

CHAPTER I

INTRODUCTION

1.1 Problem Background

Biology is one of the fields of Natural Science that provides a variety of learning experiences to understand scientific concepts and processes. Science in general can be associated with scientific discoveries in the biological sense of nature. Science through scientific discoveries can be arranged objectively, systematically, methodically, experimentally and universally. This scientific theory works on the prediction, description, and knowledge of phenomena. Several scientific facts, definitions, principles, concepts, and theories emerge from the results of natural science. Therefore, it can be concluded that the nature of science has three main elements, namely attitude, process and product (Torahudin, et.al, 2011).

The essence of learning biology consists of attitudes in the form of curiosity about objects, natural phenomena, living things, as well as causal relationships that create new problems that can be solved through correct procedures, also regarding processes in the form of problem solving procedures through the scientific method, which produces products in the form of facts, principles, theories, and laws, as well as applications in the form of the application of the scientific method and science concepts in everyday life (Tanwil, 2014).

For the application of the scientific method and scientific concepts in everyday life, experiments are the appropriate things to do in biology. Experiment is a learning activity that aims to give students the opportunity to test and apply theory using facilities, both in the laboratory and outside the laboratory. Experiment in Biology learning is an effective way to achieve learning objectives (Rustaman, 2005). The activities carried out by students in the form of observations and experiments can be implemented safely and effectively so that learning outcomes that are in accordance with the objectives will be achieved properly. Thus, the students can develop an activity such as observing, analyzing and conducting experiments on their own to discover scientific

concepts and understand them. The students can understand better the concept of the topic implementation of experiment, which can affect their learning outcomes.

Experiments will certainly help students to understand courses that have skill activities that will later have an impact on their learning outcomes. Experiments at Universitas Negeri Medan are mandatory in certain branches of science, including biology majors. The Biology Department at Universitas Negeri Medan has three other study programs namely Biology, Biology Education, and Science Education. In the Biology and Biology Education study programs there are courses that have experiments and some do not carry out experiments. One of the courses in the Biology Department that has experiments is the Vertebrate Taxonomy course, in which there are animal classes that need to be studied regarding morphometrics, classification, morphology and others. There are learning outcomes that must be achieved during the implementation of the course and also objectives that must be achieved during the experiment.

In the Vertebrate Taxonomy experiment, there are several topics, namely Pisces, Amphibia, Reptilia, Aves, and Mammalia. In the research conducted by the current researcher, the topic taken is Pisces. The objectives in this experiment on the topic of Pisces are:

1. Observing the morphology of Chondrichthyes and Osteichthyes fish
2. Studying the morphometrics and meristics of Chondrichthyes and Osteichthyes fish
3. Identify several fish species with the key to determination
4. Studying qualitative phenetic relationships

However, to get good learning outcomes, it is necessary to have media which is one of the supporting factors for achieving learning objectives. There is an appropriate and varied media in the learning process that can increase learning motivation and can reduce student passivity (Hardianto, 2005). Furthermore, the use of learning media is not only needed in classroom learning, but also in experiment. In carrying out experiment, lecturers must have learning media which are expected to help students understand learning material and get learning outcomes, one of the learning media needed in experiment is a guidebook. However, learning media in the form of guidebook in experiment sometimes still have things that need to be corrected

or added, as known as in the guidebook for the Vertebrate Taxonomy class in the topic for Pisces, the contents of the guidebook are very good and complete, it also includes a complete identification key to help students identify the characteristics of the Pisces species, but the theory, description, and morphometric pictures of each fish used as experiment sample need to be added, which can improve students' knowledge in carrying out experiment.

Based on the results of initial observations in the form of giving a questionnaire containing questions based on Learning Outcomes of Vertebrate Taxonomy class (CPMK) from the Semester teaching plan (RPS) which was compiled by a team of lecturers in the Vertebrate Taxonomy course, Biology Department Universitas Negeri Medan in the form of a Google form filled out by students from two different classes, namely PSPB (Biology Education Study Program) 2021 D class and PSB (Biology Study Program) 2021 A class stated the result that CPMK 1 was " Explaining the concept of taxonomy of vertebrate animals", of the 9 questions given with a maximum score of 17 points and filled in by 58 students, 25 students got a score ≥ 8.5 (43.11%) and 33 students others got a score ≤ 8.5 (56.89%), meaning that there are more students who scored below what must be achieved on the questions regarding CPMK 1 that have been described. In CPMK 2, namely "Describing the purposes and benefits of classification, systematics, nomenclature and phylogeny", of the 11 questions given with a maximum score of 20 points were filled in by 58 students, 19 students scored ≥ 10 (32.75%) and 39 students others scored ≤ 10 (67.24%), meaning that more students scored below what had to be achieved in the questions regarding CPMK 2 that had been described. In CPMK 3, namely "Describing the characteristics of the morphological and morphometric structures of Agnatha, Condrichtyes, Osteichthyes, Amphibians, Reptilia, Aves and Mammals; describe the distribution, life and kinship of Agnatha, Chondrichtyes, Osteichtyes, Amphibians, Reptiles, Aves and Mammalia", of the 23 questions given with a maximum score of 53 points filled by 58 students, 16 students got a score ≥ 26.5 (27.58%) and 42 other students scored ≤ 26.5 (72.41%), meaning that more students scored below what had to be achieved in the questions regarding CPMK 3 which have been described. In CPMK 4, namely "Creating and using a determination key to make it easier to identify species", of the

