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53

INVESTIGATION OF PROBLEM BASED LEARNING: PROCESS OF UNDERSTANDING THE CONCEPTS AND INDEPENDENCE LEARNING ON RESEARCH STATISTICS SUBJECT

Ediansyah¹, Dwi Agus Kurniawan^{2*}, Salamah³, Rahmat Perdana⁴

^{1,3}Department Madrasah Ibtidaiyah Teacher Education, Bengkulu State Islamic Institute, Indonesia

^{2,4}Physics Education Program, Universitas Jambi, Indonesia

Email: *dwiagus.k@unja.ac.id

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Abstract

59

Purpose of the study: The purpose of this study is to investigate the process from which students understand the concepts of research statistics and learning independence on the subject of research statistics. And their relationship between understanding the concept with independence and PBL learning models

Methodology: This research was conducted at Madrasah Ibtidaiyah Teacher Education (Primary Teacher Education/PGMI) State Islamic Institute (IAIN) Bengkulu in which the samples used were students of 6 semester and students of 8 semesters. The research method was qualitative and quantitative with correlational research design, with total samples 295 with total sampling. The research instruments were by using independence questionnaires and multiple-choice questions. The data were analyzed by using simple regression analysis.

Main Findings: Problem Based Learning (PBL) has a significant relationship with the understanding concept research statistical subject and learning independence.

Implication/Applications of this study: Understanding the statistical concepts of research. Because the statistical theory is useful in completing a student's final project (essay) it would be helpful for students to use this model to study of research statistics.

Novelty/Originality of this study: No study has been done so far on this sample.

Keywords: *Problem-Based Learning, Learning Independence, Ability of Research Statistical Concept, Correlational research design.*

INTRODUCTION

Seeing the importance of lecturers' role in training students' thinking skills, teaching strategies are needed in research statistics. [Guncaga, Zawadowski & Prodrumou \(2019\)](#); [Astalini et al \(2019\)](#) Identify the stages in acquiring knowledge, namely as follows: motivation, isolated models, generic models, abstract knowledge and crystallization. The concepts of learning and teaching held by teachers may be of interest to teachers, students, and educational institutions. Because the teacher's conception is not entirely the result of conscious decisions but can encourage them to reflect deeply can trigger a good response for students who can produce modifications of the conception ([Ho et al. 2001](#); [Mahasneh, 2018](#); [Asrial et al. 2019](#)). The statistic itself has a definition of science that studies how to plan, collect, analyze, interpret, and present ([Pfannkuch, 2018](#)). This statistical course plays an important role in daily life and according to Reston (2014) the role of statistics is fulfill needs through solving contextual problems which relevant to real life. However, in fact, the Students of the Madrasah Ibtidaiyah Teacher Education (PGMI) at the Bengkulu State Islamic Institute (IAIN Bengkulu) still categorized statistics course was difficult thing to understand. Students dislike statistical courses because they have to be involved with the many formulas and numbers that must be calculated. In addition, the low interest of students to take statistics courses can be seen from the theory given by the lecturer.

Excellent ability of students 'statistical concepts can be in the form of students' ability to process and analyze data, such as the ability to analyze descriptive statistical data and inferential statistics. Descriptive statistics are reporting trends and variations of data centers so as to provide information that can facilitate understanding of the results of the data obtained ([Creswell, 2012](#)). The results can be in the form of the mean, median, mode, standard deviation, minimum value, maximum value, quartile, and are presented in the form of pie charts or data tables. Based on the explanation of understanding statistical concepts, it seems that the importance of students to be able to master this subject is to facilitate the completion of thesis. The final task is scientific work made by students as a prerequisite for achieving academic degree. Based on the [Republic of Indonesia Minister of Research, Technology and Higher Education Regulation Number 44 of 2015](#) concerning National Standards of Higher Education Article 46 Paragraphs 1, 2, and 3 states that: (1) Standard research process is requirements of research activities consists of planning, implementation, and reporting. (2) Research activities as referred to in paragraph (1) are activities that fulfill scientific principles and methods systematically in accordance with the autonomy of science and academic culture. (3) Research activities must consider quality standards, occupational safety, health, comfort, and safety of researchers, the community, and the environment.



