

Need Assessment for Developing Learning Modules Based on Discovery Learning Ecosystem Materials

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Abstract: The scientific approach is a form of character education integrated into learning activities. The success of implementing character values internalization learning is largely determined by the teacher's skills in selecting and implementing appropriate learning models. However, in reality, school teachers still do not apply learning models that suit the students' character, and the teaching materials used also do not support character internalization learning. So, this research aims to determine the characteristics of students and the type of materials and modules to be developed based on conditions in the field. This research uses qualitative research with a descriptive approach based on ongoing problems in class X SMA Bina Ilmi, Palembang City—techniques for obtaining data in the field, namely interview techniques, observation, and documentation. The research results showed that students were of an age that had entered the formal operational stage, understood abstract concepts, had high curiosity, and tended to like discovering new things. Meanwhile, the material analysis results showed three ecosystem materials that can stimulate students' curiosity: interactions between species, ecosystem components, and ecological pyramids. This material will be made into a teaching module based on discovery learning. This model-based module can make students build their knowledge through independent observation to increase students' reasoning power in developing environmental concepts following ecosystem material and learning resources that can provide interesting discovery concepts to explore curiosity to observe and process information in the learning process and understand ecosystem material.

Keywords: Discovery Learning; Ecosystem; Learning; Teaching Modules

Introduction

Education is recognized as having extraordinary power in determining the fate of every individual, group, community, and even nation. The nation's culture is experiencing decline, causing the government to promote a mental revolution, one of which is through education. The field of education has initiated character education, which is integrated into learning activities with a scientific approach [1] and into behavior inside and outside the school with habituation [2]. The success of implementing the internalization of character values is largely determined by the teacher's skills in selecting and implementing appropriate learning models [3]. However, in reality, school teachers still do not have this competency. The teaching materials do not support character internalization learning [4]. According to Jannah [5], teaching modules are teaching materials arranged systematically and interestingly, including material content, methods, and evaluation that can be used independently to achieve the expected competencies [6]. By applying teaching principles such as correlation and socialization [7], teachers can incorporate skills to hone identification abilities for all general subjects.

Learning models are very important in different learning systems [8]. Therefore, teachers must be wise and skilled in choosing learning methods. Choosing the wrong model makes learning ineffective [9]. Teachers' lack of intelligence in choosing the right model can be detrimental to achieving learning goals [10], which depend on the

discipline and national education goals. In particular, efforts to improve students' science process skills in ecosystem material apply an exploratory learning-based learning approach [11]. One learning model that conveys the concept of exploration to students is the discovery learning (DL) model. The Discovery Learning (DL) model can train students to discover concepts for themselves by providing problems that students must solve through the teaching modules that will be used [12].

Modules are printed or electronic teaching material. The difference between the module and other teaching materials is that in the module, students can learn independently and contain the concept of teaching materials that can be studied by themselves (self-instruction) so that students will actively learn (active learning) [13]. The module uses language that is easy for students to understand and is arranged systematically. So, students carry out all the activities in the module from stage one to the next through clear instructions for students to understand [14]. Discovery learning-based teaching modules are a form of teaching material that is packaged completely and systematically [15], which contains a set of planned learning experiences and is designed to help students master specific learning objectives that contain learning objectives [16], where students build their knowledge by conducting an experiment and discovering a principle from the results of the experiment [17].

The teaching module the researchers will develop is based on the discovery learning (DL) model with ecosystem

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material. The choice of model and material was due to several reasons. The first reason for selecting appropriate models and materials is to integrate them with school activities to preserve the surrounding nature. The second reason is that by integrating models and materials into school life, the hope is that it will provide students with an awareness of preserving nature. If nature is used and preserved well, it will benefit society and improve welfare. Analysis of the needs is an important initial process in developing a module or teaching material because, through this activity, a learning evaluation can be carried out and provide a clear picture of the gap between real conditions and expected conditions for teachers and students. Analysis of the needs for developing discovery learning-based teaching modules for this ecosystem material includes analysis of student characteristics, material analysis, analysis of field conditions, and analysis of teaching modules. Various analyses were conducted to determine the need to develop teaching modules using the DL model as a whole following student conditions, the material being taught, and conditions in the field. So, this research aims to determine the characteristics of students and the type of materials and modules to be developed based on conditions in the field. It is hoped that a comprehensive and accurate needs analysis can be the initial stage in developing teaching modules based on the discovery learning (DL) model that suits the needs of students in schools.

