The Use of Moodle-based Learning Management System (LMS) on MATE (Media Ajar Teori Evolusi)

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Abstract. The goal of this research is to identify students' responses and see the feasibility of MATE (Media Ajar Teori Evolusi). This research is Research and Development. The subjects of the research were students of the sixth semester of Biology Education Department in the academic year of 2019. The ADDIE model (analysis, design, development, implements, and evaluation) was used as the design of the research. The developed product is declared as feasible because of its efficiency, light-weight, and compatibility. The students can construct their ideas. The developed product facilitates knowledge construction through the interactive online instrument. This is the first developed Moodle-based learning management system (LMS) on MATE (Media Ajar Teori Evolusi). It can help the lecturers to be more structured in teaching to achieve the goals of learning. Based on the validation conduction by experts, the overall result is 85,5% and students response in the trial to get an 88% percent-rate average. Judging from the overall result, the learning media is declared as feasible and appropriate to be used.

1. Introduction

Education-based on information, technology, and communication is one of the means to be utilized by lecturers and educational personnel to help students increase their effectiveness, quality, producibility, and accessibility in the world of education to support the development of the younger generation[1-3].

Advances in technology have encouraged development is new learning experiences for students [4] especially in the study of biology on the subject of evolution [5]. The biology learning process refers to the essence of science which covers the process (scientific process), products (scientific products), attitude (scientific attitudes), and technologies [6]. Technology is an important aspect of biological medicine. In the learning process, the media should be designed to solve the issues at hand [7, 8]. One of the uses of computer technology and the internet is the electronics learning system or often called E-learning [9]. E-learning is evolutionary and is always assimilated into the world of education [10]. E-learning is a form of technology and information that can be accepted in online education [11]. Using e-learning is an appropriate transformation of the learning process to be used in schools or digitally managed colleges [12, 13]. Technology solves the limitations of the traditional process of learning [14]. So, the learning process can be done anywhere in a controlled manner [15].

E-learning can open a new prospect for learning development [16]. The good use of E-learning creates an optimum learning process [17]. There are some benefits of E-learning, namely 1) shorten the learning process, 2) make the learning process more productive and efficient, 3) easier information
sharing and access more learning materials, 4) the scientific process not only happens inside the classroom, 5) versatility of place and time, 6) a lot of money can be saved, and 7) the students can take control of each learning process which means they are given the freedom to decide when to begin and finish [18-20].

According to the preliminary study, most students failed to take notes on the learning material and make the difficult to remember the material that the lecturer had described in previous meetings. The relatively short college hours make the process of material understanding to be slow. This research tries to provide an alternative by developing a Moodle-based learning system. The students can use the internet facilities as one of the sources.

Through this LMS, the students can build a process of learning at their own pace from various learning sources by not considering the lecturers as the only source of knowledge. This The developed media is a moodle-based learning management system (LMS) on MATE (Media Ajar Teori Evolusi). This can help the lecturers to achieve the goals of learning.

Moodle stands for Modular Object-Oriented Dynamic Learning Environment [21]. It is a web-based LMS meant to support teaching activities [22]. It is an open-source LMS and free to be downloaded or modified by anyone using a GNU (General Public License) [23, 24]. It can be used to develop an E-learning and distance learning system [25]. Through this concept, the teaching system is infinite in terms of time and space [26]. Moodle can be initialized online or offline. The system needed so the Moodle can run both offline and online is Apache Web Server, PHP, database MySQL or PostgreSQL [27]. All three can be obtained by downloading Xampp, a Moodle centralized online requires hosting, domain, and Moodle files [28].

2. Method
This research was conducted on May 21-23, 2019 to the sixth-semester students of Biology Education Department. There were 20 students involved in the small-scale trial and 60 students involved in the field trial. The research method used was Research and Development (R&D) with the ADDIE model which consists of 5 stages, namely analysis, design, development, implementation, and evaluation. The development stages are described as follow:

2.1 Analysis
At this stage, the analysis was carried out to determine the problem and the solution.

2.1.1 Performance analysis
Based on observations, questionnaires, and interviews with the students and lecturers, information was obtained. It was found that the learning duration was inadequate, students had difficulty in understanding important terms, and the students needed new learning media based on information and communication technology to simplify the learning process.

2.1.2 Need Analysis
At this stage, the specification of the learning media needed by students in the Biology Education Department was analyzed.

2.2 Design
At this stage, an initial product was developed in the form of materials that would be uploaded and hosted on Moodle. After hosting the materials, the next stage was to create a site address domain on the Internet.

2.3 Development
The development stage was carried out based on the development procedure. The developed media was then validated by experts and lecturers. The validation process was carried out by the validator
using previously-made instruments. Validation is an activity to assess whether the design of the products can be categorized as effective media by seeing its feasibility.

