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GROUP INVESTIGATION ASSISTED E-LEARNING: ASSESSING THE IMPACT OF INTERACTIVE MEDIA ON STUDENT'S LEARNING ACHIEVEMENT AND CRITICAL THINKING

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ABSTRACT

Study aimed to investigate the effect of group investigation learning model assisted e-learning on student's learning achievement and critical thinking skills of students in grade eleventh SMAN 2 Balige. Interactive media used in the study was e-learning media has developed by researcher. Method used was here developmental and queasy experimental method with sample was class XI IA 2 and XI IA 3. For developmental stage, e-learning media was developed by Luther model. Result of research showed that screen design effectiveness 66%; media operation 80 %; format and organizing 80%; content assessment 82.5%. Average percentage of small (10 teachers and 10 students) and large (26 students of SMAN 1 Berastagi) validation was 93%. At last for e-Learning media showed categorized as good. Instrument test used consists of cognitive and critical thinking test. Average of post test for cognitive test and critical thinking in experimental group was higher than control group. It means there was significant difference of students' learning achievement and critical thinking skill that taught by using e-learning media.

***Keywords**: e-Learning Media, Group Investigation*

INTRODUCTION

Biology is a subject-specific knowledge of biological systems and concepts that provide the knowledge, skills, responsibilities to the environment, and process of discovery (19). A biology course allows students to develop practical and technical skills from laboratory sessions, communication skills are learned through report writing and making presentations, teamwork skills are developed through group projects, problem-solving skills are obtained from critical analysis to a case and issue.

Learning of biology should be carried out with emphasis on the direct learning experience through the use and development of process skills and scientific attitudes that needs critical thinking skill (6). The facts indicate that the learning of biology conducted predominant in the memorizing the concept. Biology lessons at school are more geared to the mastery of knowledge and lack of developing a scientific attitude (19). The National Assessment of Educational Progress (NAEP) as the nation's report card in America reports that the

development of advanced reasoning abilities has declined in 12th grader because students are not learning how to think.

The interview result with biology teacher in SMAN 2 Balige obtained percentage of students that did not fulfill the score criteria of minimum completeness (KKM) 76 on semester final exam 2010/2011 was 48% in grade eleventh. The results of the National Final Examination (UN) 2009/2011 for Science lesson that achieved by students were relatively low. Biology was the most potentially lesson lead to failure when compared to Physics and Chemistry (20). Studies of science teaching in the late 1990 led to the observation that most teachers used the didactic methods of instruction and determined that "many students were low learning achievement, mastering disconnected facts in understandings and problem solving skills" .

Learning biology in high school had a lot of experience difficulties caused by the physiological abstract concepts of biology material that need analyzing, reasoning and critical thinking skill (8,18)). Digestive system topic is categorized difficult to comprehend because of its complicated characteristics which deal with complex physical and chemical mechanism. It is supported by the low of average percentage achievement of National Examination 2008/2009 on digestive system topic in some areas like as Kab Nias, Kab. Binjai, Kab.Siantar and Kab.Tobasa are 64% that can reach KKM (20).

The increasing of student's learning achievement and critical thinking in the learner necessary changes in methods, models and learning media in the school. SMA Negeri 2 Balige still use teacher centered learning thus creates the passive learners focused on teacher, learners are not accustomed to think critically. Learning media used by teacher is not internet based yet and does not stimulate to student's critical thinking skill (Source: prelimiery observation).

Group Investigation learning model is offered in order to foster student's learning achievement and critical thinking. This model provide students to discuss and solving physiological abstract concepts, cognitive restructuring leads, enhance elaborative thinking, more receiving of explanation which has the potential to increase depth of understanding (11, 21). Research by Johnson (33) showed that cooperative learning enhanced more positive learning result towards subject members.

The traditional teaching style is no longer sufficient for learners (9, 16). Internet based learning (e-learning) can construct a new learning style through internet. From the educational point of view, the e-learning media is more superior than the other learning media because this media contents illustrate the richness and diversification that combines sound, image, picture, motion and words, create life-time learning model in which the learner is the center of learning

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activities (18). E-learning assists learning and cognitive construction, pushes resource sharing and quiz online that can improve student's critical thinking.

ICT and Science Teaching. Learning of complex science issues often requires not only acquisition of new knowledge, but also changes in students' deeply entrenched intuitive conceptions.This kind of learning is referred to as conceptual change (13, 14). Information and Communication Technologies (ICT) enable multiple representations of concepts foster experimental study and enable the creation of models and problem solving applications (3, 5). However, modeling theory suggests that these are the wrong units whereas models represent the correct ones.