Research Methods

This research uses qualitative research with a descriptive approach. Researchers used three research instruments to obtain field data: interview techniques, observation, and documentation. Data analysis in this research refers to the qualitative analysis stated by Miles and Huberman [18], with the stages used being data reduction, data display, conclusion, and verification. A descriptive approach is used based on the consideration that the problems to be researched are currently ongoing to analyze phenomena that occur in the field. Data sources in this research were obtained from primary and secondary data sources. Primary data sources were obtained from informants, considered the most important in knowing the research focus clearly and in detail. The informants were biology class teachers and class X students at SMA Bina Ilmi, Palembang City. Meanwhile, secondary data sources were obtained through observational studies of learning implementation and documentation, including documents on the teaching materials, photos of learning activities, and other supporting data.

Results and Discussion

Analysis of student characteristics

The learning modules are arranged according to the characteristics of class X SMA Bina Ilmi Palembang City students as users of the learning modules. Analysis of student characteristics is a study of the characteristics of students who will use teaching materials [19]. The analysis is carried out to get an overview of the student's character, ultimately becoming a guideline for teaching modules. Several things can be known based on the interviews conducted with students—first, the results of the age analysis. Class X

students at SMA Bina Ilmi Palembang City have an average age of 16-18 years. Students enter the formal operational stage at this age and can understand abstract concepts [20]. They also have a strong desire and high curiosity and like discovering something new. Based on the age analysis above, students can identify and solve problems at this stage. As stated by one of the students:

"Yes, sir. I am sometimes curious when I see new things around school. Especially if there are changes to the park or schoolyard. For example, suddenly, there is a lot of rubbish in the schoolyard because of standing water during heavy rain. "Finally, the teacher told us to clean the school yard first before starting class" (AA, class X student at SMA Bina Ilmi, Palembang City).

Second, based on the results of student interviews, it can also be seen that 30 of the 38 class X SMA Bina Ilmi Palembang City students need additional learning resources or other learning resources, apart from printed books from publishers regarding ecosystem material. These students need learning resources that can direct them to be able to identify and discover new things [21], and they need learning resources that can hone their curiosity and help them learn independently anywhere and at any time [22]. Based on the conditions in the field, researchers will develop teaching modules that can encourage students to learn independently. Each stage of the learning model in the teaching module will be presented communicatively so students can easily understand it. As stated by one student:

"Yes, sir. It would be great to have additional learning resources to encourage us to discover new things and compare them with other places. For example, there is material in the module that is not in the school book. Of course, it will make us more interested in reading it." (BB, class X student at SMA Bina Ilmi, Palembang City).

Material analysis

Material analysis is carried out by identifying the main material that needs to be taught collecting and selecting relevant material. Then, rearrange them systematically. Material analysis is carried out to determine the material to be developed and identify knowledge in the material being developed [23]. Based on the results of an interview with the biology teacher at SMA Bina Ilmi, Palembang City, namely Mr. Ardianta, S.Pd, the teacher used the 2017 revised edition of the Class X SMA biology book published by the Ministry of Education and Culture as the main learning resource reference in the learning process. The results of the book review show that it contains material on biogeochemical cycles and succession, interactions between species, food webs, ecosystem components, and ecological pyramids. Students feel overwhelmed, so they reduce active learning with much material provided [24]. Therefore, it is better to have material that has a scientific approach so that students feel active in learning [25]. Based on the material analysis that has been carried out through biology teacher interviews, syllabus analysis, and identification of textbooks used in schools, it can be seen that the main material that will be included in the teaching module and taught to students is interactions between species, ecosystem components, and ecological pyramids. As stated by the class teacher:

"The other materials are good... however, some materials make students more interested because they can be seen directly around the school activities to see the

schoolyard ecosystem, for example. "This observation activity makes students more active, ultimately increasing their learning scores." (Mr. Ardianta, S.Pd, class X teacher at SMA Bina Ilmi, Palembang City).

