E-Module Implementation by Using Feature-Lesson-Based of Moodle in Physics Learning Multimedia Practices for Students of Prospective Physics Teacher

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Abstract

The rapid development of Information and Communication Technology (ICT) allows tertiary institutions to hold lectures offline, blended, and online. Nonetheless, findings in the field show that online lectures cannot guarantee whether students follow lecture material properly or not. Therefore, this study aimed to implement an e-module of the feature-lesson-based developed by Moodle for physics learning multimedia practice course. This e-module was developed using the ADDIE model which includes analysis, design, development, implementation, and evaluation stages. The developed e-module in this study used the feature-lesson to ensure students follow the material properly and coherently. Students can access the next material if they have mastered the material that has been presented. The data in this study were collected through the responses of prospective physics teacher students who had used the e-module for one semester. Student responses included the use of the feature-lesson to support coherent mastery of the material, the application of the feature-lesson in presenting the learning process through e-modules, the use of quizzes on the feature-lesson to ensure achievement of learning outcomes, and the interest of prospective teacher students in developing online learning using the feature-lesson on Moodle. The results of student responses showed that the e-module implementation of the feature-lesson-based of Moodle in physics learning multimedia practice were in very good criteria. Students liked the feature-lesson because they should follow the order in which the material was given so that it helped them understand the material properly and coherently. In addition, students can understand the material better because when they chose the wrong answer in a quiz, students would be directed to review material that they have not understood. Students can continue to the next material if they have been able to complete the quiz correctly.

Keywords: e-module, feature-lesson, Moodle, online learning

INTRODUCTION

Technological developments are increasing rapidly from year to year, encouraging people to innovate and integrate life activities with technology. The influence of technological developments in the world of education cannot be avoided and has even increased since the coronavirus disease hit Indonesia (Maharcika, Suarni, & Gunamantha, 2021). The application and adaptation of technology in education is a necessity in an era of increasingly rapid ICT development (Effendi & Wahidy, 2019). The development of ICT currently allows Higher Education to hold lectures offline, blended, and online.

Online lectures are lectures that are carried out using an internet network with connectivity, accessibility, flexibility, and the ability to present various types of learning interactions (Onyema et al., 2020). Interaction in online learning can be built by utilizing multimedia and internet technology (Jayul & Irwanto, 2020; Sobri, Nursaptini, & Novitasari, 2020). The availability of technology such as smartphones, tablets, and laptops can support the implementation of online lectures.
In addition, there are online class services such as google classroom, Edmodo, Schoology (Haeruman, Wijayanti, & Meidianingsih, 2021; Iftakhar, 2016; Nurhayati, Az-Zahra, & Herlambang, 2019; Sicat & Ed, 2015), and instant messaging applications such as WhatsApp (So, 2016), as well as social media such as Facebook and Instagram (Kumar & Nanda, 2018) can support online lectures.

Even though there are many conveniences offered through online learning, in practice there are several obstacles such as limited wireless fidelity (WiFi). WiFi limitations make students take part in online learning using cellular services. Students reveal that to be able to take part in online learning, a fee is required to keep the connectivity (Sadikin & Hamidah, 2020). These costs will increase if online lectures are frequently held synchronously. Based on its implementation, online lectures are divided into two, namely synchronous and asynchronous online lectures (Firman, Sari, & Firdaus, 2021).

In synchronous online lectures, lecturers and students are present online at the same time. The interactions that occur in synchronous online lectures are real-time, lecturers and students can communicate in two directions at the same time using video conferencing platforms such as Zoom (Singhal, 2020), google meet (Al-Maroof, Salloum, Hassanien, & Shaalan, 2023), and cisco Webex (Brady & Pradhan, 2020). Even though the communication is two-way in real-time, synchronous online lectures do not guarantee that students are attending lectures. The findings of Firman et al., (2021) show that students tend to do other activities during synchronous online lectures. These activities include eating and drinking (83%), daydreaming (72%), and playing social media (82%). This situation certainly interferes with students achieving lecture goals.

In asynchronous online lectures, lecturers provide teaching materials that can be accessed by students anytime and anywhere online. This teaching material can be in the form of e-module. E-module is computer-based learning media that can display text, graphics, images, audio, video, and animation (Nugraha, 2015). The use of e-module equipped with multimedia can add the learning experience using the module (Smeets & Bus, 2015). Along with the rapid development of technology and the internet, many e-modules have been developed in formats that can be accessed offline or online. The development of e-modules that can be accessed offline is presented in pdf and flipbook formats. While e-modules that can be accessed online are presented via Android, web, and Moodle.

The utilization of Moodle in online learning can provide information space, speed of access, and specific information. Lecturers can take advantage of the information space in Moodle to present learning resources that can be accessed by students. Moodle makes it easy for students to interact with learning resources anytime and anywhere via the Internet. The use of Moodle also helps lecturers in providing access to exam problems which can only be accessed once by certain students within a certain period.

