CE-9

THE USE OF WEB-BASED ASSISTANCE IN MULTIMODAL CHEMISTRY LEARNING AT SENIOR HIGH SCHOOL TO IMPROVE STUDENTS' MOTIVATION

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Abstract

The development of information and communication technology (ICT) affects significantly education sector. Nowadays, students are very familiar with ICT, such as computer and Internet which has the advantage to use as media in chemistry learning. The use of student-friendly application of a web based learning management system (LMS) that completed by chemistry multimedia can be benefit for chemistry learning because the multimedia in the web can be accessed anywhere at any time as potential assistance for students. Learning was managed through various learning strategies in the combination of web-based assistance and face-to-face learning in cooperative model of student team achievement division (STAD) which called multimodal learning. This research investigated the effects of multimodal learning on chemistry towards students' motivation.

This research was an experimental research to measure the improvement of students motivation due to multimodal learning. The samples of this research were 2 groups of students, which are experimental group consisting of 30 students and the control group having 31 students. Samples were from grade X of SMA N 7 Purworejo. The difference of chemistry learning between students from the experimental group and control group was learning with and without multimodal learning, respectively. The students' motivation was collected using a questionnaire, observation, and analyzed statistically. Students' motivation from one group was compared to the another group using independent sample t-test, and the improvement of students' motivation was analyzed using paired-sample t-test.

The result of this research showed that students' motivation of group with multimodal learning was higher significantly than that without multimodal learning.

Key words: Multimodal Learning; Cooperative Learning; Web-Based Learning; Learning Management System.

INTRODUCTION

The phenomenon of globalization presents education systems around the world with both challenges and opportunities (Kagan and Stewart, 2005). Students nowdays are native ICT persons. They are familiar with ICT such as gadget, computer, and their application. This condition should be considered as opportunities to improve methods of learning that can strengthen the motivation of students. This is the challenge for teachers to provide more application or media of learning and help student to solve the difficulties encountered by students, including chemistry.

Chemistry is the academic discipline concerning on the study of the composition, structure, properties, and speed of change of matter (George Philander, 2008). Chemistry is intangible and considered as a difficult matter by learners. This is a challenge for teachers to create exciting learning model that can help students to comprehend the chemistry matter. One of alternatives to solve such problems is made by using a multimodal learning in the chemistry learning process. Multimodal learning is a classroom strategy that supports students' acquisition of new knowledge by pairing digital tools with requisite other strategies (Casey Heather, 2012).

Integration various teaching was a teaching–learning is known as multimodal learning (Dominic, 2012). In the implementation of multimodal learning, teacher can use some related media that suitable with chemistry matter or even use one of learning management system (LMS) like edmodo. Teacher can also combine the learning system with cooperative learning model.

Cooperative learning is a strategy in which small groups of students with different levels of ability engage in a variety of activities to improve their understanding of the topic (Eugene, 2009). There are certain types of cooperative learning. One of them is student team achievement division. It is a collaborative learning strategy in which small groups of learners with different levels of ability work together to achieve a shared learning goal (Tiantong, 2013).

This research investigates the use of various strategies of learning accomplished by the media run in the methods of cooperative STAD and its effect on the students' motivation. There are 4 purposes in this research. The first is to find out whether there are differences in the initial motivation and motivation of students who apply late STAD cooperative learning multimodal web-based on material reduction and oxidation. The second purpose is there a difference in motivation of learners who implement cooperative learning multimodal web-based group investigation compared to implement STAD cooperative learning on the web without material reduction and oxidation. For the third purpose is there any difference in increased motivation of learners who implement cooperative learning multimodal web-based group investigation compared to implement STAD cooperative learning on the web without material reduction and oxidation. And the last whether there is a significant increase on the motivation of learners who implement cooperative learning multimodal web-based group investigation.

