

THE EFFECT OF PROBLEM-BASED LEARNING WITH GALLERY PROJECT AND LOCUS OF CONTROL ON LEARNING ACHIEVEMENT

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ABSTRACT

The purpose of this study was to examine the significance of difference in achievement between the students taught using the Problem Based Learning with Gallery Project and the Expository Learning as well as those having an internal and external locus of control, along with its interaction. This quasi-experimental study involved 52 students, randomly sampled. The methods of data collection were observation, non-test, and test. The method of analysis was a two-way ANOVA. The result of this study indicated that: (1) there was a significant difference in achievement between students taught using the PBL with Gallery Project and those taught using the Expository Learning; (2) there was no significant difference between students having an internal locus of control and those having an external locus of control on basic work of automotive engineering in a vocational high school; and (3) there was no interaction between the PBL with Gallery Project and locus of control level toward student achievement.

Keywords: gallery project, learning achievement, locus of control, problem-based learning method

INTRODUCTION

A rapid globalization has influenced the technology development of all fields, especially automotive field. Vocational high schools (VHS) in which the Light Vehicle Engineering Department or *Teknik Kendaraan Ringan* (TKR) is included are challenged to compensate for the technology development in fulfilling facilities and determining the appropriate learning strategy to embody mature students in terms of attitudes and work skills. Mukadhis (2003:1) stated that the goal of VHS is to manifest changes of learners' behavior based on the determined goal. The results of behavior changes are knowledge-understanding, skills (cognitive, personal-social and psychomotorist) as well as attitude values (Joni, 1983). The graduates can apply and develop themselves to be skillful and professional technicians in their fields. It is because vocational high school graduates will be directly involved in business and industrial fields.

Automotive Engineering Basic Work or *Pekerjaan Dasar Teknik Otomotif* (PDTO) is one of the productive theory subjects that

should be mastered by students of Light Vehicle Engineering Department to prepare themselves involving in business and industrial fields. This subject is delivered to the students for 32 learning hours. In the syllabus of PDTO, it is stated that the skills that should be mastered by students are related to workshop tools, deskwork, power tools, measurement tools, Occupational Safety and Health, and work accident prevention. The students should master the ability to operate mechanical measurement tool as the one of the basic competencies. They will learn units, specifications, and functions as well as the use of measurement tools. They also should understand the knowledge of mechanical measurement tools to know the feasibility of automotive component measurement, whether it suits the permitted tolerance standard. If they less master such knowledge, they might encounter difficulties in their work performance even when they have work accident.

Based on the observation results, the learning method used in VHS on productive theory subject is Expository with teacher-centered approach. The teachers in VHS usually start the lesson by giving a speech, asking

students to do daily tasks, introducing students the work goods as well as asking them to do practices. The expository learning, however, has not been optimal in motivating students to be active in learning. The students in the practice learning process do not optimally work and cooperate as well. They would like to depend on their friends who, they thought, are smarter than them.

Expository learning with teacher-centered approach has some weaknesses: (1) students become less active, (2) students lack thinking ability, interpersonal and adaptation skills (Amir, 2012), and (3) teacher is the only source of information while outside information is more various.

Based on such phenomena, a proper strategy to enable students to think critically and innovatively as well as have the abilities required in work world is urgently needed. Dick and Carey in Rusmono (2012: 22) define learning strategy (learning model) as a set of lessons and learning procedures used simultaneously to create student certain achievement.

This study used Problem-Based Learning with Gallery Project (PBL-GP) as an alternative learning model. This model considers problems as the main point of learning as well as reduces teachers' roles in the learning process while encourages students to be more active in the learning process. Teachers function as facilitators; they guide and advice students with various and innovative learning interactions by arousing students' curiosities through the raised problems. It is noted that Problem Based Learning can improve the students' learning independence, interests and achievement (Suparman, 2014 & Wastono, 2015). By doing such method, hopefully, the students are accustomed to thinking thoroughly, creatively, solving problems as well as adapting to any kind of works in business and industrial fields.