The availability of learning resources on Moodle makes students free to access all available learning resources, assignments, and problems. The results of investigations in the field show that students often access learning resources in a disorderly manner. There are also students who access assignments and problems without first following the related learning resources. In addition, the freedom of students in accessing learning resources allows students who do not understand one material to be able to access further material. This situation is not in accordance to the principles of learning, namely coherence in the delivery of learning resources (Rosyada, Atmojo, & Saputri, 2021).

Moodle provides various features that can support learning activities (Herayanti, Fuaddunnaazmi, & Habibi, 2017). One of the features in Moodle is the lessons feature. The lessons feature can be used to create learning activities that contain interesting content and can be used flexibly. The lesson feature consists of several pages that can be filled with material and problems. The user’s chosen answer can determine which page to display. Using the lesson
feature in online learning can increase engagement and ensure user understanding through the given problems (Mlotshwa, Tunjera, & Chigona, 2020; Petrovici & Ciobanu, 2016; Widodo, Musyarofah, & Slamet, 2022).

The physics learning multimedia practice was a subject of expertise in 2020 curriculum that must be taken by students as prospective physics teachers at Malang State University. This course provided students with skills in producing learning multimedia. In addition, this course also provided opportunities for students to express creative ideas, ideas, and concepts in digital media (multimedia). Mastery of concepts, learning, and skills in using technology in this course will greatly determine the quality of students in applying it in the world of work. Mishra and Kohler conceptualized this knowledge as Technological Content Knowledge (TPACK) (Mishra, 2019; Mishra & Warr, 2021). This framework was a lens, commonly used by researchers to develop the professionalism of teachers and prospective teachers in the 21st century. The professional development of teachers and prospective teachers in developing multimedia learning requires coherent mastery of knowledge and skills. Student-teacher candidates need to master the skills of developing learning multimedia from the simplest to the most complex.

Based on the problems and needs in online learning, this study aimed to develop e-module by utilizing the feature-lesson of Moodle in physics learning multimedia practice for prospective physics teacher. The use of the feature-lesson of Moodle was an effort to ensure that knowledge and skills were achieved in a complete and coherent manner.

**METHOD**

The method used in this research and development was ADDIE model which included analysis, design, development, implementation, and evaluation stages. The stages of the ADDIE model used in this study were presented in Figure 1.

![ADDIE model research and development flowchart](image)

**Figure 1. ADDIE model research and development flowchart**

The first stage in the ADDIE model was the analysis stage. In the analysis stage, two things were carried out, namely content needs analysis and software analysis. Analysis needs was carried out by reviewing the characteristics of the courses through the Semester Learning Plan and Topics Learning Plan for the course of physics learning multimedia practical. Software analysis was carried out by reviewing functional, and non-functional, system requirements, and an analysis of Moodle's learning management system (LMS) capabilities.

The second stage was the design stage (design). At this design stage, module, e-module, and multimedia were designed to be used as e-module content. The design produced at the design stage was then followed up at the third stage, namely the development stage. At this development stage, materials, projects and evaluations, multimedia development, and
supporting features were carried out. At the end of this stage, learning content was produced which was packaged in structured e-module according to the competency targets to be achieved.

The e-module that has been produced at the development stage was then used in the physics learning multimedia practice class. The application of the e-module was carried out for one semester until students were able to produce a project in the form of a complete physics learning multimedia. After students use the e-module, an evaluation was carried out regarding the application of the feature-lesson to the e-module. Evaluations were given by prospective physics teacher who have used the e-module for one semester.

Data analysis in this study was conducted to determine user responses to the e-module implementation of feature-lesson-based of Moodle for physics learning multimedia practice. User’s response data was obtained through a questionnaire in the form of quantitative and qualitative data. The quantitative data included the use of the lesson feature to support coherent mastery of the material, the application of the lesson feature in presenting the learning process through e-module, the use of quizzes in the lesson feature to ensure achievement of learning outcomes, and the interest of prospective teacher to develop online learning using features lessons on Moodle. The quantitative data obtained was then processed to obtain a percentage score. The percentage score obtained was then converted using score interpretation criteria (Nur’aini, Lestari, & Kurniawan, 2020) in Table 1.

<table>
<thead>
<tr>
<th>Rating Level (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 25</td>
<td>Very less</td>
</tr>
<tr>
<td>26 – 50</td>
<td>Less</td>
</tr>
<tr>
<td>51 – 75</td>
<td>Good</td>
</tr>
<tr>
<td>76 – 100</td>
<td>Very good</td>
</tr>
</tbody>
</table>

The qualitative data was in the form of student comments. The qualitative data grid included comparisons of online learning in general with online learning using lesson feature-based e-module, online learning flows, student activities, and the benefits of using quizzes and feature-lesson in online learning.

