



Prosiding Seminar Nasional Biologi dan Pembelajarannya
Medan, 23 Agustus 2014

MAKALAH PENDAMPING

#4
PENDIDIKAN

THE
Character Building
UNIVERSITY



THE DEVELOPMENT OF E-LEARNING MEDIA AND ITS EFFECT ON STUDENT'S LEARNING ACHIEVEMENT AND CRITICAL THINKING IN GRADE XI IA SMAN 2 BALIGE

Wenny Pintalitna

Biology Education Department, PPs UNIMED Medan. Jl. Willem Iskandar Pasar V Medan
20221. Email: wenny.tarigan@gmail.com

ABSTRACT

The type of this study was Research and Development. This study has purpose to develop e-learning media of digestive system and know its effect on learning achievement and critical thinking skills in grade eleventh SMAN 2 Balige. For developmental stage, e-learning media was developed by Luther model. Questionnaire was the instrument that used in validation stage. Result of expert assessment showed that screen design effectiveness 66%; media operation 80 %; format and organizing 80%; content assessment 82.5 %. Average percentage of small and large validation were 93%, it means e-Learning media showed categorized as good. After e-learning media stated as valid, it was implemented to see the effect of e-learning media toward the learning achievement and critical thinking. Sample was class XI IA 2 and XI IA 3. The data were analyzed quantitative and qualitatively. 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. There was significant difference of students' learning achievement and critical thinking skill that taught by using e-learning media.

ABSTRAK

Penelitian ini menggunakan desain penelitian Research and Development. Penelitian ini bertujuan untuk mengembangkan media belajar e-Learning pada materi sistem pencernaan dan mengetahui perbedaan hasil belajar juga keterampilan berpikir kritis siswa dengan menggunakan model pembelajaran Group Investigasi berbantu media e-Learning di kelas XI SMAN 2 Balige. Pada tahap pengembangan, media e-Learning dikembangkan dengan menggunakan model Luther. Hasil penilaian produk oleh pakar menunjukkan bahwa efektivitas desain layar 66%, operasi media 80%, format dan organisasi warna 80%, konten 82,5%. Rata-rata persentasi validasi skala kecil dan besar adalah 93%. Media e-Learning yang dikembangkan dalam kategori baik. Sampel dalam



penelitian ini yaitu kelas XI IA 2 dan XI IA 3. Teknik analisis data secara kuantitatif dan kualitatif. Uji Instrumen menggunakan tes kognitif dan tes berpikir kritis. Rata-rata nilai post tes untuk tes kognitif dan berpikir kritis pada kelompok eksperimen lebih tinggi dari pada kelompok kontrol. Hal ini menunjukkan adanya perbedaan yang signifikan pada hasil belajar siswa dan keterampilan berpikir kritis yang diajarkan dengan menggunakan media e-Learning.

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 (Budimansyah, 2002:34). This 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 and seminars, problem-solving skills are obtained from critical analysis to a case.

Learning of biology should be carried out with emphasis on the direct learning experience through the development of process skills and scientific attitudes that needs critical thinking skill (BSNP, 2006). The facts indicate that the learning of biology conducted predominant in the memorizing the concept. Students have not been taught to understand the information and relate it to life. Science lessons at school are more geared to the mastery of knowledge and lack of developing a scientific attitude (Meita, 2012:1). The National Assessment of Educational Progress (NAEP) as the nation's report card in America reported that the development of advanced reasoning abilities has declined in 12th grader because students did not learn how to think.

The interview result with biology teachers 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 (Source: BSNP Puspendik). 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" (National Research Council, 2000:17).

Learning biology in higher school had a lot of experience difficulties caused by the physiological abstract concepts of biology material that need analyzing, reasoning and

