DEVELOPMENT OF MOODLE-BASED E-MODULES ON MOTION SYSTEMS FOR ELEVENTH GRADE STUDENTS OF SENIOR HIGH SCHOOL

Reza Hendrawan[1], Zulfarina[2], Irda Sayuti [3]

[1,2,3] Magister of Biology Education, Faculty of Teacher Training and Education
Universitas Riau, Pekanbaru, Indonesia

Corresponding author: rezahendrawan793@gmail.com

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Abstract

This study aims to develop e-module teaching materials with the Moodle application on motion system materials. This e-module with the Moodle application has several advantages, namely learning is more interesting and can be done remotely where educators can still control learning and assessment activities, there are discussion forums and quizzes and has security features limiting access rights where unregistered users cannot open e-module. This research is a type of research and development (R&D). The procedure for developing this research uses the ADDIE development model, where this development model consists of 5 stages, namely Analysis (analysis), Design (design), Development (development), Implementation (implementation) and Evaluation (evaluation). The research instrument was a validation sheet and a respondent's questionnaire. The media validation stage involved 5 subjects (1 media expert, 1 material expert, 1 linguist, 1 pedagogic expert, and 1 teacher). Feasibility assessment by experts using validation sheets. The practical test phase involved 5 people, the simulation test involved 5 master students at the University of Riau majoring in biology and teachers and the limited trial involved 40 students. The data analysis technique is to calculate the percentage of validation assessment scores and user responses. The results showed that the Moodle-based e-module developed met the very valid criteria with an average of 3.54, the practical aspect showed very practical with an average of 94.54, and the results of the student response test obtained a score of 96.4 with a very good category good. Based on the description above, it is concluded that the Moodle-based e-module that was developed can be a source of learning/teaching materials that can be used during learning because with the Moodle-based e-module the material presented is more interesting, educators can include videos, animations, pictures and learning can also be done remotely where educators can still control and evaluate students.

INTRODUCTION

Education in the 21st century demands modern and professional education management with an academic and educational nuance. So the need for enlightenment and empowerment of every type and level of education to support 21st century learning. One of these enlightenment and empowerment can be done from the aspect of procurement of teaching materials, teaching materials can be pursued by developing teaching materials continuously. The development of teaching materials can take advantage of technological developments that occur in the current era of globalization (Eza and Eldarni, 2019). The fact is that the problem faced by teachers so far is that not all teachers have mastered digital technology, besides that student consider biology a difficult lesson because the material is rote and abstract. According to Zaharah and Susilowati (2020) in general, students' learning motivation is very lacking, this can be seen from their attitude that is less enthusiastic and less ready to take part in learning, so that the learning atmosphere becomes less active, students tend to be passive, and the interaction between students with very few teachers.

The Motion Systems for Eleventh Of Senior High School. The characteristics of the Motion System material include this material which is actually a phenomenon that occurs in our bodies whose process is difficult to understand only with lectures. Passive Motion System material is quite a lot that requires students to memorize because it consists of various names of bones that make up the Passive Motion System, location, and shape related to its function. If you just glance at the book, students will have difficulty understanding the essence of this material. Students need a media that can increase their understanding of the Active Motion System. According to Desinta (2013) that the mechanism of muscle contraction, for example, it will be easier if learning is given enrichment in the form of videos and quiz questions to check the extent of student understanding.

Based on these problems, researchers developed technology-based teaching materials that can make students adapt to the current developments in the IT field and are motivated in learning, namely moodle-based e-modules. The selection of moode-based e-modules is because these teaching materials are practical and can be used via smartphones, interactive e-modules that can display images, audio, video, animation, and are equipped with formative tests/quizzes whose feedback can be immediately implemented.

