CHAPTER I

INTRODUCTION

1.1. Background

Teaching materials are all forms of material used to assist instructors in carrying out teaching and learning activities in class. The material in question can be in the form of written or unwritten material. According to Sanjaya (2016) teaching materials are a form of learning resources that can be in the form of textbooks, modules, video programs, films, slide programs and so on which are used to store learning messages. One of the teaching materials that is often used is the textbook. Textbooks are one book that is a reference for students' learning activities (Suwarni, 2015). Textbooks are also used as a useful reference for all people because the material in textbooks is the realization of the material listed in the curriculum.

The tissue culture course is still included in the scope of the discussion of biotechnology studies. In this course, the material presented is quite diverse where the core of the discussion focuses on methods to isolate parts of plants such as protoplasm, cells, tissues and organs, and grow them in aseptic conditions, so that the plant parts can multiply and regenerate into complete plant. Through this course, students get the opportunity to develop competencies within themselves, especially in the ability to become biology teachers, biologists, researchers, entrepreneurs, who must be master in course material, especially tissue culture, and their competencies can be developed for other opportunities (Harahap, 2008).

Good quality tissue culture learning materials with adequate standards will be able to help students in learning, so that competency can be achieved. Tissue culture learning material includes components of tissue culture material in accordance with the subject required in the national curriculum, and contains enrichment material so that students' knowledge of tissue culture subject matter

increases. Tissue culture material in tissue culture learning materials must be complete, systematic, easy to understand, interesting, innovative, motivate independent learning, align with the curriculum, and have additional material as enrichment in accordance with the characteristics of the learner.

Based on the analysis of reference books, there are 10 chapters with introductory topics on tissue culture, that are: tissue culture laboratories, tissue culture media, hormone concepts, in vitro plant breeding, somaclonal diversity, production of secondary metabolites, preservation of germplasm of in vitro culture, plant acclimatization, in vitro culture, and mango plant tissue culture. In vitro plant breeding has indeed been discussed in this book, but not based on scientific literacy. Some of biology students have difficulty finding supporting books in learning plant tissue culture because of the limited books available in the library. This causes constraints on learning resources in the form of learning support books. So that it makes it difficult for students to understand and apply tissue culture learning in a study.

The development of innovative tissue culture learning materials for teaching tissue culture needs to be done to meet good quality teaching materials that can improve Indonesia's human resources in facing global competition. One effort to improve the quality of education is through the provision of quality subject matter, and can be started from the provision of learning materials. The good materials must be able to present teaching materials in accordance with the demands of the curriculum, follow the development of science and technology (IPTEK), and can bridge the learning so that the competencies that have been set can be achieved.

Teaching material in a tertiary institution is a part that must be prepared by lecturers in the tertiary institution because every tertiary institution has the autonomy of higher education standards that is determined, compiled, and developed by the tertiary institution. This is contained in Ministry of Education and Culture Regulation No. 50 of 2014 concerning the system of quality assurance of higher education, so that each university must prepare teaching materials that are in accordance with the conditions of students at the tertiary institution.

From the results of the analysis of the tissue culture book used by students department of biology Universitas Negeri Medan, it was found that the existing tissue culture textbook emphasized the content dimension rather than the process dimension. The teaching material that the researchers choose was about tissue culture in plants, because based on the results of interviews with lecturers and students of biology education Universitas Negeri Medan, it was suggested that tissue culture was a subject that was considered difficult for students. The lack of information and references to this textbook is the reason for the preparation of tissue culture textbook based on scientific literacy. This tissue culture textbook based on scientific literacy is expected to help students in tissue culture courses. Selection of appropriate textbooks is expected to increase understanding of science which in turn can improve students' scientific literacy. To be able to choose a good textbook, we need a way of developing books that involves aspects that contain scientific literacy, namely content, process, and context.

According to Harahap (2010) that in practice many of the materials in this course are relatively new for students, seem difficult, monotonous, and abstract for students. This is evident from the results of student examinations for the topic "tissue culture media, several media compositions, organ culture (roots, meristems, shoots), haploid plant production (anther culture, pollen, ovules)" only getting an average score of 6,4 (from a score range of 1-10).

Based on the results of the student needs analysis that has been carried out through distributing questionnaires to students department of biology Universitas Negeri Medan, it was found that 89% of students stated that they really need textbook based on scientific literacy in tissue culture courses. As many as 71% of students have difficulty learning the material of in vitro plant breeding. The difficulties experienced by students are in understanding the material, there are words that have just been learned, and understanding figures and analyzing data. Based on the results of the student needs analysis above, the tissue culture textbook based on scientific literacy was developed. Understanding these fundamental aspects of scientific literacy will help a student to comprehend thoroughly the universe of science. In other words, students' scientific literacy

skills can be improved, one way is by developing textbooks based on scientific literacy.

