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The Effect of Multimedia Based Learning (MBL) in Chemistry Teaching and Learning on Students' Self-Regulated Learning (SRL)

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Abstract

In recent years, the uses of Multimedia Based Learning (MBL) in classroom instruction increased widely. Overall, this implementation aims to improve students' motivation and also their learning outcomes. This study was answering the effect of MBL toward students' Self-Regulated Learning (SRL) in chemistry teaching and learning. The experiment was conducted in class XI of senior high school in Yogyakarta. Researchers create some computer based media for chemistry materials and continued with expert judgement of the media. Students' data SRL were measured using validated questionnaire. The questionnaire consists of three components, i.e. metacognitive, motivation and behaviour. The results showed that there was significant differences in SRL of students before and after participating in chemistry teaching and learning which applying MBL.

Keywords: *Multimedia, Self-Regulated Learning*

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Introduction

Chemistry is a part of science that is seeking the answers to the questions of what, why and how natural phenomena related to the composition, structure and properties of a substances. There are two issues related to chemistry, i.e. as the products (chemistry knowledge in the form of facts, concepts, principles, laws, and theories) and also as the processes (scientific work) (Retno Dwi Suyanti, 2010).

In the chemistry teaching and learning in a senior high school, a teacher must deliver a much of chemistry concepts with different characteristics in limited time. In the end, the teacher can only resolve the matter but has yet to provide more opportunities for students to practice and prove chemistry concept. It occurs mainly on material that requires a lot of practice, such as acid-base, thermochemistry, etc.

Based on research observations in some of senior high school in Yogyakarta, all the chemistry teaching and learning has been supported by laboratory facilities and adequate technology for senior high school such as LCD projector, screen, and speakers that are mounted on each class. However, the teacher in the teaching and learning process less utilize these facilities for the application of Multimedia Based Learning (MBL).

MBL is a teaching and learning method that applies a blend of interactive media and accompanied by text, static images, dynamic images and or video in the delivery of the subject matter (Nazir, et al, 2012). The main purpose of this method is creating better teaching and learning process, faster and foster independent learning attitude (Lightbody, et al, 2006). In addition, through the MBL, teachers can deliver more innovative materials and motivate students to study harder (Nazir, et al, 2012). Delivery of teaching materials through the MBL, it would be much more effective than just the teacher delivering a lecture course material (Osamah, et al, 2010).

Another things that determine the success of the teaching and learning process is students' self-regulated learning (SRL). The teaching and learning involves students what to do for himself, the initiative must come from himself. Education experts agree behold SRL is an important factor in the motivation of learning (academic motivation) and learning outcomes (academic achievement) (Zumbrunn et. al., 2011). Zimmerman in Greene et. al. (2011) states that the SRL is a form of the attitude of a student to monitor and control aspects of cognition, motivation, habits, and emotions according to the environment or circumstances are always changing in the learning process. Students who apply SRL means the student to plan, monitor and assess their own learning (Zumbrunn et. al., 2011). Turan (2010) claim that the students who have academic value (learning outcomes) higher will tend to have a higher SRL and vice versa.

From the description above, it can be concluded that students SRL is very important to the success of students in school. Therefore, this study aims to determine the effectiveness of the implementation of MBL on chemistry teaching and learning toward the students SRL.

Methods

This research was an experimental study of observation under artificial conditions in which the conditions set by the researcher (Moh. Nazir, 2005). The approach used in this study is a quantitative approach, meaning that all information or data realized in the form of numbers. Data were analyzed statistically, then the result was described.

Research Variables

The independent variable in this study was the method of chemistry teaching and learning. The dependent variable was students SRL. The control variables were the teacher, the students' prior knowledge, the chemistry material being taught, and the number of meetings.

Sampling Techniques

This study was held in class XI of SMA N 5 Yogyakarta. The sampling technique was simple random sampling. There were two classes taken as an experimental class and as a control class. The experiment class was XI-A2 which consist of 37 students. The control class was XI-A1 consisting 36 students. The experiment class using MBL in chemistry teaching and learning, while control class was not.

Research Instruments

The research instruments were (1) lesson plans; (2) computer based media; and (3) SRL questionnaire. All the instruments were validated by the expert. The SRL questionnaire adapts to the

SRL components proposed by Zimmerman (1989). It consists of three components, i.e. metacognitive, motivation and behavior.

Table 1. Aspects of Students SRL Questionnaire

Components	Observed	Number of questions
Metacognitive	1. Tenacity in the face of adversity	5
	2. The desire to learn more about the material being studied	5
	3. The interest in a variety of issues	3
	4. Responsible for the opinions	3
	5. Self evaluation	5
Motivation	1. The desire to perform better	3
	2. Looking for chemistry problem and solve it	3
	3. Planning strategies and learning objectives	4
Behavior	1. Completing the tasks	4
	2. Attempts to perform at their best	4
	3. Glad to learn chemistry	4
	4. Time management	4
	5. Self observation for the implementation of learning strategies	4

Data Analysis

Firstly, data were tested for homogeneity and normality. Then, data were analyzed statistically using t-test (independent sample t-test and paired sample t-test).