Gallery Project method as a learning interaction is expected to manifest more interesting teaching and learning process since

it accentuates the creativity aspect. Betlestoned (2012: 5) stated that creativity aspect enables people to solve some pro-blems by raising some outlier solutions rather than the previous vague solutions. In this learning interaction, the teachers will divide students into several groups to do different tasks. The groups then practice a sequencing discussion with each other.

Controlling Locus is one of the factors influencing students' learning process in obtaining the intended achievement. Mukhadis (2003: 58) asserted that controlling locus is an outlook of students' learning perception towards the expectation and reward in doing any activities including learning. This phenomenon would influence student motivation and achievement. It is caused by the difference students' learning perception in receiving and processing the stimulus in the learning activity. In this study, Controlling Locus was classified into two orientation groups: internal and external.

The internal group of locus of control is well-known to be more pre-eminent than the external one. Yayang (2013) addressed that the ability and effort factors of individuals having an internal locus of control are dominant. This influences their efforts in reaching their learning achievements. Lecourt and Holmes in Mukhadis (2003: 16) concluded that the learners having an external control in doing activity consider-ably depend on external factors, so the representation of learning motivation level is lower than those who tend to have internal control.

This study aimed at testing: (1) the difference in achievement between students taught using PBL with Gallery Project and those taught using Expository learning model; (2) the difference in achievement between students having the internal locus of control and those having the external one; (3) the interaction between the PBL model with Gallery Project and locus of control toward student achievement.

METHOD

This study used the quasi-experimental with the method of non-equivalent control group design to test the influence of learning model and locus of control toward student achievement. It was two factors-factorial design consisting of (1) factor of applying PBL-GP and Expository; and (2) factor of locus of control group divided into internal and external orientation. The students were divided into two groups: experimental group of students taught using the PBL-GP model and control group of students taught using the Expository learning model. Each group was then subdivided into two groups: group of students with an internal locus of control and those with an external one. The free variable in this study was PBL-GP model, the moderator variable was students' locus of control, while the bound variable was the student achievement in PDTO. The controlling variables were teachers, lesson, time allocation, place, learning media as well as environment in which those variables were controlled or constant.

The population in this study was four classes of tenth-grade students of Light Vehicle Engineering Department (TKR) at SMK 1 of Singosari. The selected samples were two classes: TKR 1 with 26 students and TKR 2 with 26 students. The samples taken were assigned to control and experiment groups. Sampling technique used in this study was random sampling. Each class, subsequently, was divided into two groups: the group of internal locus of control and the group of the external one based on the analysis results of non-test self-locus of control. The research instruments were treatment instrument and measurement instrument. Treatment instrument was the implementation of PBL-GP model and Expository learning in the form of lesson plans and all of the learning tools. Measurement instrument was the achievement test in the form of 30 multiple-choice items and five essay questions as well as non-test self-locus of control Rotter in the form of closed-

questionnaire. The validity and reliability of the instruments used had been tested beforehand.

Hypothesis test was conducted using a two-way ANOVA to know the significance level of average difference of the results of PDTO of each research subject. Before doing hypothesis test, pre-request tests of the data were conducted. They were normality and homogeneity tests. Normality test using Kolmogorov-Smirnov method showed that the data of achievement and locus of control were normally distributed. Homogeneity test using Levene's method showed that the achievement and locus of control were homogenous. The two-way ANOVA test with General Linear Model: Univariate was conducted by using SPSS 18.0 with the significance level 0.05. Ha was accepted if the significance value (Sig.) was < 0.05 , and it was rejected if the significance value (Sig.) was 0.05.

RESULTS AND DISCUSSION

The analysis results of student achievement after implementing PBL-GP showed the average mark of 74.74; the highest mark was 87.10 and the lowest one was 61.57. Besides, 12% of the students were categorized as very good, 42% of the students were categorized as good, 19% of the students were categorized as moderate and 27% of the students were categorized as low.