Suarsana (2013) states that electronic modules (E-modules) can be interpreted as a form of presenting self-study materials that are systematically arranged into the smallest learning units to achieve certain learning objectives, which are presented in computer-aided electronic format, while Moodle according to Herayanti, Fuaddunnazmi, & Habibi, 2017; Munir, 2010 is an Open Source Course Management System (CMC), also known as a Learning Management System (LMS) which plays a role in the development of

technology-based learning processes in the form of a website. Based on the above background, the researchers conducted research on the development of learning materials entitled: "Development of a Moodle-Based E-Module on the subject of Motion Systems for Eleventh Of Senior High School.

METHODOLOGY

This research is a type of research and development (R&D). The development procedure of this research uses the ADDIE development model, where this development model consists of 5 stages, namely Analysis (analysis), Design (design), Development (development), Implementation (implementation) and Evaluation (evaluation). This research focuses on the development of Moodle-based e-modules.

The research subjects were five validators consisting of one material expert, one media expert, one language expert, one pedagogic expert, and one teacher. While the object in this study is an e-module based on Moodle on the subject of motion systems. The validation data obtained in this study were processed by descriptive statistical analysis using a Likert scale, namely giving a score for each answer item. Furthermore, the validation results are carried out by finding the average assessment results from the validator and compared with the validity criteria. The Validation Sheet Instrument Grid for Media Experts can be seen in the table below:

Table 1. Instrumental Grid Validation Sheet for Media Experts

Aspect	Indicator
Programming	Ease of use menu
	Efficiency of using moodle
	Moodle content update
Functionality	User menu usage (signup, log in and out)
	Edit user mene usage
	Using the practice question menu
	Use of the download menu
Appearance	Design
	Use distance
	Teks legibility
	Picture
	Layout
	Navigation key
	Background colour
	Serving between pages
	Alphabet

*(Modification of Kustandi, et al., 2011)

The validation results with the known percentages can be matched with the validity criteria as shown in Table 2. After validating involving 5 subjects (1 media expert, 1 material expert, 1 linguist, 1 pedagogic expert, and 1 teacher) to Moodle-based e-modules, feasibility assessment by experts using validation sheets. The practical test phase involved 5 people, the simulation test involved 5 master students at the University of Riau majoring in biology and teachers, and the limited trial involved 40 students. Assessment of the practicality of the media using a questionnaire response.

Table 2. Validity Criteria

No	Interval mean score	Validity Category
1	$3{,}25 \leq x \leq 4$	Very Valid
2	$2{,}5 \leq x < 3{,}25$	Valid
3	$1{,}75 \leq x < 2{,}5$	Less Valid
4	$1 \leq x < 1{,}75$	Not Valid

RESULTS AND DISCUSSION

RESULTS

The product resulting from this R&D research is in the form of an e-module based on Moodle on a validated motion system material. The research results are presented based on the stages of research and development based on the ADDIE model.

Analysis Stage

Teachers have used teaching materials in learning. However, limited time allocation was encountered so that the teaching materials that had been prepared were not used optimally. Based on observations to several schools, educators still use print modules in learning, there is no Moodle-based e-module in learning. According to Nugraheni and Dina (2017) that Moodle-based E-module is an application program that can change learning media into web form. The benefits of using an LMS using Moodle online are very important, including reducing face-to-face meetings between educators and student users. Moodle-based e-modules are interactive which can display images, audio, video, animation, and are equipped with formative tests/quizzes and feedback. So that with the advantages of this e-module, the material of motion systems that are abstract can be mastered well by students.

Design Stage

The development of the E-module consists of a login menu, dashboard, site home, glossary, concept map, materials, modules, summaries, assignments and exercises, as well as videos. The login menu is designed to include a username and password. In this

development, login as user (student) uses Username: siti Password: Siti123#, while Login as admin uses Username: Admbi01 Password: &11aL2&F2u. According to Nurjannah, et al (2020) with limited login area access rights for e-modules, users who are not registered in this Moodle-based e-module cannot open e-modules and access e-modules. The login menu design developed can be seen in Figure 1 below.