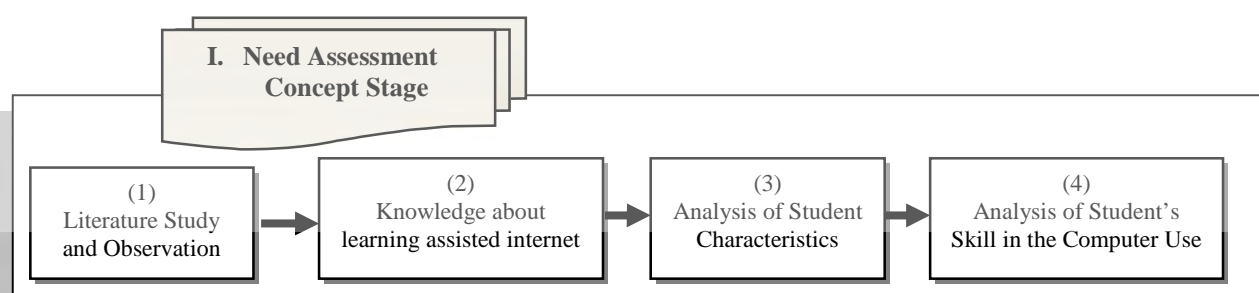


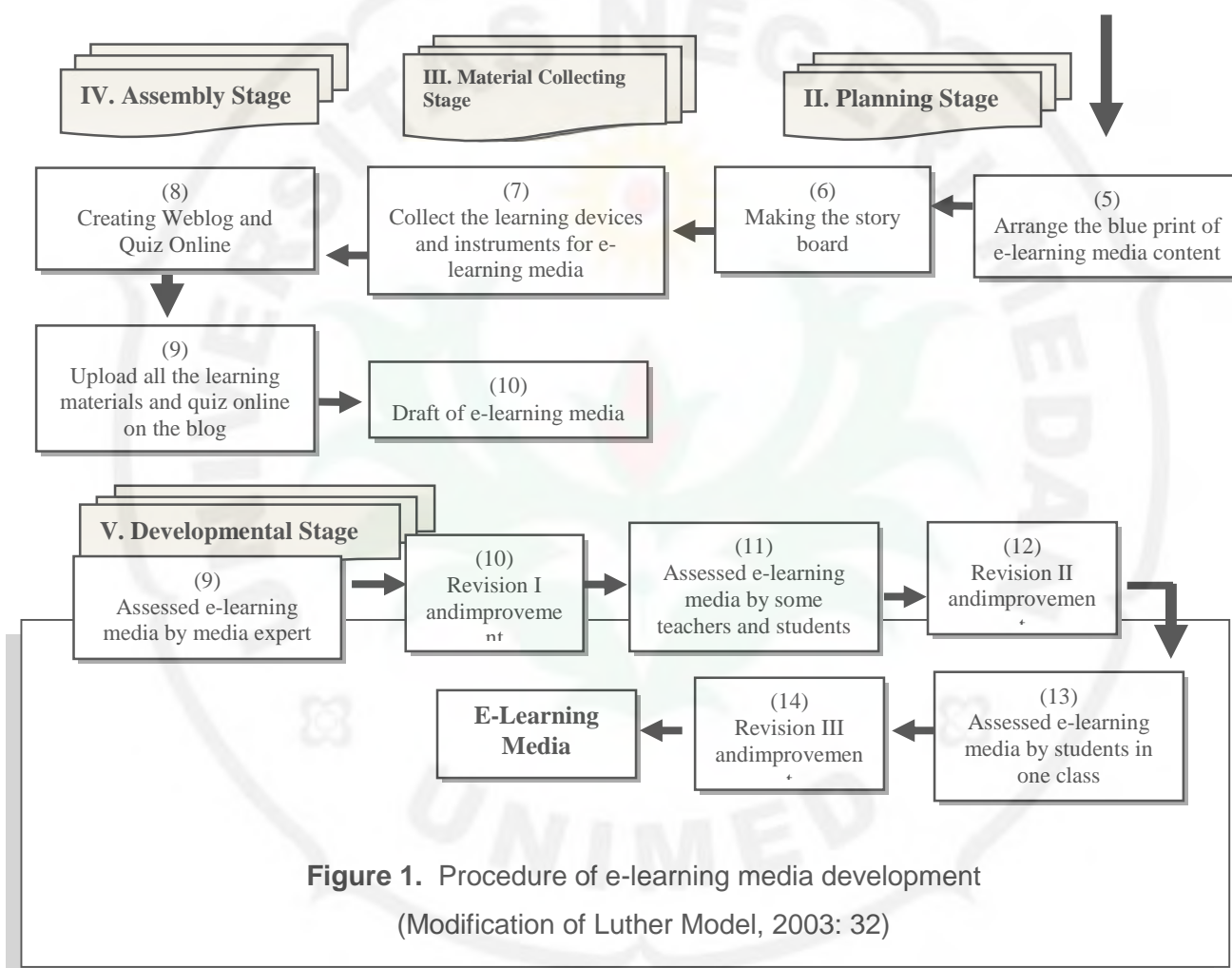
critical thinking skill (Lazarowitz, 1992). Digestive system topic is categorized difficult to comprehend because of its complicated characteristics which deal with complex physical and chemical mechanisms. It was supported by the low of average percentage achievement of National Examination 2008/2009 on digestive system topic in some areas like as Kab Nias, Kab. Binjai, Kab.Siantar and Kab.Tobasa are 64% that can reach KKM (PPMP, 2009).

The increasing of student's learning achievement and critical thinking in the learners necessary change in methods, models and learning media at school. Most of teachers in SMA Negeri 2 Balige used teacher centered learning approach thus created the passive learners focused on teacher, learners were not pushed to think critically. Learning media used by teacher was not internet based and did not stimulate student's critical thinking skill yet (Source: preliminary observation).

