

Interactive Learning Media for Human Respiratory System Topic

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INTISARI

Penelitian ini bertujuan untuk menyediakan aplikasi media interaktif yang dapat membantu guru dalam menyeleraskan penyampaian materi mengenai sistem pernapasan manusia. Selain itu dapat membantu siswa dalam meningkatkan kualitas belajar dan melaksanakan proses pembelajaran secara mandiri. Penelitian ini menggunakan pendekatan sistem *Object-Oriented Analysis Design* (OOAD) dengan menggunakan alat perancangan sistem yaitu *Unified Modeling Language* (UML), dan metode pengembangan sistemnya yaitu metode ADDIE. Hasil dari penelitian ini yaitu analisis dan perancangan (*storyboard*) aplikasi multimedia interaktif yang berisi materi mengenai sistem pernapasan manusia yang disajikan dalam bentuk audio, video, dan animasi. Selain itu, perancangan aplikasi media pembelajaran interaktif ini membantu guru dalam menyeleraskan penyampaian materi, meningkatkan kualitas belajar siswa dan membantu siswa untuk melakukan proses pembelajaran secara mandiri. Dengan adanya perancangan aplikasi media pembelajaran interaktif ini dapat memberikan gambaran kepada guru dan siswa mengenai media pembelajaran interaktif sistem pernapasan manusia yang dapat membantu proses belajar mengajar.

Kata kunci : *Media Pembelajaran, Multimedia Interaktif, Sistem Pernapasan Manusia.*

ABSTRACT

The aim of this research is to provide interactive media applications that can assist teachers in harmonizing the delivery of material about the human respiratory system. In addition, it can help students improve the quality of learning and carry out the learning process independently. This research uses an Object-Oriented Analysis Design (OOAD) system approach using a system design tool that is Unified Modeling Language (UML), and the system development method is the ADDIE method. The results of this research are analysis and design (*storyboard*) of interactive multimedia applications that contain material about the human respiratory system presented in the form of audio, video, and animation. In addition, the design of this interactive learning media application helps teachers in aligning the delivery of material, improving the quality of student learning, and helping students to carry out the learning process independently. The design of this interactive learning media application can provide an overview to teachers and students regarding the interactive learning media of the human respiratory system that can help the teaching and learning process.

Keywords : *Learning Media, Interactive Multimedia, Human Respiratory System.*



INTRODUCTION

Indonesia is one of the countries that apply information technology to support the learning process [1-3]. The learning process that applies information technology can help students to understand the material provided and assist teachers in delivering subject matter visually [4-6]. Interactive learning media is a supporting media in the learning process that synergizes all media from

text, images, videos, animations, audio, and graphics. One of the subjects that need to use interactive learning media is science because this subject is difficult to explain using only text and pictures [7-8]. The results of research on the effect of science interactive learning media on student learning outcomes show that the use of interactive learning media has an effect of 39.44% [9]. Meanwhile, other studies say that students and teachers need interactive learning media in science

lessons to help visualize some processes that cannot be practiced in the learning process [10]. The human respiratory system is a discussion of the material contained in science subjects. This material requires visualization of the human respiratory organs and how the air exchange mechanism in the human body.

Science learning in junior high schools uses books that have been prepared by the Government in the context of implementing the 2013 curriculum. In this 2013 curriculum science book, there are several materials from the fields of physics, chemistry, biology, earth, and space sciences [11]. This research will focus on the field of biology with material on the human respiratory system. In the teaching and learning process, the teacher makes three stages of teaching, namely material explanation, material analysis, and competency test. In the first stage the teacher gives an explanation of the material of the human respiratory system and students understand the explanation given. In the second stage the teacher demonstrates and provides instructions for carrying out simple practices regarding the breathing mechanism. Students follow the instructions given by the teacher and carry out an analysis or identification of the practices that have been carried out. Whereas in the third stage the teacher provides competency tests to students in the form of multiple-choice and essays to determine the level of students' understanding of the human respiratory system material. After students do the competency test, the competency test results are collected for an assessment by the teacher and the competency test results that have been assessed will be returned to students for the learning evaluation process. In the learning process, the teacher has difficulty explaining the workings of the human respiratory organs and difficulties in demonstrating the mechanism of the air that enters the human respiratory system in the form of images. Because the material described in the visualization is only in the form of text, pictures, and explanations from the teacher, students have difficulty in visualizing the air exchange mechanism in the human respiratory

system. For the learning process to be more interactive, a learning media is needed that can assist teachers in providing explanations and visualizations of the material provided.