Efforts to overcome the difficulties of students in statistical courses are needed to be creative and innovative learning. This learning should be done by lecturers as an effort to have active and creative students in solving problems both for student thesis and in daily life (Sofanudin, 2016). Kunnari (2014); Darmaji, Kurniawan, & Irdianti (2019) educational innovation is an idea, item, method, which is felt or observed as a new thing for the results of a person or group of people (society), either in the form of inverse (new discovery) or discovery (new people find), which is used to achieve educational goals or to solve. Rabgay (2018) argues that teachers need to use innovative and interactive teaching techniques to bring improvements in the teaching process. In order to improve the quality of education to produce graduates who are creative and able to face life in the future, innovation is needed, one of which is using the Problem Based Learning (PBL) learning model.

Problem-based learning (PBL) is a teaching and learning strategy designed to involve students in solving real-world problems (Vandenhouten 2017). PBL is a learning model that can improve students' critical thinking skills with procedural problem-solving activities. The results suggest for further research by providing more systematic activities, so that students can remember problems in solving their critical thinking (Rusmansyah, 2018). Problem-based learning is a teaching method and an educational philosophy in which problem-solving is a mechanism that allows students to learn. Students work independently and in small groups to gain knowledge through problem-solving (Gillette, 2017). Problem-solving skills refer to the ability of students to investigate solutions to a given problem or find a way to realize a given goal (Zhong et al., 2010). Creative thinking is needed to generate ideas to solve problems and find new approaches. Problem Based Learning can foster a student's independent learning culture (Pichaijuk, & Luksaneeyanawin, 2015). Meanwhile, teamwork is often a key component to solving problems and problem-based learning in particular also has a very close relationship with how students are independent in learning (Winarno et al, 2018).

Independent learning is focused on the principle that learning is an active and constructive process, research has investigated ways in which learners can control their own learning processes (Bramucci, 2013). This might include group learning situations where activities can be collaborative and the same individual learning outcomes but each activity is achieved independently (Welikala & Watkins, 2008). Independent learning need not be seen only in terms of learning in the form of 'isolation' but also in the student community. The same is the case with research statistics. Independence is needed by students in understanding, analyzing problems given by lecturers. Pintrich (2000) that efforts to monitor and control learning independently through various cognitive adaptive, motivational, or basically positive behavioral management strategies for learning and achieving learning goals. Schraw, et al (2006) that learning independence regulates the ability of students to understand and control their learning environment. Independence in learning will lead to an independent attitude towards students. This has been seen as one of the important elements of 'personalized learning' and is essential for the continued development of a school education system that promotes high-quality life long learning and social equality especially for college students (Meyer, 2010). Therefore, independence is a good activity for students, because through directed independence, especially in research statistics, the lecture process and outcome of learning will be better.

Learning innovation using PBL that is applied to the statistical subject of this research will be useful in the future as a provision for students to be able to work independently in solving problems especially in the thesis. In addition, one of the aims of education, especially for higher education institutions, is to equip students to achieve independent learning. Students can solve problems by being given freedom in teaching and organize their own learning processes (Jitsoonthornchaikul, 2014).

Therefore, this study is intended to determine the problem-based learning has an impact, understanding concept of research statistics and independence of study in the Madrasah Ibtidaiyah Teacher Education (PGMI) at the Bengkulu State Islamic Institute (IAIN Bengkulu). The objectives of the study are as follow:

1. How is the understanding of research statistics by students of Madrasah Ibtidaiyah Teacher Education (PGMI) at the Bengkulu State Islamic Institute (IAIN Bengkulu)?
2. What is the learning independence of the Madrasah Ibtidaiyah Teacher Education students at the Bengkulu State Islamic Institute (IAIN Bengkulu)?
3. How do students respond when teaching statistics lecturers use the *problem based learning* (PBL) model?
4. Is there a relationship between the use of PBL, understanding concept and independence learning in students of the Madrasah Ibtidaiyah Teacher Education (PGMI) at the Bengkulu State Islamic Institute (IAIN Bengkulu)?

LITERATURE REVIEW

Statistics is a way to learn about the way students are faced with building and facilitating statistical models and is very integrated with data samples, probabilistic models, contexts, and inferential in environmental learning that improves technology (Pfannkuch, 2018). Statistics itself has a science resolution that discusses how to collect, collect, analyze,



interpret, and present. Statistical mastery of students' ability to process and analyze data, such as the ability to analyze statistical, descriptive data, and inferential statistics (Kerlinger, 2014).

