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Needs Analysis of Problem-Based Learning Textbook Development for Environmental Courses

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Abstract

Learning resources in the form of textbooks and learning processes are a determinant factor of learning success. The objective of this study is to describe the learning resources available as forms of learning support, to understand the level of learning achievement of environmental material and the percentage of student problem-solving indicators. Survey research method was employed, using instruments in the form of a questionnaire based on respondents' level of understanding and certain problem-solving indicators. The study subjects consisted of 77 Natural Sciences undergraduate students. Data analysis used quantitative descriptive methods. The conclusions show that the learning resources were supported in the form of reference books, but the semester learning plans for environmental subjects did not yet exist and that environmental subject textbooks were not yet available. The percentage of students' understanding of learning outcomes or learning objectives in the environmental material was still dominated by the criteria and a 45% lack of understanding. Problem-solving indicators on problem identification aspects dominant at 55%. Aspects identify various solutions that are still low at 25% for identifying solutions, and 20% for skills to maintain solutions.

Keywords: Textbook, problem-based, environment.



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Introduction

Education is a medium for schooling people to improve themselves. A nation can only progress and develop if its education is deemed to be effective. One mode of formal education that organizes teaching and learning is the higher education institution. Higher education, as a human resource producer, must be able to generate human resources who are ready to face the challenges and opportunities of the 21st century and are ready to compete in the ASEAN Community era (MEA). Human resources that can compete and adapt must possess or acquire certain skills (Aring, 2015).

Today's skilled workers require several proficiencies, namely complex problem-solving skills, critical and creative thinking, as well as being mentally self-driving, and self-empowered (Zubaidah, 2018). Collectively these are known as 21st century skills (Zubaidah, 2018). Education through the learning process must be able to improve and develop the skills needed so that learners possess the required skills. Learning is a process of interaction between students and their instructors, and utilizes various learning resources within the learning environment. Supriadi's (2015) research demonstrated differences between learning outcome improvement in students whose learning process used high-intensity learning resources versus low-intensity learning resources. Improving the learning process in order to achieve expected learning objectives requires certain breakthroughs, especially in creating interactions in the learning process and in the learning resources needed within the learning process. Interaction within the learning process through the use of learning models and methods should facilitate the development of the skills required in learning. Of the learning resources used in the learning process, one form of learning resource is learning media.

One of the learning media are textbooks oriented towards systematic and structured knowledge transformation (LKPP-UNHAS, 2015). Likewise, according to Millah, Budipramana, and Isnawati (2012), textbooks are a set of materials arranged systematically that demonstrate the competencies of students. Textbooks can be said to be a set of materials that are based on a curriculum, and presents the students' competencies that must be achieved in the learning process.

Textbooks function as 1) Guidelines for educators who will direct students' activities during the learning process, as well as the substance of competence that should be taught to learners; 2) Guidelines for learners who will self-direct their activities during the learning process, as well as the substance of the competencies to be learned/mastered; and 3) Tools for evaluating the students' achievement/mastery of the required learning outcomes (Ministry of National Education, 2008).

Based on the observations of UNTIDAR's Science Education Program conducted in January 2018, it was shown that completeness of learning in environmental education courses is not currently achievable since students and lecturers do not have textbooks to guide the learning process. Environmental education is a compulsory subject in UNTIDAR science education program with a two-credit load. This course analyzes the mastery of the relationship between human activity and the potential, prospects and strategies for sustainable use of natural resources and the environment, the concepts and principles of reciprocity between humans and the environment, and the solutions to problems related to the environment. This course equips students to be able to adapt and maintain their surrounding environment.

Environmental education aims to shape people to develop responsible attitudes and behaviors in their interaction with the surrounding environment. Environmental education is also the basis for the process of solving environmental problems, with an overall philosophical basis of sustainability, improvement, and maintenance in order to facilitate an overall level of improvement (Anazifa & Hadi, 2016).

Some research has been carried out on the materials and environmental teaching subject in the implementation of the learning process. Suhirman (2012), in his research, concluded that learner skills in solving environmental problems can be improved through problem-based learning. In another study, Atmojo (2013) concluded that the application of problem-based learning models to the material of the environment can improve students' problem-solving skills as they undertake activities in formulating and designing problem-solving initiatives, and in solving problems related to daily life.