The qualitative data was then analyzed as follows: reducing data by carrying out a process of selecting, simplifying, focusing, and abstracting data to make it more organized and directed, presenting data in a narrative and systematic way, and drawing conclusions.

RESULT AND DISCUSSION

The development design of this Multimedia E-Module has followed the ADDIE research and development design. The needs analysis stage was divided into two stages, namely the analysis of the course characteristics of the physics learning multimedia practice and software analysis. Targets of this subject are mastering the software to build physics learning multimedia accurately, to plan, to design, and to produce innovative and creative physics learning multimedia. The material included drawing techniques, object modification, animation techniques, buttons and scripts, multi-scenes, operational design, and storyboards. At the end of the lecture, students produce a product in the form of multimedia physics learning which was developed using Macromedia swishmax4.

The physics learning multimedia practice course is a project-based and case method-based course that is carried out for 16 weeks. Lectures are usually held offline with the lecturer first explaining multimedia development techniques, then students trying to master and apply these techniques in multimedia development. The obstacle faced in this lecture is that students have different speeds in mastering multimedia development techniques. This obstacle causes students to not be optimal in developing multimedia and lecturers often have to repeatedly teach these techniques to students. Efforts to overcome differences in learning speed can be done by delivering material through learning resources such as android-based multimedia (Putri & Muhtadi, 2018), flash-based multimedia (Juraman, 2014), and learning videos (Febriani, 2017).
Analysis of the situation in the field shows that the availability of learning resources does not guarantee the optimal implementation of lectures. Students often access material in an uncoordinated manner. In fact, students tend to access assignments without first accessing the material related to the task. It was also found that students often skip material they are not mastered and immediately continue with the next material. This situation causes lectures to take place that is not in accordance with learning principles, namely confusion in the delivery of learning resources (Rosyada et al., 2021).

Moodle is a popular e-learning platform used by many educational institutions in the world. Moodle has one excellent feature, namely the lesson feature. The lesson feature allows teachers to create structured e-modules with clear steps, and students can follow these e-modules easily and with direction. The feature-lesson on Moodle is very flexible and easy to use and can present multimedia content such as text, images, video, audio, and quizzes. The use of quizzes in the lesson feature can ensure user understanding through the questions given (Mlotshwa et al., 2020; Petrovici & Ciobanu, 2016; Widodo et al., 2022).

At the design stage, the e-module was developed using the feature-lesson in Moodle. At this stage, every sequence of presentation of material and quizzes has been designed. The material was presented first then students answer the quiz. Giving quizzes aimed to test students' understanding of the material presented. If students have not been able to answer the quiz correctly, then students were directed back to the presentation of the material to review the material that has been given. However, if the student has been able to answer the quiz correctly, then the student can proceed to the next material. Can be seen in the Figure 2.
The lecturer presents the material in the form of text, ppt, and video which is presented coherently using the lesson feature.

Students work on quizzes related to previous material.

Students work on mini-projects by applying their understanding of the previous lesson material.

Students cannot proceed to the next material if they have not been able to complete the quiz related to the previous material.

Figure 2. Lesson scheme on e-module
At the development stage, e-module were arranged in the Moodle LMS using the feature-lesson. The video material was developed using the Camtasia application and uploaded to Youtube as shown in Figure 3. Uploading videos to Youtube was done to facilitate the presentation of videos on the lesson feature.

Using the feature-lesson in Moodle was done in the following way:

1. Lecture material was presented using the lesson feature with page type: content as shown in Figure 4. The content presented can be in the form of text and video.
2. The quiz was presented using the lesson in Figure 4, and page type: essay as shown in Figure 5.

Figure 4. Using the feature-lesson to present material

Figure 5. Using the feature-lesson to present a multiple-choice quiz
At the implementation stage, the e-module was tested limited to the Physics Learning Multimedia Practice in the Physics Education Study Program. The subject of the trial was consisted of 19 prospective physics teacher student offerings. The test subjects were in the fourth semester and have taken basic physics courses I, II, and III. At the end of the lecture, students made physics learning multimedia as their final lecture assignment as presented in Figure 7.
At the evaluation stage, prospective physics teacher responded to the e-module that had been used for one semester. The responses were given by students included the use of the lesson feature to support coherent mastery of the material, the application of the lesson feature in presenting the learning process through e-module, the use of quizzes on the lesson feature to ensure achievement of learning outcomes and the interest of prospective teacher students to develop online learning using the lesson feature on Moodle. The results of response are presented in Table 2.