Essay made by students is a research report carried out on a phenomenon or problem in a particular field of science, based on theories and appropriate disciplines in each college (Schraw, Crippen, & Hartley, 2006). Write Statistic is one of the compulsory subjects that must be taken by a student as one of the graduation requirements to get an academic degree (Aslinawati & Mintarti, 2017). This is in accordance with the opinion of Ningsih (2016) who said that all students must take thesis courses because the thesis is used as one of the prerequisites for students to obtain a bachelor's degree. In addition, thesis writing provides an opportunity for students to train themselves in expressing and solving independent and scientific problems.

62 Problem-based learning (PBL) is a teaching and learning strategy designed to involve students in solving real-world problems (Vandenhouten 2017). PBL is a learning model that can improve students' critical thinking skills with procedural problem-solving activities. The results suggest for further research by providing more systematic activities, so that students can remember problems in solving their critical thinking (Rusmansyah, 2018). Problem-based learning is a teaching method and an educational philosophy in which problem-solving is a mechanism that allows students to learn. Students work independently and in small groups to gain knowledge through problem-solving (Gillette, 2017). Problem-solving skills refer to the ability of students to investigate solutions to a given problem or find a way to realize a given goal (Zhong et al., 2010). Creative thinking is needed to generate ideas to solve problems and find new approaches. Problem Based Learning can foster a student's independent learning culture (Pichai luk, & Luksaneeayanawin, 2015). Meanwhile, teamwork is often a key component to solving problems (Winarno et al, 2018). Therefore the problem-based learning model has a good impact on learning. Based on the understanding of PBL itself, problem-based learning in particular also has a very close relationship with how students are independent in learning.

4 Independent learning is a theory and field of research on self-regulated school learning that emerged in the mid-1980s. (Bramucci, 2013) focuses on the principle that learning is an active and constructive process, research has investigated ways in which learners can control their own learning processes. This might include group learning situations where activities can be collaborative and the same individual learning outcomes but each activity is achieved independently (Welikala & Watkins, 2008). Based on this, independent learning need not be seen only in terms of learning in the form of 'isolation' but also in the student community. The same is the case with research statistics. Independence is needed by students in understanding, analyzing problems given by lecturers. In line with what was expressed by Pintrich (2000) that efforts to monitor and control learning independently through various cognitive adaptive, motivational, or basically positive behavioral management strategies for learning and achieving learning goals. Nowadays students are required to access knowledge and figure it independently (Tezer, Kan & Bas, 2019). Schraw, et al (2006) states that learning independence regulates the ability of students to understand and control their learning environment. Independence in learning will lead to an independent attitude towards students. This has been seen as one of the important elements of 'personalized learning' and is essential for the continued development of a school education system that promotes high-quality life long learning and social equality especially for college students (Meyer, 2010). Therefore, independence is a good activity for students, because through directed independence, especially in research statistics, the lecture process and outcome of learning will be better.

Hypothesis

The problem-based learning model of learning can make students master the statistical research subjects that will later make these students have the independence to do the final project (essay).

METHODOLOGY

Research design

This research uses descriptive research methods, in the context of the main purpose of the picture using words and numbers and presenticohennng profiles, classification of types, and outlining steps to answer questions such as who, when, where and how (Neuman, 2014) and knowing independence of student learning in statistics courses, then look at the effect of problem based learning (PBL) on the statistical concept of student understanding in research and independent learning of Madrasah Ibtidaiyah Teacher Education (PGMI) Bengkulu State Islamic Institute of Religion (IAIN), and the relationship between PBL learning models understanding concepts research statistics and learning independence using Quantitative research methods with a correlational research design. Associative quantitative research is a relationship between two or more variables (Neuman, 2014). Because research is associative research, the researcher takes a correlational research design. According to (Kerlinger, 2014) "Correlation Design in quantitative research that is used to measure the degree of association (relationship) between two variables using statistical analysis correlation procedures". As well as seeing whether or not there is a relationship between these variables using product person moment correlation because it can measure the degree of association (relationship) of two variables or more than two variables (Kerlinger, 2014).

