THE INFLUENCE OF THE USING OF VIRTUAL LAB ON THE CHEMISTRY LEARNING MOTIVATION AND ACHIEVEMENT OF GRADE XI STUDENTS OF SMA NEGERI 1 SLEMAN SEMESTER 2 ACADEMIC YEAR 2015/2016

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Abstract

This study was aimed to determine whether there is any significant difference in motivation to learn chemistry or not before and after the using of acid-base virtual lab, whether there is any significant increasing in motivation to learn chemistry or not between the students who use acid-base virtual lab in practicum activity and who do not, whether there is any significant difference in learning achievement or not if prior knowledge is statistically controlled.

This study was designed as a research experiment with one factor design, two variables, and one co-variable. One factor was in the form of learning media, two variables motivation and learning achievement, one co-variable was of prior knowledge. Samples of this research were two classes of grade XI students of SMA Negeri 1 Sleman. One class was given a treatment of the use of virtual lab (experiment class) and one class was not (normal class). The data were collected with documentation technique, exercises, and inquiries. Motivations and achievements data were analyzed using same subject t-test, different subject t-test, and covariant test.

The results of this research show that there is any significant difference in the motivation of students' before and after the using of acid-base virtual lab, there is no significant increasing in learning motivation between students' who used acid-base virtual lab in practicum activity with who did not, there are increasing in achievement and motivation to learn chemistry if prior knowledge is statistically controlled.

Keywords: *virtual lab, motivation, learning achievement.*

INTRODUCTION

Teacher presentation plays important role in the learning process and facilitate students to achieve the expected competencies [1]. One of the problems in education field is the lack of a learning process. The example of the learning process that approaches directly to the students is practicum activities. Practicum is one of the activities in chemistry learning that requires laboratory along with complete tools and materials. Since many obstacles has occurred, the virtual laboratory is created as a technology to help teachers to improve students understanding of the practiced materials without directly using the lab as well as the necessary of tools and materials.

Virtual laboratory is considered as an alternative solution of fun, effective and efficient chemistry learning. This study uses Crocodile Chemistry 605 software created by Crocodile Licence.Ltd [2]. This virtual, chemical laboratory is expected to help the teachers or students to understand some kinds of chemical tools, materials, and substances for practicum activities, along with its function, reaction mechanisms, forms of the molecule and examples of chemical reactions without having to do a chemistry practicum directly in laboratory. Virtual laboratory is one of the laboratories by observation or experiment activities by using software run by a computer [3].

The purposes of this study are to determine whether there is any significant difference in motivation to learn chemistry or not before and after the using of acid-base virtual lab of grade XI students of SMA N 1 Sleman semester 2 academic year 2015/2016, to determine wheter there is any significant increasing in motivation to learn chemistry or not between the students who use acid-base virtual lab in practicum activity and who do not, and to

determine wheter there is any significant difference in learning achievement or not between the students of grade XI SMA N 1 Sleman semester 2 academic year 2015/2016 if prior knowledge is statistically controlled.

RESEARCH METHOD

The method used in this study is an experimental method which aims to determine the effect of a treatment to research subject [4]. The study design is one factor, the two samples, and one covariate. One factor is the effect of the use of virtual lab on chemistry learning's achievement and motivation of the students. Two samples being compared are the experimental class and control class. The population in this study is the students of grade XI IPA of SMA Negeri 1 Sleman semester 2 academic year 2015/2016 consist of two classes, namely the experiment class and control class with 60 students.

Sampling determined by lab researcher and adjusts the schedule in SMA Negeri 1 Sleman academic year 2015/2016. Experiment class is given treatment class in the form of the use of virtual labs on practical activities of acid-base material. In this study, experiment class is XI MIA 5 with 30 students. Control class is not given treatment class. In this study, control class is XI MIA 4 class with 30 students. The motivation questionnaire was filled out by the students before and after the learning process for the acid and base materials. This questionnaire using Likert scale model with five alternative answers, form of positive statements were scored 5,4,3,2,1 and negative statements were scored 1,2,3,4,5 [5].

RESULTS AND DISCUSSIONS

Some schools in the Daerah Istimewa Yogyakarta do not have complete and adequate laboratories or laboratory facilities. It is based on the observation of researcher by free interview with chemistry teachers of grade XI and grade XI IPA at SMAN 1 Sleman. It is also informed that chemistry learning fully teacher centered. Teachers already provided many tasks and exercises to their students. In acid-base learning, chemistry teacher of grade XI IPA also give the exercise after presenting material. However, in this learning activity, the understanding degree of the students still low. Student comprehension on acid-base concept still low, because they just learn from teacher without laboratory activities. Under these conditions, the

researcher choose a virtual lab as an alternative learning media to solve the high school laboratory problems [6].

This study begun by downloading a virtual lab software at *http://crocodilechemistry605.edu.* Freely [7]. The application does not need internet connection to run. This virtual laboratory is not just limited to the subjects, but also other subjects. Therefore the use of virtual laboratory learning media is expected to overcome the existing problems in laboratory, and further may increase the motivation and achievement of the students [8].

Selection of these two classes is based on the similar average mark of chemistry final exam of grade XI semester 1 (83.56 and 79.36) for similar characteristics, and two classes have same number of students (30 students). Experiment or control classes is selected randomly. The results of the prior motivation and prior knowledge were then tested by using SPSS 20 for windows to recognize that these two classes under normal circumstances and homogeneous. Normality test showed that significancy degree for experiment class are 0.063 for prior motivation and 0.200 for prior knowledge. Whereas for control class are 0.200 for prior motivation and 0.098 for prior knowledge.

Based on the results, the two classes were normally distributed. The normally distributed classes were then tested their homogenity by SPSS 20 for windows. The tes indicated that degree for prior motivation was 0.191 and prior knowledge was 0.076. The two results of the test are greates than 0.05 that indicated the two classes are homogeneous.