This research aims to design interactive learning media in the science field for the human respiratory system material. Interactive learning media can help teachers convey material about how the human respiratory organs work and the mechanism of air entering the human respiratory system by visualizing using animations so that it will be seen how each organ works and the mechanism of human breathing when air enters. Besides, this interactive learning media provides material exposure in the form of animation, video, audio so that students can understand the mechanism of air exchange in the human respiratory system. In the competency test in interactive learning media, it is presented in multiple-choice form and essays using animation. Assessment and evaluation will immediately appear when the competency test has been completed. Besides, competency tests are also presented in the form of simple interactive games related to the human respiratory system material [12].

METHOD

The systems approach method used in this research is the object-oriented design analysis system approach (OOAD). This method facilitates the process of developing a program. Besides, this method can help create an overview of the interactive learning media process using UML system design tools. Meanwhile, the system development method used in this research is the ADDIE method [13][18]. The ADDIE method is one of the models commonly used in making effective learning designs [14][19]. Besides, this method can be used in online, face-to-face learning, product development such as media, or teaching lessons. The following are the stages of the complete ADDIE method in Figure 1 below:

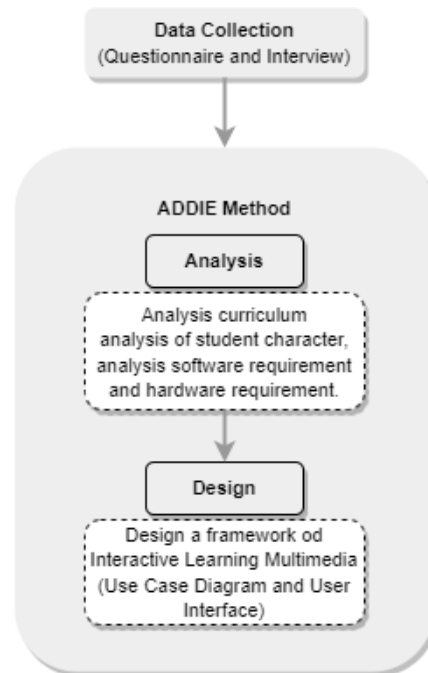


Figure 1. Research Method

In the first stage in this method, namely analysis by collecting data through the process of observation and interviews related to the learning of the human respiratory system in the field of science, analysis of the needs of learning materials for animation (teaching materials), analysis of the curriculum used, analysis of student characteristics, analysis of software requirements, and hardware requirements analysis. The second stage is designed by making use case diagrams first, then proceed with making interactive learning media user interface, arranging lesson and evaluation questions, making learning media backgrounds, images and buttons to be used in the application [15-16].

RESULTS AND DISCUSSION

Analysis

Human respiratory system interactive learning media is intended for 8th-grade students of junior high school. Based on observations and interviews that have been carried out on the

Design

After the analysis is obtained, the next step is to design an interactive learning media for the human respiratory system. Use case diagrams can complete the system analysis and design process by presenting the interactions between actors and the

analysis of needs for users of interactive learning media, it is necessary to have an animation that can explain how the human respiratory organs work, the mechanism of air exchange in the human respiratory system, multiple-choice questions and some essays are packaged into interactive questions and games interactive. The teaching lessons used in this research are the 2013 curriculum science subject book issued by the Ministry of Education and Culture of the Republic of Indonesia in 2017. Besides, there are several system requirements needed in designing this interactive learning media. Software requirements: operating system (windows) and adobe flash player (only needed if the application is to be opened in a web browser). As for hardware requirements: CPU with a minimum Intel Atom 1.6 GHz processor if using a Windows operating system, minimum 512 MB RAM, 64 MB minimum VGA card (recommended 128 MB or more), minimum 80GB hard drive, Soundcard, Mouse, Keyboard and Monitor with the screen resolution of 1024x600 pixels (1280x720 pixels or more recommended).

system. There is user involved in this interactive learning media that is students and teachers. The analysis that has been obtained in the previous stage is described in the use case diagram, which shown in Figure 2.