4 questions given with a maximum value of 10 points were filled in by 58 students, 26 students (44.82%) got a score ≥ 5 and 32 students others got score ≤ 5 (55.17%), meaning that there are more students who score below what must be achieved in the questions regarding CPMK 4 that have been described. Overall, it can be concluded that in the 4 CPMK described by students who answered questions with scores below the minimum pass score more than those who passed, for this reason students may need additional learning media that can support the learning process and increase their understanding.

Furthermore, another initial observation done in the form of asking questions related to experiment activities in the Vertebrate Taxonomy class, several questions were formulated based on the objectives in the giudebook, especially on the topic of pisces. It was concluded from the answers that were collected that the learning media used in the experiment was still only a guidebook and several journals brought by each student. Obstacles encountered during the experiment were students still not understanding the terms and pictures of fish measurements in the practicum guidebook, difficulties in understanding the terms used in the identification key instructions, difficulty recognizing the morphological structure to be observed, difficulties in understanding Latin names, and others.

Some of the problems found based on the results of the two initial observation methods described above, it is necessary to develop additional media as an addition to the experiment guide in the Vertebrate Taxonomy class. The learning media to be developed is an electronic pocket book or pocket E-Book. Product development in the form of a pocket E-Book is expected to be a solution to the lack of understanding of students regarding the subject of Vertebrate Taxonomy. Moreover, the additional learning medium in experiment guidebook, must be packaged in an attractive and practical form, thus the guidebook already has quite complete topic content. Still this media must have a lot of information but be packaged as practically as possible. This kind of learning media is what encourages students to spend more time for reading and studying. One of the learning media that is often used to overcome this problem is the pocket book.

A pocket book is a small book that can be stored in a pocket and easy to carry anywhere. A pocket book can be interpreted as book that is small, light, easy to bring

out anywhere and can be read at any time (Setyono, Y. A., Sukarmin, & Wahyuningsih, D., 2013). The general understanding of a pocket book based on this understanding is a small book that contains information and can be stored in a pocket, making it easy to carry anywhere. Students can get information from pocket books without spending too much time capturing the essence of the information. Pocket books are considered to make it easier for students to learn, but they have weakness, namely they are easily lost and still use paper. However, followed by considerations of easy loss and other disadvantages of pocket books in printed form plus the increasing pace of technological development of the times, the use of E-Pocketbooks (Electronic Pocket Books) is the choice for this study. This is also based on the many uses of cellphones in which there are many practical features, and for this E-Pocketbook it will be very useful and practical to carry and use anywhere and anytime. Digital pocketbooks are a combination of ordinary (printed) pocketbooks and digital books, which are displayed on a digital device and are easy to carry anywhere. (Hermawan, Achmad Firdaus, and Ekohardi , 2018).

The research on the effectiveness of using pocketbook and E-Pocketbook as learning media has been found and has had good results. Based on the results of research conducted by Muhamad Taufik Awaludin and R. Teti Rostikawati (2020), it can be concluded that the Mammalia pocket book of the Primate order shows valid results and is suitable for use in biology learning. The average value of expert validation from the content aspect is 83.5%, the language aspect is 83%, and the presentation aspect is 82.5%. Supported by other research conducted by Yunita, Fitri Wijarini, and Nursia (2022), the results obtained concluded that the local potential-based booklet developed refers to an inventory of fish species in the Sedulun River area as a learning resource related to vertebrate material in the Pisces class meet the criteria very feasible to be used as a learning resource for learning biology in schools with the results of the product feasibility test validated by experts consisting of media experts, material experts, and practitioners, and student response data obtained from student responses each 82% (very feasible), 94% (very feasible), 84% (very feasible), and 91% (very attractive). Another research conducted by Nur Afrianti, et al (2021) with the title Implementation of the E-Pocket Book to Improve Learning Outcomes in Economics at Madrasah Aliyah Madinatussalam, Bandar Khalifah Regency,

Indonesia. Field test results showed that the experimental class obtained higher learning outcomes than the control class, with a significant difference ($p = <.05$). The research entitled Development of Ethnoscience-Based Digital Pocket Books in Elementary Schools in Singkawang City has also been carried out by Emi Sulistri, et al (2020) with the results obtained namely; Implementation carried out small-scale trials on language aspects, namely 3.31, large-scale trials of 3.46. For the material and graphical aspects in the small-scale trial each has a value of 3.23 and 3.22 in the criteria of interest.

