

# Effects of Problem-Based Learning Model Versus Expository Model and Motivation to Achieve for Student's Physic Learning Result of Senior High School at Class Xi

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## Abstract

*Problem-based learning* (PBL) is one of an innovative learning model which can provide an active learning to student, include the motivation to achieve showed by student when the learning is in progress. This research is aimed to know: (1) differences of physic learning result for student group which taught by PBL versus expository learning; (2) differences of physic learning result for student who has a different motivation to achieve; (3) interaction effect of PBL strategy versus learning strategy and motivation to achieve toward physic learning result. For knowing motivation effect and learning model toward improvement of physic learning result for student class XI is using research method by doing Analysis Path. The result research showed that early capability of student in physic science is insignificant influenced for student's physic learning result and the examination conducted has evidenced that giving PBL model can improve significantly the physic learning result for student class XI. The research concluded that giving PBL model is able to improve the learning motivation of student in class XI significantly.

**Keywords:** PBL, motivation to achieve, expository, physic

## I. Introduction

The learning during this time is still dominated by teacher, so it doesn't give opportunity for student to develop optimally and self-sufficient through discovery and thought processes. Teacher centered has caused an accumulation of information or concepts which useless for student. Teacher always demands the student to learn, but not teaching how should the student learn and resolve the problem (Tabrani, 1998). Applicability Education Unit Level Curriculum (KTSP) asks the changing of learning paradigm, one of them is learning with teacher centered into student centered. According to Trianto (2007), learning in Education Unit Level Curriculum context with competency-based is also asking the learning not only to learn concept, theory and facts, but also application in daily life. The learning material is not only arranged from simple things with memorizing and understanding, but also arranged from the complex material which needs analysis, application and synthesis, in skill of problem solving, so the learning can reach the more maximum result.

Teacher has used many physic learning methods to discuss the learning material and also the practical which conducted in the laboratory. The methods used by teacher are speech, discussion, cooperative, interactive, and so forth. One of physic learning model used is problem-based learning (PBL). Problem-based learning is one of innovative learning model which can give an active learning condition to the student. PBL is the learning model which involves the student to solve the problem through scientific method stages, so the student can learn the knowledge related with the problem and also have skill to resolve problems. Furthermore, PBL is a learning approach by creating confrontation to the student with practical problems, or open ended through stimulus into the learning. PBL has characteristics as follows: (1) The learning is started with problem, (2) ensuring that the problem given is related with reality world of student, (3) organizing the lesson surrounding the problem, not surrounding the discipline of science, (4) giving great responsible to learner in building and operating their learning process directly, (5) using small group, and (6) demanding the learner to demonstrate what they have learned in form of the product or performance. Based on the explanation above appears clearly that learning with PBL model to be started by any problems (the problems can be rose by student or teacher), then the student deeps their knowledge about what they have known and what they need to know to solve the problem. The student can chose the problems assumed as important to resolve.

In learning, the teacher tends to give a learning material with expository by asking the question to student, but the student still have difficulty to answer and express their opinion. Teacher's efforts is always motivating the student in order to be like and not ashamed expressing their opinion. Thus, the learning can run smoothly and more effective. Expository learning is one of common approach used by teacher in learning activity for almost the whole subjects. Expository learning is the teacher delivering material, giving speech, defining subject or explaining material. Thus, expository approach is the most dominant approach conducted by teacher, and the teaching like this is much practiced almost by all teachers. Student roles in expository learning has become listener and writter of material, they seat on the chair, so the student condition becomes passive. Expository learning is more emphasizing the teacher's activity in achieving the learning goal determined, and ignoring the student's activeness in learning process, so student's capability is developed optimally, because it is

only little opportunity for student to be active involved in learning.

Based on the background above, the problem of this study is: how far an effect of PBL versus expository model and student's motivation to achieve toward physic learning result at class XI to be detailed into goals which stated: (1) differences of physic learning result between student group taught by PBL versus expository learning; (2) differences of student's physic learning result who has different motivation to achieve; (3) interaction effects between PBL learning strategy versus expository toward physic learning result; (4) interaction effects of learning strategy and motivation to achieve toward physic learning result.