Group Investigation (GI) learning model provides students to discuss and solve the physiological abstract concepts, cognitive restructuring leads, enhance elaborative thinking, more receiving of explanation which has potential to foster student's understanding and critical thinking (Johnson,1986). Group Investigation assisted learning media characterized by decisions that are developed by the group experience in the context of problems that become a central point in learning activities. The primary responsibility of teachers is to motivate students to work cooperatively and to solve the problems critically that go on in learning. In this class discussion is considered the priority of students' thinking exchange. Research by Johnson (1991) showed that cooperative learning assisted media enhanced more positive learning result in each learner. One of learning media is computer assisted.

Computer-assisted teaching using internet (e-learning) can construct a new learning style. The e-Learning media is more superior than the other learning media because this media contents illustrate and combine sound, image, picture, motion and words, create life-time learning model in which the learner is the center of learning activities (Jhang,2004). E-learning assists cognitive construction, developed by resource sharing and quiz online. (Pazos, 2002:34). These facilities help students to discuss and find the answer in group discussion about complex science issues faced. Learning of complex science issues requires deeply entrenched intuitive conceptions. This kind of learning is referred to as conceptual change (Limon & Mason, 2002).





Information and Communication Technologies (ICT) enable multiple representations of experimental concepts and enable the creation of problem solving applications (Duit, 1995). Hestenes (1999) stated that most science problems were solved through the selection of a model that provided the answer to the problem following model-based inference. ICT actively involves students in the research process and gives teachers the opportunity to work under conditions that could not be traced in a traditional learning environment.

e-Learning media helps students to comprehend the learning topic easier so improving students' learning achievement and critical thinking skills. e-Learning media can be used as an interactive learning media by optimizing facilities and infrastructure in schools that can support the learning process.

METHODOLOGY

Questionnaires for assessing e-Learning media tested to 58 students in class XI IA 2 and XI IA 3 at SMAN 2 Balige were determined by Likert scale. The sample was selected by random cluster sampling. Instrument for assessing students' learning achievement and critical thinking skills were multiple choice and essay test. The development of e-learning media used Luther (2003:32) model consisted of five stages namely need assessment, planning, material collecting, assembly, developmental stage than can be seen in Figure 1.

e-Learning media created was validated in small and large scales. The revision process of e-learning media can be seen in Figure 2.

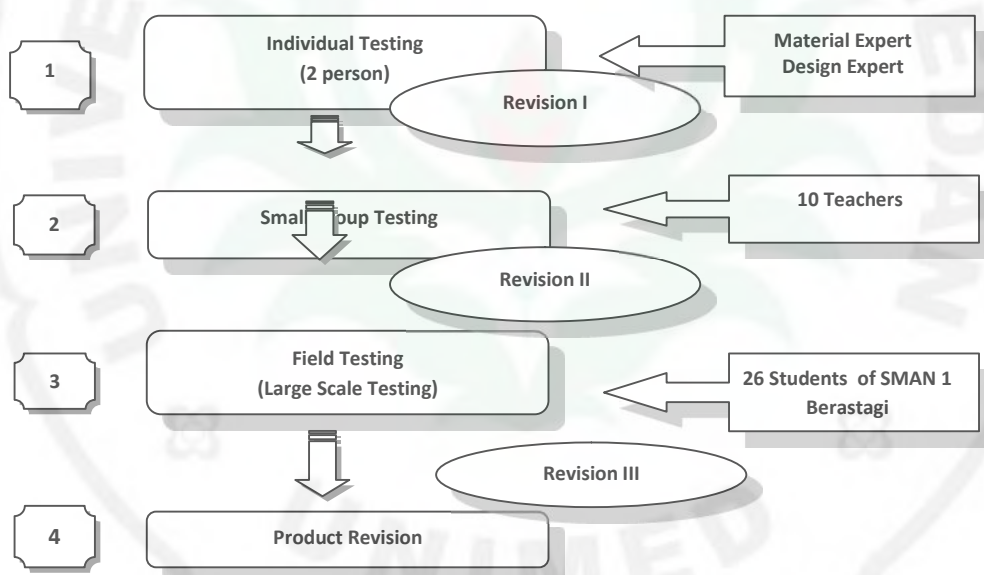


Figure 2. Validation process of e-Learning media

Pre test and post test were administered both of experimental and control class before and after treatment that can be seen detail in this following Table 1.

Table 1. Experimental research design

Group	Pre Test	Treatment	Post Test
E		X	
C		Y	

Note: E = Experimental Class

C = Control Class

X = Group Investigation assisted e-Learning media

Y = Group Investigation Learning Model

Data was analyzed by using normality, homogeneity test, and percentage for each questionnaire and observation data. The increasing of learning achievement and critical thinking determined by using t-test. If $t_{obs} < t_{table}$, H_0 will be accepted and H_a will be rejected. If $t_{obs} > t_{table}$, H_0 will be rejected and H_a will be accepted.

