

THE DEVELOPMENT OF LECTORA-BASED INTERACTIVE MODULE ON ANIMAL RESPIRATORY SYSTEM MATERIALS TO IMPROVE SPATIAL ABILITY OF MI NU SUNAN GIRI STUDENTS

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ABSTRACT

This research is motivated by the concept presentation of animal respiratory system material which is abstract for students. It affects the students' spatial ability being weak; therefore, students have difficulty in understanding the material well. The utilization of learning media with interactive modules is able to increase the attractiveness and motivation of students to learn independent, creative, and efficient, where it can improve student learning outcomes. This study aims to produce a valid and effective *Lectora*-based interactive module on animal respiratory system materials and determine learning outcomes using *Lectora*-based interactive modules on animal respiratory system materials. The module is used in learning to improve the spatial ability of MI NU Sunan Giri students. This research is a development using the ADDIE model, namely analysis, design, development, implementation, and evaluation. The results of this study are 1) *Lectora*-based interactive module on animal respiratory system material has been valid and practical. 2) The use of *Lectora*-based interactive modules on animal respiratory system materials can improve students' spatial abilities.

Keywords: *Interactive Module, Lectora, Animal Respiratory System, Spatial Abilities.*

INTRODUCTION

The teaching and learning process has three crucial components in the national education system, namely students, educators, and curriculum (Amri, 2013; Wahyu, 2018). These three components are used in improving the quality of education. Learning innovation, curriculum development and fulfillment of educational facilities and infrastructure are the methods to improve the quality of education. It needs to increase the improvement of the education quality in creating innovative learning.

Innovative learning design will be able to encourage students to study optimally, both independent learning and learning in

the classroom. Innovative learning can be implemented through creativity which is built by educators as learning implementers. Educators as learning implementers must observe and plan an interesting teaching and learning process for students in consequence students are interested and eager to learn, so teaching becomes effective and maximal (Darlen, et al., 2015).

However, to achieve the effective and maximum results still become an obstacle in terms of the learning process, especially for the animal respiratory system. During this learning, it has focused more on memorizing skills, than logic and reasoning skill. In learning the animal respiratory system, it contains many concepts and applications in daily life. Animal

respiratory system learning is a lesson which contains abstract presentation of visual and spatial experiences. This is caused that learning of animal respiratory system which presents abstraction makes it difficult for students to understand well. Abstract presentation shows many students who have not been able to visualize two-dimensional or three-dimensional images.

According to the results of initial observations at MI NU Sunan Giri, many students undergo difficulties in studying the respiratory system of animals. It can be seen that students cannot answer the questions correctly about the animal respiratory system (Wisudawati & Sulistyowati, 2014). The learning system used is a textbook containing material and exercises. However, textbooks are one-way learning which does not provide feedback to students. It makes a difficulty for students to implement concepts correctly. Moreover, the visible condition in learning is uncomfortable for students; in consequence, they often feel bored in learning the animal respiratory system.

The rapid technological developments can support the creation of an interactive learning media which overcome difficulties in learning that is still abstract. It caused that two-dimensional and three-dimensional images can be visualized. Therefore, interactive learning is able to improve students' visual and spatial abilities. One of the learning media which facilitate students' difficulties in learning of animal respiratory system is through interactive module.

Interactive module is teaching material arranged according to the necessity of students in the learning process presented perfectly (Darlen, et al. 2015). Interactive modules is also applied in independent study during the *COVID-19 pandemic*, providing opportunities for students to practice. Students can complete their own tests and accommodate students to provide feedback which was developed through software in the form of text images, sound, , or videos equipped with interactive buttons and interactive evaluations. The interactive module is integrated into a software providing benefits for students, namely students can learn anytime

and anywhere. On the other side, students do not need to bring textbooks to study because they have been stored in hardware (Sinollah & Wahyu, 2020). *Software* providing this interactive module is *Lectora Inspire software*.

Lectora is software developed by *Trivantis Corporation*. *Lectora* is used in the assessment and presentation of a product or research results, online training courses. *Lectora* is also applied to convert from *Microsoft Power Point* presentations into e-learning content. Content developed with *Lectora* software can be published to various outputs such as *Executable Single File (*exe)*, *HTML* or *CD ROM*. *Lectora* content is also equipped with *e-learning* industry standards such as *AICC (Aviation Industry Computer-Based Training Committee)* and *SCROM (Sharable Content Object Reference Model)*. Content created in *Lectora* is also supported by standards-based learning management and allows users to utilize multimedia files for the creation of interesting content for students. (Suryadarman, Y. & Nabila, 2020).

Based on the problem and necessity of students, it is necessary to make learning media to assist students in learning the animal respiratory system. The learning media is an interactive module based on *Lectora* on animal respiratory system material for MI NU Sunan Giri students. With *Lectora*-based interactive modules on animal respiratory system materials, students can interact directly with modules containing material, color images, animations, simulations, and videos.