Research sample

The population in this research that semester students 6 and 8 who have studied statistics research course and semester students who are studying statistics research course in the Bengkulu State Islamic Institute (Bengkulu IAIN), the sample is a student of 8th semester as much as 145 people with 110 female students and 35 male students and 6th semester students as many as 150 people with details of 112 female students and 38 male students. The sampling technique used is total sampling. *Total sampling* was chosen as sample determination because the researcher wants to know the overall results of existing population (Cohen, Manion, & Marrison, 2007).

Instrument and Procedures

In this study in the form of questionnaires and multiple-choice test instrument. Questionnaire contains 4 indicators. The questionnaire instrument contained 24 items using 4 Likert scales (1 – Very Not Good, 2 – Not Good, 3 - Good, 4 – Very Good). And MCQs for seeing the understanding concept level of statistical 8th-semester student research and student 6th semester, with 25 statements using 4 Likert scales (1-Very Not Good, 2-Not Good, 3-Good, 4-Very Good). Questionnaires and Multiple Choice Test Instrument were given as many as 295 students.

Data Analysis

Data collection in this study has used a questionnaire and multiple-choice test instrument. The use of questionnaires as a data collection tool because researchers want to see the level of student learning independence and student responses to the use of *problem-based learning* models in the statistics course. The use of multiple-choice test instruments as a data collection tool is because researchers want to know the level of ability of student research statistical concepts for thesis. Data collection in this study also uses interviews. A qualitative interview occurs when researchers ask one or more general participants, open-ended questions and records of their answers (Creswell, 2012). The use of interviews as a data collection tool because researchers want to examine more deeply the constraints felt by students in self-learning for statistics for the final project.

The flow of this research begins by providing a closed type questionnaire where the answer option has been determined. The procedure for collecting research data shows as this following figure:

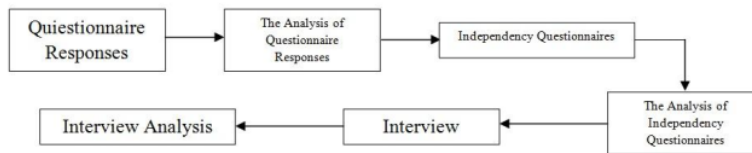


Figure 1. Procedure of Data Collection

The questionnaire used in this study is the student learning independence questionnaire on statistical subjects and student response questionnaires to see an implementation of the *problem based learning* (PBL) learning model. Below is a categorization table of ranges of values for the independence questionnaire, where there are four categories, namely excellent, good, bad, and poor. Data from the questionnaire results will then be analyzed using SPSS Software to processed into descriptive statistics. Descriptive data are in the form of mean, median, mode, and frequency.

Table 1: Criteria the value range of the independence questionnaire

Criteria	Score Range
Very Good	79.0 – 96.0
Good	61.0 – 78.0
Poor	43.0 – 60.0
Bad	24.0 – 42.0

The following is a criteria in table 2 of value ranges for the questionnaire response students, where there are four criteria, namely Very Good, good, poor, and bad MCQs done with the intention for seeing the understanding concept level of statistical 8th-semester student research and student 6th semester.

Table 2: Criteria of the range of response questionnaire

Criteria	Score Range
Very Good	58.6 – 72.0
Good	58.5 – 45.1
Poor	31.6 – 45.0
Bad	18.0 – 31.5



The following is a category table of ranges of values for multiple-choice tests, where there are four categories, namely very good, good, poor, and bad.

Table 3: Criteria of the range of understanding concept with Multiple-Choice Questionnaire

Criteria	Score Range
Very Good	76.0 – 100.0
Good	51.0 – 75.0
Poor	26.0 – 50.0
Bad	0.0 – 25.0

Data on multiple-choice test questions were analyzed to be used as descriptive statistics. The purpose of the interview is to strengthen the questionnaire results and Multiple-Choice Questionnaire and were conducted for 8th semester and 6th-semester students. In below, table 4 shown the degree of relationship used

Table 4: Degree of relationship

Interval co-efficient	Description
0.80 – 1.000	Very Strong
0.60 – 0.799	Strong
0.40 – 0.599	Enough
0.20 – 0.399	Poor
0.00 – 0.199	Very poor

RESULTS

The following is the result of the ability to master the research statistics of Madrasah Ibtidaiyah Teacher Education Bengkulu State Islamic Institute students. The results were obtained using multiple-choice test instruments. To answer the first research question about the ability of students to master the concept of research statistics, the results obtained in table 5 are obtained.

