

CHAPTER I INTRODUCTION

1.1 Background of Study

Nowadays, information and communication technology is growing along to globalization. The development of computer technology has given valuable contributions to many fields, including education. In education computer technology is used as Computer Assisted Instructional (CAI) to facilitate students in understanding the concepts that are presented.

One of a teacher's most challenging tasks is to accommodate teaching or instruction to the individual differences of students. Given the diversity of students, Elliot (2000) believed that most of the methods or techniques that teacher use to provide appropriate levels of instruction have serious drawbacks. For instance, ability groups in which students remain in heterogeneous classes can work to the disadvantage of the far advanced or below-performing students.

One important issue is matching tasks to students' abilities or vice versa. Teachers must adapt instruction to the students' level of knowledge and development, motivate them to learn and manage their behaviour. Consequently, for instruction and learning to become effective, the teacher must be concerned with the quality of instruction which means that instruction must make sense to the students, the appropriate learning media to use, the incentive to students for them to learn and sufficient time for learning to occur.

One instructional strategy which has recently gained is modular instruction. According to Goldschmid (2002), a learning module is a self-contained independent unit of a planned series of learning activities designed to help a student accomplish certain well defined objectives. Generally considered as one very important area of study is the world of Natural Science, one component of which is Biology. Today, many innovations have been made to enhance the teaching of science including Biology. One of its primary concerns is on the research-based direction for instructional refinements in bringing the desired learning outcome.

Conducting the biology lesson required a special way because the conventional learning process which the teacher explains the subject matter and students listen only, the impact would be less effective for the growing interest in learning. The learning outcomes facilitated by interactive digital textbooks have been the most solid outcomes. Digital textbook provides stimulation from different channels such as words, pictures, sounds, animation, and images, and can frequently help students use learning functions of different sensory organs, and achieve the learning targets of diverse wisdom (Li,2008). Interactive learning media help learners to memorize the lesson in the long time as the effect of memory retention.

Students are not insensitive to the outcomes of their learning but rather assess their academic results and try to understand their causes. They develop epistemological theories about their learning which are some implicit assumptions they hold about the nature of knowledge and learning (Phan, 2008). Self-efficacy was also considered important as internal factors that encourage students to be succeed in learning and able to determine the choices of learning activities. Students with high self-efficacy generally be diligent and do not easily give up when faced with difficulties in learning (Stanrock, 2009).

High sense of self efficacy increases students readiness to invest efforts in their learning, serves them well to persist when facing difficulties and helps them to recover more quickly after a negative attainment. Conversely, a perceived sense of inefficacy diminishes students interest in their learning, lessens from their capacity to resist when facing impediments and undermines their commitment to achieving their goals.

In a related research, Schunk (1995) stated that when students are engaged in activities, they are affected by personal (goal setting, information processing) and situational influences (rewards, feedbacks). These provide students with idea of how well they have learned. Self efficacy was enhanced when students perceived they performed well. In other words, the higher the sense of efficacy, the greater the effort, persistence and resilience. Efficacy beliefs also trigger emotional reactions.

Durant (2011) writes that parental involvement in children's schooling is an important component of their early school success, echoing findings of Lee and Bowen (2006) from a study of the level and impact of five types of parent involvement in elementary school children's academic achievement by race/ethnicity, poverty, and parent educational attainment.

SMAN 2 Balige makes efforts to create the maximum educational purposes by trying to provide a conducive learning environment in order to produce well quality graduates. Educational programs offered SMAN 2 Balige is dormitory program for students who wants to study in this school.

From the preliminary study, the interview with students and teachers of class XI Science at SMAN 2 Soporung Balige: (1) SMAN 2 Balige implements mastery learning in class, the development of teaching materials based printed media is not enough. Need to develop interactive digital learning modules to develop students' cognitive abilities to increase the activity and independence of student in learning; (2) Students had difficulty in understanding the abstract materials. One material that was poorly understood by students was human digestive system. Value of term assessment for human digestive system in the academic year 2012/2013, showed that 57% of students have not reached the minimum criteria of completeness; (3) Learning facilities and infrastructure in SMAN 2 Soporung Balige have been good enough. It was proved by the availability of LCD projectors in every classroom and a computer lab but teachers don't use it optimally in the classroom; (4) Students are only able to answer the questions given by the teachers both in the Bloom's taxonomy range of C1-C3; (5) students tend to lack confidence in their ability they have and apathy during learning process in the classroom; (6) SMAN 2 Balige provide boarding program for students who lived far from the location of school. Students who live in the dormitory must follow the rules set in the dorm. (7) The use BSE as a media for teaching is considered more convenient and simple than having to make a slide presentation. But the figures are displayed by BSE have not been able to visualize the concepts of the material presented especially for physiological process topic. BSE does not develop the material with video interactive. Utilization of

computer-based multimedia can enhance students' understanding of the material being studied (Mayer & Moreno, 2000); (8) Students have difficulties in learning because students more tend to memorize the lesson, which have an impact on the lack of learning memory (retention).