RESULT

Result of Developmental Research

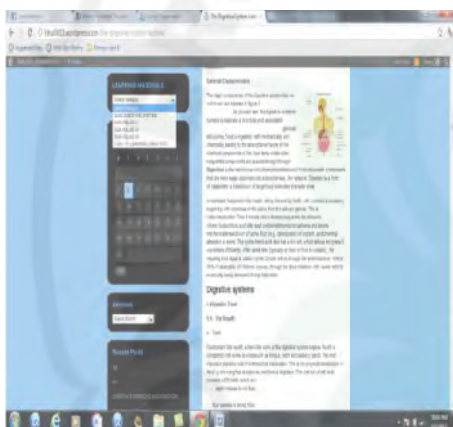


Figure 3. Screen design of weblog

Based on the script written, e-learning media consisted of 3 parts, namely:

- Home contained learning materials that can be downloaded in the home menu.
- Digestive system articles in the header contained information about digestive system topic.
- Menu of learning materials contained biology topic from grade X until grade XII.

Design of quiz online screen has been made can be seen in this following Figure 4.



Figure 4. Screen design of quiz online

The result of media and content expert assessment, there was indicators of the assessment criteria for effectiveness screen design that should be revised. They were the

introduction display and music used in quiz online. In other hand there was some aspects that did not necessary to be revised from biology material content expert.

Percentage of student's response to the implementation of e-learning media and GI learning model reached more than 85% prefer to study by using e-Learning media that can be seen in this following Figure 8. The implementation of e-Learning media gave the better result to student's critical thinking.

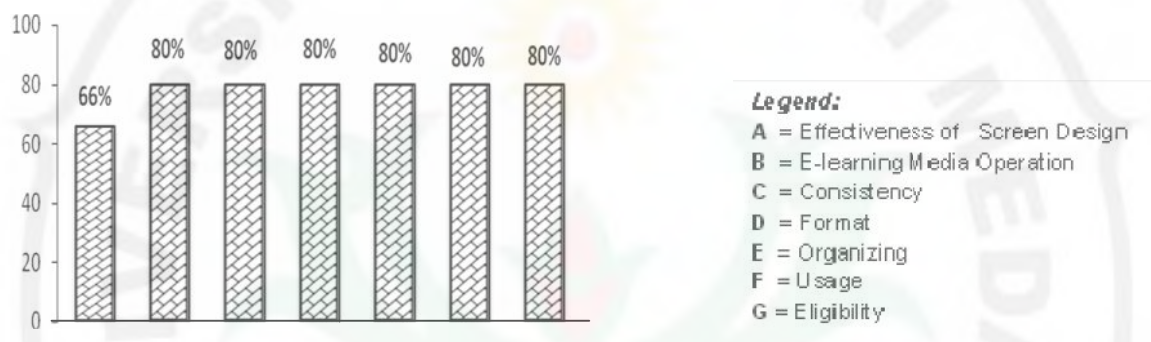


Figure 5. E-learning media assessment by media expert (% values refer to refer to the of media evaluation). Value of assessment was measured by using Likert scale with scale 1-5. The assessment was conducted before treatment in SMAN 2 Balige

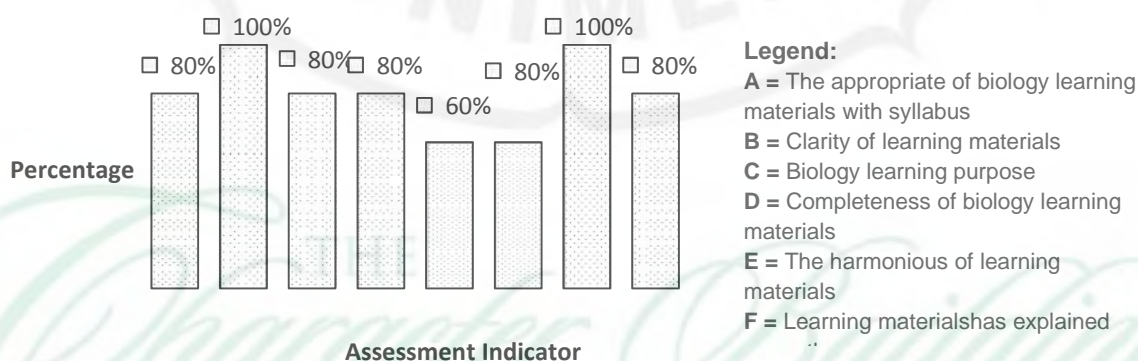


Figure 6.E-learning media assessment by content expert (% values refer to the of content evaluation). Value of assessment was measured by using Likert scale with scale 1-5. The assessment was conducted before treatment in SMAN 2 Balige

