



Analysis of Needs for the Development of Electronic Teaching Materials Based on Problem-Based Learning (PBL)

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Abstract

Background: The learning process emphasizes students' active involvement and is oriented towards applying the concept of learning by doing and prioritizing personal experiences through observing, asking, and communicating to increase student creativity. However, reality proves that the application and implementation of learning in schools are not as expected. Some problems include the learning process only focusing on completing the subject matter, not on forming an understanding of the subject matter for students. This study aimed to analyze the need to develop electronic teaching materials according to the needs of students based on problem-based learning (PBL) learning models in biology subjects at Madrasah Aliyah public schools (MAN) in Palembang, Indonesia. **Methods:** The research used a qualitative descriptive method with a survey method by conducting interviews and questionnaires with biology teachers and students. Questionnaires, observations, and interviews provided data collection techniques. **Results:** The results obtained are textbooks and learning videos are the teaching materials most often used by teachers using discovery learning and project-based learning (PjBL) models. Students' activeness can be seen when the discussion activities and presentations of assignments take place, but it does not make students think critically. **Conclusion:** Teachers want problem-based learning (PBL) electronic teaching materials so that students can learn the material earlier and improve learning outcomes in material that is difficult for students to understand.

Keywords: Discovery Learning; Learning Model; Problem-Based Learning (PBL); Project-Based Learning (PjBL); Teaching Materials

Introduction

Teaching materials play a very important role in the process of learning activities. With teaching materials, teachers can more easily convey material to improve effective learning (Frimpong, 2021). Irawati (2018) stated that teaching materials have a role in helping teachers in the learning process, which can increase interaction and effectiveness in delivering material. The benefits of teaching materials developed by the teacher in the learning process should also be integrated with the learning model in the teaching material so that there are already steps that the integrated learning model will carry out in its application. Several reasons are very important for the use of learning models, namely; 1) assist in the learning process so that the learning objectives are easy to achieve; 2) variations of this learning model can give students a passion for learning in participating in learning; 3) provide useful information to students in the learning process (Asafah, 2019).

Teachers can prepare learning activities that are mature according to learning objectives so that the learning process can run effectively and efficiently. Effective learning activities begin with ensuring that the learning process is learner-centered and engaging



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(Nawawi & Wardhani, 2023). Appropriate learning strategies are believed to improve memory and learning in various ways. Learning new things regularly, using distributed practice, and testing yourself can also be helpful ways to become more efficient learners (Yavuz & Güzel, 2020). The more students are involved in the activity, the more they will learn. Another skill that teachers must possess is skills in the field of technology. Digital technology has strategic potential and opportunities to support the success of education and learning (Hills & Thomas, 2019). In addition, digital technology can also be a solution to provide a new learning experience outside the classroom and express forms of understanding that are centered on the construction of meaning according to student construction (Cuthbertson et al., 2007; Hills & Thomas, 2019). Teachers must have good science and technology skills in managing classes so that creativity is created from within students (Baloran, 2020). Technology-based learning media can be a necessity for teachers in carrying out learning in the classroom (Syahroni et al., 2020).

Technology-based offline or online learning systems require teachers and students to be able to use digital technology to support the learning process while also increasing the independence and activeness of students (Marhayani, 2020). Accelerating the transformation of digital technology in learning, for example, teaching materials are expected to be developed electronically to create an effective and interesting learning process (Busstra et al., 2008; Coughlan & Swift, 2011; Wilson, 2018). Based on the problems the teacher feels in carrying out the learning process, which is not optimal, the teacher also does not understand teaching materials integrated with the problem-based learning (PBL) learning model. The teacher's difficulties in implementing the PBL learning model are due to the teacher's limitations in understanding the syntax of the learning model (Janah & Dimas, 2021). Developing effective and interesting teaching materials based on innovative models is necessary to overcome the above problems (Hastiana et al., 2021). Therefore, this study aimed to analyze the need to develop electronic teaching materials that suit the needs of students based on problem-based learning (PBL) learning models in biology subjects at Madrasah Aliyah public schools.

Methods

The research was conducted using a qualitative descriptive method with a survey method. The implementation was carried out at Madrasah Aliyah public (MAN) schools in Palembang, Indonesia in January 2023. The research was carried out by interviewing and giving questionnaires to four biology subject teachers and 29 students.

