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DEVELOPMENT OF A LEARNING MANAGEMENT SYSTEM (LMS) TO FACILITATE ONLINE LEARNING OF BIODIVERSITY MATERIALS

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Abstract

Biodiversity material is material that requires exploration in the field so that students can find out the types of living things. However, it is a little difficult to do so it needs a solution. the use of technology is very suitable for this. Therefore, we aimed to develop an Learning Management System (LMS) that can integrate all learning support devices into one system. The development of this LMS is carried out by following the stages of design-based research (DBR). In general, the stages of this research are preliminary studies, preliminary designs, and product development. In the implementation of preliminary studies, researchers gained data from grade X Biology learning at one of the senior high schools in Bandung, Indonesia. The application of the LMS was carried out using the one-group pretest-posttest experimental design method. The selection of research participants was carried out by purposive sampling technique. The results of the study indicate that the LMS developed can facilitate online learning due to biodiversity materials. The LMS developed can improve problem-solving abilities because it contains Wikipedia which is used as a source of information

Keywords: LMS, Online learning, Research and development, Wikipedia.

1. Introduction

Technology has an important role in compiling materials to carry out online learning. Even though the students study at home, they are still able to increase productivity in academic and non-academic fields [1]. Because the use of internet technology is still able to connect students with teachers or instructors, and activities of their interests and talents [2]. In addition potential for using technology to become a new preferred learning method [3]. The advantage is that the class participants are not only limited to students or students from certain cities but can be accessed by all students throughout Indonesia.

Because the use of technology in learning provides such great convenience, in this research technology is used to develop a Learning Management System (LMS) on Biodiversity material [4]. This is done because the material on Biodiversity has been delivered using only modules [5-7] (see Fig. 1). In addition, LMS was also developed by allowing students to access Wikipedia as a source of information. Wikipedia is a search engine that allows someone to search for information based on one keyword and the information released has a reference.

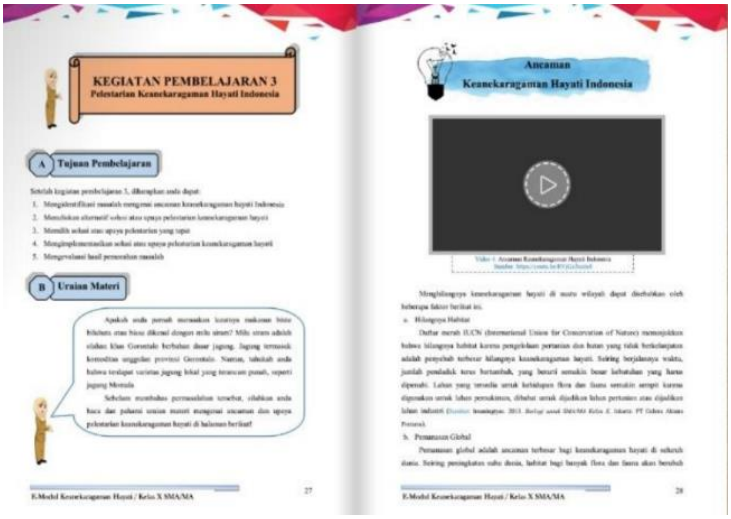


Fig. 1. Biodiversity material using e-module.

Based on the description that has been presented, the purpose of this study is to develop a LMS on the subject of the Biology of biodiversity. The novelty of this LMS is that it unites all the supporting elements of learning in one system. So that learning using LMS can be well-organized. In addition, the LMS developed refers to two competencies, namely digital literacy and problem-solving abilities. These competencies are through Student Worksheets and guidelines for finding information independently by using the Wikipedia Online Encyclopedia (EOW).

2. Literature Review

Biodiversity material is one of the materials taught in schools. The teaching model for this material also varies. For example by using field trips. The field trip method can be designed to provide direct experience, stimulate students' interest and

motivation in understanding knowledge, strengthen the relevance of the learning process with a given learning object, improve observation skills and perception and develop their social and personal skills [8]. Especially with the orientation of the material on biodiversity that wants students to always know about various models of living things.

Biodiversity is also taught with active learning methods. Where this learning is designed with the think-pair-share collaborative learning method. This is certainly good because it allows students to share with other students their knowledge [9]. There are many other methods to teach biodiversity material, but not many use technology. Therefore, this study develops an LMS to facilitate biodiversity learning using technology. LMS is an application that brings together all the things needed in learning. An effective LMS is an LMS that is designed according to the competencies to be developed [10]. To develop student attitudes, the designed LMS focuses on LMS with character education [11]. Therefore, the use of technology is very important for teachers [12].