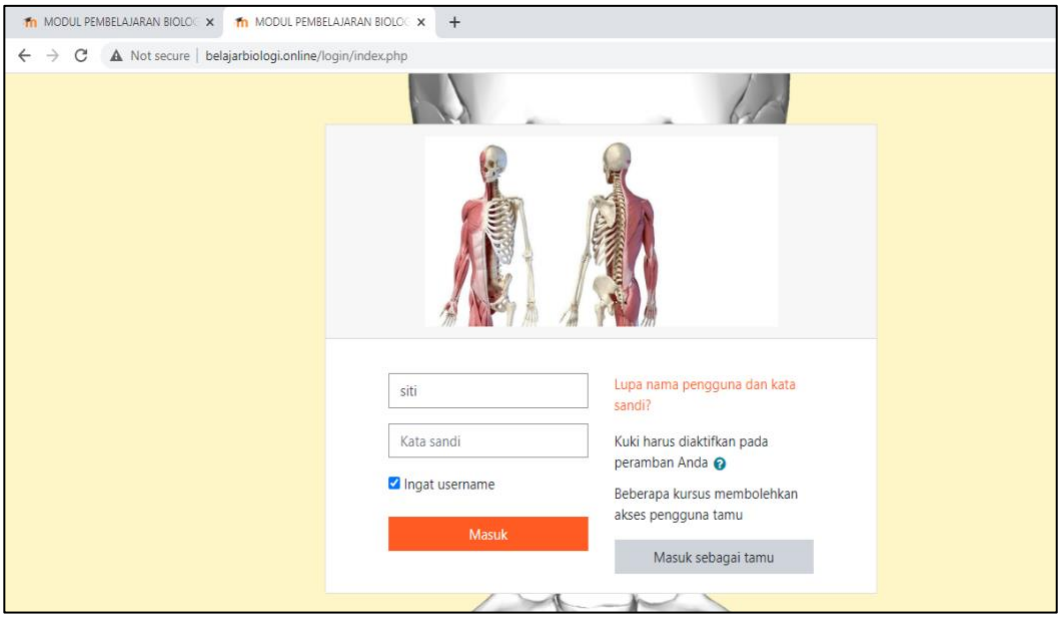

Figure 1. Moodle-Based E-Module Login Menu

Development Stage

The designed e-module was then validated by media expert validators, material expert validators, pedagogic experts, linguists, and teachers. The assessment by the validator on the validation of the media includes aspects of Programming, Functionality, and Appearance. Based on the analysis of material validation data obtained from the material validator, it can be summarized the results of the analysis from various aspects of material validation in Table 3 below:

Table 3. Recapitulation of Material Validation Average Score

No	Aspect	Validity Score	Validity Category
1	Material	3,11	Valid
2	Learning	3,34	Very Valid
	Average Validity Score	3,27	Very Valid

According to Abidin (2013) the material aspect in the teaching materials developed should pay attention to several things. First, the suitability of the curriculum. Second, the suitability of the material with educational goals. The three truths of the material

according to the science being taught. Fourth, the suitability of the material with the cognitive development of students. The evaluation by the validator on media validation covers aspects of programming, functionality, and appearance. Based on the analysis of media validation data obtained from the media validator, it can be summarized the results of the analysis from various aspects of media validation in Table 4 below.

Table 4. Recapitulation of the Average Validation Score of the Media

No	Aspect	Validity Score	Validity Category
1	Programming	3.45	Very Valid
2	functionality	3.57	Very Valid
3	Appearance	3.64	Very Valid
	Average Validity Score	3.55	Very Valid

The results showed that the developed Moodle-based e-module met the very valid criteria from the material aspect, learning with a score of 3.27%, in terms of media 3.55. Overall, the validation results show very valid criteria, which means that the Moodle-based e-module that has been developed has met the requirements set by (Ministry of National Education, 2010) in the guidelines for the development of ICT-based teaching materials that include aspects of substance, learning design, display (audio visual communication) and utilization. In addition, according to Yasmi, et al (2017) that Moodle-based e-modules can help students to be active and motivated to learn because the learning presented is more interesting, fun and not boring.

