

CHAPTER I

INTRODUCTION

1.1 Background

Education is one of the important elements in human life. Education is basically a process of communication delivery conducted by two or more people to achieve a goal that has the meaning of changes in knowledge, values, and skills, both inside and outside educational institutions that last a lifetime. Learning is a term that has a very close relationship and cannot be separated from each other in the teaching and learning process. Learning is done to create an atmosphere or provide a good and interesting service to students so that for that it is needed media to support the learning.

According to Bloom (in Suwarno, 2006) Education is an effort to improve morale and train intellectuals about the national education system affirming education is a conscious effort to prepare students through mentoring, teaching and or training activities for their role in the future masses. Therefore, as a human-conscious effort education makes the main invest in the life of both nation and state. Suwarno, 2006 said the purpose of education is distinguished into three namely: 1) Cognitive domain includes abilities that are expected to be achieved after the teaching and learning process, 2) Affective domains include the ability to receive, answer, assess, and characterize, 3) Psychomotor domains include perception, readiness, and response skills.

Education is all efforts and all efforts and all efforts to make society, can develop human potential to develop human potential to have the power of spiritual influence in the field of religion, self-will, personality, intelligence, ethics, and have skills that can be used as members of society and citizens. Education can shape the personality of a learning environment. Education can also guide people to have a disciplined nature, not discouraged, not arrogant, can respect others, obey, and creative and independent quality of education can be seen from the factors affect, among others the existence of good education.

Facilities and infrastructure and professional educator resources both are arrangements that serve in supporting learning activities. Therefore, there needs to be improvement both in terms of quality, quantity, and management system. Learning becomes more effective, efficient, and fun if there are tools in the learning process such as learning media and learning resources that are more varied. The use of learning aids must be adapted to the development of technology, learning methods and the level of ability of students to achieve their goals. The achievement of students' understanding in learning is strongly influenced by the student's own factors, the environment, infrastructure and learning facilities, as well as the interaction of all factors included in the learning process (Irham, 2013).

Duffy and Jonassen said that the use of various learning resources is an effort to solve learning problems. Meanwhile, the role of educational technology as a solution to learning problems can occur in the form of learning resources that are designed, selected and/or used for learning purposes. These learning resources are identified as messages, people, materials, tools, techniques, and backgrounds. From Seels and Richey, it is explained that educational technology is characterized using the widest possible use of learning resources for learning needs and in an effort to get maximum learning outcomes. then these learning resources need to be developed and managed systematically, well, and functionally in our country that it can be found the use of teaching materials and textbooks in learning is very dominant when compared to learning resources such as libraries, laboratories, field studies, slides, internet, computers, and others. Even so, at the present time the use of computers in learning has shown a significant increase.

According to Levie & Levie in Arsyad (2010) who reviewed the results of research on learning through image stimulus and word or visual and verbal stimulus concluded that visual stimulus results in better learning outcomes for tasks such as remembering, recognizing, recalling, and connecting with facts and concepts.

Biotechnology courses are branches of biological sciences that study the technology of utilization of living things on a large scale to produce products that have useful value for humans. Currently, the application of biotechnology is growing rapidly. Things studied in this department include fermentation techniques, enzyme technology, microorganism analysis, DNA analysis, separation and purification of biological products, plant tissue culture and genetic engineering. Biotechnology comes from the word Bio (life) and techno's (technology / tools) and logos (science). Biotechnology is a blend of natural sciences and engineering sciences that aims to improve the application of living organisms, cells and/or molecular analogues to produce goods and services.

Gratitude, (2008). In general in biotechnology courses the learning resources used are in the form of printed books plus, diktat and material tools in the laboratory biotechnology learning process that occurs is also conventional and resulted in a lack of interest in biotechnology courses and low interest in students in reading materials in courses biotechnology an alternative learning resource that can be used for environmental biotechnology learning is to develop alternative learning resources in the form of encyclopedia reasons choosing encyclopedia is a source of learning has deep information with language that is easy to understand and equipped with an bar so as to increase the interest in reading students.

According to (Rasyida,2015) one of the learning resources that can be used for learning, especially in the biotechnology course by developing learning resources in the form of an Encyclopedia. The encyclopedia can also be used as an alternative learning resource that is used to provide accurate and up to date information and able to improve and support student understanding of the material being studied availability. Encyclopedia is very important as a reference material to increase students' knowledge and the encyclopedia display is also practical, effectively used in the learning process because in the encyclopedia there are objects of images and verbal visualization as well as symbols and language that can make it easier for students to understand material, especially genetic analysis material in biotechnology subjects. so that an encyclopedia of genetic analysis needs to be developed as an alternative source of learning for biology students at the State University of Me- dan. And the reason for choosing an encyclopedia is a

learning resource It has in- depth information with language that is easy to understand and equipped with pictures so that readers are interested in learning it.

