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The Influence of Learning Model on Chemical Learning Outcomes Viewed from Goal Orientation Participants in Senior High School

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A B S T R A C T

This research was motivated by the difficulty of students in understanding the concepts in chemical material. The goal of this research is to see the differences in learning outcomes between students who are given two different learning models and see it from Goal Orientation (GO) factors owned by students. This research was conducted at SMA Muhammadiyah 01 Pekanbaru City. The variables in this study were the Learning Model and GO characters (independent variables) and chemistry learning outcomes (the dependent variable). The results of data analysis on One Way Anava was a sig. 0.02 for the application of two learning models and the Independent Sample T-Test obtained sig. 0.02 and sig. 0.32. Based on data analysis, it was concluded that student learning outcomes with those taught with the DL model were better than students taught with the PBL model. Learning outcomes MGO students who are taught with the DL model are better than those taught with the PBL model and there is no difference in the learning outcomes of the PGO students who are taught with the PBL learning model with students who are taught using the DL model.

1. Introduction

Chemistry is a branch of the Natural Sciences (IPA) group that prioritizes positive attitudes, understanding concepts, and developing students' skills in solving problems. Chemistry learning in senior high school is seen not only to transfer knowledge and skills (transfer of knowledge and skills) to students, but also to build higher-order thinking skills (analytical, synthesis, critical, creative, and

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innovative) through scientific work experience (Ministry of Education and Culture, 2016). The learning process created in an interesting and fun atmosphere, makes students feel they have a role in the learning process. Therefore, in learning chemistry the teacher's active role is key in the success of students in receiving chemistry subject matter.

Chemistry subject material is an abstract subject, because not all can be described in real terms. In addition, chemistry is rich in concepts, calculations and related laws. Chemical bonding material is one material that has a complex character. The concept characteristic of chemical bond material is the literacy context and requires presentation in three levels of representation, namely macroscopic, submicroscopic, and symbolic. (Aldila et al, 2018). This happens because most of the concepts that exist in chemical bonding material, learn about ions, atoms, molecules including their interactions that cannot be seen directly with the sense of sight

Based on the research results of the Program for International Student Assessment (PISA) it was shown that in 2012 Indonesian students' abilities were generally very low in understanding complex information and problem-solving abilities. The Ministry of Education and Culture in Andi Saputra et al., (2019). The success of the learning process can be determined through the high achievement of student learning outcomes seen through evaluation of learning (Zhang in Diarni Junita et al., 2018). Learning outcomes describe what students show after they have participated in learning (Grounlund, et al. In Woolfolk, 2016). Chemistry student learning outcomes data in class X at SMK 01 Muhammadiyah Pekanbaru, in the 2017/2018 school year still shows a low value, which is 63.56. Chemistry Bonding Material is one of the chemistry learning material that is considered difficult, this is because students have difficulty in understanding the Chemical Bonding concept. This statement is in line with the results of Hermanto's research in Wiwit (2017) regarding the identification of the difficulties of grade X students of SMA Negeri 1 Purwosari in understanding chemical bonding material with the results of: (a) The percentage of students who experience difficulties in ionic bonds is quite large (55.6%); (b) The percentage of students who have difficulty with covalent bonds is small (39.9%); and (c) Percentage of students who have difficulty with large polar and non-polar covalent compounds (64.9%).

The problems that have been found indicate the need for a learning model that can encourage students to be more active in the learning process. Learning models are used so that learning takes place can run more effectively (Arends, 2012). Learning models make students with diverse abilities can learn together in solving problems or problems given by the teacher. Learning models that involve students in groups with diverse abilities can be seen in the Problem Based Learning (PBL) model.

Students who use PBL have the opportunity to develop skills in reasoning and independent learning and build a solid knowledge base (Hmelo-Silver, et al., 2008). Research conducted by Masykurni (2016) shows the learning outcomes and scientific attitudes of students the concept of Chemical Bonds taught by

computer-based PBL models is higher than that of students taught by conventional methods.