Hestenes (21) states that most science problems are solved through the selection of a model that provides the answer to the problem following model-based inference. Problem solving is important, but it should be subservient to modelling. ICT tools aim to actively involve students in the research process and offer teachers the opportunity to work under conditions that could not be traced in a traditional learning environment. Implementation of e-Learning could eventually lead to a total automation of administrating the teaching and learning processes.

Group Investigation Learning Model. Cooperative learning type Group Investigation (GI) was first applied by Thelan. According Winataputra (21) the nature of Group Investigation characterized by decisions that are developed by the group experience in the context of problems that become a central point in learning activities. Teachers and pupils have equal status before the problem is solved with different roles. The primary responsibility of teachers is to motivate students to work cooperatively and to think the problems that go on in learning. In this class discussion is considered the priority of students' thinking exchange (4, 7)

e-Learning media help students to comprehend the learning topic easier so increasing students' learning achievement and critical thinking skills. For educator, e-learning media can be used as a media of learning to create the interactive learning activities. For school, optimizing facilities and infrastructure in schools that can support the learning process.

METHODOLOGY

Instrument Tested. Instrument was tested to 58 student's in class XI IA 2 and XI IA 3 at SMAN 2 Balige. The research instrument used in this study was instrument for assessing learning media in questionnaire form. The criteria on the results of the questionnaire responses were determined by Likert scale. Instrument for assessing students' learning achievement and critical thinking skill in multiple choice and essay test.

Subjects. This research was conducted at SMAN 2 Balige in Jalan Kartini Sopo-surung Balige. The population in this research was grade eleventh of dorm students at SMAN 2 Balige. The sample was selected by random cluster sampling with taking 2 (two) classes namely clas XI IA 2 and XI IA 3.

Research Design and Procedure. The developmental research model for developing e-learning media use Luther (12) model consists of five stages namely need assessment, planning, material collecting, assembly, developmental stage. Procedure of e-learning media development can bee seen in Figure 1.

Data Analysis. Requirement testing for data analysis used normality, homogeneity test, and percentage citeria for questionnaire and observation data. Determining the increasing of learning achievement and critical thinking by using t-test. If $t_{obs} < t_{table}$, H_O will be accepted and Ha will be rejected. If $t_{obs} > t_{table}$, H_O will be rejected and Ha will be accepted.

Interactive learning media validated by material and media expert on human digestive system sub unit. Result of this assessment considered as first revision. Second validation was done by small group (ten teachers students). Result of this assessment considered as second revision. Next, field testing in SMAN 1 Berastagi with 26 students were as the subjects. This final validation will be the last assessment to produce the final output of interactive e-learning media.

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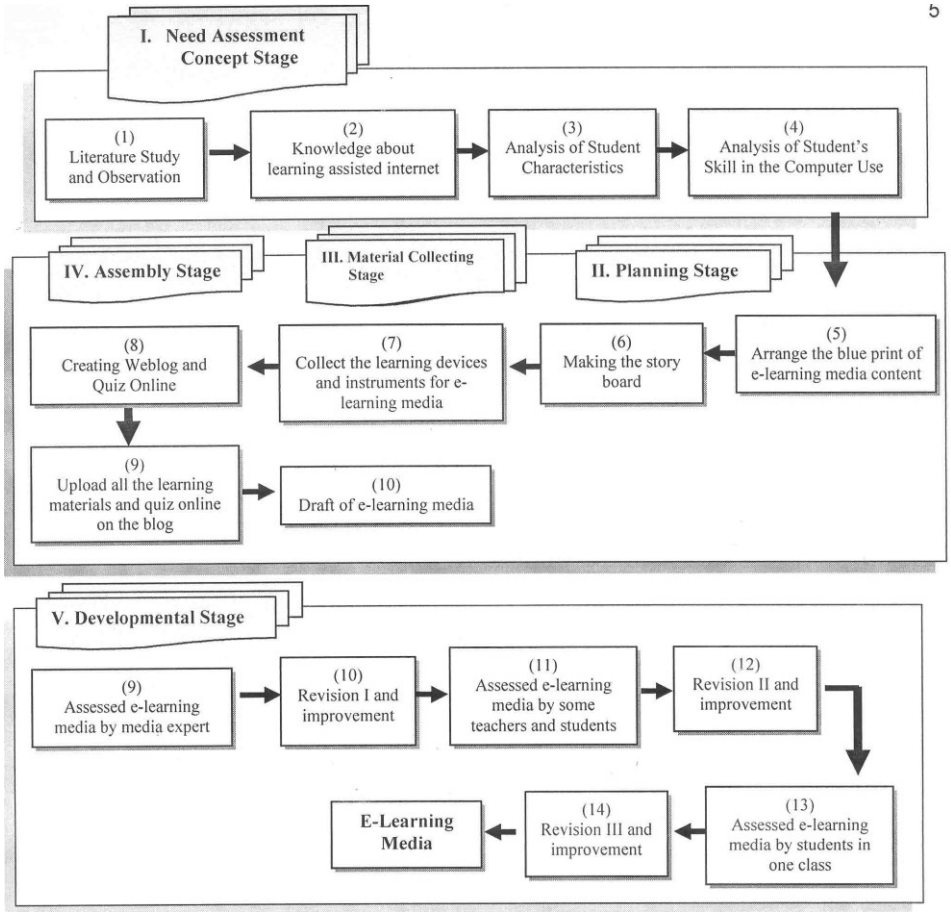