Result and Discussion

Both experiment and control classes, the chemistry teaching and learning takes 5 meetings. Material presented in all classes were same, which is acids and bases. As for the difference between two classes was the chemistry teaching and learning methods. Experiment class was using MBL, while control class was not (only lecture method).

Media used in experiment class quite varied, including PowerPoint, Frezy, video and Flash. The example of media used shown in the picture below.

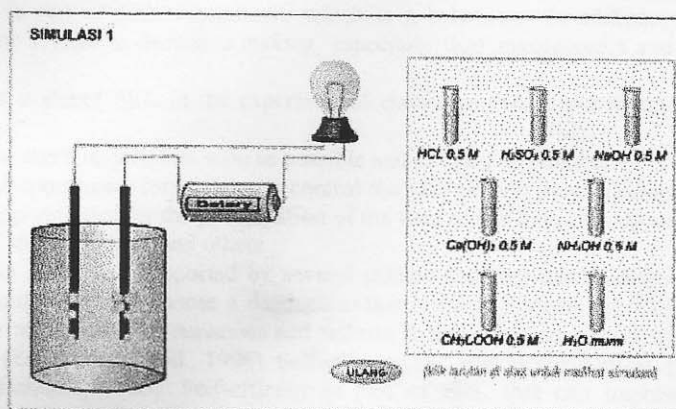


Figure 1. Media on strength of acids and bases using Flash

SRL data can be divided into two kinds, namely the SRL data before the learning process and SRL data after the learning process. SRL questionnaire used was a questionnaire enclosed models with

5 different answer options, which were always (SL), Often (S) Sometimes (K), rare (J), and Never (TP). This questionnaire consists of 51 items that include positive statements or negative statements.

Both the control class and experiment class, the students' SRL was increased. The average value of students SRL are shown in Figure 2 below.

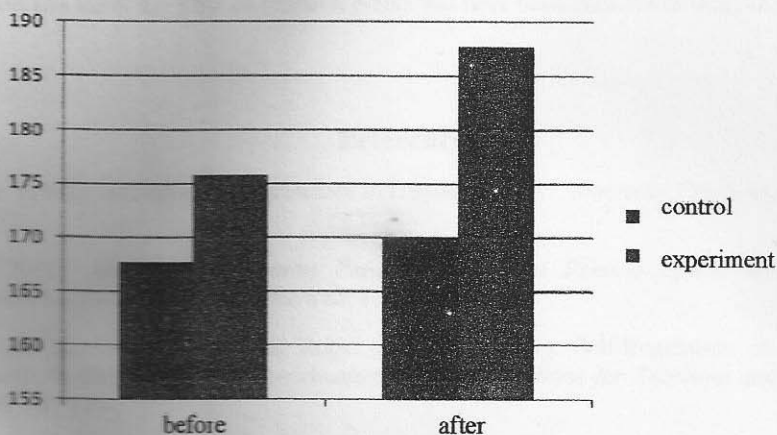


Figure 2. The average value of students' SRL before and after the learning process.

Based on the analysis using the independent sample t test (in SPSS 16 computer programm), it was known that $t(2.072) > t \text{ table}(1.99394)$ and $p(0.042) < \alpha(0.05)$. It can be concluded that there were significant differences between the students' SRL who take chemistry study using MBL with students who take chemistry without applying MBL.

Based on the analysis of the paired sample t-test (in SPSS 16 computer programm), t value obtained 10,206 with $p = 0.000$. This value is much larger than t table of 2.028 at a significance level of 0.05. It can be concluded that there were significant differences between the students' SRL before and after participating in learning chemistry using MBL.

How can MBL increase students' SRL?

The implementation of MBL in chemistry teaching and learning can improve the students' SRL because MBL can provide the opportunity for students to control their own learning rate. Controlling learning rate is part of SRL component, which is a behaviour. In addition, MBL also provide the opportunity for student in decisions making, especially time management and the matter they have to learn.

The increasing of students' SRL in the experimental class also due to the function of MBL itself (Daryanto, 2010), i.e. :

- It is able to amplify the user's response as soon as possible and as often as possible
- It is able to provide the opportunity for students to control the pace of their own learning rate.
- It is able to provide opportunities for the participation of the user in the form of response, either in the form of an answer, decision, trial, and others.

The results of this study also supported by several studies showing that students with good SRL tend to have more confidence and choose a destination that is more challenging than others. By setting goals and regularly re-evaluate the successes and failures in achieving its objectives, then their self-efficacy will increase (Zimmermen et.al., 1996). Self-efficacy can also increase effort, persistence, and learning outcomes [Bandura, 1986]. Self-efficacy is part of SRL that can improve learning outcomes. Then it can be presumed that the SRL can improve learning outcomes, so that SRL has a positive relationship with learning outcomes.

Conclusions

The result of this study showed that there were (1) significant differences between the students' SRL who take chemistry study using MBL with students who take chemistry without applying MBL

and (2) significant differences between the students' SRL before and after participating in learning chemistry using MBL.

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