Learning about environmental materials requires the use of varied and innovative learning models (Cahyaningrum, Mustofa, & Sugiarto, 2015; Muhlisin, 2017). Learning models that can be employed in the learning process to improve problem-solving skills and learning outcomes are problem-based learning models. Problem-based learning models consist of meeting the problem; problem analysis and learning issues; discovery and reporting; solution, presentation and reflection; and overview, integration and evaluation (Widianingsih, Karyanto, Prayitno, & Irawati, 2017). The main principle of problem-based learning is the process of investigation, explanation, and analysis of real-world problems (Unver & Arabacioglu, 2011). According to Cullen and Jackson (2018), problem-based learning in the science classroom is useful since it can improve students' high-order thinking skills.

These studies have provided recommendations for educators to use problem-based learning as one of the learning methods integrated within environmental learning textbooks in order to increase students' knowledge, skills, care, attention, environmental sensitivity, and thereby, learning outcomes. It is therefore necessary to conduct a needs analysis study in the development of textbooks on environmental subjects in UNTIDAR's science education program so that learning objectives can be optimally achieved.

Methodology

This study is a survey research that aims to gather information related to learning resources used in the learning process and students' understanding of environmental subjects. This research was conducted within the Science Study Undergraduate Program during the 2017-2018 academic year. The subjects in this study were 77 Natural Sciences Undergraduate Study Program students.

The instruments employed were an interview form, an observation form, and a questionnaire aimed at capturing students' understanding about environmental materials and problem solving. The questionnaire instrument contains the options with regard to the students understanding as "fully understand" (SM), "understand" (M), and "do not understand" (KM), whilst options for problem solving for environmental materials were "problem identification," "identifying various solutions," and, "maintaining solutions."

Results and Discussion

This research was conducted in January 2018 within the UNTIDAR science education program. The description of the research results is described as follows: 1) learning resources used by students in the learning process; 2) students' understanding of environmental subjects; and, 3) Problem-solving skills. A description of the learning resources used by students is obtained from the results of the completed student questionnaires. The results indicate that the learning process was supported by learning resources in the form of reference books, but that the semester learning plan on environmental subjects had not existed at that time, and the environmental subject textbooks were not available at that time.

Results of the students' understanding of environmental materials are illustrated in Figure 1.

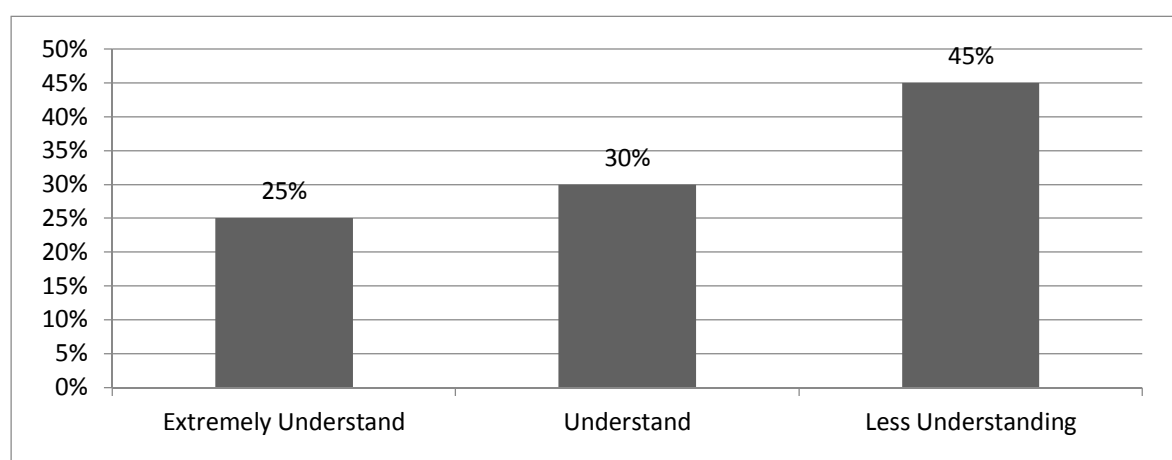


Figure 1. Percentage of Student Understanding of Environmental Material

Based on Figure 1, it can be seen that 45% of the students do not understand the achievement of learning or learning objectives on environmental material. Learning objectives can be achieved optimally if the learning process is supported by appropriate learning plans and teaching materials. The learning plan in this case is a semester learning plan that describes the implementation of learning that will be carried out within one full semester. Research results from Asri (2018) showed that the use of teaching materials within the learning process increases the effectiveness of learning activities and therefore the achievement of learning outcomes.

Environmental learning is a process in order to understand and solve environmental problems that occur in everyday life. This is consistent with Djuandi (2016), who stated that the learning process in education is an effective medium for growing and realizing harmony between human beings and their environment. Efforts carried out to realize that requires a learning process that is real or contextual (Muhlisin, Susilo, Amin, & Rohman, 2016). Contextual learning models further activate learning and improve learning outcomes (Muhlisin, 2012; Putri, Misdalina, & Oktavia, 2018).