Another learning model that can be applied is the Discovery Learning Model (DL). The DL model is a method that encourages students to arrive at a conclusion based on their own activities and observations (Balim, 2009). Furthermore, the results of research conducted by Putrayasa et al (2014) DL learning models in the experimental class are able to help students develop or increase the mastery of students' cognitive skills and processes because students are involved in the discovery of their knowledge.

Student learning outcomes can also be influenced by motivational factors. Oemar in Marina et al., (2019) reported that learning motivation plays a major role in the success or failure of students' activities. Goal Orientation (GO) is a form of motivation. According to Guler (2017) GO more directs students' understanding towards deeper understanding. Dweck in Muler (2017) GO can be directed through Mastery Goal Orientation (MGO) and Performance Goal Orientation (PGO). MGO is the personal desire of students to improve their abilities and learn, regardless of how they perform (Woolfolk, 2016). PGO focuses on showing competencies that are relative to others (Elliot, et al., 2017). The results of Keys, et al (2012) concluded that MGO was consistently able to predict the achievement of a group given a control or treatment. Further different results were shown by Kadiouglu, et al., (2008) who reported that students with PGO had a positive influence on the achievement of student learning outcomes.

This study aims to see: (1) Differences in chemistry learning outcomes between students using PBL models and DL models (2) Differences in student chemistry learning outcomes with MGO characters in PBL models of students with MGO characters in DL model classes (3) The difference between students chemistry learning outcomes with the PGO character in the PBL model class of students with the PGO character class DL model.

2. Methodology

This research was conducted at SMA Muhammadiyah 01 Pekanbaru. This type of research was a Quasy-Experiment with a 2 x 2 factorial design (Fraenkel and Wallen, 2009). The population in this study were all students of class XI MIPA. The sampling technique was carried out through random sampling so that students selected for class XI MIPA 4 and MIPA 5 were selected.

The variables in this study consisted of two independent variables, namely the Learning Model and Goal Orientation and a dependent variable that is the Chemistry Learning Outcomes (Creswell, 2014). The instruments used consisted of questionnaire instruments to obtain data about Goal Orientation and test instruments to obtain outcome data study on chemical bonding material. Normality and homogeneity tests are performed as a prerequisite for conducting research hypothesis testing (Suharsimi, 2015). The first hypothesis was tested with one-way ANOVA

test, while for the second and third hypotheses tested with Z test (independent sample T-test) with a significance level $\alpha = 0.05$.

3. Results and Discussion

The results of the GO questionnaire are used to divide students into two groups of characters, namely MGO characters and PGO characters in both PBL and DL classes. The determination of participants Goal Orientation characters was taken from MGO questionnaire scores totaling 18 items and PGO questionnaire scores totaling 13 items. The description of the results of the MGO and PGO questionnaire results can be seen in table 1.

Table 1. Goal Orientation Characters

Character Goal Orientation	**Frequency**	**Percent (%)**
Mastery Goal Orientation (MGO)	26	44,83
Performance Goal Orientation (PGO)	25	43,10
Undefined	7	12,07
Total	58	100

The division of students in the PBL class who has a Mastery Goal Orientation score ≥ 53, is categorized as a Mastery student, while students who have a Performance Goal Orientation questionnaire score ≥ 43 is categorized as a Performance student. Students who have a Mastery Goal Orientation Score and a Performance Goal Orientation score are the same, so they cannot be categorized as Mastery or Performance. Based on the questionnaire data, it was found that 13 students with Mastery characters, 15 students with Performance characters, and 4 students who were undefined or did not include characters as Mastery or Performance students.

Distribution of DL class students who have Mastery Goal Orientation questionnaire score ≥ 62, categorized as Mastery students, students who have Performance Goal Orientation questionnaire score ≥ 39.5 categorized as Performance learners, Students who have Mastery Goal Orientation Score and scores of Mastery Goal Orientation scores Performance Goal Orientation is the same, so it cannot be categorized as a Mastery student or a Performance student. Based on the questionnaire data it was found that 13 students with Mastery Goal Orientation characters, because they have a Mastery Goal Orientation score higher than the Performance Goal Orientation score. Furthermore, there are 10 students with Performance Goal Orientation characters, because they have a Performance Goal Orientation score higher than the Mastery Goal Orientation score. The next data there are 3 students not defined as Mastery Goal Orientation or Performance Goal Orientation.