## II. Literature Review

### ***Problem-Based Learning (PBL)***

PBL model asks the student to be active involved directly into learning process. PBL model contains some steps which can ask the student to be active in learning process. Student activeness in learning process can train the student's capability. It is accordance with Sudarman's opinion (2007) that the learning approach which uses the reality world problem as context for student to learn about problem solving skill, and to obtain essential knowledge and concept. Using of PBL can improve an autonomy learning, motivation to achieve, problem solving and communication skill. As one of ways to improve the student's capability is PBL.

Based on PBL model, problem is one of challenging approach for student to seek solution from the real world that can be solved with group. PBL leads student to be self-learning, so it can develop the motivation to achieve and analyze the existing problem in the real world. PBL model can also stimulate the motivation to achieve and a new knowledge which useful for long term. PBL process is signed by any problem (the problem can be from both student or teacher), then the student deeps their knowledge about what they have known and how to solve the problems with group in order to help each other, so student is able to collaborate in problem solving. Using PBL with heterogeneous member of group is likely to the student exchanging their thought, collaborating to solve problem and finally they can improve their motivation to achieve. Thus, application of PBL can also help student improving their motivation to achieve.

It is accordance with opinion of Senocak (Akinoglu 2007) who has stated that PBL model is more effective if compared with traditional model, because PBL Model is more applying the learning concept, process and problem solving for student. Basically, student has potential of motivation to achieve, this potential should be better trained since early through learning which the student must be active and it were very not fortune if can be developed well. Thus, applying PBL model on sub main topic of vector can train the student's capability. The increasing of affective aspect is caused by creation of a new learning environment in the classroom through PBL which stimulates a good attitude for student. Affective aspect on this study is: presence of student; b) student's focus when the learning is in progress; c) courage of student to express an opinion; d) courage of student to ask; e) appreciate an opinion of other student. It is accordance with Anni's opinion (2006) that an important factor in learning is the learning place, environment situation and sociey learning cultural will influence a readiness, process, and learning result. Then, all those aspects can be observed when learning is using PBL model.

On the PBL model, before starting learning, the student has been ready to learn. Student is grouped into small group when the learning in progress. This small group is intended to make the student can collaborate, exchange opinion (ask the question, give an opinion), and they can appreciate an opinion of other student, until they can decide the common conclusion. If PBL model were related with the real life, it is interesting of student's attention, so the student will be motivated to be always presence and join with the classroom before teacher arrives at the classroom. These aspects become indicators on the affective aspect assessment which entered to know the student's attitude for implementation of applying for PBL model on main sub-topic of Kinematics with vector analysis.

Based on the study of Akinoglu (2007), PBL is more influencing of student's learning achievement than traditional learning model applied in the school. PBL is also more effective than classical model which discovery-based. PBL is the model which preferred by student. Because, PBL model can improve the capability to solve problem and collaborate within one group and improve student's motivation to achieve.

PBL is the learning approach which uses the real world problem as the context for student to encourage student's motivation to achieve and problem solving skill, and to obtain an essential knowledge and concept from course or learning materials. Teacher within problem-based learning has much roles, especially in presenting problem, giving question, establishing dialog, helping to find problem and giving a research facilities. Teacher is also preparing the encouragement which can improve inquiry growth and student's intellectual with motivation to achieve.

PBL is the learning model which involves student to solve problem through scientific method stages, so the student can learn the knowledge related with the problem and have skill to solve problems. PBL is as a learning approach which uses the real world problem as the context for student to learn about the way of critical thought and problem solving skill, and also to obtain an essential knowledge and concept from lesson material.

## Expository

Expository model is the learning model used by firstly giving definition, principles and learning material concept and also giving example of problem solving exercise in form of speech, demonstration, question and answer and assignment. The student follows the pattern determined by teacher carefully. Using expository method as learning method leads to deliver the lesson content to student directly. Student doesn't need to look for and find the facts, principles, and concept by themselves, because the material had been presented clearly by teacher when using this method. Learning activity by using expository method tends to teacher-centered. Teacher is active to give explanation or information of learning about learning material with detail. Expository method is often analogized with speech method, because they are the same in giving information.