Table 2. Limited trial results

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Percentage (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of the feature-lesson on the e-module to support coherent mastery of the material</td>
<td>89.4</td>
<td>Very good</td>
</tr>
<tr>
<td>Use of the feature-lesson in the e-module to apply the learning process (flow) to online learning</td>
<td>89.4</td>
<td>Very good</td>
</tr>
<tr>
<td>The use of the feature-lesson for quizzes on e-module guarantees the achievement of learning outcomes</td>
<td>89.4</td>
<td>Very good</td>
</tr>
<tr>
<td>The interest of prospective teacher students in developing online learning using the feature-lesson on Moodle</td>
<td>89.4</td>
<td>Very good</td>
</tr>
</tbody>
</table>

Based on the responses, the use of the feature-lesson-based e-module implementation in Moodle was considered very good in supporting coherent mastery of the material, implementing the learning process in online learning, and ensuring the achievement of learning outcomes. Using the lesson feature in Moodle allows lecturers to automatically direct students to other pages based on the answers given by students (Simarmata, Santyadiputra, & Divayana, 2017). The advantage of using the feature-lesson was that prospective teacher student who have used the e-module for one semester were very interested in developing online learning using the feature-lesson.

Comments from students on the implementation of the feature-lesson-based e-module when compared to online lectures often attended were presented in Table 3.

Table 3. User comments

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Comment</th>
</tr>
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<tbody>
<tr>
<td>Respondent 1</td>
<td>The use of feature-lesson-based e-module was better than the online lectures that I usually take. Online learning using the feature-lesson-based e-module makes me coherent in paying attention to the material to strengthen the material. Other online lectures only use Zoom without giving quizzes at the end of the lecture, so I often don't pay attention to explanations. With the sequence in the lesson feature, I find it helpful to understand the material, and again the explanation in the video material is very easy to accept. In my opinion, the use of the feature-lesson-based e-module for multimedia learning practice courses helps participants understand the material in online lectures like this because in this lesson feature the material cannot be skipped and carried out in a coherent manner accompanied by quizzes which are very helpful student understanding.</td>
</tr>
<tr>
<td>Respondent 2</td>
<td>In my opinion, the feature-lesson is better applied to online lectures because apart from helping students in lectures, the lesson feature is also very interesting in lectures. There is an interaction between students and their learning media, and lecturers can also monitor whether their students pay attention to the material in lectures or not. By using the feature-lesson on the physics learning multimedia practice e-module I can better understand the material presented. Other online learning that I take part in is often only given material, then explained through a Zoom meeting. This is what makes students bored. Learning becomes more interesting and focused. Because we weren't immediately given a stack of material, but in a step-by-step manner and interspersed with quizzes at the end of each material. This can make it easier for me to follow the lesson.</td>
</tr>
<tr>
<td>Respondent 3</td>
<td></td>
</tr>
<tr>
<td>Respondent 4</td>
<td></td>
</tr>
<tr>
<td>Respondent 5</td>
<td></td>
</tr>
</tbody>
</table>
Comments given by students showed a positive response to the implementation of lesson feature-based e-modules in Moodle. Students liked the use of the feature-lesson because they have to follow the material provided in a coherent manner, and there was a quiz feature after the material. The material presented was clearer, more interesting, and interactive. Students also feel that they can understand better because when they choose the wrong answer in doing the quiz they would be directed to review material that students have not understood.

Good perceptions based on students’ experiences using the lesson feature are in line with the research of Guillen-Gamez, Garcia-Magarino, & Prieto-Preboste (2014). Instructors can provide material to students in parts, assess patterns of lesson use, and can determine the level of knowledge of each student through activity history. The feedback feature is also crucial in making e-modules (Tazkiyah et al., 2020). Both presented qualitatively and quantitatively, students will feel guided in their learning process. However, broader testing of the effectiveness of using lessons in this course needs to be done. S. Wisniewski and Hortman have proven that between providing video recordings of learning and using lessons in Moodle, there is no significant difference in the achievement of pharmacy students (Wisniewski & Hortman, 2019). The need to prove the suitability of the content with the lesson format is very important before the research is carried out (Wisniewski & Hortman, 2019).

CONCLUSION

The application of feature-lesson-based e-module in Moodle for physics learning multimedia practice to prospective physics teacher was in very good criteria with a percentage of 89.4%. Students liked the feature-lesson because they have to follow the material provided in a coherent manner. The material presented was clearer, more interesting, and interactive. In addition, students can take quizzes after studying the material. Students can understand the material better because when they choose the wrong answer in quiz work, students will be directed to study again material that they have not understood. Students can continue to the next material if they have been able to complete the quiz correctly. There were many things in this study that can be used as suggestions in conducting further research and development. Future researchers are expected to be able to conduct broader testing of the effectiveness of using the lesson feature. In addition, future researchers can also develop other subjects with different characteristics, such as courses involving calculations or mathematics.

ACKNOWLEDGMENTS

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