The results of the final motivation questionnaire was then tested using SPSS 20 for windows to see these two classes under normal circumstances and homogeneous [9]. After normality test to final motivation of students in the experimental class gained significance result 0.104 and 0.200 for control class. Significance result of final motivation for both classes were greater than 0.05, so that it can be stated that the two classes are normally distributed. The results of

final motivation that have been tested its normality, and then tested its homogenity. Homogenity test using SPSS 20 for windows, obtained 0.068 in significancy or greater than 0.05, so both classes are homogeneous.

Based on the data of questionnaires of student motivation, the students motivation to learn chemistry was increase. The results of the same subject t-test by using SPSS 20 for windows acquired significance result 0.00 for experiment class. The resulted significance less than 0.05 so that H_0 is rejected, it means that there are significant differences in the motivation of the students significant before and after the treatment by using of virtual laboratory media. For control class, the result obtained a significance of 0.703, or more than 0.05. Based on the results of questionnaires motivation from both classes, average results for the experiment class is 7.000, whereas control class is -32.833. It shows that the experiment class is increase greater than control class. The results of the different subject t-test by using SPSS 20 for windows acquired significance price of 0.00. Normality test of the prior knowledge of students obtained the significance of 0.200 for experiment class and 0.098 for control class. Significance for both classes are greater than 0.05, so that it can be stated that the two classes are normally distributed.

Homogenity test of prior knowledge for experiment and control classes obtained the significance of 0.076 (greater than 0.05) it means that the two classes are homogeneous. Anacova test shows that there are any differences in learning achievement based on the significance of 0.018 (less than 0.05). It shows that H_0 is rejected, it means that there are significant differences in learning achievement between students who treated by virtual laboratory media use with tose who did not if prior knowledge is statiscally controlled.

CONCLUSION

The use of acid-base virtual labs increase motivation and achievement of the students. There are significant difference in the

motivation of grade XI students before and after the using of acid-base virtual lab of SMA N 1 Sleman semester 2 academic year 2015/2016, there is no significant difference in the increasing of motivation to learn chemistry or not between the students who used acid-base virtual lab in practicum activity with who did not and there are increasing in achievement and motivation to learn chemistry of grade XI SMA N 1 Sleman semester 2 academic year 2015/2016 if prior knowledge is statistically controlled.

Teachers should be able to apply and develop alternative instructional media in learning process that is in accordance with the objectives and learning materials [10]. Students are expected to conduct further research of the use of virtual labs with other materials to improve the motivation and learning achievement of students. If there will be held further research or similar research to this study, virtual laboratory should be created its own media and empirically validated beforehand to see how effective the media if used by students.

REFERENCES

1. Arief S. Sadiman, R.Rahardjo, Anung Haryono, Rahardjito. (2011). *Media Pendidikan*. Jakarta: Rajawali Press.
2. Craig A. Mertier. (ed). *Action Research: Improving Schools and Empowering Educators.* Washington DC: SAGE.
3. Deni Darmawan. (ed). *Inovasi Pendidikan: Pendekatan Praktik Teknologi Multimedia dan Pembelajaran Online.* Bandung: PT Remaja Rosdakarya.
4. Djaali. (2009). *Psikologi Pendidikan.* Jakarta: Bumi Aksara.
5. Edi Santoso. (2009). Pengaruh Pembelajaran Online Terhadap Prestasi Belajar Kimia Ditinjau Dari Kemampuan Awal Siswa. *Tesis*. PPs-UNS.
6. Fian Totiana, Elfi Susanti VH, Tri Redjeki. (2012). Efektivitas Model Pembelajaran Creative Problem Solving (CPS) Yang Dilengkapi Media Pembelajaran Laboratorium Virtual Terhadap Prestasi Belajar Siswa Pada Materi Pokok Koloid Kelas XI IPA Semester Genap SMA Negeri 1 Karanganyar Tahun Pelajaran 2011/2012, *Jurnal Pendidikan Kimia Universitas Sebelas Maret, Vol.1 No.1 Tahun 2012.*
7. Hamzah B. Uno, Satria Koni. (2013). *Assesment Pembelajaran.* Jakarta: Bumi Aksara.
8. Hamzah B. Uno. (2007). *Teori Motivasi dan Pengukurannya.* Jakarta: Bumi Aksara
9. J. Georgiou, K. Dimitropoulos, A. Manitsaris. (2007). A Virtual Reality Laboratory for Distance

Education in Chemistry, *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering, Vol.1 No.11 2007.*

10. Muhibbin Syah. *Psikologi Pendidikan Dengan Pendekatan*
11. Natasa Rizman Herga, Milena Ivanus Grmek, Dejan Dinevski. (2014). Virtual Laboratory As An Element of Visualization When Teaching Chemical Contents in Science Class, *The Turkish Online Journal of Educational Technology, Vol. 13 issue 4 year 2014.*

Baru. rev.ed. Bandung: PT Remaja Rosdakarya.

12. Nana Sudjana. (2009). *Dasar-dasar Proses Belajar Mengajar*. Bandung: Sinar Baru Algesindo.
13. Nasution. (2010). *Teknologi Pendidikan*. Jakarta: Bumi Aksara.
14. Retno Dwi Suyanti. (2010). *Strategi Pembelajaran Kimia.* Yogyakarta: Graha Ilmu.
15. Slameto. (2003). *Belajar dan Faktor yang Mempengaruhinya.* Jakarta: PT Asdi Mahasatya
16. S. Nasution. (2008). *Metode Research.* Jakarta: Bumi Aksara.

This article has been approved for published by supervisor
on 18 April 2016

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This article has been reviewed by examiner 1
on 18 April 2016

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