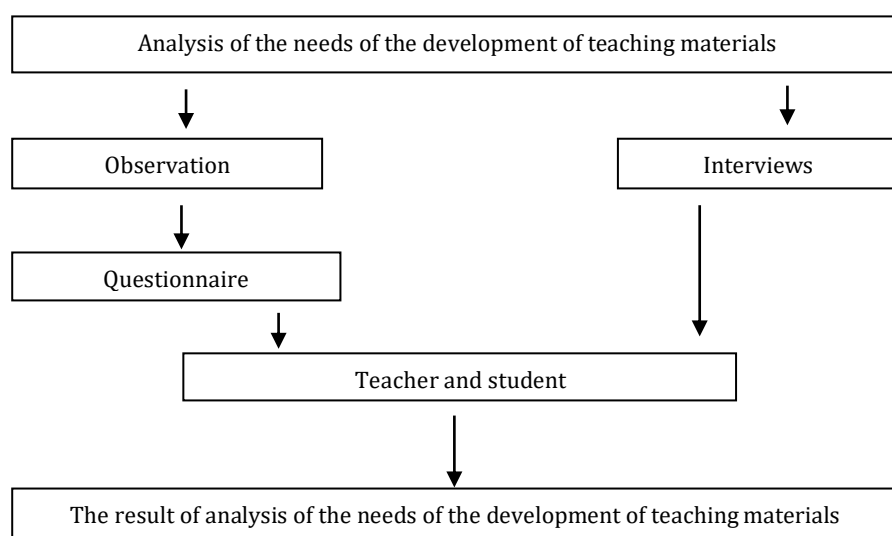


Figure 1. Research method diagram

Questionnaires, observations, and interviews provided data collection techniques (Figure 1). Researchers made research instruments before conducting interviews and giving questionnaires. Observation sheets are used to obtain data about learning activities

for introductory biology teacher profession courses. The research instrument is a questionnaire consisting of indicators of teaching materials, learning models, and development of teaching materials.

Result

Based on the needs analysis results in interviews and questionnaires, the teaching materials used by teachers were still in the form of textbooks and general worksheets from schools sourced from publishers and learning videos originating from the internet (Table 1). The results of observations and interviews with class teachers show that there is still a lack of learning resources to provide students with interesting discovery concepts. Students lack opportunities to explore curiosity to observe, try, communicate, and process information in the learning process, and teaching materials are not yet available for PBL-based electronics. The teaching materials still do not activate students in the teaching and learning process and help them understand the concept of Plantae material. Innovation in electronic teaching materials based on learning models is needed to support the learning process in the classroom. Textbooks (30%) and learning videos (30%) are the teaching materials most often used by teachers in class (Table 2). In comparison, learning magazines (5%) are used the least because the material listed does not match the subject matter being taught.

Table 1. Observation results of the learning process

No.	Observation results
1.	Teachers still use textbooks from publishers and learning videos from the internet.
2.	Teachers do not yet have a handbook to support students' activeness in understanding Plantae material.
3.	Students find it difficult to understand the Plantae material.
4.	The teaching materials used are not yet effective and attractive, making it easier for students to understand the Plantae material.
5.	Some students began to be active in the learning process.
6.	Teachers are no longer the main resource in the learning process.

Table 2. Percentage of teaching materials used by teachers

Teaching materials	Percentage
Module	15%
LKPD	20%
Tutorial video	30%
Textbooks	30%
Magazine	5%

The use of teaching materials is still in the form of textbooks because teachers have difficulty making their teaching materials, and there is a need for training in making creative and innovative teaching materials. As stated by one of the class teachers:

“Yes, we find it difficult to make our books for students. We don't know what to do first because we haven't received training on making our own books or teaching materials that are creative and interesting for students” (AA, teacher of MAN schools in Palembang).

Based on the results of the analysis of the learning model shows that teachers are more likely to use the PjBL model (50%) and discovery learning (30%) (Table 3). This is by the learning method (Table 4) applied by the teacher, where students are active in discussion activities (45%) and percentages (34%). The value of the analysis results for these two models is higher than the other models because the teacher invites students to directly see the plants around the school by the contents of the Plantae material. The teacher uses the results of these observations as material for discussion and to present the results of the

discussion in front of the class. The learning method through problem-solving (1%) applied by the teacher can support the PBL learning model (10%) used by the teacher in class. Even though the percentage value obtained is the smallest value of all the models and methods obtained, based on the results of interviews with teachers, the PBL model and problem-solving method are still students' favorite choices in class. As stated by one of the class teachers:

"Students are more interested in activities that make them actively discuss with their friends while solving a problem that we give to students. The PBL model is suitable for students because it can awaken their critical thinking power and get core knowledge from the material provided at that time" (BB, teacher of MAN schools in Palembang).

Table 3. The percentage of learning models used by teachers

Teaching materials	Percentage
Discovery learning	30%
Project-based learning (PjBL)	50%
Problem-based learning (PBL)	10%
Inquiry learning	10%

Table 4. The percentage of learning methods applied by teachers

Learning methods	Percentage
Lecture	17%
Discussion	45%
percentage	34%
Project	3%
Problem-solving	1%

Online learning is a learning process that can be carried out without face-to-face meetings using the help of Internet access. E-learning is another learning model that is becoming increasingly popular, especially during the Covid-19 pandemic. This is by the results of interviews with teachers and students.

"It would be nice if there were electronic teaching materials that used the PBL model. Moreover, the teaching materials are effective and interesting for students. So that their grades in the material increase even more and they are more enthusiastic and not bored in learning. The PBL model can improve students' critical thinking while gaining important knowledge concepts, especially those related to students' daily lives" (CC, teacher MAN schools in Palembang).

"yes, sir. It would be nice if electronic teaching materials could be accessed using gadgets. Moreover, we are the current generation. So, gadgets can't be separated from us. Suppose there are electronic teaching materials with material that is difficult for us to understand. In that case, it can make us more enthusiastic in learning and not imagining anything else when the teacher explains it" (DD, MAN schools in Palembang student).