2.4 Application
The test subjects in this study were 6th-semester students of classes A, B, D, H which consisted of 60 students.

2.5 Evaluation
The feasibility evaluation was carried out using observations, interview sheets, student and lecturer questionnaire sheets, and assessment sheets for media experts, material experts, and language experts. Data analysis was performed to determine the feasibility of the learning media. The results obtained were used as a consideration in improving the developed product [29, 30].

The data obtained were qualitative and quantitative data. Quantitative data were analyzed descriptively. This quantitative result can determine the level of feasibility of the product. The qualitative data analysis was done by consulting the quantitative scale in table 1.

| Table 1 Qualitative Data Scores |
|---------------------------------|
| Category | Score Positive Statement | Score Negative statement |
|----------|--------------------------|--------------------------|
| Excellent| 5                        | 1                        |
| Good     | 4                        | 2                        |
| Moderate | 3                        | 3                        |
| Bad      | 2                        | 4                        |
| Poor     | 1                        | 5                        |

The scores for each statement are all averaged and expressed as a percentage using the formula:

\[ x_i = \frac{\sum S}{S_{max}} \times 100\% \]

Description:
Smax = Maximum score
\( \sum S = \text{Total score} \)

The quantitative data obtained in this study were analyzed using the percentage method taken from each aspect as shown in table 2.

| Table 2 Criteria for Media Feasibility Assessment |
|-----------------------------------------------|
| Percentage | Criteria         |
|------------|-----------------|
| 0 - 20%    | Not Feasible    |
| 20,01% - 40% | Less Feasible |
| 40,1% - 60%    | Moderate        |
| 60,1% - 80%    | Feasible        |
| 80,01% - 100%  | Highly Feasible |

3. Results and Discussion
This research produces a product in the form of a Moodle-based learning management system on MATE (Materi Ajar Teori Evolusi). The development process was carried out using the ADDIE model as follows:
Students need learning media that can provide freedom of time in learning without having to meet in class and follow technological advancements.

• The media used were only powerpoints, learning videos, pocket books.

The level of students lack of interest in learning, especially evolution subjects is quite high.

• The groups presentation using PowerPoints to discuss the material, questions sessions were held to build mastery of the material. In addition, evaluation questions in the form of a posttest were also given.

3.1 Analysis
Problem analysis can be obtained from the results of interview sheets by the students and lecturers. The results can be seen in Figure 1.

3.2 Design
This stage consisted of 5 steps: 1) hosting, 2) creating a domain, 3) making teaching materials, 4) making a course, 5) uploading the learning materials.

3.3 Development
This process was carried out by validating the developed media. The steps taken in this stage were 1) media experts validation to analyze and assess the display, 2) material expert validation to analyze and assess the material, 3) language expert validation to analyze the writing in the material.
**Figure 3.** Login and Home Site Display

**Figure 4.** Material Display

**Figure 5.** Activities and Resources Display
The validation process was carried out by experts. The expert team consisted of one material expert, one media expert, and one language expert. The following are the results of validations.

3.4 Media Expert Validation
The results of validation by media expert are presented in the following table:

| No. | Assessment aspects       | Average | Category          |
|-----|--------------------------|---------|-------------------|
| 1   | Quality aspects          | 93%     | Highly Feasible   |
| 2   | The effectiveness aspect | 96%     | Highly Feasible   |
| 3   | Graphic aspect           | 93%     | Highly Feasible   |
| 4   | Presentation aspects     | 95%     | Highly Feasible   |
|     | Overall Average          | 94%     | Highly Feasible   |

3.5 Material Expert Validation
The results of validation by the material expert are presented in the following table:

| No. | Assessment aspects     | Average | Category |
|-----|-------------------------|---------|----------|
| 1   | Content aspect          | 74%     | Feasible |
| 2   | Linguistic aspects      | 67%     | Feasible |
|     | Overall Average         | 72%     | Feasible |

| No. | Assessment aspects     | Average | Category          |
|-----|-------------------------|---------|-------------------|
| 1   | Content aspect          | 83%     | Highly Feasible   |
| 2   | Linguistic aspects      | 80%     | Feasible          |
|     | Overall Average         | 82%     | Highly Feasible   |

3.6 Language Expert Validation
The results of validation by language expert are presented in the following table:

| No. | Assessment aspects                  | Average | Category |
|-----|-------------------------------------|---------|----------|
| 1   | Aspects of language and communication | 73%     | Feasible |
| 2   | Ethical aspects                      | 80%     | Feasible |
|     | Overall Average                      | 76%     | Feasible |