RESEARCH METHOD

This research is an experimental research which has one factor, two samples, and one covariable. The factor is the implementation of cooperative multimodal learning of group student team achievement division (STAD), based on web. Two samples are students from class experiment and control. The class experiment I was class that used cooperative multimodal learning of student team achievement division (STAD) based on web and class control is class that implement cooperative of student team achievement division (STAD) without web. The covariable is students' chemistry prior knowledge taken from the school documentation.

There are three variables in this research. They are independents variable, controlled variable, and dependent variable. The independent variable is the implementation of cooperative multimodal learning of student team achievement division (STAD) based on web. The controlled variable is the students' chemistry prior knowledge, and the dependent variable is the students' motivation on chemistry learning. Chemistry learning motivation was measured by using a questionnaire, and the collection was done before and after the experiment.

Population of this experiment was grade tenth students of science class at SMAN 7 Purworejo in 2013/2014 academic year consisting of 156 students. The sample was chosen by purposive sampling method which was then divided into class experiment and control.

The instruments of this research consist of lesson plan, questionnaire and observation check list. The lesson plan was prepared for five meetings for each class. The lesson plan for class experiment is the lesson plan that implement cooperative multimodal learning of student team achievement division (STAD) based on web and the lesson plan for class control is the

lesson plan that implement cooperative of student team achievement division (STAD) type without web. The instrument should be valid and reliable. The questionnaire for motivation was validated by construct validation method. The design of this experiment can be observed in the diagram 1.

Diagram.1 : Flow Chart of Research
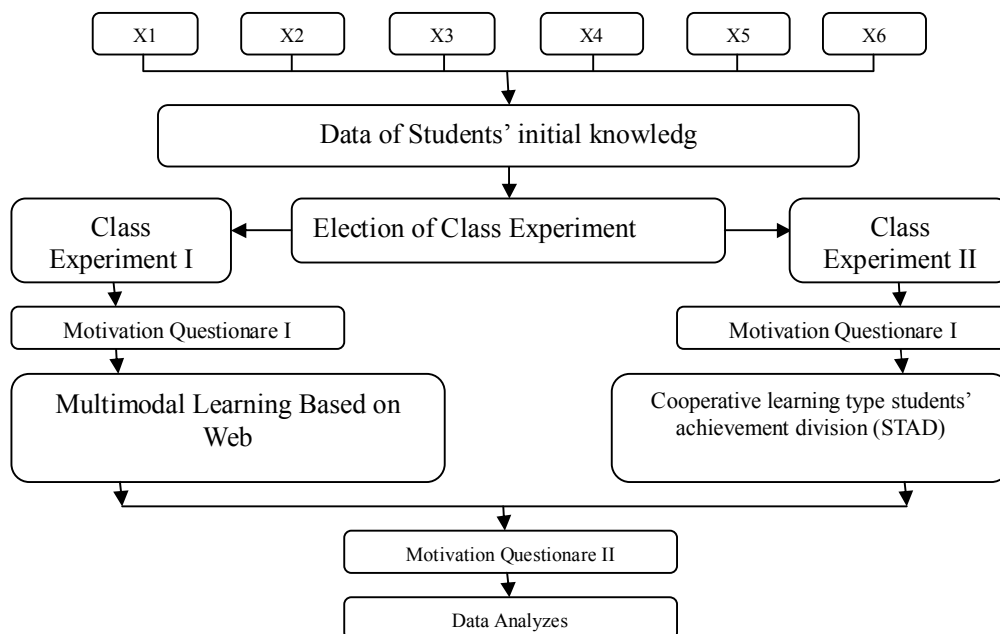
The media that used in this experiment class are power point, prezi, and e-book. This media has been validated by the validate (chemistry teachers and peers). There are some relevant notes from validatory about the look and lay out of writing such as writing a reaction, phase, or other type errors. While the content of the media was good. Notes from validatory were then used to revise and corrected the errors.