Alternatives that can be done to solve the above problems are designing a study with modular instructions for students and find the influences of self-efficacy toward students' learning outcomes and activities. One effort to improve the quality of education is by facilitating of qualified textbooks and implementing programs in boarding schools to improve student learning independence. Boarding school program is intended to create a learning environment that is conducive and enable students to more learn organized, concentrated and independent.

Life in the dormitory requires students to abide and more discipline. The ethical rules are important in supporting the process of independence (Benson and Grove, 2000). Although initially the compliance was controlled by the dormitory supervisor but along of time living in the dormitory as well as the maturity of themselves, the compliance process evolved into decided and controlled by themselves so that students can be more independent in learning at last it give positive impact to learning achievement. Thus, an eventually become a major concern in scientific inquiry, in which focuses on the pedagogical usability criteria for evaluating the learning topic and the preparedness of students to access study aids such as lecture recordings via traditional and digital devices.

A challenging goal was to improve student learning outcomes in basic science especially biology courses through the introduction of innovative teaching strategies. As such the use of computers in combination with effective teaching strategies, has a tremendous potential in the teaching and learning processes. The interactive learning activities allow the learner to self test their knowledge base.

One promising approach that can help students understand and learn biology better by involving the digital textbook as multimedia presentations of explanations in visual and verbal formats such as presenting a computer-generated animation synchronized with narration or on screen text. Digital textbook as a tool

for effective teaching and learning. It is increasingly providing richer environments for learning in a wide variety of formats that explains how a causal system works and one rationale for this trend is the assumption that multimedia has properties that can aid learning, particularly the learning of abstract subject matter.

Research conducted by Willerman and Harg (2002) which implement learning media on the matter pollution reported that students become active in the learning process. According Priyanto (2012) textbook can support the implementation of student centered learning, where as the learning paradigm in schools more focused on student as the subject of learning and teacher acts only as a facilitator.

Learning biology in secondary school had a lot of difficulties. Michael (2007) found factors cause physiological material is considered difficult and complicated such as the characteristics of biological materials to be studied, how to teach the learning topic. The existence of the electronic textbooks help students to convey the subject matter easily that support the achievement of learning objectives. Beside the implementation of modular instruction, according to Albert Bandura's self-efficacy have influence in improving learning achievement.

Self-efficacy is the conception of nurtures about own personal power to achieve a given level of performance. In fact, it is more than a mere self recognition of being competent in a given domain of functioning. It is rather linked to the persuasion that people hold about their capacity to effectively use cognitive skills in order to attain a specific goal (Pintrich & Schunk, 1996).

To properly address the effectiveness of modular instruction, investigate the extent of self-efficacy and boarding program effect in learning that can be detected from the value of learning achievement, retention and autonomy. Further, researcher chooses grade eleventh of students as the research participants to investigate the learning autonomy of students class XI IPA who live in dormitory and non-boarding program in SMAN 2 Balige and the most effective way of teaching modules as well as computer animation in the presentation of instructional materials on students' learning achievement, activities and retention.

1.2 Problems Identification

Based on the background above, problems identified in this proposal are:

- a) BSE has not been featuring interactive simulations by combining video, animation, audio, and image.
- b) Number of students that did not reach the minimum criteria of completeness for term assessment of human digestive system is about 57%.
- c) SMAN 2 Balige implements mastery learning in class, the development of teaching materials based printed media is not enough. Need to develop interactive digital learning modules to develop students' cognitive abilities to increase the activity and independence of student in learning
- d) Learning process is limited to the explanation of abstract concepts through lectures (teacher centered approach).
- e) Students' poor self efficacy towards biology, perceived abstract and difficult nature of biology.
- f) Multimedia facilities are available at school, but teachers don't use it optimally in the classroom.
- g) Students are only able to answer the questions given by the teachers both in the Bloom's taxonomy range of C1-C3.
- h) Students tend to lack confidence in their ability they have and apathy during learning process in the classroom.
- i) Students have difficulties in learning because students more tend to memorize the lesson, which have an impact on the lack of learning memory (retention).