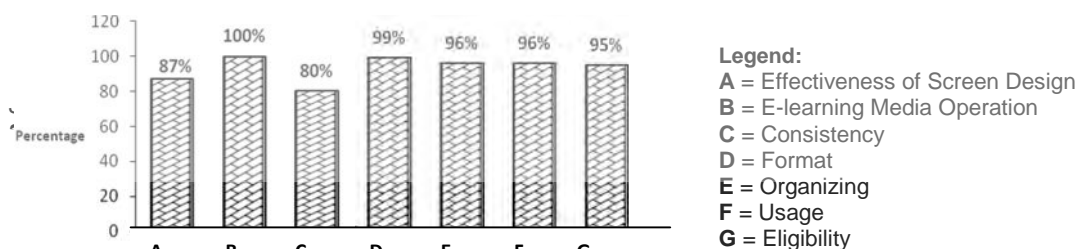
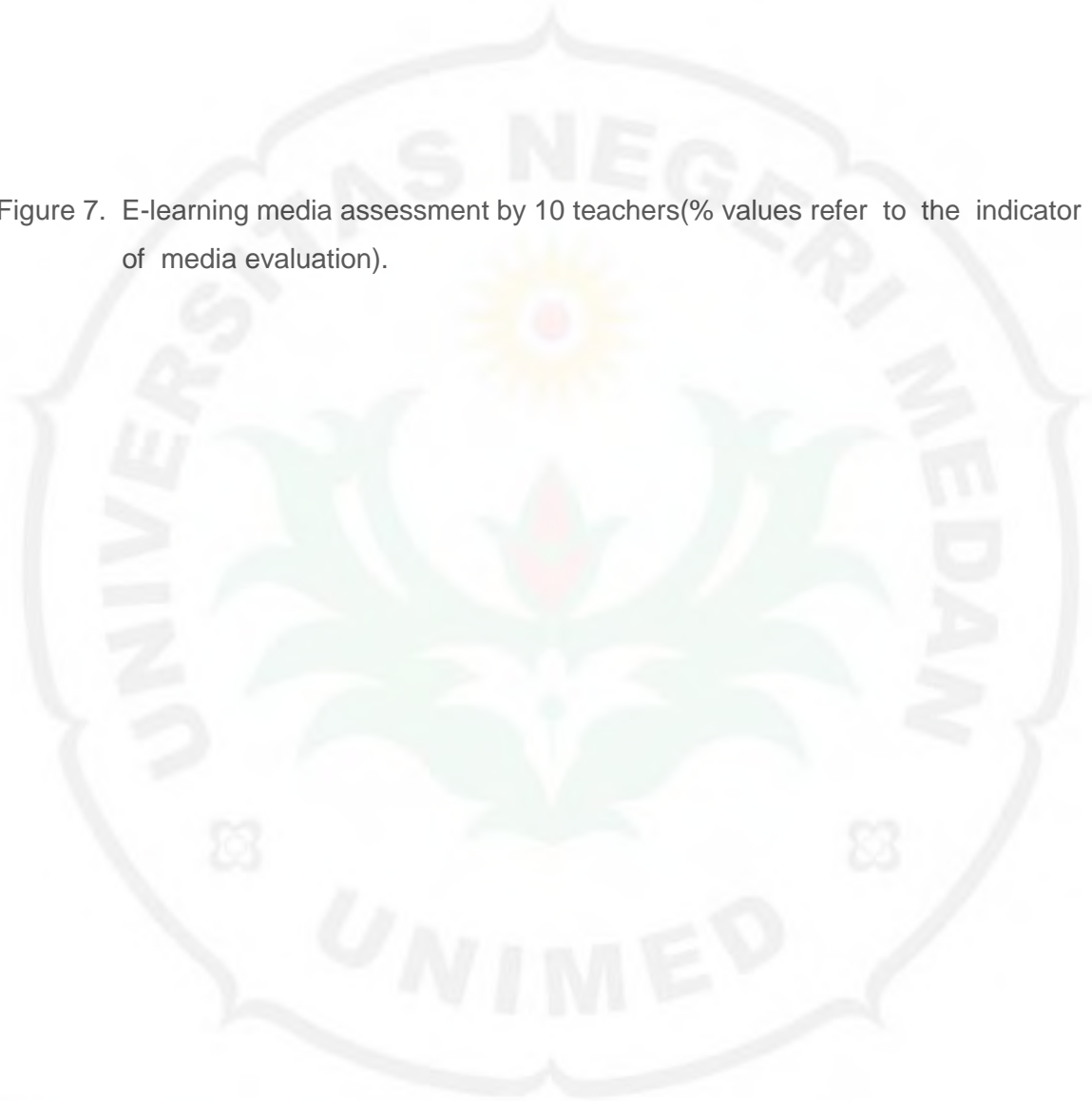




Figure 7. E-learning media assessment by 10 teachers(% values refer to the indicator of media evaluation).