Figure 1. Procedure of e-learning media development (Modification of Luther Model, 2003: 32)

RESULT AND DISCUSSION

Interactive Media (Product of Media Development). Based on the script written, e-learning media consists of 3 parts, namely: Home, which contains the learning materials that can be downloaded in the home menu, Digestive system article in the header contains information about digestive system topic. And Menu of learning materials contain biology topic from grade X until grade XII. The design of weblog, quiz online screen has been made can be seen in Figure 2 and Figure 3.

Validation by the matter expert. The examiner stated e-learning media helped teacher to create the interactive learning atmosphere at class and mark could be sent into students' email. The percentage of content assessment aspect achieved with an average percentage of 82.5% categorized feasible and suitable as a media of learning.

Validation by the media expert. The feasibility of instructional e-learning media based on the aspects of visual; display aspect and design were 73.63 % which categorized as feasible category. It means e-learning media can be tested to population target at class

Figure 2. Screen design of weblog

Figure 3. Screen design of quiz online

Validation by the students and teachers. The assessment of e-learning media evaluation by ten students and teachers was about 90% for quality of content and learning materials; 84% for indicator technical quality of e-learning media. It means that the e-learning media categorized as very decent category. The large scale assessment held in in SMAN 1 Berastagi was 93%

Experimental Results (The Impact of Interactive Media). The cognitive test and critical thinking results both in control and experimental class can be seen in Figure 4 and Figure 5. Most of students (85%) prefer to study by Group Investigation (GI) learnning model assissted e-Learning media that can be seen in this following Figure 5. The implementation of e-Learning media gives the better result to student's critical thinking

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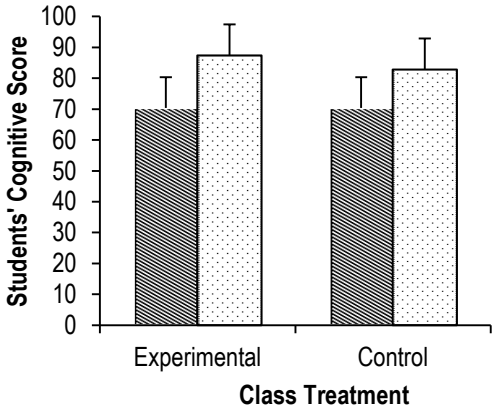

Figure 4. Student's achievement ($\bar{X}$±SD) before (pretest) and after (post test) using e-learning media and without e-learning media. Values of score was measured by using Paired t-test with t_{obs}= 4.015; p=0.05, n=29. Error bar indicates standard deviation.

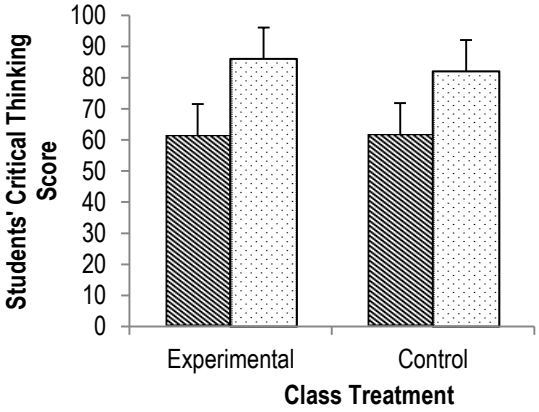

Figure 5. Critical thinking (±SD) before (pre test) and after (post test) using e-learning media and without e-learning media. Values of score was measured by using paired tail t-test with tobs= 2.173; p=0.05, n=29. Error bar indicates standard deviation

Learning response. 93.10 % of students prefer to study by using e-learning media during teaching and learning in the class. Students were interested in learning by using e-learning media tested caused e-learning media gave students more opportunity to learninteracively, the existence of feedback to students work. Problem cases in worksheet given by teacher can foster students' critical thinking and motivation in learning In other hand, 86.6% of students gave positive answer for implementing cooperative learning during teaching and learning in the class.

