According to Hidayat et al. (2021), using the help of Quiz Bot Telegram on the Problem Based Instruction learning model is considered to help teachers in correcting assigned task and was able to save time because it already saved one answer correctly about the quiz that will be tested, as well as on the Quiz Bot application there are statistical results of the order of assessment seen from the time of processing the questions and the results of the value of the answers given by the lecturer.

The existing problems encouraging researchers to conducted a research about the effect of Problem Based Instruction learning using Telegram Quiz Bot on the students' learning motivation in Mathematics.

METHODS

The purpose of this study was to find out how the application of the Problem Based Instruction (PBI) learning model using Telegram Quiz Bot through the students' mathematics learning motivation, to find out how the the students' mathematics learning motivation and to find out how the relationship between the PBI learning model using the Telegram Quiz Bot and the students' mathematics learning motivation.

There are several steps in using the Telegram Quiz Bot: open the Telegram application on the device, type @quizbot in the Telegram Search, select and click the Quiz Bot, then press 'START' and then follow the directions (Hidayat, et al, 2021). The researcher as the lecturer designed test questions on the Telegram Quiz Bot that would be given to the students. First, we click the 'Create New Quiz' button, write the quiz title in quotation marks, click the send icon, type skip and click submit, click the square icon to display the Create Question button, click the Create Question button to create a quiz, type a question, enter the answer choices, click Add an Option to add answers, choose the right answer and click create, click the Create Question button to create another question then follow the previous steps. To finish creating the quiz, we click done, then choose a time limit for answering quizzes, randomized question and answer choices, and the quiz is ready to be distributed to students. After receiving the quizziz link from the lecturer, the students click the link then the device will immediately connect to Telegram's Quis Bot. Students solve the test questions according to the instructions on the Telegram Quiz Bot, including the number of possible answer choices and the working time limit on the test.

This research is a quantitative research with the quasi experimental research type. Quantitative research is a research with the data obtained in the form of numbers and analysis using statistics (Sugiyono, 2012). Ruseffendi (in Nasution, 2017) stated that in the quasi experiment research, the subjects were not randomly grouped, but the researchers accepted the condition of the subjects as they were. The location of this research was the Department of Mathematics Education (TMTK), State Islamic Institute (IAIN) Kerinci.

The population in this study were all Semester V students of the TMTK IAIN Kerinci. So we used the purposive sampling technique. The samples were 30 students of VA class who was being taking the Capita Selecta Mathematics course that taught by the

reasearcher as the lecturer. The university students are still need Telegram Quiz Bot because according to Aladsani (2021), the students' perceptions of Telegram as a technology to enhance their course interactions, including the advantages and disadvantages of using Telegram in their course. The developed software (Telegram Quiz Bot) is cheap (free) and flexible to implement since the university students usually have Smartphones, then it offers an interactive experience while encouraging the collaboration in the classroom preserving the anonymity of the student, this offers a greatest integration and participation (Alcayde et.al, 2017). It was easier for lecturers to give a simple test at the beginning of the meeting (Parlika & Pratama, 2020) Next, Ong et. al. (2021) said that the Quiz Bot aimed to supplement the learning of environmental concepts at the university level. Futhermore, the Telegram Quiz Bot as e-learning materials can increase the motivation of PGRI Wiranegara University Pasuruan students (Aisyah, Istiqomah & Muchlisin, 2021).

The research design used in this research is one group pretest-posttest design. The one group pretest-posttest design is described in Figure 1 below:

T_1 X T_2

Figure 1. The One Group Pretest-Postest Design

Note:

T_1 : Initial questionnaire before treatment

X : Treatment

T_2 : Final questionnaire before treatment

The lecturer as researcher gave an initial mathematics learning motivation questionnaire (T_1) for all students to find out the initial conditions about their mathematics learning motivation. After being given the initial questionnaire, the researcher gave treatment (X) with implement the Problem Based Instruction learning model used the Telegram Quiz Bot in the VA Class during the learning activities. The final step is the lecturer gave a final mathematics learning motivation questionnaire (T_2) for all students to find out the final conditions about their mathematics learning motivation after the treatment. This results then compared with the initial mathematics learning motivation questionnaire data to determine the effect of Problem Based Instruction learning model treatment on the students' mathematical learning motivation.