This interactive module has been integrated into a digital module which is interactive and appropriate for students, especially during the current *COVID-19 pandemic*. Objects which are originally displayed in images can be displayed in the form of animations, simulations, and videos. Animations and simulations are also implemented in discussing sample questions; therefore students can see the problems which are showed. This interactive module also provides interactive evaluation for students. Interactive evaluation can be used by students to measure students' cognitive abilities based on the material they have learned.

METHOD

Lectora-based interactive module development model on animal respiratory system materials using the ADDIE development model (Maribe Branch, 2009), it consists of five stages, namely; *analysis, design, development, implementation, evaluation stages*. The analysis phase consists of text book analysis and interview analysis of educators and students. The design stage consists of designing a *Lectora*-based interactive module which includes a) compiling the material presented in accordance with the basic competencies and learning experiences which have been determined, b) developing an interactive module *framework*, c) preparing program *flowcharts*, d) preparing program *storyboards*, e) preparing materials interactive modules, f) designing the themes, menus, and forms used.

Self-evaluation is conducted on the design of *lectora*-based interactive module in order to obtain an appropriate module design with the results of the analysis phase. The development stage consists of creating and validating *Lectora*-based interactive modules according to the designs made. The implementation phase consists of a practical test of the *Lectora*-based interactive module. A product has a high practicality value if it is practical and easy to use in testing the *Lectora*-based interactive module that has been developed. The trial is conducted to test the effectiveness of the *Lectora*-based interactive module on animal respiratory system materials to improve students' spatial abilities.

RESULTS AND DISCUSSION

The analysis phase is to identify problem and necessity in the development of *Lectora*-based interactive modules. The data obtained include interviews with educators and students, collection of syllabus documents, and text books on animal respiratory system materials. Based on the results of interviews, it collects information about the spatial ability of students on the material of the animal respiratory system. Students tend to memorize the material. The use of textbooks by students is poor. The tendency

of students to only receive information from educators.

The limited method used by educators in face-to-face activities by explaining the material, providing examples of questions, and practicing makes students less motivated and not trained in imagining. Educators have also never written teaching materials which help students in visualizing. The development of *Lectora*-based interactive modules is designed to facilitate limitations in the learning process. The utilization of *Lectora* as a medium in presenting material is able to provide an attractive spatial appearance and animation and motivate students in learning, therefore; students' spatial abilities also increase. According to educators and students, *Lectora*-based interactive modules are very interesting and can be used by students for independent study.

The results of syllabus analysis to determine the suitability of the competencies which must be achieved by students. The analysis of several available animal respiratory system textbooks aims to see the suitability of the book contents, presentation methods, sample questions, and exercises with the applicable course syllabus. The material contained in these books includes competencies which must be achieved by students. Presentation of animal respiratory system material according to the syllabus. However, there are differences in the order of presentation in some of these books. In this case, the books show the logic in the presentation of the material. The order of presentation of the material on the module is also adjusted to the existing syllabus and textbooks.

The design phase begins with designing the systematics and structure of the interactive module. Then after the design stage is carried out, a prototype will be produced based on the systematics and structures that have been designed. The initial display of the module presents *home*, instructions for using the module, the module compiler team and *menu* containing a list of material choices that students want to learn. Each sub-topic begins with the presentation of basic competencies and learning experiences. Then, it contains the presentation of material and exercises. An

interactive evaluation is given at the end of the module for students containing a collection of test practice questions for all sub-subjects.

Based on the systematics and structure of the interactive module which has been designed, a prototype is produced. The initial *prototype* starts from the title of the interactive module which contains the “start” navigator button menu and the building team menu. The “start” *navigator* button menu is useful for guiding students to start opening interactive modules. The display of the module title and the menu of the development team can be seen in Figure 1.



Figure 1. Display of Interactive Module Title

The main menu has 6 tabs containing material, exercises, and evaluations related to chapter titles. Each tab is not related to each other, thus; students can return to the home menu. This main menu contains a hint button using an interactive module. The material in the interactive module contains animations for the animal's respiratory system based on each component it has. The material tab can be seen in Figure 2.

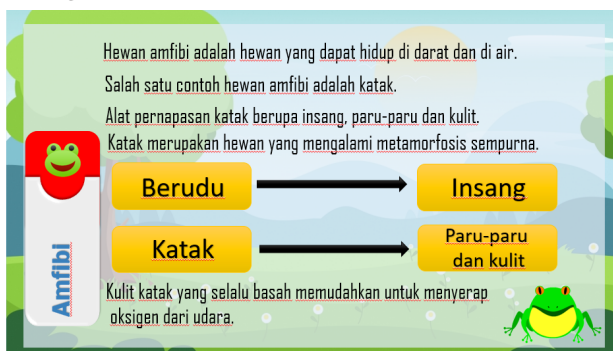


Figure 2. Display of Material Tab Menu

Based on Figure 2, Amphibian is animal that live in water. An example of an amphibian is a frog. The frog's respiratory organs are

gills, lungs, and skin. Frogs are animals which undergo complete metamorphosis. frog skin which is always wet makes it easy to breathe oxygen from the air.