Based on the interview results, it can be said that ecosystem material is closely related to the environment and the processes that occur in it, and ecosystem observation activities in the school environment can make students more active. The same results were shown by Amaliah *et al.* [26], who found that students seemed enthusiastic about listening to additional information provided by the teacher and listening to information that could not be obtained in the school park ecosystem, with observation results showing that student activity reached 94%.

Analysis of field conditions

The results of observations by researchers in learning activities in class Learning is still centered on using textbooks published by the Ministry of Education and Culture. The results of the researcher's interviews with class teachers showed that the teachers admitted that they experienced difficulties explaining or giving examples of

things that were rarely or not found in the surrounding environment. Teaching and learning activities will be influenced by various factors, starting from motivation, the relationship between students and teachers [27], the level of freedom, verbal abilities, teacher skills in communicating, and a sense of security [28]. Teaching and learning activities can occur well if these factors can be met. Teachers must clarify things to students and be skilled at solving various problems [29]. According to the results of the interview, teachers need teaching modules that can encourage students to be more active in learning and arouse their curiosity about the natural surroundings so that in learning, teachers no longer experience difficulties in providing examples that are appropriate to the environment and can compare them with those around where the participants live to educate. As stated by the class teacher:

"Students' curiosity about things around them is good. However, this sometimes feels inadequate because students still want to explore wider information on the material provided, which can be seen directly. So, they can hone their independence to learn on their own." (Mr. Ardianta, S.Pd, class X teacher at SMA Bina Ilmi, Palembang City).

Table 1. Results of observations of the learning process in class X SMA Bina Ilmi, Palembang City

No	Component	Observation Results
1	Learning Media	Educators have learning tools they make themselves and learning tools from the composition of the MIPA team at the Palembang Integrated Islamic School (IT).
2	Teaching materials	To support the learning process in class, educators use other teaching modules and videos as an addition to the learning process in class. During the learning process, educators use teaching modules, but the educators themselves do not make the teaching modules used. However, it is taken from electronic teaching modules on the internet.
3	Ecosystem material	When providing material on ecosystems, educators are constrained in providing material on biogeochemical cycles. Because in this material, it is very difficult for students to understand the material. To understand students in ecosystem material, educators use PPT and Video to understand the material.
4	Learner skills and activities	Students' skills and activities are good for exploring more information on the material provided. Ecosystem material is linked to science process skills to hone students' knowledge during the learning process. To improve student learning activities, educators increase student literacy and enrichment by providing examples of differences between school and home ecosystems for students to understand ecosystem material better.

Based on the results of the needs analysis in interviews and observations, the teaching materials used by teachers are still general textbooks from schools sourced from publishers and learning videos from the internet (Table 1). The role of the teacher as a learning resource will be closely related to the teacher's ability to master the existing subject matter [30]. So that when students ask something, the teacher can quickly and responsively answer students' questions using language that is easier to understand [31]. Based on the results of observations and interviews with class teachers, there is still a lack of learning resources that can provide interesting discovery concepts for students. There is a lack of opportunity for students to explore their curiosity to observe and process information in the learning process. The teaching materials still do not activate students in the learning process and understand the material [32, 33]. Teachers can be said to be travel guides [34] who, based on their knowledge and experience, have a sense of

responsibility for the smooth running of the journey [35]. This journey is physical, more complex, and deeper mental, creative, moral, emotional, and spiritual [36]. Class teachers have taken the initiative to use other supporting books. However, teachers still have difficulty providing examples that do not exist or are far from the surrounding area, so several teachers take the initiative to find material, either videos or images, that are deemed appropriate to the conditions surrounding the school. Class teachers admit that they want teaching modules that have a fairly broad range of material [37] and have activities that can activate students in all aspects, including attitudes, skills, and knowledge, but are still following local wisdom around them [38] so that students can learn according to experience found in students' everyday lives.