The results of the student achievement after implementing the Expository model showed the average mark of 69.93 with the highest mark of 89.62 and the lowest one of 43.50, 15% of the students were categorized as very good, 38% of the students were categorized as good, 38% of the students were categorized as moderate, and 8% of students were categorized as poor. The achievement results of the students with internal locus of control were 20.83% of them got a very good mark, 37.50% of them got a good mark, 25% of them got a moderate mark and 16.67% of them got a poor mark. The average mark of students

with internal locus of control was 74.69 with the highest mark of 89.62 and the lowest one of 56.14.

The analysis results of achievement of students with external locus of control were 47.06% of the students were categorized as very good, 29.41% of them were categorized as good, 11.76% of them were categorized as moderate and 11.76% of them were categorized as poor. The average mark of the students with external locus of control was 68.82 with the highest mark of 82.24 and the lowest one of 43.50. The first hypothesis tested was: H_a : there was a significant difference in achievement between the tenth-grade students taught using the PBL with Gallery Product model and those taught using the Expository model in the PDTO subject of TKR in VHS. H_o : there was no significant difference in achievement between the tenth-grade students taught using the PBL with Gallery Product model and those taught using the Expository model in the PDTO subject of TKR in VHS.

Hypothesis test result yielded F_{count} 9.181 and the significance was 0.004, so H_o was rejected. The result can be interpreted that there was a significant difference in student achievement between those taught using the PBL with Gallery Product model and those taught using the Expository model in PDTO of TKR in VHS. The second hypothesis tested was: H_a : there was a significant difference

between the achievement of the tenth-grade students having an internal locus of control and those having an external one in the PDTO subject of TKR in VHS. H_o : there was a significant difference between the achievement of the tenth-grade students having an internal locus of control and the external one in the PDTO subject of TKR in VHS.

The hypothesis test result yielded F_{count} 2.418 and the significance was 0.129, so H_o was accepted. The result can be interpreted that there was no significant difference in achievement of students having an internal locus of control and those having an external one in the PDTO subject of TKR in VHS.

The third hypothesis tested was: H_a : there was a significant interaction between the PBL-GP model as well as students' locus of control and the achievement of the tenth-grade students in the PDTO subject of TKR in VHS. H_o : there was no significant interaction between the PBL-GP model as well as students' locus of control and the achievement the tenth grade students in the PDTO subject of TKR in VHS.

The hypothesis test result yielded F_{count} 0.203 and the significance value was 0.655, so H_o was accepted. The result can be interpreted that there was no significant interaction between PBL-GP model and students' locus of control toward student achievement in the PDTO subject of TKR in VHS. The results of data analysis (ANOVA) is presented in Table 1.

Table 1. Results of Data Analysis (ANOVA)

Sources	Sum of Squares	Df	Mean of Squares	F	Sig.
Corrected Model	1155.06	4	288.76	3.222	.023
Intercept	8746.44	1	8746.44	97.590	.000
Learning Model	746.01	1	746.017	8.324	.007
Locus of control	216.71	1	216.72	2.418	.129
model * locus	18.216	1	18.22	.203	.655
Total	217881.33	41			

The hypothesis test results showed that there was not significant interaction between the PBL-GP model and students' locus of control. Therefore, it can be concluded that: (1) the group of students taught using PBL-GP model was more pre-eminent than the group of students taught using the Expository Learning

on any condition of locus of control; and (2) there was no significant difference between the group of students with more pre-eminent internal locus of control than the group of students with external locus of control on any kind of learning. Figure 1 shows the interaction between learning model and locus of control.