In the current study, the results of student problem-solving skills obtained, according to the questionnaires completed by the participant students, gives an overview of the problem-solving indicators, namely problem identification, identifying various solutions, and maintaining solutions. The results for problem-solving skills can be seen in Figure 2.

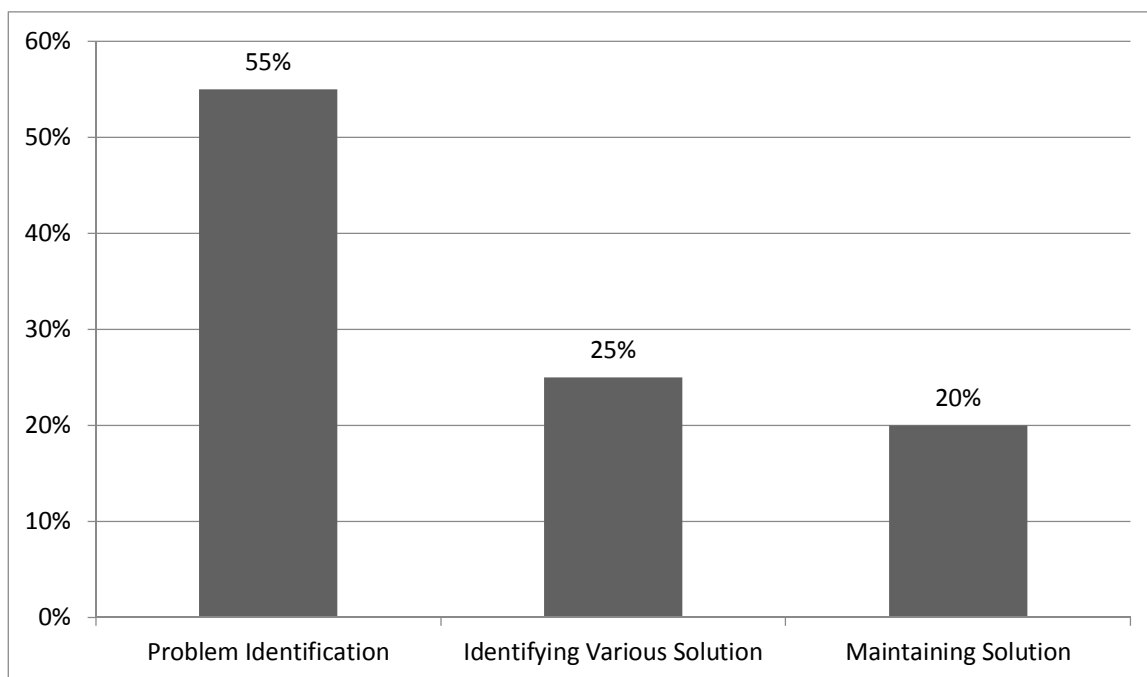


Figure 2. Percentage of Student Problem Solving Skills

Based on Figure 2, it can be seen that the students' skills in solving environmental problems are dominated by the aspect of problem identification, according to 55% of the respondents. Problem-solving indicators related to identifying various solutions and maintaining solutions were much lower at 25% and 20% , respectively.

Problem identification dominates in the aspect of problem-solving skills, and may be caused by several things such as learning models lacking due emphasis on the development of identifying and maintaining solutions. This result is in accordance with the study of Sinno (2017), who stated that learning that engages learning activities such as presentations and teamwork can improve the conceptual understanding of learning in order to improve problem-solving skills. Problem-based learning helps students think critically in problem solving through the application of analysis and evaluation skills (Major & Mulvihill, 2017). As a result, problem-based learning can be seen to improve learning achievement (Kumar & Refaei, 2017; Merritt, Lee, Rillero, & Kinach, 2017).

Conclusion and Suggestion

Based on the results of the data analysis and discussion described, it can be concluded that in the case of this study:

- Learning resources were supported in the form of reference books, but semester learning plans on environmental subjects did not yet exist and environmental subject textbooks were not yet available.
- The percentage of students' understanding of learning outcomes or learning objectives in the environmental material was dominated by 45% of students lacking the required understanding
- Indicators for problem solving in the aspect of problem identification dominate with 55%. However, identifying various solutions and maintaining solutions were reportedly much lower at 25% and 20%, respectively.

The researchers suggest that it is necessary to develop environmental textbooks according to learning processes that develop problem-solving skills and are contextual. Therefore, learning processes can more effectively train and improve high-order thinking skills in students.

Notes

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