Data analysis included normality and homogeneity tests, before the paired sample t-test and the independent sample t-test. Normality was to find out that the data are in normal distribution. Homogeneity test was the test to check the homogeneity of the population. Paired sample t-test is to analyze the improvement of students' motivation before and after treatment, and independent sample t-test was to determine the difference of students' motivation from the experimental group compared to that from the controled group. When the improvement of students' motivation was significant, therefore, average normalized gain test was conducted.(Meltzer in Wiyono, 2013).
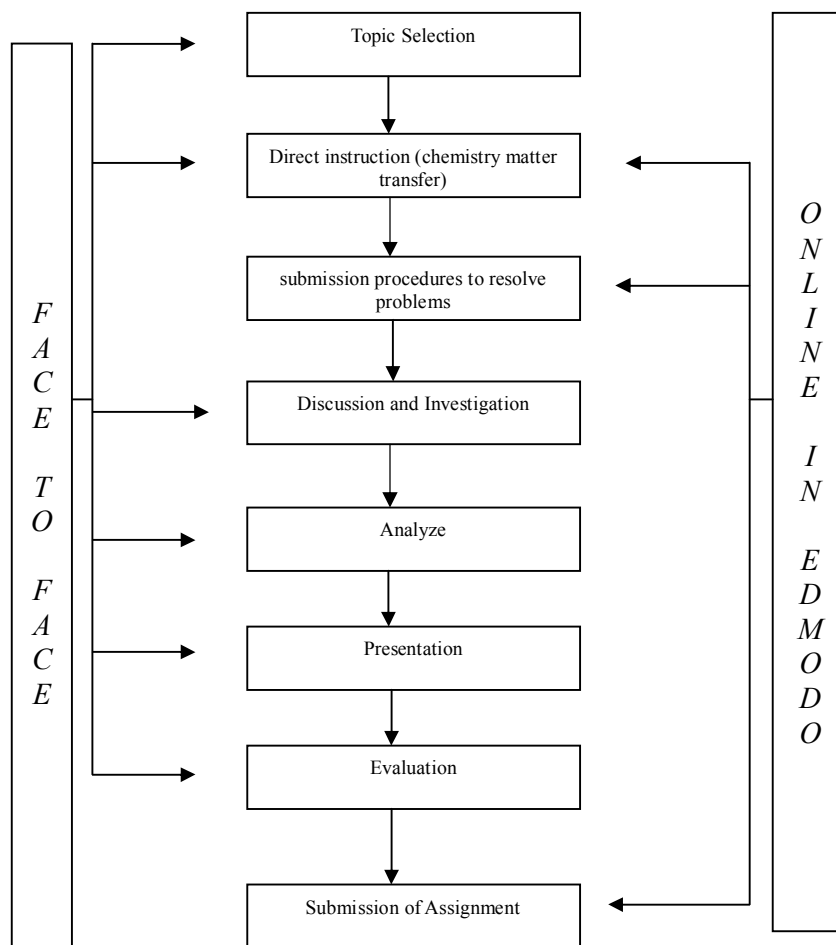
RESULT AND DISCUSSION

1. Design of the cooperative multimodal learning of student team achievement division (STAD) type based on web

Cooperative multimodal learning of student team achievement division (STAD) based on the web was conducted for five meetings. i.e. Four times of meetings was for teaching learning and once for the final test. Teaching and learning were always delivered with a group setting. Teacher divided students into six equal heterogen groups with different levels of students competencies. According to Slavin (2010), Student Team Achievement division (STAD), learners are grouped into several groups with diverse members of ability, gender, race and ethnicity. Students were not permitted to pick their own teams. Educators delivered learning materials in a face to face meeting and then the students were given a task that must be completed in a group to ensure that all members of the group have completed the lesson well. In this group, the smart student must help the other students who got difficulties in understanding learning matters. At the end of meeting, all learners acquired individual quiz on teaching materials and at the time the individual should not help each other because it was about team achievement division to which a reward was given to a good team.

