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THE EFFECTIVENESS OF LABORATORY EXPERIMENT METHOD TO INCREASE ACTIVITY AND STUDENT'S ACHIEVEMENT ON TEACHING SALT HYDROLYSIS

Ramlan Silaban^{1*}, Agustina ML Tobing², and Irving Josafat Alexander³

¹Department of Chemistry, ²Graduated from Department of Chemistry, and ³Student in Department of Chemistry, State University of Medan, Indonesia

*E-mail: drsilabanmsi@yahoo.co.id

ABSTRACT

The objectives of this research are to get the effectiveness of laboratory experiment method to increase students' achievement, students' activity and the significance correlation between students' achievement and students' activity. This research was done in 3-s state senior high school (SMA N) in North Sumatera-Indonesia, those are SMA N 1 Lubukpakam, SMA N 2 Medan, and SMA N 3 Medan. The samples are 2 class from students in SMA RSBI and Non RSBI which taken by purposive random sampling. The research instruments are achievement test and non test in list activity form, which have been validated. The research data analyzed by description and inferential statistic methods. The results data shows that (1) Using laboratory experiment method is effective to increase students' activity on teaching hydrolysis chemistry, (2) Using laboratory experiment method effective to increase students' achievement on teaching hydrolysis chemistry, (3) There is significant correlation between student's achievement and student's activity on classroom that is taught by using laboratory experiment method.

Keywords: *Laboratory experiment method, teaching hydrolysis chemistry, student achievement, student activity, Senior High School (SMA) students.*

INTRODUCTION

Learning must be done individually by students, learning is experiencing, and learning cannot be delegated to others. According to Edgar Dale, argued that learning is best learned through direct experience. In learning through direct experience of the students do not simply observe directly but he should live, directly involved in the action, and are responsible for the results.

Chemistry is an experimental science, cannot be learned only by reading, writing or listening it. Chemical Sciences not only learn to master a body of knowledge of facts, concepts, principles, but also is a process of discovery and mastery of the procedures or the scientific method. Therefore, in teaching chemistry there are two important issues that must be considered, namely the chemical as a product of the scientists in the form of facts, concepts, principles, laws, and theories of chemistry as a process of scientific work.

Subject matter of abstract and concrete chemistry requires direct observation by the students towards the object and the material being discussed. Therefore, by using practical teaching methods are very effective delivery of teaching materials for students will be confronted with real situations. Practical methods of implementation in the laboratory is expected students will have the ability to think scientifically, is able to find scientific facts, identify, think critically and be able to accept criticism from fellow students owned a difference. Students are asked to experience for her/his, seek the truth and draw conclusions from what has been taught.

Experimental method is a way of teaching which provides the opportunity for students to find some facts that they need or want to know by themselves. This method emphasizes the activities that must be experienced personally, sought and found their own data and solutions.

Learning chemistry is closely associated with experiments suitable with the characteristic of chemistry as an experimental science. There are 2 important things that must be noticed in studying the chemistry that is chemistry as a result of the finding of experts such as principles, laws, theories and the chemistry as process that is scientific work such as laboratory experiment. One effort to improve student's achievement is to use laboratory experiment method. By laboratory experiment method, activities students will be more focused attention on the learning process and not on other things as well as students have the opportunity to develop the ability to observe all things that are involved in the process and can take the expected conclusions.

Learning activity are all activities that done by a student in the context of learning to achieve the goals. Without any activity so the learning process will not be going well. Activity of students in the learning process not only to listening and writing. Increasingly more activities that done by students in learning, so the process of learning that happen will be better. According Sadiman 2008, studied activity is a principle or rules that very important in teaching and learning interactions. So to make it easier for students to learn the salt hydrolysis, the author argues that laboratory experiment method is learning method that appropriate to be used to teaching salt hydrolysis.

The instruction procedures in conducting chemistry laboratory experiment must be concerned, it should at least containing of: (1) The purpose of experiment has to be clear and specified, (2) The equipment and materials which is used in experimental must be explained in details, (3) The steps in the procedures must be easy to follow in observation and data collection, (4) The raised question to be answered has to be relevant to the experimental that could be help to control the students, (5) Typical report to be done by students after finishing an experiment, an (6) The discussion and suggestion raised related to the laboratory experiment.