Learning achievement and critical thinking. The result showed that there was positive influence of using e-learning media to the student's learning achievement and critical thinking on the digestive system topic. Based on the observation, all critical thinking attitude items (100%) appear in the experimental and control in the last meeting. Learning which emphasizes self-learning could encourage students to learn better. It is proved by opinion Hijazi (1,2) states that sstudents wish to have a more substantial offer concerning such courses and, consequesntly, the participation could be greater. The increase of the technology will contribute to the technological competence of the student. Thus, students may demand implementation of more sophisticated technolo-gical equipment in the educational environment.

Students need a new substantial thing in learning. Consequently, the utilization of technology as learning media was important issue in the education side. Educator could take advantage of learning with this technology to enhance the critical thinking skill. The meaningful learning and psychological atmosphere can build wonder students' learning experience. Piaget states that every individual has the ability to think ranging from children to adults are constantly evolving toward higher levels of thinking.

E-learning media also developed by biology article, quiz online and biology learning video. The questions in the quiz online and problems like as study case written by teacher in box chatting involved students to answer the problem by using critical answer that need critical thinking. Students could access the previous learning topic in the home so enrichment of learning materials not only focusedmon the handbook and textbook of student from school. Rusyan Saragih (15,17) states the students have had the potential within themselves to find their own learning information independently. The interactive media could provide a way to convey and clarify the concept, train students to become more effective in developing the concept. This learning method also increased the motivation to learn which was characterized by high student's learning response in the classroom.

CONCLUSION AND RECOMENDATION

E-learning media was developed is very effective as an interactive learning media. The use of Group Investigation assisted e-learning media has a positive effect on student's learning achievement and critical thinking. Implementation of interactive learning media in class has able to stimulate the student's critical thinking attitude. Biology teachers should apply the innovative learning media to improve student's learning achievement and critical thinking.

REFERENCES

[1] Bates and Wulf. 1996. *Web-Based Instruction. Educational Technology Publications.* New Jersey: Englewood Cliffs.

[2] Brown, Sally. 2003. *Computer Assisted Assessment in Higher Education.* New Delhi: Cres Publishing House.

[3] Bull, J. et al. 2003. "Assessing Learners Through the WWW, Computer Networks and ISDN Systems." *Journal of Educational Technology and Society,**3**:1-7*

[4] Djamarah. 2002. *Strategi Belajar Mengajar.* Jakarta: Rineka Cipta.

[5] Dongsong, Z. et al. 2005. "Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness." The Journal of the Learning Sciences, 43 (2006) 15–27.

[6] Edelson, D. C., Gordin, D. N., & Pea, R. D. 1999. *"*Addressing the challenges of inquiry based learning through technology and curriculum design*." The Journal of the Learning Sciences*, **3:**391- 450.

[7] Farland. 1996. *Media in teaching. In M. Wittrock (Ed.). Handbook of Research on Teaching (*3rd edition*).* New York: Macmillan.

[8] Fisher, Alec. 2007. *Critical Thinking.* USA: Cambridge University Press.

[9] Ginnis, Paul. 2008. *Trik dan Taktik Mengajar.* Jakarta: PT Indeks.

[10] Harckbarth, Steven. 1996. *The Educational Technology Handbook*. New Jersey:Engle Wood Clifts.

[11] Heinich, et al . 1996 . *Instructional Media and Technology for Learning*. New Jersey: Prentice Hall, Inc.

[12] Luther, Arc C. 1994. *Authoring Interactive Multimedia*. Boston: AP Professional

[13] Mayer. 2001. *Instructional Media and Technologies for Learning.* New Jersey: Prentice Hall.

[14] Moore. 2005. *Technology, E-learning and Distance Education.* London: Routledge Falmer.

[15] Norris, S and Ennis, R. 1989. *Evaluating Critical Thinking*. New York: Pacific Grove.

[16] Pazos. 2002. "*The Educational Technology Handbook."* New Jersey: Educational Technology Publication.

[17] Savin and Baden. 2000. *Instructional Media and Technologies for Learning.* New Jersey:Prentice Hall.

[18] Sheybeni. 2004. *E-learning.* Jakarta: Gramedia.

[19] Simanjuntak, Maria. 2012. *Skripsi.* FMIPA. Medan: UNIMED.

[20] Pusat Pengembangan Media Pendidikan (PPMP). 2009. Universitas Negeri Semarang.

[21] Slavin, R.E. 1995. *Cooperative Learning*. Second Edition. Boston: Allyn and Bacon.