Generally, teacher prefers to use speech method combined with question and answer method. Speech method is preferred because easy to implement with simple preparation, not wasting time and energy, by one step can reach the whole student directly and this can be done in classroom only. Every presentation the information orally can be said as speech. Presentation of speech is formal and usually in 45 minute or informal which only 5 minute. Speech can be said good or bad, but delivering speech should be assessed according to objective of their using. Expository method is the way to deliver lesson material with oral communication. Speech method is more effective and efficient to deliver information and meaning. Speech method is the teaching method by using verbal explanation. It is one way communication and completed with aided tool of audio visual, demonstration, question and answer, short discussion, etc. Furthermore, to make effective of speech method, it is important to prepare the steps as follows: a) formulating the large special instructional goal, b) identifying and understanding the student's characteristic, c) arranging the speech material by using an advance organizer, d) delivering the material with giving short information on the black board, giving a concrete examples and feedback, giving summary in every last material discussion, e) planning an evaluation with programmed. Recitation method is the learning method which more known as home work, although this statement is not true in overall. The question and answer method is used together with speech method, to stimulate student's thought activity, and to know their instructional effectiveness. Within question and answer method, the teacher can regulate important parts which need to get special attention.

In learning process by expository method should be sensitive for student response. Description of relationship between stimulus and response may not be simple as predicted, and this interaction influences the response given is also producing some consequence which will influence the student's behavior. For creating an interaction, interesting student's attention and training student skill, the speech method is usually combined with question and answer method and giving assignment. Recitation or assignment can be also done out door or in laboratory. Pasaribu stated that recitation method has three phases, such as: a) teacher gives an assignment, b) student does the assignment, and c) student is responsible to the teacher about what they have learned. This conventional model is the learning with *the Teacher Centered Approach*. Within the Teacher Centered Approach, all learning activities are almost controlled by teacher. All systems should be directed into series of the neat happening within institution education, without effort to look for and applying the different learning strategy accordance with the theme and learning difficulties for every individual. Differing expository method and speech method Teacher's domination in expository method is much reduced. Teacher doesn't talk persistently, an information will be given when it should be, as like on the start learning, to explain a new concept and principles, when gives an example of case at field and other. Expository method is the way to express idea in giving information with oral or written. Expository method can include combination of speech method, drill method, question and answer method, discovery and demonstration methods. Within learning by using expository method, central of activity is still on teacher. Compared with speech method, expository method has much reduced the teacher's domination. But, compared with demonstration method, this method is still greater.

## Motivation to Achieve

Brophy et al. (within Eggen, 2007:298) stated that motivation is the power that gives energy, encouragement and as direct behavior to achieve the goals. It is meant that the very strong motivation influences individual's life power. Motivation is the power or motif which exist on self-individual to act achieving the concrete goal to satisfy their needs (Schermerhorn, et all, 1998:64). According to Sardiman (2000:73), motivation is series of efforts to provide certain condition, so individual wants to do something. If he/she doesn't like, then he/she efforts to eliminate the sense of dislike. Then, the motivation on self-student is very important factor that influenced what big the student do the learning activity and to be active on certain time, especially if the need to achieve the goal is very urgent (Eggen, 2007:298). In lining with the argument above, motivation is something which supports to move, to direct, and keep individual behavior in order to do something, so individual achieves certain result or goals.

Discussing on motivation to achieve is certainly not lost from the word of motive. Motive is from the word of motion which means move or impulse. Motive is the situation within self-individual that encourage them to do activity or certain behavior to the goal which they want to achieve based on the needs (Tabrani,

1994:98). Motive is as individual thruster to do certain activity for achieving the goal. Every activity conducted by individual is stimulated by the power of individual inner, we call this thruster power is as motive. Concept of motivation to achieve is firstly using the term of *Need for Achievement* and popularized by McClelland (within Martaniah, 1984:21), this concept is started from assumption that *Need for Achievement* as the psychological power which encourages every individual, so it makes an active and dynamics to pursue the learning progress, thus the student can obtain an expected value. While (Eggen, 2007:315) stated that motivation to achieve tends to sustainable efforts, and ready to accept challenges with expectation to achieve high achievement. Motivation to achieve is as hard effort to improve self-capability as high as possible in all activities by using an advantage standard as comparator. An advantage standard can be the task implementation result perfectness level, comparing with self-achievement before, and comparing with other achievement. Capability within some activities owned by individual is an advantage standard where the activity may be success or failure. Motivation to achieve can be meant as struggle to add the achievement as high as possible.

