CHAPTER I
INTRODUCTION

1.1. Background

Learning activities are complex activities because they involve many components, one of which is the activity of producing a product. One of the components needed is material. Materials needed in learning activities are teaching materials. The role of media or learning materials is very important in the learning process. Learning is a process of transferring information, making the teacher as a facilitator not a learning resource for students. Without learning materials, learning will not produce anything. Thus, learning becomes more effective through experiments or demonstrations, and makes students more active in developing their intellectual potential directly (Supardi, Ertikanto, & Manurung, 2017).

One of the competencies that a teacher needs to have in carrying out his duties is developing teaching materials. The development of teaching materials is used as a way to identify, develop, and evaluate learning content and strategies. In addition, the development of teaching materials considers the nature of the teaching material, the number of students, and the availability of the material. The development of teaching materials uses a flexible principle. The principle of flexibility means being able to accept new things that have not been included in the subject content. The principle of flexibility is that students are able to accept new things in subject content that have not been included in the teaching materials delivered by the teacher.

One of the teaching materials that are easiest to make by teachers is teaching materials in printed form, namely textbooks. In the process of developing textbooks, teachers are also not allowed to make any. Everything must be made systematically. The content of textbooks must also attract students or readers. The purpose of developing teaching materials is to assist students in obtaining alternative teaching materials. In addition, it also makes learning activities more interesting.

Textbooks are part of teaching materials designed so that students master the competencies to be achieved. In the Regulation of the Minister of National Education of the Republic of Indonesia Number 11 of 2005 article 2 (two) types of textbooks as follows: (1) textbooks that are used as mandatory references by teachers and students in the learning process; and (2) enrichment books and reference books that serve to increase the knowledge and insight of students.

Based on the analysis of reference books, there are 10 chapters with introductory topics on tissue culture, tissue culture laboratories, tissue culture media, hormone concepts, in vitro plant breeding, somaclonal diversity, production of secondary metabolites, preservation of germplasm in in vitro culture, plant acclimatization. in vitro culture, and mango plant tissue culture. Tissue culture laboratory has indeed been discussed in this book, while for the implementation stage of tissue culture there is no topic yet. Meanwhile, one of the topics that need to be known in tissue culture is what processes must be passed in making a tissue culture product. Some 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 or mini-research.

Zulpadly *et al.* (2016) also revealed that in their research many students did not complete each indicator of the biotechnology material taught. As many as 63.44% of the students experienced high difficulty in sequencing the steps in tissue culture and identifying the process and advantages of doing tissue culture. In this material, it is known that many students do not understand the process and steps in carrying out tissue culture, students also do not understand the advantages and disadvantages of tissue culture. The lecture process in the Tissue Culture course at Medan State University also uses learning resources in the form of textbooks and teaching materials from journals. Some of the books and journals used are books compiled by subject lecturers.

Firman (2007) said that the reason why students' literacy levels in Indonesia is based on PISA is that most books emphasize the content dimension rather than the process and context dimensions. The results of the 2018 Program

for International Student Assessment (PISA) survey announced the literacy results of each country. In the category of reading, science and math skills, Indonesia's score is low because it is in the 74th position out of 79 countries. The low literacy skills of students in Indonesia are also influenced by the selection of teaching materials used in universities. Teaching materials play an important role in the learning process, namely as a medium for delivering information. Therefore, good teaching materials are needed so that learning objectives are achieved optimally. Good teaching materials are teaching materials that contain a balanced component of scientific literacy. The science literacy category is close to a balanced proportion, namely 42% for the science knowledge category, 19% for the science inquiry category, 19% for the science category as a way of thinking, and 20% for the interaction between science and technology and the community (Wilkinson, 1999).

According to Kurniawati & Rahayu (2014) in studying plant tissue structure material, especially tissue culture students often experience difficulties. This difficulty can be caused by the absence of learning media other than textbooks which are used as the only learning medium and no other supporting media used in learning other than textbooks on plant tissue structure material. In addition, the availability of microscopes is also limited so that not all of them can observe various kinds of plant tissues at the time of study.