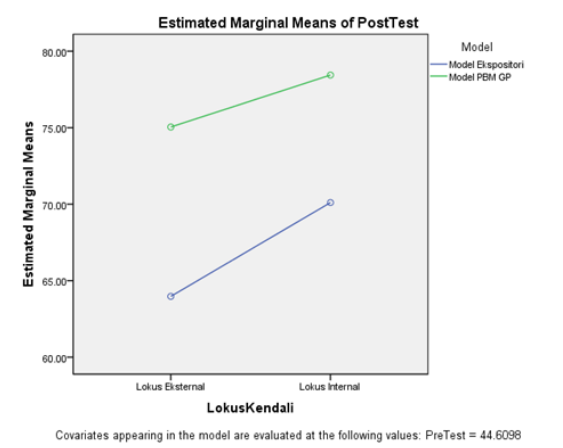


Figure 1. Graphic of Interaction between Learning Model and Locus of Control

The result of hypothesis test showed that there was a significant difference between the group of students taught using the PBL with Gallery Project model and the group of students taught using the Expository. The students taught using the PBL-GP reached the average mark of 75.76, while those taught using the Expository reached the average mark of 68.93. It can be concluded that students taught using the PBL-GP model got more pre-eminent achievement than those taught using the expository learning.

Figure 2 presents the graphic of the difference between achievement with the PBL-GP model and the expository model

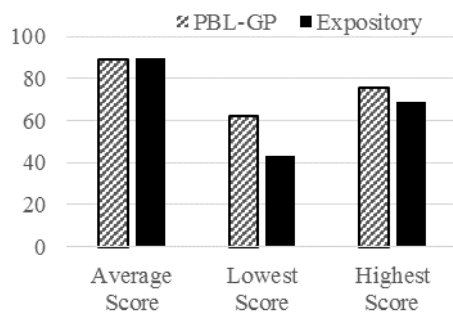


Figure 2. The Graphic of the Difference between achievement with the PBL-GP Model and the Expository Model

The analysis result showed that the PBL-GP model contributed positively toward

student achievement in PDTO subject. This was because in vocational school subjects, the learning model should encourage hands-on experience in which students were given the chances to observe, examine, and analyze as well as to build their knowledge independently.

Mukhadis (2014) stated that Shared Gallery Project aimed at: (1) enhancing students' understanding of the learning content up to meaningful level; (2) enhancing skills, identifying, searching, packaging, as well as delivering relevant information as learning orientation; (3) developing students' positive attitude toward idea and learning action, independence, creativity, and productivity; (4) facilitating the students' potentials, skills and affective developments holistically; (5) building induration power as well as the ability of teamwork; (6) maximizing the use of learning sources both by design and utilization; and (7) enhancing active, creative, innovative, interesting and challenging learning.

The implementation of the PBL-GP model triggered students' motivation and curiosity to solve the problems given to them. Through observation done by the researcher during the implementation of the PBL-GP, the researcher saw students were more enthusiastic, actively participating in the learning activity. Such small groups facilitated students to share ideas and opinions to each other. The students were not shy anymore to deliver their ideas and brave to ask their teachers when they faced problems. In addition, the students were triggered to search any kind of sources to complement their group task results. The sequencing discussion enabled the student groups to criticize and recommend each other as well as to think critically. They could correlate what they got in the particular learning with other lessons they had acquired.

Basic competence of measurement tools PDTO subject needs students' critical thinking as well as gives the students experiences to directly practice and deliver what they have

understood to other students and practice their abilities. The learning pattern of the PBL-GP has been an alternative good learning model to sharpen students' skills and abilities by allowing students to construct their own thoughts and refine them through group discussions with other students under teacher's supervision. Teachers were no longer the center of learning source. They, however, as the facilitators ensured that the learning was well conducted as well as correct students' inaccurate understanding.

The research results were supported by Husada (2015), stating that the group of students taught using the PBL got better achievement than the ones taught using the cooperative learning method.

Pribadi (2015) stated that there was a significant difference in achievement between students taught using the PBL model and those taught using the direct learning model on the basic competence of customizing PC components by using software (through BIOS setup and activation of system component). He addressed that the average mark of the class taught using the PBL was higher than the one of the class taught using the direct learning method.

In line with Amir (2013:10), the problem Based Learning with learner centered-approach enabled students to do, the following process in learning, i.e. searching, getting, combining more information that would be their knowledge. They constructed the concepts they learned from any kind of sources by themselves.

Situmorang (2014) pointed out that the enhancing of understanding of mathematics concepts taught using the PBL was higher than the enhancing of understanding of mathematics concepts taught using the conventional learning.