Discussion

Needs analysis in the context of developing a product is a very important part and step, and the product to be developed is the result of the interpretation of the needs analysis that was carried out first. Development research needs to begin with a step in which researchers conduct a needs analysis before product development activities are carried out (Branch, 2010). This activity is often interpreted as an initial research activity before the researcher determines the type of product to be developed. This means that needs analysis is an activity to collect information to make a priority decision and identify needs that are relevant to learning (Afifulloh & Cahyanto, 2021).

Teachers' difficulties in making their teaching materials make teachers still use textbooks from school. The main problem with teacher difficulties in developing teaching materials is that teachers have difficulty keeping up with developments in learning technology while making attractive lesson plans (Rozek & Stobäus, 2016) and the curriculum and the ability to use skills, tools, devices, and strategies to create digital learning resources, strategies for organizing teaching materials to be applied to learning resources (Wahyuningsih et al., 2021). The learning process needs assistance compiling and developing creative and innovative teaching materials, syllabus, and lesson plans (Zuriah et al., 2016). Learning patterns of students can be supported by teaching materials that are systematically used by teachers during the learning process in class so that students can follow the learning process more effectively in developing cognitive, affective, and psychomotor domains. In addition, teachers are expected to be able to develop their teaching materials to improve students' critical thinking skills. Teaching materials are a collection of materials guided by the curriculum to achieve competency standards (Lestari, 2013). Other teaching materials that teachers also use during the learning process are using learning videos taken from the internet. For teachers, learning videos have an interactive element with students. According to Jauhari et al. (2018), learning media is considered to be used as a sender of messages that can stimulate thoughts, concerns, feelings, and interest in learning for students to take part in learning. This is because learning videos can help students see, hear, and videos can be played back (Rahmawati & Saputra, 2021). Using learning media can effectively and efficiently impact the learning process in the classroom (Syaribuddin et al., 2016).

Analysis of the learning model shows that the teaching materials developed are expected to support an understanding of integrated learning materials, the process of analyzing integrated learning models, and the process of developing integrated learning tools. The PjBL learning model is a model that motivates students to carry out problem-solving activities independently in constructing their learning and applying it to real products (Amini et al., 2019; Purwanto, 2019). Meanwhile, the discovery learning model is a learning model to find, seek and provide opportunities for students to solve and find ways to solve them (Riyanto, 2014). PBL-based learning can be done in groups to solve the problems presented, analyze and discuss (Riyanto, 2014; Rahmawati & Sukidjo, 2016), where the learning method with discussion (45%) in class is the method with the highest value.

Online learning is education that provides teaching to students who are separate from the teacher and supports the interaction of student participation in class at a certain time online learning can be done and view teaching materials at any time and also can be carried out without face-to-face meetings using the help of internet access. E-learning is another learning model that is becoming increasingly popular, especially during the Covid-19 pandemic. This learning can be done using technological assistance through the internet, supporting distance learning (Thurston, 2005) and helping to increase student independence and learning motivation (Zimmerman & Kulikowich, 2016). The enthusiastic attitude of students in using gadgets strongly supports the development of electronic teaching materials. Electronic teaching materials allow students to easily understand, use and study Plantae material, and meet their learning needs (Cahyanto &

Afifulloh, 2020). Delivery of material or practice questions will make it easier for students, specially equipped with learning activities that can be carried out to students to build an independent experience, although not face-to-face with the teacher. Very dynamic learning activities, like today, require innovation and creativity to make learning more colorful (Baloran, 2020; Karademir et al., 2019). The development of information technology should not only be a reality of changing times. Still, it must be addressed as a strategic opportunity to encourage interesting student learning. Effective competency can be achieved through learning with PBL-based teaching materials to develop social skills in communication, social responsibility, and collaboration (Rahmawati & Sukidjo, 2016). Teaching materials developed electronically teachers and students argue that electronic teaching materials will facilitate the learning process because they can be done anytime and anywhere. Innovatively developed teaching materials can encourage effective and independent learning (Wilson, 2018) and assist students in acquiring a skill needed for learning (Busstra et al., 2008). Good teaching materials support blended learning (Zwart et al., 2017). The selection of appropriate teaching materials will provide good learning facilities for students to achieve the expected educational competencies. PBL-based teaching materials were developed with the hope that they will become teaching materials that can facilitate students in achieving affective competence by studying real-life problems that are presented as learning materials in class.

Conclusions

Based on the data from the analysis of the needs for the development of teaching materials, it can be concluded that, in general, students have a tendency to be attracted to electronic teaching materials that can be used flexibly and contain detailed material, both theoretical and materials that support teaching simulation practices, so that they can help understand the material, especially when online learning. The limitations of this research are the research time used in this study is relatively short, and the responses of teachers and students are only made to see the need for the development of teaching materials. Based on the conclusions and limitations of this study, the researchers suggest that teachers should use learning models and methods that are interesting for students. Students tend to be interested in electronic teaching materials that can be used flexibly.

Declaration statement

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