Based on these reasons that have been presented, research on experimental pocket books on the topic of Pisces will be carried out using the R&D or Research and Development, research method using the 4D (4-Doors) model whose detailed stages are Define, Design, Develop, and Disseminate. The product development will be carried out requires validation by experts to assess the feasibility of the product being developed, as well as what will be carried out in this study.

So, based on the background of the problems that have been described, the researcher will conduct a study entitled "**DEVELOPMENT OF POCKET E-BOOK INTRODUCTION TO FISH TAXONOMY FOR THE VERTEBRATE TAXONOMY COURSE AT BIOLOGY DEPARTMENT UNIVERSITAS NEGERI MEDAN**".

1.2 Problem Identification

1. The guidebook used in the Vertebrate Taxonomy class still needs to be added in several points, such as morphometric pictures and explaining the description of each order used as an experimental sample, and others.
2. The pretest scores in several classes that have carried out experiment in the Vertebrate Taxonomy class, especially on the topic of Pisces, are still relatively low.
3. The initial observation value of the CPMK analysis given shows that in the four existing CPMKs, the majority of students score below the minimum score specified for each CPMK. This leads to many students who do not understand the CPMK they want to achieve in this course.

4. In the initial observation in the form of an analysis of the guidebook that has been given, students still do not really understand a number of things in the experiment on the topic of Pisces and still receive several obstacles in carrying out the experiment, such as the measurement of Pisces morphometric, and others.
5. The Pocket E-Book as an additional medium after the guidebook has never been applied in Vertebrate Taxonomy class.

1.3 Scope of Research

1. The research variable is the development of a pocket E-Book as an additional learning media product in the experiment of Vertebrate Taxonomy class.
2. The object of research is students majoring in biology at Universitas Negeri Medan.
3. Pocket E-Book that will be developed only for the Introduction of Fish Taxonomy.
4. Product evaluation will be assessed by material expert (fish taxonomy) validator, design expert validator, linguistic expert validator, lecturer responses, and student responses.

1.4 Problem Formulation

Based on the identification and scope of the research described above, the formulation of the problem to be studied is as follows:

1. How is the process of developing the Introduction to Fish Taxonomy Pocket E-Book?
2. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to the material expert (Fish taxonomy expert) validator?
3. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to the design expert validator?
4. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to the linguistic expert validator?

5. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to the lecturer teaching Vertebrate Taxonomy Class' responses?
6. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to student responses?
7. How effective is the Introduction to Fish Taxonomy Pocket E-Book as a learning medium for student cognitive and psychomotor learning outcomes?

1.5 Problem Scope

To facilitate understanding in research and so that this research is not too broad, the problem is limited as follows:

1. This development is oriented to produce a product in the form of a Pocket E-Book its contents are limited only to an introduction to the taxonomy of fish.
2. Topic in the Pocket E-Book developed in the Vertebrate Taxonomy experiment class is Pisces.
3. The development model used in this study is the 4-D development model.
4. Product assessment is carried out to determine the level of feasibility by material expert validators, design experts validators, linguistic expert validators, assessments and responses from lecturers teaching in the vertebrate animal taxonomy course and responses from students majoring in biology.
5. Applications used in making Pocket E-Book are only those that are not paid.

1.6 Research Objectives

Based on the formulation of the problem that has been formulated, the research objectives are to find out:

1. How is the process of developing the Introduction to Fish Taxonomy Pocket E-Book.
2. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to the material expert (Fish taxonomy expert) validator.
3. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to the design expert validator.

4. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to the linguistic expert validator.
5. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to the lecturer teaching Vertebrate Taxonomy Class' responses.
6. How feasible is the Introduction to Fish Taxonomy Pocket E-Book according to student responses.
7. How effective is the Introduction to Fish Taxonomy Pocket E-Book as a learning medium for student cognitive and psychomotor learning outcomes.

1.7 Research Benefits

1. For lecturer

The Introduction to Fish Taxonomy Pocket E-Book from the development of this research can be used as a reference and example for lecturers in increasing the variety of learning media, especially in experiment class.

2. For researcher

This research can be useful for future researchers who plan to do the same research as a research reference.

3. For student

This research can be useful for students by using an Pocket E-Book as a teaching medium in addition to a guidebook in experimental course, thus that it is more varied and efficient.