Each group received instruction consisting of the list of work procedures, learning materials in the format of multimedia (e-book, Prezi and Power Point) in Edmodo, so the group can start to investigate, analyze, and synthesise the topic. Learning of Chemistry in this research was designed by using the mixture of face to face mode and other modes with the use of some multimedia. This study of learning was called multimodal learning. In this experiment, there were four of learning strategies has been implemented. They were demonstration, experiment, discussion, and games. In the first meeting, learning was on the topic of reduction and oxidation reactions in daily life by demonstration approach. With this approach, students' interest toward chemistry could be built and their motivation increased. At the second meeting, experimental strategy of learning was applied. In this meeting, students understood the learning matter well. At the third meeting, discussion strategy was utilized. At the last meeting, learning in games was chosen to study the compound nomenclature. In each meeting, students from all groups can ask the teacher about the tasks. The results of their task/assignment were presented in front of the class and uploaded to edmodo, so the other group was able to download and do cross check about their answers. Each group finally presented group discussion result, and the other groups raised questions. When the presentation and question time was over, each group answered questions listed on the work sheet. The best performance group will be given more stars or points that were accumulated in the final meeting. Teacher gave a reward to the best team. Teacher also had to confirm and emphasized the answers in the discussion group. So, this went to minimize the misconception that may occur. Teacher and students took the conclusion from learning process. The design of multimodal learning in the class of experiment was presented in the diagram 2.

Diagram.2 : Description of the Class Experimental

Based on the results, teaching learning in the class of experiment was more active than that in the class of control. Students were enthusiastic and they understood the topic well. So, the implementation of cooperative multimodal learning of student team achievement division (STAD) based on web was able to provide good learning environment generating students' joy of learning so that students learned independently, active, and high motivation.

2. Normality and Homogenity of Data

The data of students' motivation were analyzed for normality using SPSS 16.0. For the class experiment, the significance of the students' final motivation data was (p) $0.200 > (\alpha)$ 0.005. The significance for class control was (p) $0.101 > (\alpha)$ 0.005. All significances of the data were higher than 0.05, all sets of data were in normal distribution. The homogeneity test results showed that the sample was homogen, as showed by the significant value was more than 0.05, (p) $0.479 > (\alpha)$ 0.005.

3. The Effect of Multimodal Learning toStudents' Motivation

Analysis of data using paired sample t-test showed that the significance (p) value was $0.000 < (\alpha)$ 0.005. It meant that the motivation of students improved significantly in class experiment due to the multimodal learning, but in the class control, the motivation did not improve, as the p value was (p) $0.138 > (\alpha)$ 0.005.

In the independent sample t-test, the result analysis showed that the significant (p) value is $0.000 < (\alpha)$ 0.05. It meant that there was a significant difference between students' motivation in class experiment and class control due to multimodal learning based on web. There was also significant magnitude improvement of the class experiment compared to class control, as can be seen from the significant value of (p)$0.000 < (\alpha)$ 0.005. The gain test result showed that the significant improvement of students' motivation in class experiment was fair not quite high, with the average normalized gain test results of 0.26 (26%) of motivation improvement. The factors that may influence the improvement were:

a. Cooperative multimodal learning of student team achievement division (STAD) based on web was able to increase students' interest and the curiosity. As stated by Latifah (2008) that cooperative learning can strengthen students' motivation in different ways, like encouraging group development, promoting social and academic interaction among students, and encouraging successful group participation. This research showed that students' curiosity increased significantly after learning reduction and oxidation matter using the student team achievement division (STAD) in Edmodo. Besides that, teacher also gave some quiz in each face-to-face learning process and if students could solve the problems fast and right, they got more stars/points.

b. Cooperative multimodal learning of student team achievement division (STAD) based on web provided good learning environments. Fathul Imam (2013), said that Edmodo is a social networking platform that was designed as a medium of interaction between teachers and students in the online learning environment that was safe to share data, information and educational contents in the form of writings, documents, video, audio, photos, calendar, links that can be distributed either by teachers and students as well as special content in the form of grades, quizzes, event activities, assignments and polls by teachers that can be done anytime and anywhere, as well as parents can control the course of the study. So, student interaction with the teacher was more intensive and it can help students to better understand chemistry matter easily.