Overall questionnaire data obtained there were 4 students in the PBL model class and 3 students in the DL class who were not categorized as Mastery or Performance. Students who are not categorized into one of the Goal Orientation

characters, because when filling out the questionnaire, they choose the highest point in the Mastery Goal Orientation and Performance Goal Orientation questions with almost the same amount. This happens because the orientation of students is not permanent. The orientation of the students will change, if the subject matter or the learning atmosphere they receive. For students who consider chemical bonding material is a difficult material, then they tend to be Mastery, because for Mastery participants, chemical bonding material is a challenge for them. This is in line with the opinion of Ormrod (2012) which states Mastery participants are more motivated to learn because of the material, even though the material is considered difficult.

Students with Mastery tendencies when faced with the learning atmosphere of PBL or DL experience different things. For students in a group with friends who are considered less competent, will feel less comfortable. so when filling out the questionnaire, students with the tendency of Mastery to consider the question items contained in the Performance Goal Orientation questionnaire, according to their character. This is in line with the opinion of Ormrod (2012) which states looking at the mistakes of others as a sign of failure and being unable, including the ability of oneself to state the basis of mistakes and failures. So that for the next test only students who have the character of Mastery Goal Orientation and Performance Goal Orientation are included in the further analysis test.

The prerequisite test results showed that the data were normally distributed and homogeneous. Then the hypothesis test was carried out using the one way ANOVA for the first hypothesis. The one way ANOVA test results are presented in Table 2.

Table 2. Comparison of student learning outcomes in the PBL model class with the DL model class

Variance	Total Kudrat (JK)	Dk	Average Squared (RK)	F	Sig.
Between groups	1113.250	1	1113.250	6.257	0.02
In Group	9429.186	53	177.909		
Total	10542.436	54			

The results of one-way Anova test show that the Sig. is 0.02 smaller than 0.05. This means that H0 is accepted and H1 is rejected. The data in the table shows the differences in learning outcomes between students in the PBL model class and students in the DL model class. The average value obtained by students in the PBL model class was 59.53 and the average value obtained by students in the DL model class was 68.65. Based on the average achievement of the class, the value achieved in the PBL model class and the DL model is still below the KKM achievement standard, but based on the comparison of the average value between the PBL model class with the DL model class it is found that the average value of the DL model class is higher than the average value of students in the PBL model class. This finding is in line with the results of the study of Puji Rahayu, et al.,

(2015) which concludes that the learning achievement of students subjected to learning with the DL model is better than learning with the PBL model.

The second hypothesis was tested using the Z Test (independent sample T-test). The results of the Z test are presented in table 4.

Table 3. Comparison of student learning outcomes MGO characters in the PBL model class and the DL model

Item Analysis	PBL Model	DL model
Number of Learners (N)	13	13
Average ($\bar{X}$)	57,31	70,92
Standard Deviation (S)	14,32	12,724
F_{Hitung}	0,29	
Variance	0.59	
Significance	0,02	
Significance level	0,05	
Conclusion	There is a difference	

The data displayed shows the Sig. is 0.02 less than 0.05 (significance level), this means that H0 is accepted and H1 is rejected. The data in the table shows the differences in learning outcomes between MGO character students in the PBL model class and MGO character students in the DL class. The average value obtained by MGO character students in PBL model class is 57.31 and the average value obtained by MGO character students in DL model class is 70.92 so it can be concluded that the average value of participants the students of the MGO character DL model students are higher than the average value of the students of the MGO character PBL model students. In accordance with the results of research Keys, et al (2012) concluded that MGO was consistently able to predict the achievement of a group given a control or treatment. So it can be concluded that the learning outcomes of students with MGO character in the DL model class are better than the learning outcomes of students with MGO character in PBL class.