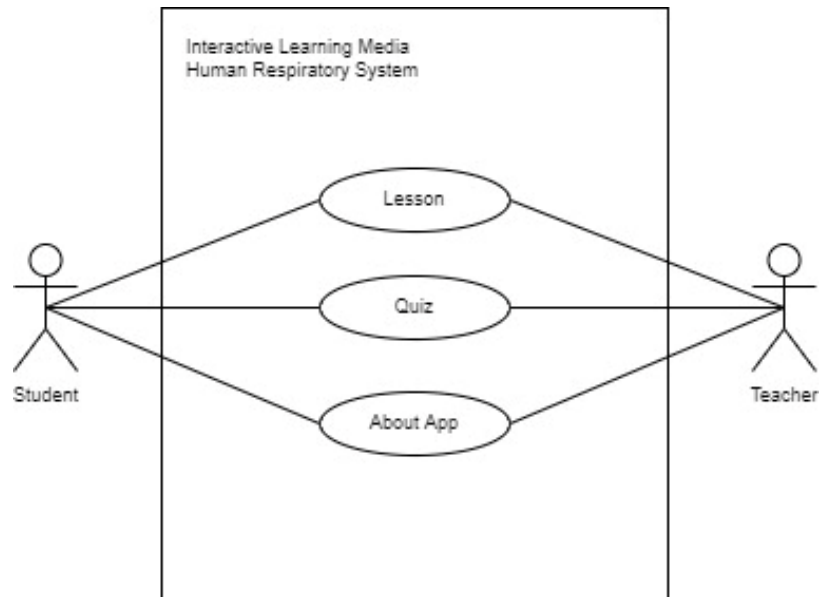


Figure 2. Use Case Diagram

The next step is to create an user interface application. UI (User Interface) is the visual part of an application or software that determines how a user interacts with the product[19]. Besides, the user interface will be used as a combination for programmers or graphic designers in building an interactive learning media system. The design of the

user interface begins with the main menu consisting of lesson (lesson explanations and videos about the human respiratory system), quiz (multiple-choice, essays, and games), and about apps (containing the application of learning media for the human respiratory system) which shown in Figure 3.

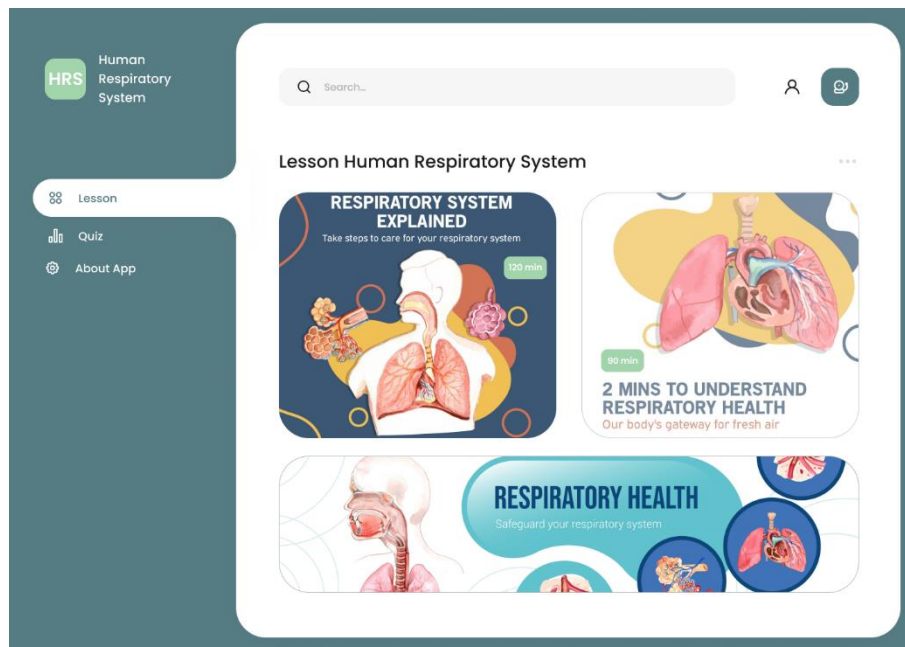


Figure 3. Main Menu Application

In the lesson menu, there are several explanations about the human respiratory resource, human respiratory mechanism, respiratory rate, respiratory volume, the disorder of the human

respiratory system, and human respiratory system video. Figure 4 is the user interface of lesson (human respiratory resource).