The existing textbooks emphasize the content dimension rather than the process and context dimensions as demanded by PISA, which is the main factor that should be suspected of causing the low literacy level of Indonesian children in PISA (Firman, 2007). According to the Organization for Economic Cooperation and Development (OECD, 2003) scientific literacy is defined as the capacity to use scientific knowledge, identify questions and draw fact-based conclusions to understand the universe and make decisions from changes that occur due to human activities. Scientific literacy is important for students to be mastered in relation to how students can understand the environment, health, economy and other problems faced by modern societies that depend heavily on technology and the progress and development of science (Yusuf, 2003).

Based on the 2006 PISA, the average value of the scientific literacy component of Indonesian children is below the ability scale which places Indonesia in 50th place out of 57 countries under Thailand, which has an average score of 421 in the 46th position. At this level of ability students are generally only able to remember facts, terminology and laws of science and use general science knowledge in drawing and evaluating conclusions (Hayat, 2003). The weakness of science learning in Indonesia mainly lies in the knowledge of how process skills are implemented and the orientation of science learning (Darliana, 2011).

As stated by PISA, the level of literacy of Indonesian students is very low, it can be considered a serious problem and needs special attention. The low scientific literacy of Indonesian students is caused by learning that has been irrelevant in the eyes of students. With the pattern of science teaching that has been used in schools, students think that science is a separate subject from the world they are in. The applied learning and assessment still focuses on the content dimension and forgets the process dimension and the scientific context.

1.2. Identification of Problems

The identification problems in this study are:

1. The level of literacy of Indonesian students is very low, it can be considered a serious problem and needs special attention.
2. The tissue culture textbook used by students only presents the content dimension rather than the process dimension.
3. The material in the tissue culture course is still considered difficult, monotonous, and abstract for students.
4. Students difficult to find appropriate and trusted literature.
5. Based on the results of the needs analysis, 89% of students stated that strongly agreed with the development of textbook based on scientific literacy in tissue culture courses.

1.3. Scope

Based on the identification of the problems stated above, the scope of the problem in this study is the development of tissue culture textbook based on scientific literacy as a source of student learning.

1.4. Formulation of Problems

Based on the limitation of the problem above, it can be formulated the problem under study, namely:

1. What are the results of the material expert's validation of the tissue culture textbook based on scientific literacy that have been developed?
2. What are the results of the learning design expert's validation of the tissue culture textbook based on scientific literacy that have been developed?
3. What are the results of the layout design expert's validation of the tissue culture textbook based on scientific literacy that have been developed?
4. How is the response from the lecturer of tissue culture course to tissue culture textbook based on scientific literacy that has been developed?

5. How is the response of students department of biology Universitas Negeri Medan to the tissue culture textbook based on scientific literacy that has been developed?

1.5. Limitation of Problems

In order for research to provide the right direction, the problem needs to be limited as follows:

1. The material developed is limited to the topic of in vitro plant breeding.
2. The tissue culture textbook based on scientific literacy that has been developed is validated by material experts, learning design experts and layout design experts.
3. The tissue culture textbook based on scientific literacy that has been developed will be assessed by lecturers in the tissue culture course and students in department of biology.
4. Making tissue culture textbook based on scientific literacy using the Dick and Carey model which is limited to the standardization stage of textbooks, not to the implementation stage.
5. The preparation of a tissue culture textbook is aimed to students department of biology Universitas Negeri Medan.

1.6. Research Objectives

The objectives of this development research are:

1. To know the validation results of the tissue culture textbook based on scientific literacy that has been developed by material experts.
2. To know the validation results of the tissue culture textbook based on scientific literacy that have been developed by learning design experts.
3. To know the validation results of the tissue culture textbook based on scientific literacy that has been developed by layout design experts.

4. To know the responses from lecturer of tissue culture course to the tissue culture textbook based on scientific literacy that has been developed.
5. To know the response of students department of biology Universitas Negeri Medan to the tissue culture textbook based on scientific literacy that has been developed.

1.7. Research Benefits

The results obtained from this study are expected to be useful theoretically and practically. The theoretical benefits of research are as follows:

1. To add and enriching scientific knowledge which aims to improve the quality of lectures related to the development of tissue culture textbook based on scientific literacy.
2. Contribution of thoughts and references for lecturers, universities, and further researchers who want to develop tissue culture textbooks.

Furthermore, the practical benefits obtained from this research are:

1. Provide reference books to support tissue culture activities based on scientific literacy to support tissue culture learning.
2. As material for consideration, the empirical basis and frame of reference for relevant educational researchers in the future.

1.8. Operational Definition

1. The textbook developed was prepared for the learning process by selecting learning topics, namely in vitro plant breeding.
2. Scientific literacy can be defined as the ability to engage with knowledge related to science, scientific ideas, and reflective citizens. Tissue culture textbook based on scientific literacy are textbooks that fulfill four themes, namely science as a body of knowledge, science as a way of investigating, science as a way of thinking, and interaction between science, technology and society.