Anderman and Anderman (2013) stated Mastery students who were mastery oriented, were very interested in following and mastering the material provided. Based on the observations of researchers, on the application of the PBL model, students face difficulties when solving problems presented by the teacher. The limited information and learning resources faced by students cause them to have difficulty understanding the concepts contained in the problems given by the teacher. The inability of Mastery students to understand the material provided, causes them to be less interested in participating in the learning process. This finding is contrary to the results of the study of Geitz, et al (2016) which shows that through the PBL model, Mastery students get high learning outcomes, because of the collaboration in the PBL group. However, this finding is in line with the results of Duhling and Ruppel's (2016) research which concluded that students with Mastery characters have negative feedback when they experience failure in mastering a subject matter.

The DL model, requires teachers to be more active in guiding students in answering or solving problems they face. Based on the observation of researchers, during the learning process students are more free to get information from teachers when they face obstacles in answering questions. The active role of the teacher increases the involvement of students in learning. This finding is in line with the results of the study of Saab et al (2009) who reported Discovery Learning learning provided a positive relationship in improving students' orientation towards mastery of the material. So it can be concluded that the learning outcomes of students with the Mastery character in the DL model class are better than the learning outcomes of the students with the Mastery character in the PBL class.

The third hypothesis was tested using the Z Test (independent sample T-test). The results of the Z test are presented in table 4.

Table 4. Comparison of student learning outcomes PGO characters in the PBL model class and the DL model

Item Analysis	**PBL Model**	**DL model**
Number of Learners (N)	15	10
Average ($\bar{X}$)	60,40	65,70
Standard Deviation (S)	13,50	11,90
F_{Hitung}	0,51	
Variance	0,48	
Significance	0,32	
Significance level	0,05	
Conclusion	No Difference	

The data displayed shows the Significance value is 0.32 greater than 0.05 (significance level), this means that H0 is rejected and H1 is accepted. The data in the table shows that there are no differences in learning outcomes between PGO character students in the PBL class and PGO character students in the DL class. This is consistent with the results of the study of Hazari et al., (2010) which concluded that for individuals with PGO character, students are not motivated by high scores and rewards, where no significant effects were found in one of the models given. So it can be concluded that the learning model both PBL and DL does not affect the ability of students with PGO criteria in achieving learning outcomes.

Anderman in Woolfolk (2016) states that performance students tend to avoid collaborating with other students. The application of cooperative learning models such as PBL and DL, emphasizes collaboration in groups as opposed to Performance characters who prefer individual learning. As a result, during learning, they are more passive. This finding is contrary to the research results of Sungur and Tekkaya (2013) which show, that Performance students have high learning outcomes compared to. This result was obtained because the anxiety factor about failure made Performance students try harder to get the highest score. This finding shows that Performance students do not have an interest in working together in study groups, because their desires are likely to compete with other students. So it can be concluded that there is no significant effect between the

application of learning models on the learning outcomes of students with Performance characteristics.

4. Conclusion

Based on the analysis of the data that has been presented in the results of the study, it can be concluded from this study, including (1) The learning outcomes of students with those taught with the DL model are better than students taught with the PBL model. The DL model is better than the PBL model, this is because the DL model organizes the learning material with a final form that is in accordance with the level of progress of students thinking. (2) Student learning outcomes with MGO characters taught by the DL model are better than learners with MGO characters who are taught with the PBL model, because in the DL model, the problems faced by learners are some kind of manipulation of subject material ie problems that are engineered by the teacher . Manipulation of subject matter The concept of problem solving through engineering by the teacher, in line with the character of students who have MGO. (3) There is no difference in the chemistry learning outcomes of PGO students who are taught with PBL learning models and PGO students who are taught using DL learning models. This result was obtained because students with PGO focused more on efforts to get test scores and good grades where the learning strategy did not affect the achievement of learning outcomes and student motivation.

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