Implementation Stage

The Moodle-based e-module on the subject of the motion system that has been declared very valid by the validator is then tested limited by asking for responses to students as users (respondents). The application of Moodle-based e-modules is carried out on a small scale consisting of 40 students. Students try Moodle-based e-modules using laptops and smartphones. The Moodle-based e-module has a security feature, namely the limitation of access rights where users who are not registered in the e-module cannot open the e-module so that 40 students as users give access rights before trying the e-module.

The learning process using e-modules involves students actively, where students learn the module by downloading the material that has been provided on the web, then study it independently, then students discuss with their friends to solve group questions through e-modules. In the last stage, students take quizzes through e-modules whose values can be seen directly after completing the quiz. The e-module material on the human movement system at the first meeting (1), studied the functions of the skeleton, ossification, cartilage and hard, bones based on shape, and the relationship between bones. Students learn this material by downloading material on the site in the e-module. Students also work on group assignments using e-modules that are done online. In learning about the skeleton and bones, the e-module is packaged in a simple form by using a lot of tables to make it easier for students to understand the material.

Evaluation Stage

Based on the results of the response test to the use of Moodle-based e-modules, the students obtained a score of 96.4 with a very good category. E-modules can help students understand the material because the language used is communicative and the guidance steps provided are clear and easy to understand. In the learning process, students use e-modules equipped with videos and animations, are very enthusiastic and enthusiastic in discussing the problems presented. Students are also very active when presenting, answering questions and responding to the results of group discussions, as well as the attention of students who previously tended to be lazy, sleepy and distracting friends look focused on learning material because the learning resources used were very interesting, fun and a great thing. new for students, this is in line with the results of research conducted by Istiqfar et al. (2018) which states that the use of e-modules can increase students' learning motivation, as seen from the effect of learning motivation that has increased by 17%.

DISCUSSION

The use of this Moodle-based e-module learning media can facilitate learning activities so that students can learn and still understand the material being taught, the e-module learning media is quite interactive because of the features that can upload variously, in the sense that it is not in the form of writing. only, but it can be in the form of videos so that it can attract the attention of students in learning activities. The use of this Moodle-based e-module makes students active when presenting, answering questions and responding to the results of group discussions, as well as the attention of students who previously tended to be lazy, sleepy and distracting friends, they seemed to focus on learning material because the learning resources used were very interesting, fun and new for students.

According to Batubara (2018), the advantages of Moodle-based e-modules compared to other applications are as follows: 1) Complete features, 2) Moodle has a simple design display and includes a link to the usage tutorial page on each page, 3) is available in 120 languages and continues increases, 4) can operate on all computer and smartphone devices, 5) available levels of user roles, namely site administrator, manager and registered user. Supported by Habiburrahman's opinion (2020) the presentation of this media uses the information method once bribe (chunking the information), where the material provided is presented with pieces of material equipped with animated images and videos that provide flexibility for users to learn the material. According to Mas'ud, et al (2021) interactive e-module of integrated science with connected type on energy topic was declared effective in increasing the students' concept mastery.

CONCLUSION

Based on the description above, it is concluded that the Moodle-based e-module developed meets the very valid criteria with an average of 3.54, the practical aspect shows practicality with an average of 78.4, and the results of the student response test obtained a score of 86.94 with a very good category. E-modules that have been developed can be a source of learning/teaching materials that can be used during learning because with this Moodle-based e-module the material presented is more interesting, educators can include videos, animations, pictures and learning can also be done remotely. where educators can still control and evaluate students. This Moodle-based e-module also has discussion forums, quizzes and CBT-based exercises and provides feedback. The Moodle-based e-module has a security feature, namely the limitation of access rights where users who are not registered in the e-module cannot open the e-module.

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