THE
Character Building
UNIVERSITY

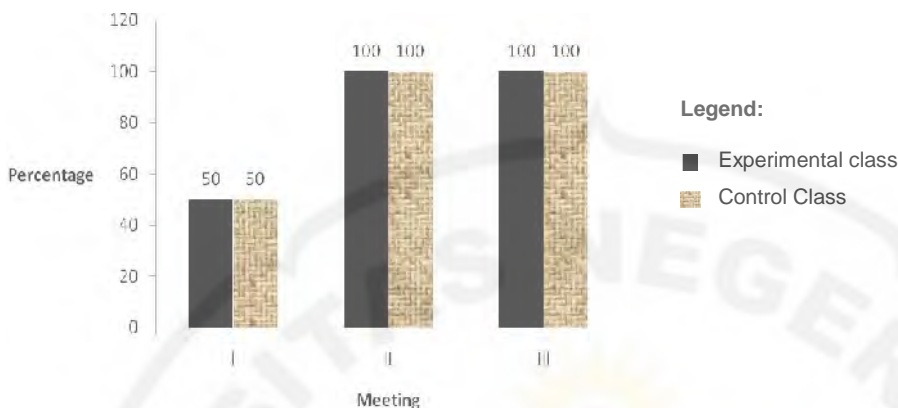


Figure 8. Percentage of students response to learning activity in control and experimental class. Values of percentage was measured by using Likert scale hold in the last meeting

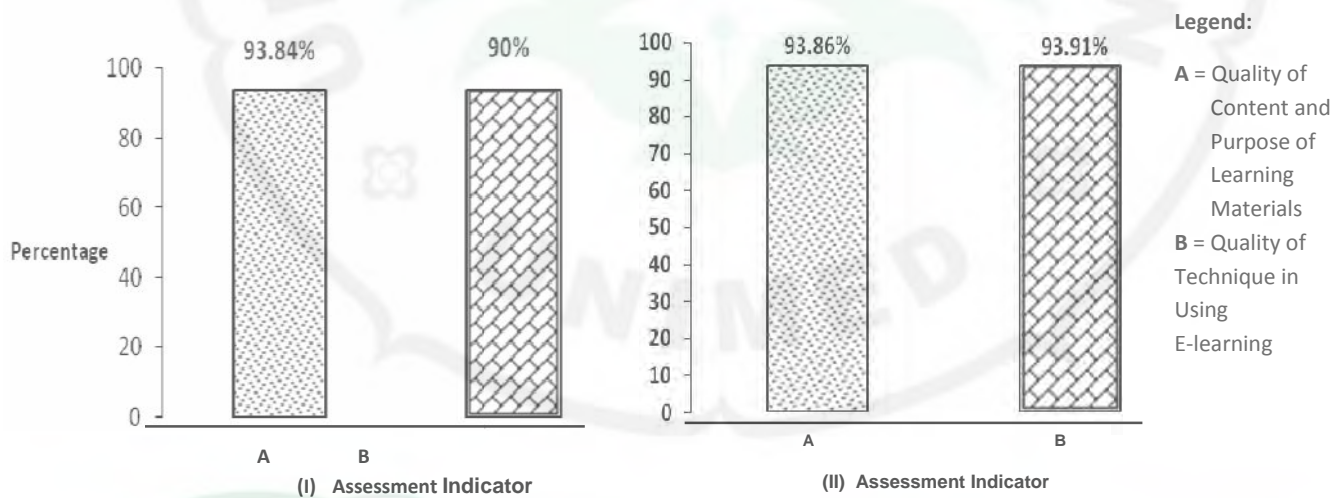


Figure 9. E-learning media assessment by 10 students (I) and 26 students (II) at SMAN 1 Berastagi. Value of assessment was measured by using positive and negative answer

Result of Experimental Research

The value of cognitive test and critical thinking result both in control and experimental class can be seen in this following Figure 10 and Figure 11.