The independent variable in this research is the Problem Based Instruction learning model using the Telegram Quiz Bot then the dependent variable is mathematical learning motivation. Data collection techniques used in this study were observation sheets and questionnaires. The observations sheet were made to determine the accuracy of the implementation of Problem Based Instruction learning model using Telegram Quiz Bot Telegram. The observation sheet used in this study was compiled based on indicators of PBI learning model using Telegram Quiz Bot. The lecturer as the researcher consider to reduce the research bias regarding the occurrence of differences in the learning treatment that will be applied. During the research, researchers were assisted by research partners as the observer who filled out the likert scale in the observation sheet. The criteria for the Problem Based Instruction learning models using Telegram Quiz Bot category (Arikunto, 2013) based on the observation sheet data is present in Table 1 below:

Table 1. The Criteria for The PBI Learning Model Using Telegram Quiz Bot

Score	Interpretation
3,26 – 4,00	Very Good
2,51 – 3,25	Good
1,76 – 2,50	Enough
1,00 – 1,75	Less

The questionnaire used in this study was compiled based on indicators of learning motivation: (1) diligent in facing tasks; (2) tenacious facing difficulties; (3) show an interest in various problems; (4) prefer to work independently; (5) bored with subject matter and routine assignments; (6) defending his opinion; (7) not easy to let go of things you believe in; and (8) enjoys finding and solving problems (Sardiman, 2020). The questionnaire was structured using likert scale that filled out by the students. The criteria for the students' mathematical motivation category (Syah, 2007) based on the questionnaire data is present in Table 2 below:

Table 2. The Criteria for The Students' Mathematical Motivation

Score	Interpretation
80 – 100	Very Good
70 – 79	Good
60 – 69	Enough
50 - 59	Bad
0 - 49	Fail

The experts in mathematics education analyzed the questionnaire validity, they are Dr. Pardomuan Sitompul, M.Si and Dr. Selvia Erita, M.Pd. Based on the calculation of the validity analysis through the mathematical learning motivation questionnaire obtain 30 valid statements. We use the Cronbach Alpha for the questionnaire realibility test that

obtain 0.766 which means high reliability. Therefore the questionnaire can be used as the data collection tool according to the validity and reability analysis. This research hypothesis is there is the effect of Problem Based Instruction learning model using Telegram Quiz Bot through the students' learning motivation on mathematics

RESULT AND DISCUSSION

The analysis of lecture activities in implementing Problem Based Instruction model using Telegram Quiz Bot obtain from the observation sheet data. The observation sheet data is present in Table 3 below:

Table 3. The Data of Observation Sheet

Learning Steps	Score	Category
Student orientation	3,5	Very Good
Organizing students to study	3,5	Very Good
Guiding individual as well as group investigations	3,1	Good
Develop and present the work	3,3	Very Good
Analyze and evaluate the problem-solving process	2,1	Enough
Average	3,1	**Good**

According to Table 3, the implementation of the Problem Based Instruction learning model using Quiz Bot Telegram in the first and second indicators reach 3,5 score. It means the student orientation and the way to organize the students for studying has been carried out in a very good way. The implementation of the Problem Based Instruction learning model using Quiz Bot Telegram in the third indicators reach 3,1 score. It means the lecturer way for guiding individual as well as group investigations has been carried out in a good way. The implementation of the Problem Based Instruction learning model using Quiz Bot Telegram in the fourth indicators reach 3,3 score. It means the way to develop and present the work has been carried out in a very good way. The implementation of the Problem Based Instruction learning model using Quiz Bot Telegram in the last indicators reach 3,5 score. It means the analyzing and evaluating the problem-solving process has been carried out just in a enough category.

According to Table 3, the average score obtain 3,1 which is included in the "Good" category based on the assessment criteria in Table 1. Therefore we can conclude that the implementation of the Problem Based Instruction learning model using Quiz Bot Telegram in this study has been carried out the appropriate learning steps.

The explanation above shows that the Problem Based Instruction learning model using Telegram Quiz Bot Telegram generally has been well carried out the accordance learning steps of Problem Based Instruction learning model.