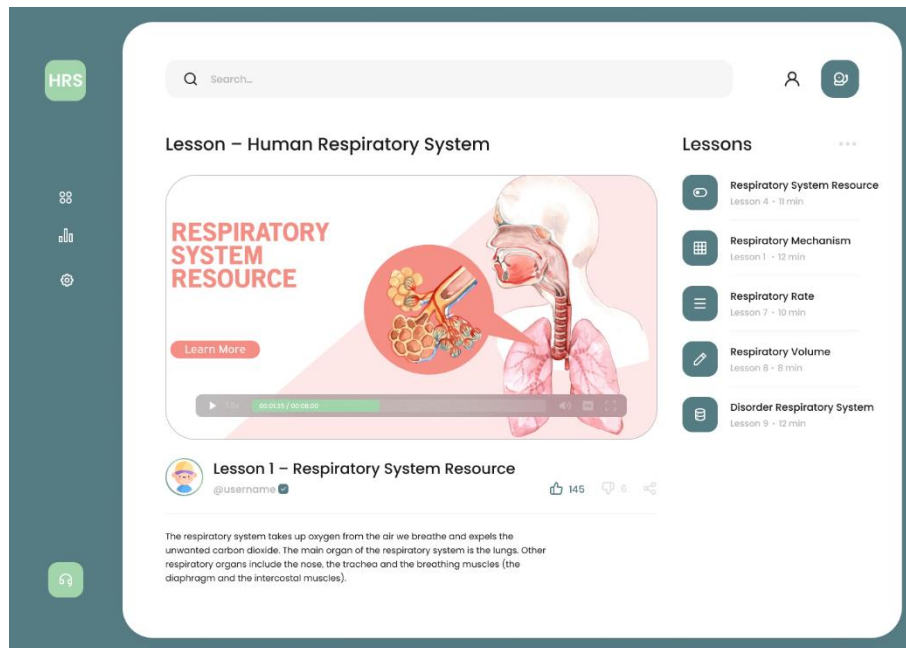


Figure 4. User Interface Lesson

In Figure 5, there is a user interface for quiz menu. In this menu, there will be several questions supported by visualization of animated videos and several answer choices. Students answer the questions by choosing one of the answers that are considered correct. If they have chosen the student's answer, press the next button to go to the

next question until it is finished. After finishing answering all multiple-choice questions, students can see the final score display and review the student's incorrect answers. The results of these final grades can help teachers measure the success of learning that has been done.

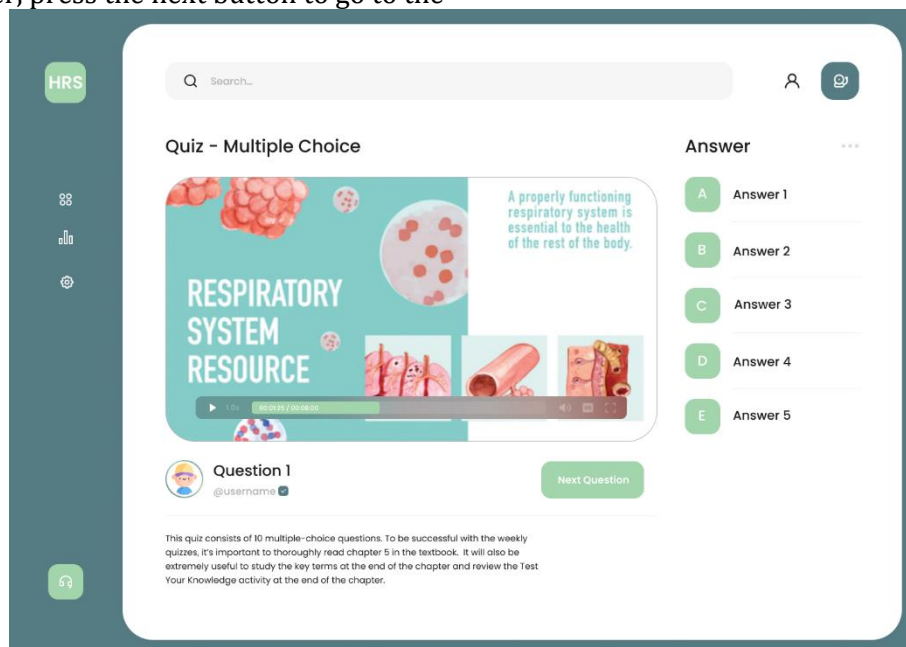


Figure 5. User Interface Quiz (Multiple-Choice)

CONCLUSION

The design of this interactive learning media application can assist teachers in equalizing

delivery and providing an explanation of how the human respiratory organs work and the mechanism of air entering the human respiratory system. The

learning process becomes clearer, more interesting, and interactive with visualization in the form of animated videos[17]. With the design of this interactive learning media application, it can provide an overview to teachers and students about interactive learning media of the human respiratory system that can help the teaching and learning process.

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