

# CHAPTER I

## INTRODUCTION

### 1.1. Background of the Research

The fourth industrial revolution in the 21st century encourages the use of technology in various fields, including education. Developments in education during the fourth industrial revolution in the 21st century led to changes in the education system model, which now utilizes digital devices and technology in the learning process. The model of the education system that is suitable for the 21st century consists of four aspects such as the way of thinking, the way of working, tools in learning, and how to live in a global world. As a result, in an attempt to face the twenty-first century, teachers and students must have literacy skills in media, information technology, digital communication, and critical thinking skills (Efriyanti, 2020). In line with this, education in Indonesia currently uses the 2013 curriculum with a scientific approach. The scientific approach is designed to involve students in active learning, eventually developing students' thinking processes.

Educators must appropriately utilize the existence of technological developments to create learning innovations. Educators can utilize the internet, smartphones, and computers that can facilitate the implementation of a scientific approach so that learning effectiveness increases and students can develop 21st-century skills. One of the learning innovations by utilizing technology is mobile learning applications. Mobile learning is an e-learning learning process carried out by an individual (educator or student) or group that can occur at any place and at any time to learn a theme/topic that you want to learn on the condition that it is connected to the internet and supports mobile devices such as an android-based smartphone (Efriyanti, 2020).

The development of mobile learning in the form of an Android-based application is one of the uses of information and technology digital devices in learning. As a result, in the era of the Fourth Industrial Revolution, the use of mobile learning applications is suitable as a method of learning for the 21st

century. However, based on preliminary observations at SMAS Budisatrya Medan, the utilization of technology and digital devices in the learning process remains inadequate. Despite the fact that teachers and students already have Android-based smartphones that should be used to support the digital learning.

According to the results of an interview with a biology teacher (Appendix 1) and a questionnaire on the needs analysis of grade XI students at SMAS Budisatrya Medan (Appendix 2), teachers' main learning media were textbooks and power points. The PowerPoint presentation used by the teacher merely contains a summary of the learning material. It is not interactive and does not attract students' interest in the subject matter. Additionally, the teacher appears to be more active than the students, and the students can only listen to and watch the teacher explaining. This condition is in contrast with the fact that in the learning process, the teacher must be able to interact well with students to create student-centred learning and use a variety of media in the learning process, such as audio-visual, animated videos, pictures, PowerPoint or the other media that can support the success of the learning process.

Then, according to the student needs analysis questionnaire (Appendix 2), grade XI SMAS Budisatrya students have difficulty in learning about the digestive system. As many as 80% of all respondents experienced difficulties understanding the mechanism of the nutrient digestion process, and 90% of students had trouble understanding the nutrient absorption process. Furthermore, approximately 50% of students indicated difficulty understanding the food test practicum procedure. In contrast, students are required to have competencies following basic competencies 3.7. that is, students can analyze the relationship between the structure of the tissues that make up the organs in the digestive system and relate it to nutrients and their bioprocesses so that they can explain the digestive process and functional disorders that can occur in the human digestive system. Furthermore, students are also required to have competence 4.7. Students can present reports of the food test practicum of various food ingredients.

Students' learning difficulties in the material of the digestive system were also found in previous studies. According to Mardiah et al. (2021), the students failed the digestive system material test with the lowest score on indicators of the

role of the digestive glands and the process of food digestion. Pakpahan (2021) also discovered similar results in his research, which is that students struggled to understand the process of food digestion and defecation. These problems may arise as a result of a lack of supporting learning media to assist students in learning the process of digestion and absorption of food.

Difficulties experienced by students while learning digestive system material are also confirmed by Muarikha's research (2021), which discovered that up to 56.21 % of students experienced misconceptions about digestive system material. Misconceptions can be caused by students' lack of complete understanding of the concepts in the digestive system material. These findings indicate that students find it difficult to understand the material on the human digestive system. Misconceptions about the digestive system were also discovered in biology textbooks for grade XI high school. According to Hanifah's (2021) research, there were misconceptions in the digestive system material, with the highest percentage of misconceptions in the oversimplification category.

Based on these issues, it is necessary to develop a mobile learning application that can help students understand the digestive system material for grade XI SMA, especially the process of digestion and absorption of food, in order to solve students' learning difficulties on the digestive system material. This is in accordance with the results of student needs analysis, which shows that students have Android smartphones and prefer to learn using multimedia with visual, audio, and video elements, as well as interesting illustrations, such as mobile learning applications. Adobe Animate CC is one of the computer programs that can be used to create android-based mobile learning applications. Adobe Animate CC can present multimedia with interactive features in the form of audio and visuals featured in animated videos on the process of digestion and absorption of food to help students understand the material more easily.

Mobile learning application has several advantages compared to another learning media. Learning using this application can make students easier to learn the material because each student may learn it directly through their Android smartphone and this application can be designed in offline mode so that the application can be used repeatedly without using internet access so that students

can learn anywhere and anytime without concern about unstable internet connection. Efriyanti (2020) also argued about mobile learning application advantage, which the learning process that utilizes mobile learning presented with interactive and fun multimedia would make students have the ability to master technology and increase student activity, participation, enthusiasm, and learning outcomes so it can accelerate the process of achieving the goals of learning material being studied.