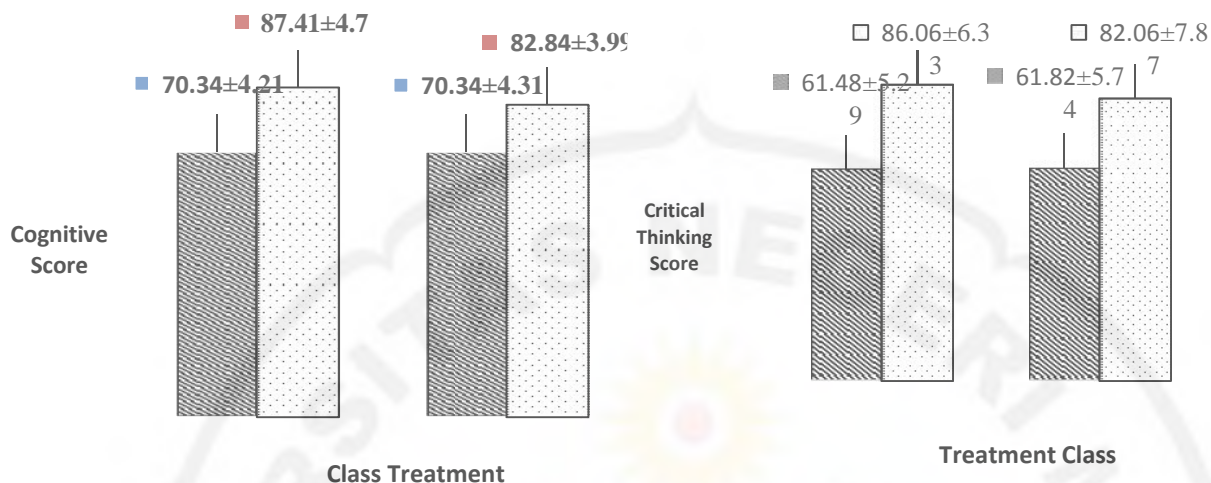


Figure 10. Student's achievement ($\bar{X} \pm SD$) before (pre test) and after (post test) using e-Learning media and without e-Learning media. Values of score was measured by using paired t-test with $t_{obs} = 4.015$; $p = 0.05$, $n = 29$. Error bar indicates standard deviation.

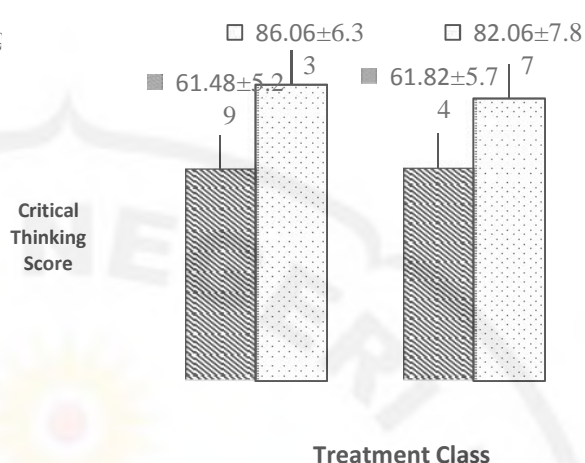


Figure 11. Critical thinking ($\pm SD$) before (pre test) and after (post test) using e-learning media and without e-Learning media. Values of score was measured by using paired tail t-test with $t_{obs} = 2.173$; $p = 0.05$, $n = 29$. Error bar indicates standard deviation.

DISCUSSION

a. Developmental Research

- Matter Expert

Based on the content expert assessment found that the learning materials has uploaded was less of clarity and harmonious. It was caused, the learning materials did not sort based on the level of degree yet by researcher. The assessor stated e-learning media provided teacher to make learning evaluation easily during learning in the class and the mark could be sent into students' email directly which made efficiency of time. The percentage of content assessment aspect achieved with an average percentage of 82.5% categorized feasible and suitable as a media of learning eventhough should be revised accordance with the suggestion given.

- Media Expert

Media expert assessed the effectiveness of weblog screen design was not enough good. It was caused the featured music in blog was too loud, composition of background color with color of text in blog and quiz online were contrast and blur, quality of animation in blog and quiz online were still two dimensions, the size of font in quiz online was smaller. The feasibility of instructional e-learning media based on the aspects of visual; display aspect and design were 73.63 % which categorized was feasible category. This meant that e-learning media fitted for using during learning process eventhough should be revised accordance with the advice.

- Students and Teachers

The result of e-learning media evaluation by ten students and teachers got the average percentage was 90% for quality of content and learning materials; 84% for indicator technical quality of e-learning media. It meant that the e-learning media categorized was very decent category. The assessment of students in SMAN 1 Berastagi was 93%. Students understood biology materials featured in the web blog and quiz online easily and were very interested in the answer the quiz in the quiz online because of the attractive display of e-learning media.

b. Experimental Research

- Learning response

Analysis of students' learning response got data that 93.10 % of students prefer to study by using e-learning media during teaching and learning in the class and 89.65 % of students that give positive answer for implementing cooperative learning during teaching and learning in the class. Students felt good when learning by using e-learning media tested caused e-learning media gave students more opportunity to learn, the existence of feedback to students work. In other hand, learning without assisted e-learning media gave low contribution in the fostering student's learning response. Problem cases in the article and worksheet given by teacher can foster students' critical thinking and motivation in learning.

- Learning Achievement and Critical Thinking

The result showed that there was influence of using e-learning media to the student's learning achievement and critical thinking on the digestive system topic in grade eleventh semester II SMAN 2 Balige. Based on the observation, all critical thinking attitude items (100%) appear in the experimental and control in the last meeting. The treatment in the control and experimental gave the influence to student's learning achievement and critical thinking skill. Learning which emphasizes self-learning could encourage students to learn better. It is proved by opinion Hijazi (in Asandulul & Ceobanu, 2008:44) states that students wish to have a more substantial offer concerning such courses and, consequently, 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 technological 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 focused on the handbook and textbook of student from school. Rusyan Saragih (2010) 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 created 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 like e-learning media to improve student's learning achievement and critical thinking.