Laboratory experiment method is often used because it has the advantages by this following:

- a. Students are trained to use the scientific method in facing any problems, so it is not easy to believe in something that has not been true.
- b. Students are more active thinking and doing in trying to reach the truth or proof from a theory he had learned.
- c. Students find the practical experience and skills in using the experimental tools.
- d. Students proved themselves the truth of a theory.

In addition, laboratory experiment method also contain some weakness, among others:

- a. This method requires many facilities equipment and materials are not always easy to obtain and expensive.
- b. This method requires thoroughness, tenacity and patience.
- c. Each experiment is not always deliver the expected results because there may be certain factors that are beyond the reach or control capabilities. (Djamarah and Zain, 2002)

According to Handoyo (in Sugondo, 1988) learning activity classified the or called students' intellectual learning, as this description : First, testing. When the teacher giving the matter, the teacher is possibly involve the students' intellectual by testing and exploring the situation in order to abstraction and finding. Abstraction means identify the essence from the form or structure from the thing that has been known while finding means produce something that is new by using imagination, opinion or experiment.

Second, expressing. This activity hopes the students can produce the words, sentences, graph or table by using the symbol appropriate the problem condition. This is the learning process to construct the learning models from the problems that faced. Third, approving. If the students are succes to formulate something, they need to prove based on the argument or structural reason. Fourth, applying the problem. Concept and procedural that has been known needed to applied to the new situation. In applying , the students are possible to abstraction.

Fourth, finishing the problems. From the complex problem that faced but never has been finished, a student has to finish with the concept or theory also the procedure that has been mastered. Fifth, communicating. This activity is the changing of information between students, every students using the same symbol. The students have to get the chance to stated the their idea verbally and writely, comprehension and interpretation the idea to other students.

Learning activities that has been observed in this research during teaching and learning happen in the classroom those are: (1) give question, (2) answer the question, (3) give argument/suggestion, (4) doing experiment/doing discussion group, (5) write a note for

observation result in experiment/discussion group result, (6) doing test/solve problems, (7) make conclusion from experiment /discussion group.

The chemistry topics of salt hydrolysis is categorized as a difficult subject to be taught to the students as the contents of the subjects are difficult to understand. Salt hydrolysis is one of the subject matter in the even semester of Grade XI Sciences. One of learning activities that suggested by BSNP (Badan Standar Nasional Pendidikan) in syllabus KTSP 2006 is to designing and doing experiment to determine salt hydrolysis. From that learning activity so teacher has to combine the theory and practice when teaching of salt hydrolysis.

METHODOLOGY

As description before, the population of this research is all grade XI-Science class in SMA N 1 Lubukpakam, SMA N 2 Medan and SMA N 3 Medan which are having chemistry laboratory facilities. From each unit sample, taken 2 classes as a research target, one as experimental class that taught by laboratory experiment method and another as control class that taught by conventional method. In this research, there are 2 instruments those are test and non test. The instrument test is achievement test in the form of multiple choices and non test instrument is observation sheet. Both of the instruments were used in experimental class and control class. The achievement tests are arranged based on the hydrolysis topic that taught in the study including the properties of some salt which is hydrolyzed in water, the properties of salt which is hydrolyzed from the ionization reaction, the pH of salt solution that is hydrolyzed, the example of salt hydrolysis in daily life. The questions raised for each topic are distributed based on the grade, category, and difficulty level of the subjects. In the instrument that used for measuring student's activities having form observation sheet that has been filled by observer during teaching and learning process. There are 7 indicators, those are give question, answer question, give suggestion or argument, doing experiment/doing discussion group, make a note for observation result in experiment/discussion group result, doing test/solve the problems, and make conclusion for discussion/experimental report. The research containing of students group treated with conventional method and experimental method.

Research design in this research by using quasi experimental with factorial design 2×2 . This research is done in experimental design and divided into two groups namely control group which applying with conventional method and experimental group which applying laboratory experiment method. Pre test and post test are given to both of control class and experimental class before and after treatment and the students in each group would be taught with the same topic that is hydrolysis.

Implementing of learning has been done by researcher which is helped by observer and other teacher as an observer in the observation of the students' learning activity during the learning process. The steps in this research are:

- 1) Arranging the research instrument program like lesson plan for each group sample, the activity observation sheet of students in learning process and the test of learning achievement.
- 2) Giving the pretest in order to homogenize the data for two groups' sample, and then analyze.
- 3) Conducting the learning process based on lesson plan that has been arranged. During the learning process happen, the observers are active to observe and to write the student's activity in the observation sheet that is prepared.
- 4) Giving the post test with multiple choice test in order to determine the learning achievement of students for two groups sample.
- 5) Conducting the data tabulation and describing the research result data.
- 6) Doing the analysis requirement test (homogeneity and normality test)
- 7) Doing the hypothesis test.
- 8) Giving conclusion.