3. Method

The purpose of this research is to develop a Learning Management System to facilitate students' 21st-century learning. The design-based research (DBR) method to develop the LMS. In general, the steps that have been taken include preliminary research, development of LMS materials, and product trials. In the preliminary study stage, a needs analysis was carried out through field studies and literature studies. The field study was conducted by interviewing and identifying the needs of students, while the literature study was carried out by reviewing the curriculum used by the school. At the planning or product design stage, the research component planning steps are carried out based on the information obtained in the preliminary study. This stage includes strategic planning and learning tools as well as storyboards from the developed LMS. Based on the results of research at the preliminary study and design stages, a development research stage was carried out which included the creation of an LMS accompanied by the development of learning tools. However, due to time constraints, this research was only carried out at the limited trial and revision stage. The selection of research participants during the preliminary was carried out by purposive sampling technique. Researchers apply criteria to recruit eligible research participants. 41 students of class X were selected at one of the schools in Bandung, Indonesia.

4. Results and Discussion

4.1. Preliminary research

The preliminary study stage applies a qualitative descriptive approach. Activities in the preliminary study were carried out to maximize the function of the product to be developed, be it models, media, or teaching materials. Preliminary studies conducted include literature studies and field studies [13]. The information obtained in the preliminary study is used to design specific product development procedures. At this stage, several aspects must be considered, namely users. In this case, teachers and students, curriculum analysis, and content requirements for products were developed in LMS. The LMS developed can answer the problems faced by students, a preliminary study is carried out to obtain information related to student needs [14]. Data at this stage was obtained through interviews with

teachers and students. Questions to teachers and students are intended to find out the problems faced both from the point of view of teachers and students. In addition, the researchers also ensured the availability of facilities and infrastructure in the form of adequate ICT facilities. Additional information relating to the results of teacher and student interviews is shown in Table 1.

Table 1. Results of analysis of teacher and student needs.

No	Aspects	Results
1	Knowledge background	Students do not understand the application of the concept of biodiversity in solving everyday problems
2	Learning method	Learning is done online, with the direct method
3	Facilities and infrastructure	Students and teachers have adequate ICT knowledge and accessibility
4	Availability of learning media	There are no learning resources in the form of books that students can use to obtain complete information

In addition to the material, at this stage, we designed global problems used as discussion material between groups. The LMS developed is not only used as a learning facility during a pandemic but is also used as a means to train students' higher-order thinking skills, in this case solving global problems. The information obtained at the preliminary study stage is used to design the LMS at the next stage.

4.2. Product design

The results of this design stage are in the form of storyboards. We developed LMS or learning media and used storyboards to communicate the content and display patterns of the designed media to learning media developers (see Fig. 2). Storyboards are rough visual sketches that can be drawn manually or using an application [15]. For certain materials, they used storyboards as learning media, because they are considered to be able to increase students' creativity [16]. A storyboard is used as a reference for developing LMS.

Fig. 2. LMS front page design.

4.3. Product Development

The LMS is made based on the design on the storyboard. The collection of materials filled the content in the LMS, such as materials, images, icons, and others. The results of the development are shown in Fig. 3. The LMS developed has two modes, namely administrator (teacher), and student modes. Administrator mode has more access to LMS, including designing and editing the content included in the LMS. Meanwhile, student mode can only access courses/classes that have been prepared. But the two modes can be connected in a discussion forum. In addition, learning tools using LMS were also developed in this research. Researchers compiled lesson plans which were also used as a reference when teaching using the LMS. Figure 4 shows part of the lesson plan that shows where the use of LMS in learning.

