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## EXPLORING BIOLOGY EDUCATION STUDENTS MISCONCEPTIONS BY USING THREE TIER DIAGNOSTIC TEST

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### Abstract

This research aims to know misconceptions of biology educational student in the concepts of marine. It consists of three stages, they are developing the instrument, validating the instrument, and using the developed instrument. The instrument that will be developed is three tier diagnostic test (true or false question) with CRI (*certainly of response index*). This research is in the second stage which is planned to result in 20 questions items on validating process.

**Keywords:** *marine, misconception, diagnostic test, three tier*

### Introduction

Indonesia as a developing country has some breakthrough in improving the quality of the economy, health, and education. Efforts to improve the quality of education can be seen from the improvements applied learning curriculum from year to year. Recently in 2013, the government announced a new curriculum called Kurikulum 2013 or K13. Kurikulum 2013 is a modified form curricula adopted the approach of previous fixed SCL (Student Centered Learning). The learning approach with SCL believed to optimize and tapping the potential of learners as a whole. In the SCL approach learning with learners get the opportunity to build on our understanding of the lessons given by the teacher as a facilitator.

The learning process is said to be meaningful when learners are able to construct a given phenomenon into a new knowledge. As expressed by Widodo (2004), knowledge can not be transferred from a source to the receiver, but the learners themselves are construct the knowledge. Constructing knowledge by learners produces conceptions whose truth is not necessarily true. Application of SCL in the learning process produces two types of learners. If learners can generate knowledge that can be accepted by the experts, it can be said that such learners generate the correct concept but when learners produce a concept which is not in accordance with the opinion of the experts it is said that the concept generated is a wrong concept. According to the Duit (2009) misconception is referred to as the science of the child or misconceptions or alternative conceptions. In general, to explain the conception which is not in accordance with the opinion or accepted scientific explanations of commonly used terms misconceptions.

Students before following the learning process has brought each concept well when interacting with the environment and the learning process that takes place at school earlier. No learner whose brain was completely empty. Possessed prior knowledge of learners plays an important role when he learned about something that has to do with what is already known (Widodo, 2004). In the process of learning, learners will process the information coming into their brains. If the information received in accordance with the structure of existing concepts, this information will directly add to their knowledge networks, this process is called assimilation. If the information does not match, they will rearrange their cognitive structures until this information can become part of their knowledge networks (Sanger & Greenbowe, 1997). Before starting the study, is very

good for teachers to perform diagnostic tests in advance. The use of diagnostic tests intended to determine the extent to which understanding of the learners. Besides diagnostic tests can be used to capture learners' misconceptions of the material that will be taught. The diagnostic test was first developed by Treagust in 1988. The tests were developed by Treagust to capture the misconception that is a multiple choice test two levels (two-tier diagnostic test). This test contains multiple choice questions and then shows the options reasons that may have to answer multiple choice beforehand. This test was specifically developed to identify misconceptions within a restricted area and has been determined (Chandrasegaran, et al., 2006). In addition to using multiple-choice questions about the two-tier could use one right about then followed by a choice of reasons. In further developments, some researchers believe that the two-tier diagnostic test has several shortcomings. The shortage arose because this test there is a tendency of students to guess the answers and reasons provided. Perfecting the diagnostic test is called a diagnostic test three levels or three tier diagnostic test. Three tier diagnostic test is a test that is equipped with a two-tier CRI (certainly of response index). The addition of CRI proposed to address the weaknesses found in diagnostic tests (Pesman, 2005). This test can be used to determine the ability of students to understand the material to determine the pattern of thinking students to obtain the correct answer. Having regard to the reasons which have a basis in order to choose the correct answer, so if the student has not truly understand the material being tested, the students do not have the possibility to guess.

Ecology as a science in Biology provides insights concept that is factual. This factual concept will be difficult to be taught to the student when the student has to bring his own knowledge about the phenomena they experienced. The concept of falsehood that they save will be difficult to be reduced with new knowledge so that learning will not take place optimally. In addition, as a student teacher candidates must be equipped with the correct concept. Research conducted by Reid et al. (2011) reveal student misconceptions coastal areas that fish in the sea will never run out. They also assumed that the existence of the ocean is very important only to organisms that live in the ocean ecosystem. The findings are interesting perhatin writers to explore more deeply on misconceptions contained in marine materials. To the researchers will use diagnostic test instruments to encompass three levels of student misconceptions.

## Method

This research aims to develop a diagnostic test multiple choice of three levels in maritime concept. Based on these objectives, this study used methods of Research and Development. Development of a three tier diagnostic test instrument consists of three stages: development items, the validation, and implementation stages of the final product.

## Discussion

Besides being able to capture the misconceptions, three tier diagnostic test also can capture students' answers either already understand the concept, error, and have less knowledge (lack of knowledge).

Table 1 are presented categorizing of students' concept.

Analysis of Test	Category	Answer Types
One tier	Knowing concept	Correct answer
	Misconception	Wrong answer
Two tier	Knowing concept	Correct answer + correct reason
	Error	Wrong answer + correct reason
	Misconception	Correct answer + wrong reason
		Wrong answer + wrong reason
Three tier	Knowing concept	Correct answer + correct reason + certain
	Lack of knowledge	Correct answer + correct reason + uncertain
		Wrong answer + correct reason + uncertain
		Correct answer + wrong reason + uncertain
		Wrong answer + wrong reason + uncertain
	Error	Wrong answer + correct reason + certain
	Misconception	Correct answer + wrong reason + certain
		Wrong answer + wrong reason + certain

(Source: Kusumah, 2013)

Developed items contain questions that are factual and conceptual to minimize the occurrence of lack of knowledge or error probably caught during the process of implementation problems. Prior to the development of items, researchers conducted a content analysis of the sea. Problem is made from four main content that is characteristic of the sea, zoning in the sea, plankton communities, and marine life. After the analysis of the content then it is developing several items were completely wrong with the choice of answers and the index level of confidence. Problems that may occur during the process of answering the question was dishonesty in answering the students' confidence index. To minimize these problems in this study only provided two options in the confidence index is confident or not confident that the level of students' beliefs for the answers and the reasons that have been measured directly.

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