RESULT AND DISCUSSION

The aim of this research to find out the student's activity and students' achievement that given the treatment by experiment laboratory methods. The result of that, can be seen at below descriptions.

Description of Students' activity. To find out the students' activity is used observation sheet that has been valid. The criteria of observation sheet, The Summary of the research result data can be seen at Table.1.

Tabel 1. The description of student's activity result data

SMA N 1 Lubukpakam						
Result	Control Class			Experiment Class		
	Meeting 1	Meeting 2	Meeting 3	Meeting 1	Meeting 2	Meeting 3
Averages	12.97	13.27	13.47	15.20	15.53	14.87
Deviation Standard	2.58	2.64	2.89	2.30	2.27	2.75
SMA N 2 Medan						
Result	Control Class			Experiment Class		
	Meeting 1	Meeting 2	Meeting 3	Meeting1	Meeting 2	Meeting 3
Averages	12.00	12.83	12.88	14.65	14.58	13.88
Deviation Standard	1.97	1.72	1.79	1.75	1.89	2.03
SMA N 3 Medan						
Result	Control Class			Experiment Class		
	Meeting 1	Meeting 2	Meeting 3	Meeting1	Meeting 2	Meeting 3
Averages	14.40	14.98	15.20	15.35	14.75	15.55

Deviation Standard	1.96	1.54	1.38	2.21	1.96	2.19
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Based on Table 1, the averages of students' activity in control for each meeting is increased from meeting 1 to meeting 3. Based on the data, we can concluded that in control class for each meeting is increased from meeting 1 to meeting 3. It caused the discussion method that given in control so that it make students more active after giving the method. While in experiment class for each meeting is decreased from meeting 1 to meeting 3. It caused the laboratory experiment method that given in experimental class because he students' are active to observe the experiment.

Description of Students' Achievement. Students' achievement has been calculated by giving 20 instrument test before and after treatment that has been valid. The summary of the research result data can be seen at below Table 3:

Tabel 3. The description of student's achievement result data

SMA N 1 LUBUKPAKAM						
Result	Control Class			Experiment Class		
	Pretest	Posttest	N-Gain (%)	Pretest	Posttest	N-Gain (%)
Averages	29.50	70	57	30.83	77.50	67.99
Deviation Standard	7.47	9.13	11.95	8.10	9.63	11.61
SMA N 2 MEDAN						
Result	Control Class			Experiment Class		
	Pretest	Posttest	N-Gain (%)	Pretest	Posttest	N-Gain (%)
Averages	29	69	57	30	73.38	62
Deviation Standard	6.28	8.16	11.00	6.50	8.35	8.77
SMA N 3 MEDAN						
Result	Control Class			Experiment Class		
	Pretest	Posttest	N-Gain (%)	Pretest	Posttest	N-Gain (%)
Averages	25	69	58	28	75	66
Deviation Standard	6.79	7.94	9.26	7.58	9.09	9.77

Based on Table 3, the averages in pretest for each class is similar, it means that the students' for each school has same capabilities about the topic before giving the treatment. From the above Table 4, we can see that the value pretest for each school has the similar value. It means that the students from each school has same capability before giving the treatment in teaching and learning process. The effectiveness percentage of student's achievement is 11.703 % from average gain of experiment class (64.60) and average gain from control class (57.04), while student's activity is 8.45 from average of experiment class (71) and control class (65).

CONCLUSION

Based on the research result in the discussion obtained the conclusions that (1) laboratory experiment method effective to be used to increase students' activities on teaching

hydrolysis chemistry, (2) laboratory experiment method effective to be used to increase students' achievement on teaching hydrolysis chemistry, (3) There is correlation between two variables that is student's activities and student's achievement that is taught by laboratory experiment method. From the results obtained from this study, some suggestions had to be raised in order to the learning process on chemistry is effective in increasing of student's achievements, they are: It is suggested to chemistry teachers to use laboratory experiment method in order to increase students' achievement and students' activity on teaching Hydrolysis, it is suggested to other researcher in order to notice the relevant topic so that the research result for the next will be better and the activity of students will be increase, it is need to do the next research with other subject matter as an effort to increase education quality especially in chemistry subject.

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