Table 3. Results of Media Expert Validation

Table 4. Results of expert validation on stage 1 material

Table 5. Results of material expert validation in Stage 2

Table 6. Results of Language Expert Validation on Stage 1
Table 7. Results of Language Expert Validation on Stage 2

| No. | Assessment aspects                              | Average | Category       |
|-----|------------------------------------------------|---------|----------------|
| 1   | Aspects of language and communication          | 90%     | Highly Feasible|
| 2   | Ethical aspects                                | 92%     | Highly Feasible|
|     | **Overall Average**                            | **91%** | **Very decent**|

3.7 Application

The implementation stage was carried out in 3 stages, namely the lecturer assessment, the small-group trial with 20 students, and a field trial with 60 students. Students gave an assessment of responses to the developed media using a Likert scale questionnaire. The following are the results of the lecturer students' responses:

Table 8. Lecturer Assessment Results

| No. | Assessment aspects       | Average | Category       |
|-----|--------------------------|---------|----------------|
| 1   | Learning Aspects         | 82%     | Highly Feasible|
| 2   | Linguistic Aspects       | 88%     | Highly Feasible|
| 3   | Presentation Aspects     | 95%     | Highly Feasible|
| 4   | Visual communication aspects | 88%   | Highly Feasible|
|     | **Overall Average**      | **87%** | **Highly Feasible**|

Table 9. Small-Scale Trial Results

| Assessment aspects                          | Average | Category       |
|---------------------------------------------|---------|----------------|
| Feasibility Aspects and Usage Aspects       | 87%     | Highly Feasible|
| **Overall Average**                         | **87%** | **Highly Feasible**|

Table 10. Field Trial Results

| No. | Assessment aspects                          | Average | Category       |
|-----|---------------------------------------------|---------|----------------|
| 1   | Feasibility Aspects and Usage Aspects       | 89%     | Highly Feasible|
|     | **Overall Average**                         | **89%** | **Highly Feasible**|

3.8 Evaluation

The evaluation stage was carried out to improve the product's quality. The evaluation process was based on overall advice from material experts, media experts, language experts, and the results of lecturers and students' responses. Furthermore, after the evaluation, the developed media was declared as feasible without any further revision.

The media developed in this study is a Moodle-based learning management systems. It was developed by following the ADDIE procedures (analysis, design, development, implementation, evaluation)[31,32]. According to and (2015), a media is said to be good if it meets an aspect of quality, among other things, are the validity, practicality, and effectiveness [33]. Validation is a requirement before the implementation. Students' responses in this study show positive results. The students' responses are based on certain criteria. Permata (2016) states that the responses are meant to show
students’ support, excitement, and interest toward component and activity in learning [11]. If the students’ positive response toward the media is equal to 85% of the overall subjects, based on the media feasibility criteria in table 2, then the media deemed feasible to be used as a learning media.

The results of validation obtained from the experts are as follows: 1) in the first steps, the score obtained from the material expert was 72% but after the revision, the score obtained was 82%. 2) The validation score by media experts was 94%. 3) The validation score by the language expert was 76% percentage and after the revision, the score was 91%. The overall percentage was 87%. The next scores come from the small-scale trials with a total percentage of 87% and a field trial with a total percentage of 89%. Based on the analysis, it can be said that the developed media has met the quality of good media.

According to the student's activity data, it shows that the students have been using some of the media features to download materials, activities, assignments, forums, and chatrooms. However, some parts of the media haven't been accessed by the students such as the glossary dan database. This is because of some reasons: 1) the tools and infrastructure that the students have are limited to access the media optimally and 2) the students are still not used to E-learning.

Improving student's attitudes toward the evolution theory necessary because it affects achieving the objective of learning. This is reinforced by the opinion of Arisandy (2016) that one of the keys to science learning is the students’ positive attitude toward science because it can motivate students to study science. Understanding the students’ attitude is crucial in supporting achievement and interest in certain disciplines [34].

Based on the analysis, it can be said that the developed media meets the quality of good media since it is practical and flexible to be used in learning. However, this development research still has a limitation since the product is only applied to the subject/course. Thus, the researcher suggests applying the developed media into another subject/course.

4. Conclusions
It can be concluded that the developed media is worthy to be used as an additional learning media in the Biology Education Department. The media is efficient, light-weight, and compatible with many browsers. The media is easy to use and supports a variety of languages including Indonesian. It is also has a special management site to make full adjustments to the module. The user management and course management can help the lecturers to achieve the goals of learning. Based on the conclusions above, the suggestions from the researchers are as follows: The lecturers can utilize the developed learning media on the evolution topics in the classroom or outside of the classroom as a tool in delivering material without time limitation due to the availability of the internet network. For further researchers, the developed media should be disseminated to reach a wider range of the target, as well as other subjects besides evolution.

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