The other experts, Aini, et al. (2015) concluded that the achievement of the students taught using the PBL was better than the achievement of the students taught using the TPS model and direct learning model.

In the same breath, Sholeh (2014) drew a conclusion that the achievement of the students taught using the PBL, in the context of high critical thinking ability, was significantly different from the achievement of those taught using the speech method.

Mukhadis & Ulfatin (2014) conducted research related to gallery project and found that an integrated learning with Gallery Project based shared model was more interesting than the learning model used recently.

The hypothesis test results showed that there was no significant difference between the achievement of students having an internal locus of control and those having the external one in the PDTO subject, TKR department in VHS.

This finding was different from the theory stated by Mukhadis (2003:16) i.e. the orientation of the students' locus of control were very influential toward the students' self-tendency and self-belief in attempting and interpreting the results of activity conducted. This phenomenon, in learning activity, will be influential in the form of motivation level and achievement. As Zimbarod and Ruch and Coop and White stated in Mukhadis (2003:119), the group of people having the internal locus of control tend to have strong toughness and self-belief as well as see that the success in solving certain problems truly depends on their ability and effort.

Locus of control is a control level of people of their works and self-belief toward self-success. Internal locus of control reflects someone's personality who believes in his/her behavior. External locus of control reflects someone's personality who believes that work action and success are because of some factors beyond him/ herself. The students' locus of control is one of factors influencing their efforts to reach the achievement due to their awareness level to get the intended results. The students with locus of control and high awareness will try hard to do all efforts to reach the intended achievement through various efforts such as learning seriously,

practicing frequently, setting their daily activities in order to avoid wasting time, and many other efforts which lead them to be disciplined, smart and highly motivated in learning.

The absence of significant difference between internal locus of control group and the external one related to the student achievement in PDTO subject was possibly because PDTO is a kind of productive theory subject that does not need deep problem solving so it could not be used to see the difference in the achievement between students having the internal locus of control and those having the external one. The designed learning and the demanded achievement in the PDTO oriented more on understanding the type, function as well as the way of operating mechanical measurement tools. This case showed that the content of lesson and the demanded achievement were less based on students' higher order thinking. Therefore, in delivering PDTO, the teachers could conduct the learning process without paying attention to the students' locus of control.

This phenomenon was possibly because of the control variable—learning time—of the experimental class and control class was not well controlled. The learning process in the control class was conducted in the morning while the the learning process in the experimental class was conducted in the day. The difference in time could influence students' motivation and concentration in undergoing learning and getting the achievement. Additionally, the factor of the same teacher teaching in the experimental and control classes could cause the bias and lack of references and deep content knowledge. The finding of this research was supported by the results of the study conducted by Widyaninggar, showing that there was no direct influence of locus of control toward the achievement in Mathe-matic.

Saputra (2013) found that there was no significant influence of internal locus of control toward problem solving ability of the

students in Education Sciences Faculty, State University of Surabaya, so theory entation of internal locus of control did not always directly enhance the students' ability in problem solving. Achadiyah & Laily (2013) also got the results that there was no correlation between external locus of control and student achievement.

The result of hypothesis testing showed that there was no significant interaction of PBL-GP and the tenth grade students' locus of control in PDTO of TKR department in VHS. As what have been exposed in the hypothesis table, the Sig. value was under significance level 0.05, i.e. 0.665 so H_0 was accepted.

The result showed that the implementation of the PBL-GP was not specified for students with certain locus of control whether only internal or external locus of control. The model of PBL-GP can be applied in the class of students having a different locus of control. The absence of interaction of the PBL model and locus of control group toward student achievement in this study can be interpreted as follows: (1) the group of students taught using the PBL-GP model was pre-eminent than the group of students taught using the Expository Learning for any kind of locus of control group; (2) there was no significant difference in the achievement of the students having internal locus of control and the external one for any kind of learning model.

It can be concluded that (1) The difference in the achievement of AEBW for experimental group and control group dealt with any kind locus of control; (2) the absence of difference of internal and external locus of control toward the achievement of PDTO dealt with any kind of learning model.

