

CHAPTER I

PRELIMINARY

1.1. Problem Background

Education is an important aspect for the development of human resources and is an effort to provide certain knowledge, insights, skills and expertise to individuals in order to develop themselves so that they are able to face any changes that occur due to advances in science and technology. Education is believed to be able to instill new capacities for everyone to learn new knowledge and skills so that productive humans can obtain (Sudarisman, 2013).

The educational process in its implementation there is a teaching and learning process between educators and students to achieve learning objectives (Majid, 2014). The achievement of learning objectives is influenced by changes and renewal of educational components. Curriculum, facilities and infrastructure, teachers, students, learning models and learning media are components of education that work together to help students achieve learning goals (Suardi, 2012). Students are now required to be central in learning so they must actively participate in learning guided by teachers as facilitators.

Professional teachers not only prepare the material they teach, but also creatively use and develop learning media to facilitate interaction between teachers and students so that the learning process becomes more effective (Puspita et al., 2017). Learning media is a tool or method used to disseminate a message or information that has a specific purpose. The use of learning media can help students understand or simplify a concept that is difficult to understand (Hanifah, 2020).

Learning media consists of various types, namely: print media, video media, exhibition media, audio media, visual media, video media, multimedia and computer devices (Yaumi, 2012). Accuracy in choosing the use of learning media is very influential on the learning process. With the help of media, students can at least more easily digest and understand the material that has been delivered. One of the learning media that is often used in learning is textbooks / print. This book usually has a relatively large size of about 20 x 26.5 cm and has a less attractive appearance. Therefore, a small book is needed to make it easier for students to bring it to school.

Choosing the right approach to learning will also help students in the learning process. So that students are easier to digest the material delivered by the teacher. One of the right approaches in supporting learning is a STEM-based approach. STEM (*Science, Technology, Engineering and Mathematics*) is an approach that aims to teach two or more practice that related STEM subjects authentically in order to increase and motivate students' interest in learning (Mulyani, 2019). The STEM approach creates learning in everyday life that can train students to apply the knowledge they gain from school to what happens in the real world. Success in an education can be measured if students are able to apply the knowledge they gain in everyday life. Unifying the STEM approach will be more effective if it uses the right learning media in its application so that it can make students learn well.

Pocketbook is a small book that contains information that can be stored in a pocket so that it is easy to carry and easy to read. Pocket books can also be used as interesting reading books for students because they are practical, look attractive, easy to carry and make students focus when reading them (Elpina et al., 2021). Based on this statement, pocketbooks can be used as a media for learning Biology, as well as attracting students to learn Biology. Pocketbooks can support and create opportunities for learners to participate in providing actual learning experiences so that learning objectives can be met and student motivation in learning can be raised (Wijayanti, 2019).

Biology learning is carried out in high schools studying everything related to life, one of which is the human respiratory system. The human respiratory system

is a material that introduces system organs which become structures in the mechanism for air exchange when breathing. In studying the respiratory system, a student is expected to be able to use his skills and reasoning abilities to the fullest. The application of the concept of respiratory system material in biology learning makes students less active and bored, students tend to be passive in learning because they do not carry out activities so that the understanding obtained is less absorbed. Many students experience misconceptions about the respiratory system material. Dewi et al., (2021) in their research stated that the sub-matter of respiratory mechanisms is the sub-matter that most often experiences misconceptions in learning the human respiratory system.

Based on the results of observations and interviews conducted by researchers at SMA Mitra Inalum, it is known that there are problems faced by students, namely students feel a lack of variety of learning media used because they predominantly use textbooks in learning. The presentation of the human respiratory system concept in the package book is difficult for students to understand because the image captions are unclear and dominated by writing.

To improve student learning outcomes, it is necessary to have supporting learning media that can help expand students' understanding of concepts (Akbar, 2021). STEM-based pocket book learning media will greatly affect student learning outcomes because it can train students in applying knowledge to solve problems related to the environment. In addition, from the questionnaire distributed to students, 81% of students agreed on the existence of additional learning media in the form of pocket books with human respiratory system materials to support the learning process.