1.3 Scope of Study

The scope of this study namely:

- a) Developing the interactive digital module, text module and electronic modules for human digestive topic.
- b) Learning modules that have developed were validated and assessed by matter, learning module construction and digital media experts.
- c) Learning modules that have developed were assessed by teachers and students as small scale validation to determine the feasibility of modules that have been developed.

- d) Learning modules that have developed were assessed by students in SMAN 1 Berastagi as large scale validation.
- e) Final product of learning modules was tested in dorm and non dorm students at SMAN 2 Soposurung Balige.
- f) Learning topic is Human Digestive system in Grade Eleventh Natural Science SMAN 2 Soposurung Balige Semester II at A.Y. 2014/2015.
- g) Students' learning achievement is limited to cognitive domain of Bloom's taxonomy.
- h) Retention of students is long-term memory retention and measured at the third week (21 days) after learning completed.
- i) Self efficacy of students measured by using questionnaire consists of four aspects namely choice of activities, level effort, persistence and emotional reaction.
- j) Learning autonomy of students measured by using questionnaire adapted from Steinberg theory that consists of three domains/indicators of student's learning autonomy they are (1) ability to make decisions that are characterized by some aspects namely choosing alternative solutions based on the consideration itself and able to manage time efficiently, find the learning sources individually (2) self reliance which is characterized by some aspects namely able to finishing the daily homeworks at home, able to fulfill responsibilities at home and school, (3) dare to express the ideas that are characterized by some aspects namely choose alternative solutions by access the learning resources, not easily affected in a situation when doing homework.
- k) Learning activity of students measured by using questionnaire adapted from John Dewey principles that stated learning activity is one of principle of learning by doing. Student learning activities can be classified into indicators namely (a) visual activities consist of some aspects namely reading, looking at the pictures and video, observe, watching video or other people work, (b) listening activities consist of some aspects namely listen to teacher's explanation at class, (c) writing activities consist of answer the questions, take tests, and fill out a questionnaire, (d) mental activity consist of reflect,

remember, solve problems, makes decision, (e) emotional activity consist of interest, brave, calm.

- l) Different biology learning modules (interactive digital, electronic and text learning modules) implementation in the classes.

1.4 Research Questions

The research questions of this study are formulated as follows :

- a) What is the percentage of learning module feasibility that analyzed by matter experts for human digestive system topic grade XI IA at even semester?
- b) What is the percentage of learning module feasibility that analyzed by digital media expert for human digestive system topic grade XI IA at even semester?
- c) What is the percentage of learning module feasibility that analyzed by construction module experts for human digestive system topic grade XI IA at even semester?
- d) What is the percentage of learning module feasibility that analyzed by biology teachers for human digestive system topic grade XI IA at even semester?
- e) What is the percentage of learning module feasibility that analyzed by students for human digestive system topic grade XI IA at even semester?
- f) How is the response of students toward the interactive learning module that has developed for human digestive system topic grade XI IA at even semester in order to support teaching and learning activities?
- g) Are there any effects of interactive learning module toward student's learning achievement?
- h) Are there any effects of interactive learning module toward student's memory retention?
- i) Are there any effects of interactive learning module toward student's learning autonomy?
- j) Are there any effects of interactive learning module toward student's learning activity?
- k) Are there any effects of self efficacy toward student's learning achievement?
- l) Are there any effects of self efficacy toward student's memory retention?

- m) Are there any effects of self efficacy toward student's learning autonomy?
- n) Are there any effects of self efficacy toward student's learning activity?
- o) Are there any effects of dormitory program toward student's learning achievement?
- p) Are there any effects of dormitory program toward student's memory retention?
- q) Are there any effects of dormitory program toward student's learning autonomy?
- r) Are there any effects of dormitory program toward student's learning activity?
- s) Are there any effects of learning modules, self efficacy and dormitory program interactions toward student's learning achievement?
- t) Are there any effects of interactive learning module, self efficacy and dormitory program interactions toward student's memory retention?
- u) Are there any effects of interactive learning module, self efficacy and dormitory program interactions toward student's learning autonomy?
- v) Are there any effects of interactive learning modules, self efficacy and dormitory program interactions toward student's learning activity?