The non-specified model of PBL-GP based on the type of locus of control had eased the teachers to choose it as an alternative proper learning model to be applied in PDTO for all students in the class without differentiating the students' locus of control. The teachers also could help the students change their external locus of control orientation to the internal one

by using this learning model because the students would be habituated to think critically and triggered to get motivated to study and develop their knowledge.

The process of PBL-GP helped the teachers to give valuable learning process to their students although they needed longer time than when they were using the Expository learning model. The understanding obtained by the students, however, will be firmed and influential. Therefore, the students' cognitive understandings and skills will be well mastered by the students. The teachers can choose the PBL-GP model as a learning strategy that centers on students to facilitate them in arranging learning scenario to reach the intended learning target. The students' internal factors might be varied and different. In the other hand, this model can also be used to compact all students in order to increase their learning motivation, every student learns actively, and the learning will be more interesting. Additionally, the interaction of the PBL-GP can trigger students' curiosity in order to motivate them in delivering opinions and learning to think critically. This causes students previously tended to have the internal locus of control, lacking self-belief or getting bored in learning, to change to be more active and motivated to look for knowledge.

This is also supported by Yudha (2014), stating that the absence of significant interaction of the use of the PBL and intelligence level and the tenth-grade students' achievement in Gasoline Motor Engineering subject of TKR department at SMK 1 Muhammadiyah Kepanjen.

Husada (2015) in his study found that there was no significant interaction between the use of the PBL model and mechanical skill, and the competence of maintaining the electric system. Setiawan (2011) in his study found that there was no interaction between learning approach and students' locus of control.

Mukhadis and Ulfatin (2014) in their study stated that the interesting sides of Shared gallery Project learning model can be seen

from some following aspects: (1) the multi-direction interaction process between the learners and learning sources was the realization of building new meaning as a representation of learning experience. The by design-learning sources, in this case, they are lecturers, students, printed materials, and many others. Meanwhile, the learning sources were not designed and existed in the society in which the learning took place. (2) This learning enabled individual to feel free. The students usually study in different ways and styles. We can see them as students involve in learning process, for example, in making group, doing field observation or gallery group and research proposal. This flexibility could approach learning style of every learner. (3) This learning created the synergy between modus and learning way that could raise initiative and learning action. This might accommodate any kind of learning tips individually or in the group inside or outside the class to advisor lecturers or other lecturers. (4) There was meaning-ful learning signified by the mastering study topics and steps or solving problems procedures through research activity. (5) The manager functioned as an orchestra maker of learning activity. This was reflected in learning scenario that positioned lectures as the facilitators, managers as well as acatalyzers in learning activities.

CONCLUSION

The conclusions can be taken from this study are as follows: First, the student achievement in the PDTO subject after the implementation of the PBL-GP model was better than the one after the use of Expository learning. Second, there was no difference in the students' achievement from those having the internal locus of control and those having the external one. Third, the group of students taught using the PBL-GP got more pre-eminent achievement than the group taught using Expository learning model in condition of locus of control. Fourth, the group of students

having the internal locus of control was similar to the external locus of control group related to the achievement in PDTO on any kinds of learning models. Some recommendations from this study are as follows: First, the teachers of vocational high schools can apply Problem-Based Learning Model with Gallery Project as an alternative to Expository learning model to help enhancing every student's independence and participation in learning and prepare the students to solve every problem they will encounter in work world. Especially for PDTO subject, the teachers should not pay attention to the students' locus of control since this particular subject does not need complicated problem solving. Second, the headmasters of VHS may hold seminars and trainings for teachers concerning the PBL with Gallery Project model as well as the other innovative learning models by cooperating with experts of the learning model. Besides, the headmasters may provide infrastructures to support the implementation of the PBL with Gallery Project model. Third, the future researchers may conduct a study related to factors influencing the student achievement besides locus of control more broadly, such as intelligence level, mechanical skills and many others. They could also conduct a study related to the PBL with Gallery Project in more complex stages and pay attention to the similar learning time of experimental class and control class as controlling variable should pay attention to.

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