Table 5: Results of Ability of the concept of Research Statistics

	Male				Female		
	Criteria	Frequency	%		Category	Frequency	%
Students of 6 Semester	Very Good	12	32	Students of 6 Semester	Very Good	23	21
	Good	19	50		Good	55	49
	Poor	5	13		Poor	21	19
	Bad	2	5		Bad	13	12
Total	38	100		Total	112	100	
Students of 8 Semester	Very Good	3	9	Students of 8 Semester	Very Good	10	9
	Good	10	29		Good	28	25
	Poor	16	46		Poor	43	39
	Bad	6	17		Bad	29	26
Total	35	100		Total	110	100	

From the table, it can be seen that from 295 8th semester students and 6th-semester students Madrasah Ibtidaiyah Teacher Education Bengkulu State Islamic Institute there were 35 male students in the 8th semester and 38 male students in the 6th semester and 110 female students in the 8th semester and 112 students semester 6 women. Presentation of mastery results of research semester 6th male student statistics is 50% is good category. For male students in the 8th semester, 46% were poor. As for the 6th-semester female students have a percentage of 49% is good. Moreover, for 8th-semester female students have percentage 39% in the unfavorable category. In addition, to measure the ability of student research statistical concepts, this study also measures student learning independence and also measure student responses to the use of problem-based learning (PBL) learning models. To answer the second research question about student learning independence, the results obtained in table 6 are obtained.

From the table, it can be seen that from 295 8th semester students and 6th-semester students Madrasah Ibtidaiyah Teacher Education Bengkulu State Islamic Institute there were 35 male students in the 8th semester and 38 male students in the 6th semester and 110 female students in the 8th semester and 112 female students in semester 6th. Presentation of learning outcomes of male students in semester 6 is 53 % good. For the 8th semester male students are 57 % is good. While for 6th-semester female students have a percentage of 63 % is good. Next for the 8th-semester female students have percentage of 55% is good.



Table 6: Student Independence Learning Questionnaire Results

	Male				Female		
	Criteria	Frequency	%		Criteria	Frequency	%
Students of 6 Semester	Very Good	15	39	Students of 6 Semester	Very Good	32	29
	Good	20	53		Good	70	63
	Poor	3	8		Poor	10	9
	Bad	0	0		Bad	0	0
Total	38	100	Total	112	100		
Students of 8 Semester	Very Good	5	14	Students of 8 Semester	Very Good	17	15
	Good	20	57		Good	60	55
	Poor	10	29		Poor	33	30
	Bad	0	0		Bad	0	0
Total	35	100	Total	110	100		

To answer the third research question about the response of students to the use of problem-based learning (PBL) learning models in statistical subjects, the results obtained in table 7 are obtained.

Table 7: Student Response Questionnaire Results

	Male				Female		
	Category	Frequency	%		Category	Frequency	%
Students of 6 Semester	Very Good	10	26	Students of 6 Semester	Very Good	30	27
	Good	25	66		Good	74	66
	Poor	3	8		Poor	8	7
	Bad	0	0		Bad	0	0
Total	38	100	Total	112	100		
Students of 8 Semester	Very Good	7	20	Students of 8 Semester	Very Good	30	27
	Good	23	66		Good	60	55
	Poor	5	14		Poor	20	18
	Bad	0	0		Bad	0	0
Total	35	100	Total	110	100		

From the table, it can be seen that from 295 8th semester students and 6th-semester students Madrasah Ibtidaiyah Teacher Education Bengkulu State Islamic Institute there were 35 male students in the 8th semester and 38 male students in the 6th semester and 110 female students in the 8th semester and 112 students female half of 6th. The percentage of the results is male student 6th semester has 66% is good. For the 8th semester male students as much as 66% are good. As for the 6th-semester female students have a percentage from 66% as good category. Next for 8th-semester female students have percentage of 55% is good category.