Therefore, the author wants to develop an alternative source of learning in biotechnology courses that is the encyclopedia of genetic analysis. encyclopedia of genetic analysis is a learning resource for students who belong to the print media there is an encyclopedia of genetic analysis containing practical materials, interesting appearance, and able to make students focused in learning. The developed encyclopedia of genetic analysis must be effectively packaged, with a variety of interesting writings and drawings that foster students' motivation to study the material in the developed digital encyclopedia.

According to Sudjana (2007) who said that from some of Edmund Faison's research on the use of images showed that to obtain maximum learning results, the images must be closely related to the subject matter, and the size is large enough that the details of the elements are easy to observe. Arsyad (2010) who reviewed the results of research on learning through image stimulus and word or visual and verbal stimulus concluded that visual stimulus results in better learning outcomes for tasks such as remembering, recognizing, recalling, and connecting with facts and concepts.

According to (Darmayanti et al, 2007). In its use in a university, books such as dictators still have weaknesses that should be improved, including: First, it is less attractive for students to read because the book looks monotonous because it is only a printed sheet of paper. Second, the dictatorship is still unable to present interactive simulations by combining video, animation, audio, and images, therefore an attractive, innovative, concise, easy-to-learn encyclopedia is needed that can be used by students to add references, insight in understanding the material. biotechnology It is hoped that independently and easily this encyclopedia can be an alternative source of learning for students and make it easier for lecturers to deliver learning material and can streamline time with this digital encyclopedia can provide references and add insight for students in fostering scientific attitudes so that learning outcomes are better, In addition, this encyclopedia can provide an evolution of the student paradigm that biotechnology, especially in genetic analysis material, is not monotonous and

becomes more interesting.

Therefore, with the existence of a digital encyclopedia, it is hoped that students will have no difficulty if they want to bring books in large quantities. In addition, digital encyclopedia books are also easier to distribute and more interactive, thus encouraging increased use of digital encyclopedias among students. Selection of a good development model will produce an effective and efficient product. The right choice of development model will produce the right product. One of the characteristics of the accuracy of product development is that the product can be used or applied properly and provides benefits for its users. The results of a good and appropriate development product will increase the motivation and desire of the readers to gain deeper knowledge of the material presented one of the development models that pays attention to the basic stages of media development design that is simple and easy to understand is the ADDIE model.

ADDIE emerged in the 1990 and was developed by Reiser and Mollenda. The ADDIE model can be interpreted as a learning model that uses 5 interrelated stages of development that guide the formation of a teaching program consisting of (*Analysis, Design, Develop, Implementation, Evaluation*). This ADDIE model is a description of the system-oriented learning model which is the root of behavioristic learning theory. This learning theory explains the role of external factors and their impact on changes in one's behavior The learning process is carried out by creating conditions that can provide the possibility for individuals to demonstrate a behavior in a relatively long period of time (Branch, 2009). The reason for choosing the ADDIE model is a more generic learning design model, and this model also provides opportunities for continuous evaluation and revision in each phase that is passed, in addition, Molenda also said that the ADDIE model is a general learning model and suitable for use in development research, when used in development, this process is considered sequential but also interactive (Molenda, 2003). In line with Molenda's opinion, Cheung stated that ADDIE is a model that is easy to use and can be applied in a curriculum that teaches knowledge, skills, or attitudes.

Cheung states "The advantage of the ADDIE model is that it is simple to use and can be applied to a curriculum that teaches knowledge, skills, or attitudes." This model is also often used to describe a systematic approach to instructional development. Molenda stated "I am satisfied at this point to conclude that the ADDIE model is merely a colloquial term used to describe a systematic approach to instructional development, virtually synonymous with instructional systems development (ISD)". Cheung (2016)

Mulyati, gave the opinion that "the ADDIE model is a model that is considered more rational and more complete than other models". Therefore, this model can be used for various forms of product development such as models, learning strategies, learning methods, media and teaching materials, one of ADIDE's functions is to be a guide in building training program tools and infrastructure that are effective, dynamic and more rational and more complete. than the 4D model, this model has similarities with the information base system development model. Besides that, ADDIE is also very simple in its procedure, but its implementation is systematic. Mulyati ningsih (2011)

As we know that this ADDIE model consists of 5 components that are interrelated and structured systematically, which means that from the first stage to the fifth stage in its application it must be systematic, it cannot be sorted randomly, or we can choose which one we think we want first. Because these five stages / steps are very simple when compared to other design models. It is simple and systematically structured, so this design model will be easy to learn by educators.