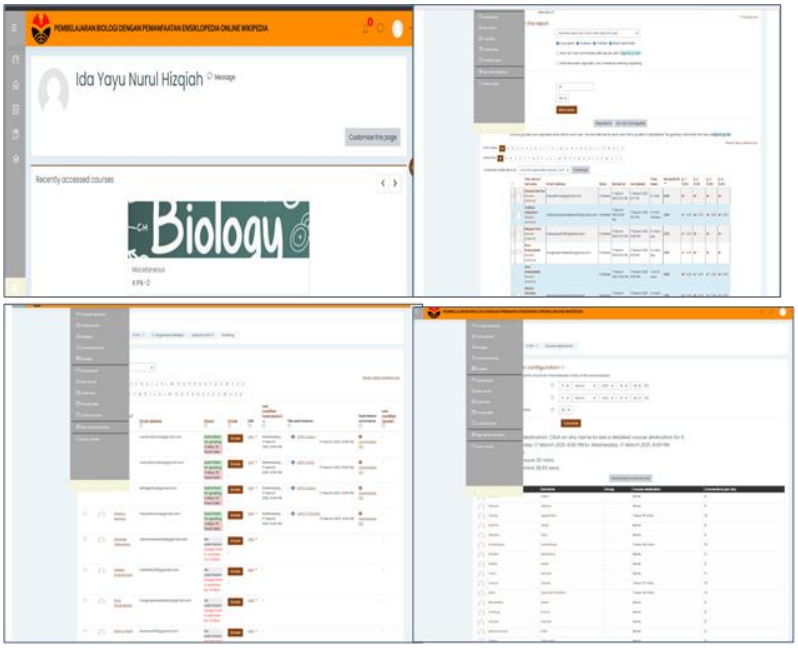
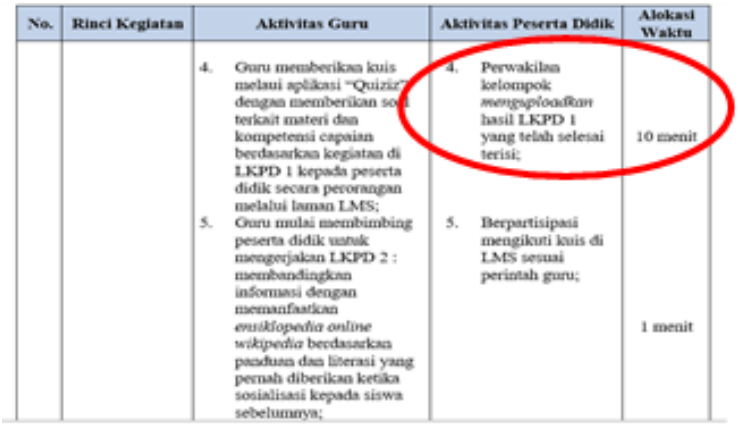


Fig. 3. LMS features.

A new way of learning can be reached by applying the LMS. The features of the LMS allow students and teachers to interact without having to meet in the same class [17]. If we viewed from the constituent words in LMS, it contains the words in management and system. The word system shows the regularity owned by the LMS, which of course can be regulated because it contains the word Management. The use of LMS makes it easier for teachers to organize the components to be included. The LMS developed can meet student learning needs well as evidenced by an increase in students' problem-solving skills. The designed LMS is also juxtaposed with the EOW. When students search for information, they certainly carry out complex thinking processes. They sort the information according to the problem and decide to read and understand what it contains. They are most likely to do and to search information based on the keywords contained in the problem presented [18]. After students obtain the required information, the next process is to choose the best problem-solving plan. In this process, students process the information obtained to choose a problem solver from the given issue. Further,

students can make modifications and propose new problem-solving plans. This is of course based on the agreement of all group members. The use of the EOW information source is suitable for helping students solve problems and improve students 21st-century skills [19-20].



No.	Rinci Kegiatan	Aktivitas Guru	Aktivitas Peserta Didik	Alokasi Waktu
		4. Guru memberikan kuis melaui aplikasi "Quiziz" dengan memberikan soal terkait materi dan kompetensi capaian berdasarkan kegiatan di LKPD 1 kepada peserta didik secara perorangan melalui laman LMS; 5. Guru mulai membimbing peserta didik untuk mengerjakan LKPD 2 : membandingkan informasi dengan memanfaatkan *ensiklopedia online wikipedia* berdasarkan panduan dan literasi yang pernah diberikan ketika sosialisasi kepada siswa sebelumnya;	4. Perwakilan kelompok *mengupload*kan hasil LKPD 1 yang telah selesai terisi; 5. Berpartisipasi mengikuti kuis di LMS sesuai perintah guru;	10 menit 1 menit

Fig. 4. LMS supported by lesson plan.

EOW can be used as the first stop site for students to search for information. The method is very easy. By entering the browser and typing Wikipedia, students can escort to the home page (see Fig. 5). On the first page of Wikipedia, students can get reading material just by typing keywords in the search field. Supposing students are looking for information about "biodiversity", it will appear general information and some specific information about biodiversities, such as etymology, definition, distribution, benefits, number of species, and others. Another feature is the presence of a link in the text presented. The text is marked in the blueprint. When there is a vocabulary that has its meaning, the vocabulary will be marked.

Fig. 5 Wikipedia view and guide.

Based on the above results, LMS is an effective method for integrating all learning support devices into one system. The development of this LMS is carried out by following the stages of DBR. This LMS has been well documented and used for improving students' understanding [2, 14, 21, 22]. This also can support online learning, in which this type of learning is one of the best practical methods for making easy in teaching process [23-26].

5. Conclusion

The LMS was developed by applying the DBR model with a development design that includes preliminary studies, product design, initial product development as well as limited trials and revisions. The development of the LMS is adjusted to the competencies, specifically problem-solving skills. The LMS developed is equipped with Student Worksheets and used Wikipedia as an information resource that contains global problems related to the topic of biodiversity.

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