The data obtain from the initial and final questionnaire contain mean, median, mode, standard deviation, minimum score and maximum score present in Table 4 below:

Table 4. Statistical Description of Questionnaire Data about Students' Motivation

Data	Initial Questionnaire	Final Questionnaire
Mean	57,3	81,33
Median	57,5	81,5
Mode	53	82
Std. Dev	4,103	6,504
Min	51	70
Max	66	93
Category	**Bad**	**Very Good**

According to Table 4, the mean score of initial questionnaire is 57,3 in the bad category while the mean score of final questionnaire is 81,33 in the very good category. It means that there is the improvement of students' mathematical motivation learning after implement Problem Based Instruction learning model using Telegram Quiz Bot.

Before testing the research hypothesis i.e. there is an effect of Problem Based Instruction learning model Telegram Quiz Bot on the students' mathematical motivation learning, we analyzed the normality test first as the prerequisite test. The Normality test aims to find out whether the scatter of the data that obtained in this study is normally distributed or not The normality test results was obtained by using the help of the SPSS 22 with the One Sample Komogorov Smirnov formula. The normality test result of the initial and final questionnaires is presented in the Table 5 below:

Table 5. The Normality Test Results

Asymp. Sig. (2-tailed)	Initial Questionnaire	Final Questionnaire
α	0,072	0,200
Category	**Normal**	**Normal**

Based on the Table 5 above, the normality test result of the initial questionnaire was obtained 0.072 which means it is greater than 0.05 then it can be concluded that the initial questionnaire data was normally distributed. The normality test result of the final questionnaire was obtained 0.200 which means greater than 0.05, then it can be concluded that the final questionnaire data was normally distributed. All data is normally distributed, next we continued with the population homogeneity test.

The homogeneity test aims to determine the variance of the population before and after implement the Problem Based Instruction learning model using Telegram Quiz Bot. The homogeneity test of the initial and final questionnaire values were processed using the SPSS 22 program at One Way Anova. The homogenity test result of the questionnaires data is presented in the Table 6 below:

Table 6. The Homogenity Test Results

Levene Statistic	df1	df2	Sig.
3.101	1	58	0.084

Based on the Table 6 above, the homogenity test result obtain the significant valus is 0,084 which means it is greater than 0.05 then it can be concluded that the sample was come from the homogeneous population. Because of the data was normally distributed and the sample was come from the homogeneous population, therefore we use the parametric statistics to analyze the hypothesis test.

The hypothesis testing aims to find out whether the research hypothesis can be accepted or rejected about there is an effect of Problem Based Instruction learning model Telegram Quiz Bot on the students' mathematical motivation learning. The hypothesis test were processed using the SPSS 22 program with t-test. The t-test result is presented in the Table 7 below:

Table 7. The t-Test Results

t	df	Sig. (2-tailed)	Decision
-25.497	29	0,000	Rejected H_0

Based on the Table 7 above, the significant 2-tailed value obtain 0,000 which means it is greater than 0.05 then it can be concluded that reject H_0 . Rejected H_0 means there is an effect of Problem Based Instruction learning model Telegram Quiz Bot on the students' mathematical motivation learning.

To find out the relationship strength between the effect of Problem Based Instruction learning model using Telegram Bot Quiz and the students' mathematical motivation learning, we used the correlation coefficient test. Level of Closeness Relationship between Variables is presented in the Table 8 below:

Table 8. Level of The Relationship Between Variables

Correlation Coefficient	Interpretation
$0,00 \leq r_{xy} < 0,20$	Very Weak
$0,20 \leq r_{xy} < 0,40$	Weak

$0,40 \leq r_{xy} < 0,60$	Enough
$0,60 \leq r_{xy} < 0,80$	Strong
$0,80 \leq r_{xy} < 1,00$	Very Strong

The correlation coefficient test were processed using the SPSS 22 program. The correlation coeficient-test result is presented in the Table 9 below:

Table 9. The Correlation Coefficient Test Results

		X	Y
X	Pearson Correlation	1	0.609**
	Sig. (2-tailed		0.000
	N	30	30
Y	Pearson Correlation	0.609**	1
	Sig. (2-tailed	0.000	
	N	30	30