Motivation to achieve is the thruster which related with achievement, that is mastering, manipulating, regulating an environment or physic to resolve challenge and to keep the high quality learning, competing through an effort to be better than before and creating an higher action than other people. Individual with motivation to achieve is usually preferring the duty which demands a responsible. It means that the successful achieved is not from help of other people or luck factor, but because their hard effort. Individual has also strong thruster to know soon the real result of their action, because it can be used as feedback. Furthermore, from that evaluation result, individual can improve him/herself.

### **Essence of Motivation to Achieve**

Motivation is very strong related with capability, so we can say that there is capability contained within individual which has full motivation. Motivation is meant as thruster or mover that conditioning an individual and lead to achieve the goal. Individual will only learn if he/she has capability to learn. Any capability to learn showed that individual has motivation to learn. There is positive and significant correlation between motivation to achieve with learning result. High or low motivation of individual will determine option to act, intensity to act, and effort to act or performance in every time. Individual with motivation to achieve will do a better activity, efficient, faster, and more spirit and responsible. For achieving a good learning achievement, exercise factor is absolutely important to do by student, but without motivation will have the constrained result and the process takes time. In the contrary, motivation without exercise is impossible because everything will not be directed. Motivation to achieve is individual inclination to react for situation to achieve the achievement performed within behavior form. Motivation to achieve is the motive which stimulates an individual to triggered with advantage of other and self-advantage.

### **Relationship between motivation to achieve and physic learning result**

Essence of physic is the learning process to move and learning through movement. Physical program attempts to help the learner to used their body to be more efficient in conducting various basic move skills and the complex skills which needs in daily life. Physical teacher should give the successful experience for every children, because it becomes the source of motivation. Motivation is an individual willingness to chose, direct and strengthen the behavior in achieving goal. Individual with motivation to achieve will do something by strong intention to progress, direct to advantage standard, happy with competition, has high spirit, believe in their capability, and dislike wasting of time. Motivation to achieve supports individual to spur with advantage, both self-advantage or other advantage, and support individual to be active participating in physical activities. Student involvement in every movement task, beside supported to express their capability. also to reach successful experience. Therefore, effort to provoke student's motivation is giving the successful experience to the student. Thus, tasks of move are also adapted with student's capability, so they will be motivated to perform the performance owned, related with implementation of move tasks within physical activities. Based on the explanation above, we can assume that there is positive correlation between motivation to achieve with physic education learning result.

### **Effecting Factors for Motivation to Achieve**

One of principle in implementing education is individual take part effectively in the implemented education activities. For conducting an activity, firstly it should have impulse to do that activity. In other word, for conducting an activity should have the motivation. It is also in learning process, individual should have motivation to join learning activity which in progress. Motivation to achieve can be influenced by their environment (Crow and Crow, 1989:24), it is meant that an attitude for environment is the guideline of individual's view and assessment for the environment. Positive attitude for environment will increase motivation to achieve, while negative attitude for environment will decrease motivation to achieve.

Weiner (within Martaniah, 1984:2) stated that there are four elements which cause the motivation to

achieve. Weiner based on his finding with Potipan stated their opinion about motivation to achieve are as follow:  
 (a) Individual with high motive to achieve attributes the success on effort and attributes the failure on no effort;  
 (b) Individual with low motive to achieve doesn't see an effort as the determinant of result;  
 (c) Individual with high motive to achieve assumes that the cause of success is the high capability;  
 (d) Individual with high motive to achieve have relatively high capability.

Many theories relies on the motivation. According to Morgan (within Sardiman, 2000:78), there are four supporting factors for individual to do activity and these can trigger the rising of student's motivation to achieve, such as: (a) Need to do an activity; (b) Need to satisfy other people; (c) Need to achieve a result; (d) Need to solve problem; (e) Other factors which can influence motivation to achieve.

Owens, (1991:15) stated that motivation is a good encouragement from internal or external, so it makes an individual to do something. Some internal and external factors will influence individual, where the factor may be the need. According to Gollwitzer (1996) that motivation can meant the need, drive, and goals. The same thing was stated by Ford (1992) that individual's motivation can be based on emergency, intention, and drive in relating with needs. Individual will have motivation to do an activity, if that becomes their needs. Gagne, (2002) stated that motivation is as very important element in education process and in task implementation process within daily life. Motivation is very important part in human life, both as researcher, farmer, servant, and others.