To answer the fourth research question about the relationship of problem-based learning on understanding concept of research statistics and student learning independence. Therefore, it is used as a correlation product moment test, according to the results of table 8.

If the value of sig < 0.05 then the variable has a relationship. From the table 7 we can see the value is 0.035 small from 0.05, it can be seen that there is a relationship between PBL Respond and Understanding Concept of students in the R-value of 0.725 and positive, for attitude with discipline has a sig value of 0.015 more small than 0.05, it means there is a relationship between PBL Respond and Independence Learning with a R-value of 0.702 which means positive.

Understanding Concept and Independence Learning have a value of sig 0.027 which means that it is smaller than 0.05, indicating that there is a relationship between Understanding Concept and Independence of students with a R-value of 0.658 which means positive. This is in accordance with (Gall, 2003) $r = -1$ is a perfect negative correlation, meaning that there is a contradictory relationship between variables X and Y, if X rises/high then Y falls/low, while $r = 1$ is a perfect correlation, which means there is a relationship in the direction of variable X and variable Y, if X rises then Y rises or if Y drops then X drops.

DISCUSSION

Reid and Petocz (2012); the curriculum needs to accommodate variations in student conceptions, both because these variations exist and to help students expand their awareness of statistics.

Table 8: The Result Correlation Person Moment for PBL Respond, Understanding Concept, and Independence Learning

Components/Variable	Mean	PBL Respond		Understanding the Concept		Independence Learning	
		R	Sig. (2-tailed)	r	Sig. (2-tailed)	r	Sig. (2-tailed)
PBL Respond	78.5		1	.725	.035	.702	.015
Understanding Concept	81.0	.725	.035		1	.658	.027
Independence Learning	82.0	.702	.015	.658	.027		1

To help students consider the widest and most inclusive statistical concept, the curriculum also needs to encourage them to be aware of their perceptions of their place themselves in the world and to develop critical assessments of how statistics can help them in their endeavors. Gordon (2004); that mathematics learning experiences in schools can have an impact on statistical learning at the University.

The most commonly applied statistical methods among those available: descriptive statistics; experimental design; example; hypothesis testing; regression, correlation, and factor analysis; time series analysis; tolerance determined statistically; analysis of measurement accuracy; process control statistics; (Khusainova, Shilova, and Curteva, 2016). Descriptive statistics useful about collecting data and describing populations. Sample statistics, median, variance, sd a clear estimator of their population, Mean, Median, Variation, Standard Deviation (SD) (Steinhorst and Keeler, 2017). Pullinger (2013) students have good initial knowledge of statistics, so that in the learning process students easily connect existing knowledge with the material obtained during college.

Universities develop antipathy towards statistics and usually, students at all levels are less interested in learning when taking introductory statistics courses. Over the past decade, there have been significant concerns expressed about the future of statistics (Tishkovskaya and Lancaster, 2012). Because the subject of research statistics relates to complicated calculations and lack of curiosity of students towards the eyes lecture on research statistics, so that it has an impact on student learning outcomes (Sowey, 2006; Karlina et al, 2019). Statistical service course to mean a course designed for students who pursue discipline using statistics. students assuming research statistics courses were subjects that were not easily understood without the help and guidance of others to understand them and the statistical subjects of this study could only be understood by individuals who understood statistics only. But, the subjects of research statistics are also important to learn about thesis (Student interview, November 2018).

Duda, Susilo, & Newcombe (2019); that Problem-Based Learning (PBL) is constructivist learning with the potential to improve students' science process skills and independency learning. Receiving material in the research statistics subject by understanding the concepts explained by the lecturer, then students look for additional information about the concept of research statistics in order to increase the insight they have. As other factors which influence PBL on learning independence students, there are factors that arise both from within (internal) students and external factors. The factors are the motivation of students to solve a problem or object given by the lecturer so that it gives a positive effect for students in understanding the information provided by the lecturer. Studying research statistics only during lectures and the existence of less understood concepts such as hypotheses in research and their relation to the statistics of research students obtained that the research statistics course is an easy-to-understand subject, by reading statistical books in the library and asking peers or people who are more experts in the field of statistics. Tosun and Taskesenligil (2013) states, PBL has a positive contribution to access and utilization of resources, independent learning skills, critical thinking skills, scientific process skills (observing, classification, measurement, estimation, and deduction), the ability to work in cooperative groups, communication skills, research skills, problem solving skills. Students in solving problems not only need to understand the material but also need to analyze, evaluate, and draw conclusions on the subject matter to find solutions to the problem (Saputra, Joyoatmojo, Wardani & Sangka, 2019).