1.5 Objectives of Study

The purposes of this research to investigate :

- a) The percentage of learning module feasibility that analyzed by matter experts for human digestive system topic grade XI IA at even semester.
- b) The percentage of learning module feasibility that analyzed by digital media expert for human digestive system topic grade XI IA at even semester.
- c) The percentage of learning module feasibility that analyzed by construction module experts for human digestive system topic grade XI IA at even semester.
- d) The percentage of learning module feasibility that analyzed by biology teachers for human digestive system topic grade XI IA at even semester.
- e) The percentage of learning module feasibility that analyzed by students for human digestive system topic grade XI IA at even semester.

- f) The response of students toward the interactive learning module that has developed for human digestive system topic grade XI IA at even semester in order to support teaching and learning activities.
- g) The effects of interactive learning module toward student's learning achievement.
- h) The effects of interactive learning module toward student's memory retention.
- i) The effects of interactive learning module toward student's learning autonomy.
- j) The effects of interactive learning module toward student's learning activity.
- k) The effects of self efficacy toward student's learning achievement.
- l) The effects of self efficacy toward student's memory retention.
- m) The effects of self efficacy toward student's learning autonomy.
- n) The effects of self efficacy toward student's learning activity.
- o) The effects of dormitory program toward student's learning achievement.
- p) The effects of dormitory program toward student's memory retention.
- q) The effects of dormitory program toward student's learning autonomy.
- r) The effects of dormitory program toward student's learning activity.
- s) The effects of interactive learning module, self efficacy and dormitory program interactions toward student's learning achievement.
- t) The effects of interactive learning module, self efficacy and dormitory program interactions toward student's memory retention.
- u) The effects of interactive learning module, self efficacy and dormitory program interactions toward student's learning autonomy.
- v) The effects of interactive learning module, self efficacy and dormitory program interactions toward student's learning activity.

1.6 Significances of Study

The results of this study are expected to have theoretical and practical benefits.

- 1) Theoretically, the result of this study gives the contribution in the biology learning, especially in the using of interactive digital module to improve students' learning achievement.

2) Practically:

- 2.1. For school, optimizing facilities and infrastructure in schools that can support the learning process.
- 2.2. For students, interactive digital learning module able to overcome student's difficulties problem in understanding biology concept which is facilitated by computer. Foster the ability of students to learn independently.
- 2.3. For educators, as an interactive teaching materials at class.
- 2.4. For officials in the Ministry of National Education, the results of this study are used as input for on consideration in their policy.

1.7 Operational Definitions

- a. Interactive digital module using Adobe Creative Suite applications. Interactive digital module is a media that is used as a tool by teachers to convey the learning message that is packaged in a digital module look like BSE and developed by video, and self assessment.
- b. The appearance of BSE is a blend of text and images only but the display of digital module combines text, animation, video, images, and audio. The interactivity element of digital module designed through evaluation questions for each sub material which can directly respond to the students' answers to show their scores obtained.
- c. Learning Achievement is the result of study referred to the result of learning in the cognitive domain (C1-C5) as a result of learning with media. The objective tests in the form of multiple choice questions consists of 30 questions with 5 answer options as well as pretest and after learning posttest.
- d. Learning retention is the ability of students to remember the material that has been studied in the certain time. In this study, the period will be used about 3 weeks after learning. One of the factors that disrupt memory in students is the inclusion of new information. Thus, it can be seen how much the students' retention capability after receiving additional information as interference in their memory. Instruments used in the retention test are same in cognitive level

and learning indicators which used during the first posttest, but with bit different of questions.

- e. Self efficacy of students measured by using questionnaire consists of four aspects namely choice of activities, elevel effort, persistence and emotional reaction.
- f. Learning utonomy of students measured by using questionnaire adapted from Steinberg theory that consists of three domains/indicators of student's learning autonomy they are (1) ability to make decisions that are characterized by some aspects namely choosing alternative solutions based on the consideration itself and able to manage time efficiently, find the learning sources individually (2) self reliance which is characterized by some aspects namely able to finishing the daily homeworks at home, able to fulfill responsibilities at home and school, (3) dare to express the ideas that are characterized by some aspects namely choose alternative solutions by access the learning resources, not easily affected in a situation when doing homework.
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