Correlation between motivation and learning is very closely, where the motivation may be basic/internal/external drive of individual. Motivation is to drive, direct and defend the student's learning behavior. This was stated by Elliot (2000), that motivation is one of factor influencing learning process and result. Motivation influences the student's choice for different of activity and capability and also student's academic goals. The established of academic motivation influences the student's capability. That motivation can become individual drive to do behavior changing in order to become better in fulfilling their life needs (Gresham, 1988). Motivation owned by student is very diverse, and that diversity need to understand and pay attention to lead and improve the student's capability, because the motivation to achieve is very influencing the student's successful to mastery the lesson. Other finding by Hamid, within HasaruddinHafid 2007:211) who stated that learning treatment is not interacted with motivation.

### III. Research Method

This research is aimed to obtain an accurate empirical data and can be trusted to get the proper description about direct effects of variables: Learning model and motivation to achieve for student's physic learning result at Junior High School Class XI. This research is aimed to know: (1) Effect of learning model ( $X_1$ ) for student's physic learning result at Senior High School Class XI (Y). (2) Effect of motivation to achieve ( $X_2$ ) for student's physic learning result at Senior High School Class XI (Y). (3) Effect of learning model ( $X_1$ ) and motivation to achieve ( $X_2$ ) and for student's physic learning result at Senior High School Class XI (Y).

#### Place and Time of Research

This research has been conducted in Jakarta, at SMAN Jakarta during eight months. This research consisted of three stages, such as: 1) stage of trial and error for an instrument, 2) stage of collecting data, and (3) stage of data processing and data analysis. The method used on this research is survey method with quantitive approach. The research focused on disclosure of effects among variables. Relationship between these research variables can be described into the problem constellation as follows:

### IV. Analysis Result and Discussion

#### A. Result

This research was conducted at State Junior High School (SMAN) in Different Class II, such as Class XI A and Class XI B. For knowing an effect of PBL and expository models for student's physic learning result at Class XI. The research was conducted on 62 students, they were grouped based on learning model given. There are 32 student at Class XI who has been given PBL model and 30 students at Class XI who has been given expository model. Descriptively, average of student's physic learning result before and after given the learnings are as follow:

**Table 1. Average of Physic Learning Result on Pretest and Post-test**

Learning Model	Average	
	Pretest	Post-test
Problem Based Learning	27.7	82.5
Expository	23.9	76.8

Descriptively, the research obtained that on student group with PBL model have average of student's physic learning result before learning (pretest) is 27.7. After learning (post-test), has happened an increasing with average of physic learning result as 82.5. On student group with expository learning model have average of physic learning result before learning (pretest) is 23.9. After learning (post-test), has happened an increasing

with average of physic learning result as 76.8. Based on that table can be showed that overall learning model group have happened an increasing of physic learning result after learning.

For knowing an effect of motivation and learning model toward an increasing student's physic learning result at class XI have been conducted the analysis process by using Path Analysis. Here is structural model of motivation effect and learning model toward student's physic learning result at class XI: Within this structural model, there are four relationships among variables directly (direct affect) which had been examined. Examination result of relationship among variable of this research is as follows:

**Table 2. Structural Model of Path Analysis Result: Direct Effect**

Path of Direct Effect	Standardized Coefficient	CR	p-value	Note
Pretest→of Learning Result	-0,203	0,189	0,055	Insignificant
Motivation→of Learning Result	-0,123	0,128	0,284	Insignificant
Learning Model→ of Motivation	0,388	1,431	0,001	Significant
Learning Model→of Learning Result	0,564	1,557	0,000	Significant

Based on Table 2 showed that an examination of direct effect between pretest for learning result is obtained CR-value as 0.189 with p-value as 0.055. P-value is greater than 0.05, it showed that pretest is not giving a significant effect for learning result, in other word, early capability of student for physic science is insignificant effect for student's physic learning result. On examination of direct effect between motivation for learning result was obtained CR-value as 1.538 with p-value as 0.128. P-value is greater than 0.05 showed that motivation variable gave insignificant effect for learning result, in other word, student's learning motivation both student with PBL model or expository model are insignificant effects for physic learning result.