**. Correlation is significant at the 0.01 level (2-tailed)

Based on the Table 9 above, the correlation coefficient value obtain 0,609 in a strong category (Table 8 based). We can conclude the the effect of Problem Based Instruction learning model using Telegram Quiz Bot on the students' mathematical motivation learning has a strong relationship. The use of Telegram Quiz Bot in Problem Based Instruction learning model in this study was aplicated in the fifth learning steps, i.e. analyze and evaluate the problem-solving process. During the learning process with PBI Model, the use of Telegram Quiz Bot can motivate the students during the explanation and reflect on the correct answer once the lecturer has solved it. This allows for complete feedback between lecturer and student. This free tool was being installed in the mobile phones of the students of the subject and allowed the teacher to ask questions in class regarding the explanation given, both true or false and multi-response, which were answered in class by the students immediately. And from the point of view of the use of new technologies, it is introducing the student to a world in constant technological evolution. It has been verified that student satisfaction with the tool is very satisfactory (García, et al, 2022). The using of Telegram Quiz Bot with Problem Based Instruction learning model make the learning process *was more interactive and engaging then the feedback was also motivating.* (Ruan, et al, 2019) suggest that educational chatbot systems may have beneficial use, particularly for learning outside of traditional settings.

The strong effect between the Problem Based Instruction learning model using Quiz Bot Telegram on students' mathematical learning motivation is because the Problem Based

Instruction learning model contains many indicators that can generate the learning motivation. Futhermore, the use of Telegram Quiz Bot can improve the students' mathematical learning motivation. The Students' Quiz Bot Telegram result show in the Figure 2 below:

Figure 2. The Students' Telegram Quiz Bot Results

According to the Figure 2 above, we can conclude that most of students can solve the problem quickly and currently. We gave five minutes for the students to solve each problems or we gave maximum 25 minutes for them to solve all the five problems. But Figure 2 show that they can solve all the problem less than 10 minutes. It seems that the students were being motivated when using the Telegram Quiz Bot.

As the recent study by Anggis (2017), the result obtain that there is an improvement of students' motivation after the implementation of the Problem Based Instruction learning model. Then the study by Murtopo & Sutarni (2017) obtain that there was the improvement of students' learning motivation occur in each indicators when applied the Problem Based Instruction learning model. Based on the prior researches we can conclude that the results of this study was relevant or parallel with another prior researches.

The implement of Problem Based Instruction learning model using Telegram Quiz Bot was also relevant with the Ausubel Learning Theory about meaningful learning. The use of Telegram Quiz Bot in learning process will remain in the students long term memory. Nasution (2016) said that Ausubel's learning theory aims to create meaningful learning to students. The Telegram Quiz Bot can trigger the students' memory because it can arouse the students' curiosity through this more interesting learning strategy so it can improve the students' learning motivation. Mohan et al (2021) has been found a significantly increase of the students' motivation through the Quiz Bot that provided a competitive platform which motivated them to learn better.

CONCLUSION

Based on the research and discussion results, it can be conclude about the research questions. The implementation of the Problem Based Instruction learning model using Quiz Bot Telegram in this study has been carried out the appropriate learning steps according to the average score that obtain 3,1 which is included in the "Good" category. The mean score of initial questionnaire is 57,3 in the bad category while the mean score of final questionnaire is 81,33 in the very good category, it means that there is the improvement of students' mathematical motivation learning after using Problem Based Instruction learning model using Telegram Quiz Bot. The effect of Problem Based Instruction learning model Telegram Quiz Bot on the students' mathematical motivation learning has a strong relationship according to the correlation coefficient value that obtain 0,609 in a strong category.

This research is limited to the effect of Problem Based Instruction learning model using the Quiz Bot Telegram on students' mathematical motivation learning at the Capita Selecta Mathematics course. This research implements the combination of Problem Based Instruction learning model and Telegram Quiz Bot. We recommend the next researcher to combine the implementation of Problem Based Instruction learning model with another Quizzez application in order to improve another students' mathematical abilites. This research can be continued by developing learning media using the Telegram Quiz Bot based on the Problem Based Instruction Learning Model steps with using Research and Development (R&D) method.

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