Based on the results of the student needs analysis that has been carried out through distributing questionnaires to students of the Department of Biology at the Universitas Negeri Medan, it was found that 85% of students stated that they really need textbook based on scientific literacy in tissue culture courses. As many as 65% of students experienced difficulties in studying tissue culture laboratory materials and felt the need to add material for the steps in carrying out plant tissue culture. The difficulties experienced by students are in understanding the material, newly learned words, understanding pictures and analyzing data. Based on the results of the student needs analysis above, a tissue culture textbook based on scientific literacy was developed. Understanding the fundamental aspects of scientific literacy will help students to understand the universe of science as a whole. In other words, students' scientific literacy skills can be improved, one of

which is by developing textbook based on scientific literacy.

The book that has been the main book used by students is the book on tissue culture written by Fauziyah Harahap. The use of this book is adequate for several learning topics. However, according to Harahap (2010: 162) that in its implementation, many materials in this course are 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, some media composition, organ culture (roots, meristems, shoots), haploid plant production (anther culture, pollen, ovule)" only got an average score of 6.4 (from the score range 1-10).

Based on this background, most of the teaching materials circulating and used in universities are still small and do not yet contain a balanced scientific literacy component. Therefore, the researcher intends to make a study entitled "Development of a Tissue Culture Textbook based on Scientific Literacy Tissue Culture Textbook in Tissue Culture Media and Protoplast Culture" which has a balanced, easy to understand, feasible and effective scientific literacy composition for students to use and reproduce books to support the learning process.

1.2. Problem Identification

Based on background above, problems which will be identified are:

1. The level of literacy in Indonesia according to PISA in 2018 is still in the low category.
2. Textbooks used by students currently do not present a balanced scientific literacy.
3. Biology students have difficulty finding supporting books in learning about plant tissue culture due to the limited books available in the library.
4. The existing textbook has not utilized the development of science.

1.3. Research Questions

Based on identification and scope of problem which is described above, and then the problem formulation which will be studied are:

1. How is the feasibility of tissue culture textbook based on scientific literacy that has been developed according to material expert?

2. How is the feasibility of tissue culture textbook based on scientific literacy that has been developed according to learning design expert?
3. How is the feasibility of tissue culture textbook based on scientific literacy that has been developed according to layout design expert?
4. How is the response of the lecturer in tissue culture subject on tissue culture textbooks based on scientific literacy that has been developed?
5. How is the response of Biology students at the Universitas Negeri Medan to the existing tissue culture textbooks based on scientific literacy that has been developed?

1.4. Scope of Problem

So that research does not deviate from the purpose of research, the problem needs to be limited as follows:

1. Only 2 topics will be developed in this research, namely tissue culture media and protoplast culture.
2. The tissue culture textbook based on scientific literacy that has been developed is validated by material expert, learning design expert and layout design expert.
3. The tissue culture textbook based on scientific literacy that has been developed will be assessed by lecturer in tissue culture course and students in Biology Department in Universitas Negeri Medan.
4. The development of tissue culture textbook based on scientific literacy using the Dick and Carrey model has only been carried out until the formative evaluation stage and no trials have been conducted to see the effectiveness and efficiency of the developed book.
5. The analysis of needs and objectives carried out in this study is still lacking in depth and less effective because the statements contained in the needs analysis questionnaire are inadequate.

1.5. Research Objectives

Based on problem formulation which is described above, the purpose of this research are:

1. To know the validation results of material expert on Tissue Culture course to textbooks that has been developed.
2. To know the validation results of design expert on Tissue Culture course to textbooks that has been developed.
3. To know the validation results of layout expert on Tissue Culture course to textbooks that has been developed.
4. To know the validation results of tissue culture lecturer in Universitas Negeri Medan to textbooks that has been developed.
5. To know the responses of Biology students in Universitas Negeri Medan on Tissue Culture course to textbook that has been developed.

1.6. Research Contribution

This research is expected to contribute both theoretically and practically. Theoretically, this research is expected to add insight to researchers and students who want to develop textbook based on scientific literacy method to increase the level of student literacy in Indonesia. For the practical benefits of this research is this textbook can use as a guide and support for the sustainability of tissue culture course. This research is also expected to be a guideline for researchers who will develop textbook using scientific literacy method.

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