Ersoy and Başer (2014); PBL shows that students can identify and solve problems with their own ideas and abilities and develop their creative thinking, one of the higher-order thinking skills. PBL enables higher education quality learning because it facilitates students to realize their imagination, provides opportunities to think, express their ideas, and encourage them to get new information. When lecturer teaching statistics using the problem-based learning (PBL) model was included in the good category. Because the model with giving problems early helping students respond to active thinking. Lectures can run smoothly so that the material provided by lecturers is easy to understand by students. and then, students are interested in because the research statistics subject given by the lecturer is appropriate so that students easily understand the material and concepts given.

Li (2012); that talking about the basis of this study, it can be assumed that the learning independence towards an academic course plays a role in influencing their intrinsic motivation, such as efforts. Therefore, theory can be applied: when students have a positive attitude towards research methods and statistics (for example, the subject is meaningful and relevant to their academic studies and future careers, they are more likely to be more likely to learn about this problem. Yuliana and Firmansah (2018) students will learn better if they learn something close to them. Learning methods that are based on problems will involve them to think critically. Technology-based learning and problem-based learning will collaborate well in the learning process. Sometimes students ask each other what is not understood so that cooperation emerged between fellow students. Hopefully, the students can understand research statistics and research statistics subjects are very helpful in completing thesis. Balapurni and Aitken (2012) state that independent learning is learning where the direction, control, and regulation of their learning processes are solely guided and managed by individuals. Independent individuals, because it can be described as proactive, self-motivating, and resourceful (utilizing available resources) individuals who are able to direct themselves, monitor and manage their own learning progress towards achieving their learning goals.

Learning innovations use Problem Based Learning have an impact on understanding concepts in research statistics. Because statistical theories are useful in solving thesis. Given that PBL is learning that results from the process of working toward the understanding of a problem (Overton, 2015). Another factor affecting the PBL towards mastery of concepts students of the 6th semester that students work independently to find the concepts they need to know and adjusted with the principal problems given by the lecturer. In line with what was said by Gillette (2017) Students work independently and in small groups to acquire knowledge through problem-solving. So the concepts found by students will be easier to remember. On the other hand, students have a negative attitude towards methods and statistics (for example, the subject is meaningless and irrelevant to their academic studies and future careers), they probably have less effort to learn the subject.

Students' attitudes have been included in many theories and empirical studies in scientific disciplines other than statistical education to help explain student achievement according to student choices (Ramirez, Schau, and Emmioğlu, 2012). As for other factors that influence PBL on mastery of concepts in 8th-semester students, namely with the existence of PBL as a learning model students are trained to get used to group discussions that help students to activate their prior knowledge. In cooperative group work, each team member is responsible not only for learning what is taught but also for helping other group members to learn and create an atmosphere of achievement. It can be said that students learn effectively when they work cooperatively and have good learning abilities, they also have good academic abilities (Brahmakasikara, 2013). In accordance with what was revealed by Leppink (2013) students are encouraged to actively search for literature related to the problem. In addition, students are encouraged to actively search for literature related to problems in research, especially the thesis. Explains PBL approach that allows students to gain effective skills for problem-solving through different research and experiences in the field of accumulated knowledge through learning, teamwork, different subjects and disciplines (Demirel and Dagyar, 2016). So when students take thesis courses, the student is used to solving problems in thesis.

CONCLUSION AND SUGGESTION

The understanding concept of research statistical and learning independence has significant results. It was shown by findings that students mastering the concepts of the statistical research subjects would make independence in doing the final project easier, such as determining what research to use for the final project. Learning innovations used are not only PBL but also others, with the aim of learning innovations that produce meaningful learning for students in preparing themselves to make a mini project for research. Because the regulations in force in Indonesia students are said to graduate if they have completed their research. Therefore, researchers provide suggestions for using innovative learning models, one of which is PBL, using PBL can foster an attitude of student independence in completing their final assignments.

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