The questions contain multiple choice questions. Each exercise is accompanied by an assessment, hence students can see the results directly without waiting for an explanation from the educator and get feedback in the form of the value of practice questions.

Then based on the evaluation that has been conducted by the researcher, the module prototype is revised and continued with validation to experts. This expert validation is carried out to evaluate the module that has been revised and adapted to the results of the self-evaluation. Validation is conducted in order to obtain a valid *lectora*-based interactive module.

Data from expert validation was collected based on the results of the validation sheet as well as suggestions submitted by the experts, both oral and writing. The assessment given consists of four aspects, namely the aspect of material presentation with an average of 3.73, the aspect of content feasibility with an average of 3.76, the linguistic aspect with an average of 3.9, and the graphic aspect with an average of 3.89. After the validation process is over, it is continued with the implementation phase, namely by conducting small group trials.

Small group evaluation was conducted to determine the practicality of the developed interactive module. Practical data were collected based on a questionnaire distributed to the small group. Scoring is described using the following scale: (1) a score of 1 is given if strongly disagree with the statement in the questionnaire, (2) a score of 2 for the disagree category, (3) a score of 3 for the moderately agree category, (4) a score of 4 for the agree category, and (5) a score of 5 for the category strongly agree.

The questionnaire compiled in this study consisted of three indicators with 1 statement. The first indicator is the time which is needed to use the module which consists of one statement. The second indicator is the ease of using the module which consists of six statements. The third indicator is the benefits obtained in using the module which consists of three statements.

The results of completing questionnaires by students showed that most of the students stated that the time to understand the material was in accordance with the available time. Likewise, for the ease of use of the module and the benefits obtained in using the module, most of the students agreed. The results of the questionnaire score analysis per indicator showed that the *lectora*-based interactive module had been practically used by students.

This trial was also conducted to see the effectiveness of the developed interactive module and to obtain information for further improvement of the developed module. Effectiveness data was collected in the form of data on the initial and final test scores of students who took part in small group trials. The utilization of modules by students at each meeting is quite maximal. The initial test was conducted at the first meeting before the learning activities begin. The questions tested are evaluation questions contained in the interactive module. The same questions were tested again in the final test which was conducted after the implementation of the research. This final test aims to obtain data on student learning outcomes after the implementation of learning using the developed module. that the average student test scores changed by 25 with a standard deviation of 7.07. This data shows the magnitude of the change in value ranging from 17.93 to 32.07. Judging from the average score of the initial and final tests, there has been an increase in the final test scores of students by 17.93 to 32.07. The test results statistically show that the value of $t_{count} > t_{table}$ which means that there is a difference in the average value of the initial test and the final test. It can be seen from the average test scores, there was a significant increase in scores. Thus, it can be concluded that the interactive module developed is effective in improving student learning outcomes. In other words, the spatial ability of students has increased after using the *lectora*-based interactive module. The results of the final test experience a significant improvement over the initial test.

The well-understanding of the material has a good influence on student learning outcomes

which can be seen from the acquisition of satisfactory learning outcomes. As stated by Suparno (1997) that a person's learning outcomes depend on what he himself knows, whether it is concepts, goals, and motivations which affect interactions with studied material. The understanding and application of knowledge and experience gained with sample questions and exercises contain the module which expands and refines students' knowledge and increases understanding of the material being studied. In accordance with the opinion of Hamalik (2012) which stated that practice provides a learning experience which is able to help mastering the aspects of behavior change, develop the ability to think in solving problems, and assisting the effective learning process.

CLOSING

The *lectora*-based interactive module which is developed is intended as an alternative learning resource for students in understanding animal respiratory system material. According to the data and discussions that have been conducted, it is concluded that the results of the expert review show that *lectora*-based interactive module already has content (relevance) and construct (consistency) validity. The validity assessment includes aspects of the feasibility of content, presentation of material, language, and graphic. Each validated aspect has been categorized as valid in terms of content and constructs. The results of small group evaluation involving ten students showed that the prototype of interactive module developed was practical. The presentation of material in this module is easy to understand, the language used is clear and easy. The effectiveness of module observed through student learning outcomes after using this interactive module shows that the module has been effective. The results of the trial showed that there was a significant difference in learning outcomes between the initial and final test scores obtained by students. Based on the results of data analysis, it was obtained that it gets an increase in the average of initial test to the final test of the students.

According to the results of development which has been performed, several suggestions

are presented to be applied as a basis for making policies, using products, and conducting further research and development. This *lectora*-based interactive module can be used as an alternative learning resource in learning activities at school. The module was limited development to animal respiratory system materials using *Lectora*. This module is developed and used as teaching material with a wider range or different disciplines. This module can be used by educators as teaching materials in the learning process using *blended learning* model. The outlook of using this module is that it can help students visualize the material for the animal respiratory system, thus; the spatial ability of students has increased dramatically. Hence, *lectora*-based interactive module is able to increase student learning outcomes better than before.

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