Several previous studies related to the development of pocketbooks as additional learning media conducted by Aprilia et al., (2021) stated that pocketbooks can increase students' insights and increase their usefulness in learning. Awaluddin and Rostikawati (2020) developed a pocket book adapted to Basic Competencies in the 2013 curriculum that can help students to easily understand the material. Colorful pocketbooks and images that support the material can also interest its readers. Research conducted by Elpina et al., (2021) states that pocketbooks are practical learning media because they contain material and

problems related to everyday life so that they can improve students' thinking power and invite students to think more actively.

Another study has been conducted by Wijayanti (2019) stating that there is a change in the attitude of students after pocket books are given to students. This shows that pocket books are very effective in helping learners in learning (Mardhatillah, 2018). The application of STEM approaches can also affect improving student learning outcomes in Biology subjects (Syarah, 2021). Based on this background, development research was carried out with the title "Development of STEM-Based Pocketbook Learning Media on The Topic of The Human Respiratory System on Student Learning Outcomes of Class XI SMA Mitra Inalum Tanjung Gading 2023/2024".

1.2. Problem Identification

Based on the background of the problems that have been stated above, the following problems can be identified:

1. Learners only use textbooks as the main learning medium.
2. The presentation of the concept of human respiratory system in the textbook used is difficult for students to understand.
3. Textbooks owned by students are less attractive to students
4. The need for additional references for students to easily understand material about human respiratory system

1.3. Scope of Research

Based on problem identification, the scope of this research is focused on developing STEM-based pocketbook learning media on the topic of the human respiratory system which was carried out at SMA Mitra Inalum. In the development of this pocketbook, the development model used is a 4D model that has 4 stages of development, namely define, design, development and disseminate. To test the feasibility of the pocket book developed is determined from the feasibility test by learning material experts, material experts, design experts and to test the effectiveness of the pocket book can be seen from the results of the scores obtained

from the use of pretest and posttest which will be carried out in class XI of SMA Mitra Inalum.

1.4. Scope of Problem

Based on the scope of the research, researchers limit the problems in this study, namely:

1. The learning media developed in this study is a STEM-based pocketbook.
2. The development of pocket book media is focused on the topics human respiratory system.
3. The development of pocketbooks is carried out based on the Thiagarajan (4-D) model until the last stage, namely disseminate.
4. Assessment of product quality by material experts, learning experts, design experts .
5. Responses of product quality by Biology and student.
6. Product research was carried out to find differences in learning outcomes for experimental and control class students.

1.5. Problem Formulation

Based on the limitations of the problem, the formulation of the problem in this study are:

1. What is the level of feasibility by material experts, learning experts and design experts for the development of STEM-based pocket book learning media on human respiratory system topics?
2. What is the response of the biology teacher and students to the development of STEM-based pocket book learning media on human respiratory system topics?
3. Is there a difference in the average learning outcomes of experimental class and control class students after using a STEM-based pocket book on the human respiratory system?

1.6. Research Objectives

Based on the formulation of the problem that has been described, the objectives in this study are:

1. To determine the level of feasibility by material experts, learning experts and design experts for the development of STEM-based pocket book learning media on human respiratory system topics
2. To find out the biology teacher and student responses to the development of STEM-based pocket book learning media human respiratory system topics
3. To find out the differences in the average learning outcomes of experimental class and control class students after using a STEM-based pocket book on the human respiratory system

1.7. Research Benefits

The benefits expected from the results of this study are as follows:

1. Theoretical benefits
 - a. The results of this study are expected to add to the field of knowledge, especially in the field of education
 - b. Pocket book material on the human respiratory system can be an alternative medium in organizing active learning to develop and improve the quality of education
2. Practical benefits
 - a. For schools, as material for consideration in making policies regarding biology learning media for students that can be used as a support in the school syllabus.
 - b. For educators, this research can provide information about human respiratory system pocket books as a medium for learning biology
 - c. For students, increase enthusiasm for learning and increase students' understanding of human respiratory system material.
 - d. For future researchers, it becomes initial information for researchers who wish to conduct similar research.