On examination of direct effect between learning model for learning motivation was obtained CR-value as 1.431 with p-value as 0.001. P-value is less than 0.05 showed that variable of learning model gave significant effect for learning motivation. Path coefficient as 0.388 had positive value which contains the meaning that PBL model given to the student at class XI is able to increase student's learning motivation. This is supported from comparison of student's learning motivation on two groups:

**Table 3. Comparison of Student's Learning Motivation at Class XI**

Learning Model	Average of Motivation	t-statistic	p-value	Note
Expository	79.7	-3,296	0,002	Significant
PBL	84.4			

Based on table 3 showed that average of student's learning motivation at class XI who given PBL model is greater that the student given expository learning model. From this examination was evidenced that giving PBL model to be able to increase student's learning motivation at class XI significantly. On examination of direct effect among learning model for learning result was obtained CR-value as 1.557 with p-value as 0.000. P-value is less than 0.05 showed that variable of learning models gave significant effect for learning result. Path coefficient as 0.564 has positive value which contains a meaning that PBL model given to student at class XI to be able to increase student's physic learning result. This is supported by comparison result of student's physic learning result on the second group:

**Table 4. Comparison of Student's Physic Learning Result at Class XI**

Learning Model	Average of Learning Result	t-statistic	p-value	Note
Expository	76.8	-3,792	0,000	Significant
PBL	82.5			

Based on table 4 showed that average of student's physic learning result at class XI who given PBL model is higher that student given expository learning model. Based on this examination had been evidenced that giving PBL Model to be able to increase student's physic learning result at class XI significantly.

## Discussion

Physic is the science which learns the natural behavior in some symptom in order to be able to understand what does control or determine those behavior. Based on this explanation, then learning physic is not lost from mastery of physic basic concept through understanding. Basically, physic is basic science, as like chemical, biology, astronomy, and geology. Basic sciences are needed in some branch of application and technique knowledge sciences, without a strong basic science, application sciences can't be progress faster. Physic theory is not only read, because physic is not only memorizing, but it should be read and understood and also practiced. Physic learning is part of natural sciences subjects. Natural sciences classically can be divided into two sections: (1) *physical sciences which has an object as substance, energy, and transformation of substance and energy*, (2) *biological sciences which has an object as organism and their environment*. Learning is an effort to obtain knowledge and understanding through series of activities which involves some existing elements. Learning student is really having many concepts on his/her brain, especially an early concept about natural in his/her surrounding. Through systematically learning, those early concepts will be producing the true concept and

directed properly. In physic learning, the first thing demanded is capability to understand concept, principle or laws, then the student should be able to rearrange into their language accordance with their maturity and intellectual development. Physic learning is developing a capability to think analytically, inductive and deductive in solving the problem related with phenomenon of surrounding natural, and it can develop knowledge, skill and confidence behavior.

Furthermore, physic learning globally is like stated as follows: (1) Physic learning process is determining concept, principle, theory, and natural laws, and also it can stimulate the reaction, or an answer which can be understood and accepted objectively, honest and rational; (2) Basically, teaching physis is an effort to chose strategy to educate and teach accordance with the material will be delivered, and an effort to provide conducive physic learning condition and situation, in order to the student can do exploration physically and to find concept, principle, theory, and natural law and also applying them in daily life; (3) Basically, physic learning result is awareness of student to obtain concept and physic concept networking through exploration and experiment, and awareness of student to apply their knowledge to solve the problem faced in their daily life.

Learning is development process of new knowledge, skill, and attitude when individual interacted with information and environment. According to learning is the process where an individual environment is managed intentionally to be likely participating within certain behavior in special condition or producing response for certain situation. Physic learning can be seen as the process to develop an capability to understand physic concept, principle or laws, so within the learning process should consider an effective and efficient learning strategy and method. Physic learning in junior high school is one of Natural Sciences which become facilities for student to learn themselves and surrounding natural. In physic learning, science process experience and science product understanding in direct experience form will be very meaningful in forming the student's concept. This is also accordance with mental development level of Junior High School Student which are still on transition phase from concrete into formal, it would make very easy for student, if the science learning asks the student to learn formulating concept inductively based on an empirical facts in the field.

## V. Conclusion and Suggestion

### A. Conclusion

1. Early capability of student's physic science has insignificant effect for student's physic learning result.
2. All learnings model group, both PBL or expository has increased the physic learning result after learning.
3. Student's learning motivation, both student given by PBL model or expository model has insignificant effect for physic learning result.
4. Giving PBL model is able to increase student's physic learning result at Class XI significantly.

### B. Suggestion

For researcher should see early capability of student, which they must be homogeneous and observe their student's cognitive style, if they want to investigate the student's learning achievement. Then, investigation result will be more perfect.

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