REFERENCES

- Arikunto, S.2003. *Prosedur Penelitian Suatu Pendekatan Praktek*. Jakarta: Rineka Cipta.
- Arikunto, S. 2009. *Dasar-dasar Evaluasi Pendidikan*. Jakarta: Bumi Aksara.
- Bates and Wulf. 1996. *Web-Based Instruction. Educational Technology Publications*. New Jersey: Englewood Cliffs.
- Brown, Sally. 2003. *Computer Assisted Assessment in Higher Education*. New Delhi: Cres Publishing House.
- Bull, J. et al. 2003. "Assessing Learners Through the WWW, Computer Networks and ISDN Systems." *Journal of Educational Technology and Society*, **3**:1-7 (<http://www.jtla.org>, accessed 28thDecember 2011).
- Djamarah. 2002. *Strategi Belajar Mengajar*. Jakarta: Rineka Cipta.
- Dongsong, Z. et al. 2005. "Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness." *Journal of the Learning Sciences*, **43** (2006) 15–27. Tersedia pada <http://www.elsevier.com/locate/dswhtml>, accessed 28thDecember 2011
- Edelson, D. C., Gordin, D. N., & Pea, R. D. 1999. "Addressing the challenges of inquiry based learning through technology and curriculum design." *Journal of the Learning Sciences*, **3**:391- 450.

(<http://www.edweek.org/ew/index.html>, accessed 28th December 2011)

- Farland. 1996. *Media in teaching*. In M. Wittrock (Ed.). *Handbook of Research on Teaching* (3rd edition). New York: Macmillan.
- Fisher, Alec. 2007. *Critical Thinking*. USA: Cambridge University Press.
- Fried, George. 2005. *Biologi Schaum Outline*. Jakarta: Gelora Aksara Pratama.
- Ginnis, Paul. 2008. *Trik dan Taktik Mengajar*. Jakarta: PT Indeks.
- Harckbarth, Steven. 1996. *The Educational Technology Handbook*. New Jersey: Engle Wood Clifts.
- Heinich, et al . 1996 . *Instructional Media and Technology for Learning*. New Jersey: Prentice Hall, Inc.
- John. 2000. *Research in Education*. New Jersey: Prentice Hall.
- Luther, Arc C. 1994. *Authoring Interactive Multimedia*. Boston: AP Professional.
- Karno To. 1996. *Evaluasi Hasil Belajar*. Jakarta: PT Indeks.
- Mayer. 2001. *Instructional Media and Technologies for Learning*. New Jersey: Prentice Hall.
- Moore. 2005. *Technology, E-learning and Distance Education*. London: Routledge Falmer.
- Mulyanta and Leong. 2009. *The Design Development and Education of Instructional Software*. New York: Mc. Millan Publ.
- Munir. 2005. *E-learning*. Kuningan: Uniku.
- Nisa, Raihan. 2010. *Skripsi*. FIP. Medan: UNIMED.
- Norris, S and Ennis, R. 1989. *Evaluating Critical Thinking*. New York: Pacific Grove.
- Nurhayati, Nunung. 2006. *1700 Bank Soal Biologi*. Jakarta: Yrama Widya.
- Nurkencana, W. 1995. *Evaluasi Pendidikan*. Surabaya: Usaha Nasional.
- Pazos. 2002. "The Educational Technology Handbook." New Jersey: Educational Technology Publication.
- Priadi, Arif. 2009. *Biology 2 For Senior High School*. Jakarta: Yudhistira.
- Sanjaya, Wina. 2006. *Strategi Pembelajaran*. Jakarta: Kencana.
- Savin and Baden. 2000. *Instructional Media and Technologies for Learning*. New Jersey: Prentice Hall.
- Sheybeni. 2004. *E-learning*. Jakarta: Gramedia.
- Silitonga, P.M. 2011. *Statistik Teori dan Aplikasi dalam Penelitian*. Medan: FMIPA UNIMED.
- Simanjuntak, Maria. 2012. *Skripsi*. FMIPA. Medan: UNIMED.

- Slameto. 1996. *Teknik Evaluasi Pendidikan*. Jakarta: Raja Grafindo Persada.
- Slavin, R.E. 1995. *Cooperative Learning*. Second Edition. Boston: Allyn and Bacon.
- Sudjana, N. 2009. *Penilaian Hasil Proses Belajar Mengajar*. Bandung : Remaja Rosdakarya.
- Sugiyono. 2011. *Metode Penelitian Kualitatif, Kuantitatif dan R&D*. Bandung: Alfabeta.
- Suharsimi. 1989. *Media Pembelajaran*. Jakarta:Rineka Cipta.
- Suhendar. 1997. *Media Pendidikan: Pengertian, pengembangan dan pemanfaatanya*. Grafindo: Jakarta.
- Sukartawi. 2003. Prinsip dasar e-Learning dan aplikasinya di Indonesia. *JurnalTeknodik*, 12:VII