Based on the description that has been described, the researchers intend to develop a digital encyclopedia that was developed using the ADDIE model specifically on genetic analysis material by conducting research entitled: "DEVELOPMENT OF A DIGITAL ENCYCLOPEDIA WITH THE ADDIE MODEL SUB GENETIC ANALYSIS IN THE BIOTECHNOLOGY COURSE AT THE BIOLOGY DEPARTMENT UNIVERSITAS NEGERI MEDAN"

1.2 Problem Identification

Based on the background, the relevant problems identifications are:

1. Is the Encyclopedia of Addie's Model Development in the Sub-Material of Genetic Analysis according to the material expert lecturer at the Department of Biology, Universitas University of Medan?
2. What is the feasibility of the genetic analysis encyclopedia that has been developed as a learning resource according to learning media experts?
3. 3. What is the feasibility of a digital encyclopedia as a learning resource according to design experts?
4. How do lecturers of biotechnology courses respond to the feasibility of a digital encyclopedia being developed to be effective if it is used as a learning resource?
5. How do students respond to the developed digital encyclopedia if it is used as a learning resource?

1.3 Scope

Based on the identification of the problems stated above, the scope of the problem in this study is the Development of a Digital Encyclopedia with the Addie Model of Genetic Analysis Sub Material in the Biotechnology Subject at the Department of Biology, Universitas Negeri Medan.

1.4 Problem Formulation

Based on the problem identification above, the problem formulations are:

1. How is the development of a digital encyclopedia for genetic analysis, as an alternative source of learning for biotechnology students at the Biology Department, Universitas Negeri Medan?
2. Is the biotechnology encyclopedia of good quality so that it is suitable to be used as an alternative learning resource for biology students at the Universitas Negeri Medan?
3. How do biotechnology lecturers respond to the genetic analysis encyclopedia that has been developed?

1.5 Problem Limit

Given the extent of the problem, it is necessary to limit this research as follows:

1. The digital encyclopedia to be developed only pays attention to the material in biotechnology courses.
2. The digital encyclopedia developed is an encyclopedia with a scientific approach.
3. This development research uses ADDIE model.
4. Product validation in terms of materials, learning, design, and assessment by students and lecturers in biotechnology courses.
5. This encyclopedia trial was conducted in the department of Biology, Universitas Negeri Medan, North Sumatra.
6. The creation of this digital encyclopedia only reaches the standardization stage of the encyclopedia as an alternative learning resource, not to the implementation stage.

1.6 Research Objectives

Based on the problem formulation of the research, the objectives of the research are to:

1. Knowing the evaluation results of the digital encyclopedia on genetic analysis material that has been developed by material experts.
2. Knowing the results of the evaluation of the digital encyclopedia on genetic analysis material that has been developed by learning design experts.
3. Knowing the evaluation results of the digital encyclopedia on genetic analysis material that has been developed by layout design experts.
4. Knowing the responses of lecturers in biotechnology courses to digital encyclopedias on genetic analysis materials that have been developed.
5. Knowing the responses of students majoring in biology at the State University of Medan to the digital encyclopedia on genetic analysis materials that have been developed.

1.7 Research Benefits

The expected benefits of this research are:

1. For researchers, it can add experience for writers in developing digital encyclopedias as teaching materials.

2. For students, it makes it easier for students to understand genetic analysis materials with alternative learning resources that are more effective because they are accompanied by clearer images and in-depth information
3. For lecturers, as a reference material for lecturers in the selection of learning resources and to improve the quality of the learning process especially the process of genetic analysis in biotechnology courses

1.8 Operational Definition

Based on the explanation above, the operational definitions of this research are:

1. A digital encyclopedia is a reference work presented in a (or several volumes) book containing information about all branches of science, science, and technology, or which comprehensively summarizes a branch of science in a series of articles whose subject headings are arranged alphabetically. Based on the form of presentation, the pattern of content, and the pattern of preparation, and the purpose of its utilization it appears that the form of the encyclopedia strongly resembles a dictionary.
2. Addie is a model that is easy to use and can be applied in a curriculum that teaches knowledge, skills, or attitudes. Cheung states "The advantage of the ADDIE model is that it is simple to use and can be applied to curriculum that teaches knowledge, skills, or attitudes". Addie models are also common and suitable for development research.
3. Biotechnology courses are courses that are included in the discussion of studies and related to molecular biology of materials presented growth of microbial cells, animals, or plants to produce biotechnology product