c. Cooperative multimodal learning of student team achievement division (STAD) based on web made learning more attractive and fun. Scott Amstrong and Jesse Palmer (1998) stated that use of STAD in the social studies classroom made learning fun, and students could understand the contents of learning easier.

d. Multimodal learning that completed by some media can give opportunities for students to choose media that were appropriate to their interest. Casey Heather (2012) said that the use of technology and digital modes of texts offered further opportunities for engagement, in part, because students found these tools inviting, but also because they had more opportunities to work with materials that were specific to their individual needs.

Based on the result, the conclusion is the cooperative multimodal learning of student team achievement division (STAD) based on web can improve student's motivation.

CONCLUSION AND SUGGESTION

The conclusion of this research are.

1. There was significant difference between initial motivation and final motivation of students in class that implemented multimodal learning based-web on material reduction and oxidation.

2. There was significant difference of motivation of students from the class that used multimodal learning based on web with the class which used cooperative learning type STAD without web.
3. There was signiffical difference of magnitude improvement of students' motivation from the class that used multimodal learning based on web with class which used cooperative learning type STAD without web.
4. There was little signiffical improvement of the students' motivation in the class that use multimodal learning based on web.

Authors would like to suggest:
1. If further research or similar research is carried out, the media should be validated empirically beforehand to see how effective the media when used by learners.
2. If a similar study is conducted, instructional media that are developed should be more innovative, variatif, and as attractive as possible so that students will be more interested in using it.

REFERENCES

1. Sharon Lynn KaganandVivienStewart,. (2005). *Education in a Global Era*. Phi Delta Kappan. Vol. 87. p185-187.
2. Ed. S. George Philander. (2008).*Encyclopedia of Global Warming and Climate Change*. Vol. 1. Thousand Oaks, CA: SAGE Publications. p189-193.
3. Heather Casey,.(2012).*Multimodal Learning Clubs*. Middle School Journal. Vol. 44. p39-48.
4. Dominic W. Massaro. (2012). *Multimodal Learning*: *Encyclopedia of the Sciences of Learning*. Universitas California, p. 1.
5. Eugene F. Provenzo, Jr. (2009).*Encyclopedia of the Social and Cultural Foundations of Education*. Ed. Vol. 1. Thousand Oaks, CA: SAGE Publications. p182-183.
6. MonchaiTiantong andSanitTeemuangsai,. (2013).*Student Team Achievement Divisions (STAD) Technique through the Moodle to Enhance Learning Achievement*. Vol. 6. p85-92.
7. Latifah A. Alharbi. (2008). *The Effectiveness of Using Cooperative Learning Method on ESL Reading Comprehension Performance, Student's attitudes toward CL, and Student's Motivation toward Reading of Secondary Stage in Saudi Public Girls' Schools*. Dissertation. West Virginia University.
8. Fathul Imam. (2013). *Efektifitas E-learning Melalui Media Edmodo Terhadap Hasil Bealajar Peserta Didik Pada Materi Statistika SMA*. Thesis of IKIP PGRI Semarang : Semarang.
9. Scott Armstrong and Jesse Palmer. (1998). Student Teams Achievement Divisions (STAD) in a twelfth grade classroom: Effect on student achievement and attitude. ***Journal of Social Studies Research***. Vol. 22.1 . p3.
10. Robert E Slavin. (2010). *Cooperative learning teori riset dan praktek*. Bandung: Nusa Media.
11. Wiyono. (2013). Pembelajaran Matematika Model Concept Attainment Meningkatkan Kemampuan Pemecahan Masalah Materi Segitiga. Journal of Education Research and Evaluation. Vol. 1. P51-54.