The Android-based mobile learning application also contains multimedia such as images, simulated video animation, audio narration, and text, which according to Baukal et al. (2013), can make the learning material less abstract, making it easier for students to understand, in particular material that is difficult to understand especially the process of digestion and absorption in food digestive system material. Then, because of these advantages and there is no mobile learning application that developed especially for food digestion and absorption process for students in grade XI, it is important to develop Android-based mobile learning application on digestive system materials for grade XI.

Previous researchs have supported the importance of android-based mobile learning application development such as the research of Pakpahan et al. (2021) with the development of interactive learning media on the digestive system material using Macromedia Flash (a previous version of Adobe Animate) which obtained the result that interactive media can improve students' understanding. Similarly, Pratama et al. (2021) who develop android-based mobile learning application integrated with scientific approach on colligative solution material, obtained the result that learning with Android-based mobile learning application also give positive impact in increasing students' learning motivation.

Based on the explanation above it is necessary to develop android-based mobile learning application on digestive system materials for grade XI to overcome students' digestive system learning difficulties and as implementation of technology in the learning process to follows the 21st-century education. As a result, this research entitled "Development of Android-Based Mobile Learning Application on Digestive System Materials for Grade XI Students of SMAS Budisatrya Medan A.Y. 2021/2022."



## **1.2. Problems Identification**

Based on the background that has been described, several problems can be identified as follows:

- a) The use of technology in learning biology at SMAS Budisatrya Medan is still not optimal.
- b) Teachers tend to dominate learning activities in the classroom (teacher-centered learning).
- c) There is no interactive learning media used at SMAS Budisatrya Medan.
- d) Students' lack of enthusiasm and participation in learning activities.
- e) Students experience difficulties in learning the human digestive system, such as the mechanism of digestion, absorption of food substances, digestive enzymes and food test practicum procedures.
- f) There are misconceptions about the digestive system material.
- g) There is no mobile learning application on digestive system material that focuses on food digestion and absorption process.

## **1.3. Scope of Research**

The scope of the problem in this research is to develop a feasible android-based mobile learning application according to the assessment of media expert, material expert, biology teacher and students's responses to be implemented in the digestive system material learning for grade XI MIA SMAS Budisatrya Medan.

## **1.4. Scope of Problem**

The problem in this research is limited to:

- a) The learning media developed is an Android-based mobile learning application.
- b) The mobile learning application developed on the digestive system material with animated videos of the digestive process and absorption of food substances and simulation of food test procedure.
- c) The animated video created using Adobe Animate CC.

- d) This research uses 4D (define, design, develop, and disseminate) development model by Thiagarajan (1974) and is limited to limited field product trial.
- e) The product trial of an Android-based mobile learning application on the digestive system material will be tested on students of grade XI MIA SMAS Budisatrya Medan.

### **1.5. Research Questions**

Based on the scope of problem, the research questions in this study are:

- a) How is the feasibility of the Android-based mobile learning application on the digestive system material for grade XI MIA SMAS Budisatrya Medan according to media expert?
- b) How is the feasibility of the material presented in Android-based mobile learning application on the digestive system material for grade XI MIA SMAS Budisatrya Medan according to material expert?
- c) How is the feasibility of the Android-based mobile learning application on the digestive system material for grade XI MIA SMAS Budisatrya Medan according to biology teacher?
- d) How do grade XI MIA SMAS Budisatrya Medan students respond to the android-based mobile learning applications on the digestive system material?

### **1.6. Research Objectives**

Based on the research question, the objectives of this study are:

- a) To find out the feasibility of the Android-based mobile learning application on the digestive system material for grade XI MIA SMAS Budisatrya Medan, according to media expert.
- b) To find out the feasibility of the material presented in Android-based mobile learning application on the digestive system material for grade XI MIA SMAS Budisatrya Medan, according to material expert.

- c) To find out the feasibility of the Android-based mobile learning application on the digestive system material for grade XI MIA SMAS Budisatrya Medan, according to biology teacher.
- d) To find out students' of grade XI MIA SMAS Budisatrya Medan response to the developed Android-based mobile learning application.

### **1.7. Research Benefits**

This research is expected to provide the following benefits:

- a) Theoretical benefits

The theoretical benefit from the results of this research is to add and enrich scientific studies on mobile learning application on digestive system materials as creative and innovative media to improve the quality of learning as a 21st-century learning media.

- b) Practical benefits

There are several benefits obtained from this research. For students, the application can help students to understand digestive system material in interactive and interesting way. Then, for teachers, the developed application can be used by teachers as supporting teaching media in digestive system learning activities at schools. While for school, this research provide educational innovation ideas in developing learning media using computer programs to be implemented in the teaching and learning process to improve the quality of learning. Lastly, for other researchers, this research provides a reference for the futher research about android-based mobile learning application development.

### **1.8. Operational Definitions**

The terms that need to be defined in this research are as follows:

1. The Android-based mobile learning application on the digestive system material in this research is a android smartphone learning application in apk format on the digestive system material with visualization, audio, video simulations about food digestion and absorption process and food

test practicum procedure to facilitate students in learning the digestive system material.

2. The digestive system is a learning material in the 2013 curriculum for biology grade XI high school, which consists of food, nutrition, digestive system organs, the mechanism of the food digestion and absorption process, and digestive system diseases.