According to the researcher's analysis of the material in the textbook, it is only limited to introducing students to ecosystems in general. However, it does not include implied

values that students can interpret as learning in social life while maintaining the importance of protecting the surrounding ecosystem. So far, students have not been introduced to the important values of protecting the ecosystem for future life, for example, the importance of keeping the yard or school garden clean from rubbish or damage from the ignorant hands of students. Teachers have a role as demonstrators. Namely, they have a role that can introduce attitudes about maintaining the importance of the surrounding ecosystem, which can inspire students [39]. Teaching and learning activities will be successful if students have high motivation instilled by the teacher [40]. Teachers are important in fostering motivation and enthusiasm in students in learning [41].

Analysis of teaching modules

Teachers are obliged to prepare teaching modules completely and systematically so that learning takes place in an interactive, fun way, motivates students to participate actively, and provides sufficient space for initiative, creativity, and independence following the students' talents, interests, and physical and psychological development [35, 36]. A teacher's ability and creativity are necessary in compiling teaching modules [42]. This is because teaching modules are a very important tool for the success of the learning process in class [43]. This teaching module aims to be a direction or benchmark for the learning process that will be carried out in class later so that creative thinking is needed from a teacher to manage the class so that the learning process becomes interesting and enjoyable [44]. However, class teachers still do not understand how to prepare teaching modules that suit the characteristics of students. As stated by the class teacher:

"Yes, we find it difficult to make our books or other materials to give to students. How nice it would be if there were teaching materials that used the DL model. Moreover, the teaching materials are effective and interesting for students. So that they do not feel bored because they cannot observe, their grades can improve, and they can be more enthusiastic about learning. "The DL model can improve students' science skills while gaining important knowledge concepts, especially those related to the ecosystem around students" (Mr. Ardianta, S.Pd, class X teacher at SMA Bina Ilmi, Palembang City).

The development of teaching modules aims to provide teaching tools that can guide teachers in implementing learning. In its use, teachers have the freedom to choose or modify teaching modules that the government has provided to suit the characteristics of students [45]. One of the important learning tools for successfully implementing learning in schools is teaching modules. Modules are teaching materials arranged systematically based on the curriculum, packaged in the smallest lesson, and allowed to be studied independently in a certain amount of time [46] so that students can master the competencies being studied and achieve the expected learning goals [47]. So, the solution that can be taken is to develop teaching materials in the form of modules that suit the needs of students. As stated by one student:

"Yes, sir. Teachers have provided many learning models, so we are more interested in learning. "However, it would be better if the learning model provided by the teacher also follows the teaching materials used for learning,

especially as the material taught also supports the model used in the module." (CC, class X student at SMA Bina Ilmi, Palembang City).

The presentation of material in the module is related to daily life and guides students to discover material concepts independently. Students can increase the importance of ecosystems and direct them to discovery learning-based teaching modules. Modules developed using the discovery learning model can be used to develop students' active learning by discovering for themselves [48] and investigating themselves so that students can discover the concepts of learning material themselves [49]. The characteristic of a discovery learning-based module is that each step has activities that emphasize discovering concepts in the material to be studied that were previously unknown [50]. So, this discovery learning-based module can increase students' reasoning power in developing environmental concepts to train understanding of ecosystems. So, it would be very appropriate to answer problems in the field if the module were developed to include discovery learning steps in the module [51]. Discovery learning-based modules can encourage and stimulate students to study learning material [52] and complete the tasks in the module. Besides that, students are happier and more motivated in learning [53].

Conclusion

Based on the results above, it can be concluded that based on the analysis of student characteristics, it can be seen that the average age of the class Meanwhile, the teaching materials used in the classroom learning process are biology textbooks provided by the government. It is felt that the textbooks used by students are still difficult to understand because students cannot observe, identify, and compare different ecosystems directly, making students feel that they are too difficult to understand. Students also need learning resources that can hone and identify new things around them—learning resources that can provide interesting discovery concepts to explore curiosity to observe and process information in the learning process and understand ecosystem material. Teaching modules with the discovery learning model can direct students to learn actively through their observations so that students can discover the concepts of learning material themselves.

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