THE USE OF DIFFICULTY LEARNING ASSESSMENT IN ASSESSING THE CONCEPT MASTERY OF BIOLOGY TEACHER CANDIDATES ON DEVELOPMENT STAGE OF ANIMAL EMBRIOLOGY

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Abstract

This study aims to obtain a description of the mastery of the concept of biology teacher candidates through the study of learning difficulties in the concept of development stage of animal embryo. The subjects of the study were 43 students of semester 6 of academic year 2013 which contracted embryology subjects. The instruments used consist of diagnostic questions (essays and multiple choice questions) and interview format. Data analysis was done quantitatively and qualitatively. The results showed that the mastery of the concept of students on aspects of C1 (remember) is 53% (enough); C2 (understanding) of 77% (good); C3 (applying) of 98% (excellent); And C4 (analyze) of 58% (enough). In addition, some students who experienced difficulty showed a positive response to their learning difficulties.

Keywords: Assessment of Learning Difficulties, Concept Mastery, Stages of Animal Embryology Development

INTRODUCTION

In the implementation of teaching and learning process there are students who can get high learning results and there are also students who get low learning outcomes. Some of them can take their learning activities smoothly and successfully without any difficulty. However, on the other hand not a few students who actually in learning to experience various difficulties. Student learning difficulties are indicated by the presence of certain obstacles to achieve learning outcomes and can be psychological, sociological, and physiological so that ultimately can lead to achievement of learning achievable under the proper (Daryanto, 2010). Furthermore, Aschlock (Wulan, et al., 2010, 2010) States that students who always get a low learning outcomes are referred to as students who have learning difficulties.

Learning difficulties because of students are not able to associate new knowledge with old knowledge so as to cause incomprehension or vagueness of a lesson. Similarly in biology that is part of the Natural Science (IPA), Symptoms of learning difficulties will be seen when students can't concentrate more, most students get low grades, students show lethargy, and most students do not master the material that has been submitted (Hamalik, 2004).

Liliasari (1999) revealed that the low mastery of the concept of IPA is caused by the use of low mindset in the formation of conceptual IPA system. The absence of improved quality of science education is related to the unresolved problems in science learning The absence of improved quality of science education is related to the unresolved problems in science learning, Including science education is still oriented only on knowledge products, less oriented to the process of science; More science teaching is devoted through lectures, questioning, or discussions without being based on the results of practical work (Susanto, 2002).

Lecturers as educators need to analyze the learning difficulties to diagnose students' learning difficulties. Learning difficulties are a condition where students can't learn properly. Wiersma and Jurs (Darmiyati, 2007) Believes that diagnosis is a teaching plan for a student, and otherwise is based on a thorough diagnosis of the shortcomings and advantages of students. Remember the importance of conducting diagnostic activities in learning activities, so Linn and Gronlund (Darmiyati, 2007) confirmed that the diagnostic assessment was developed to examine the unresolved learning difficulties with ordinary

formative assessments. In conducting diagnostic activities requires not only a diagnostic approach but also a form of assessment tool that can diagnose student learning difficulties. The assessment of learning difficulties in this study is an assessment given to students by giving diagnostic tests to students, to see students' difficulties with the material given. This assessment is given as an ingredient in order to provide guidance to students who have learning difficulties (Wulan *et al.*, 2010). It will be used to diagnose the learning difficulties in stage development of animal embryology concept. The concept has a wide scope. Achieving learning outcomes from this is very important to achieve in order to prepare competent human resources in the future era.

METHOD

This research uses descriptive method. Subjects used in this study are 6th semester biology students as much as 43 students who contracted embryology subject FKIP Universitas Muhammadiyah Sukabumi Academic year 2013. Subject selection is done by using purposive sampling technique. The data were collected using a diagnostic question consisting of essays and multiple choice items of 20 questions based on Bloom's revised taxonomy from C1 (remembering) to C4 (analyzing). Implementation of research conducted by first providing essays on prospective students of teachers, then analyzed into a test of ability in the form of multiple choice. The deductions contained in the multiple choice test are the development of the student's answer to the essay question. Test data processing using Anates Version 4.1.0 software from To (2003) Which includes validity, reliability, difficulty, distinguishing, and distortion analysis of the problems used in the assessment of learning difficulties. Then it will be calculated using the formula Arikunto (2013) as follows.

$$\% \text{ Occurrences} = \frac{\sum \text{ aspects of the emergence of the concept}}{\sum \text{ All mastery of concept}} \times 100\%$$

The next stage is categorized based on the formula Arikunto (2008) as follows.

Table 1. Category of Percentage Occurrence of Cognitive Level Problem Bloom's Taxonomy Revised At BSE High School Biology

Percentage	Predicate
81-100%	Very well
61-80%	Vell
41-60%	Enough
21-40%	Less
$\leq 21\%$	Very less

Data processing of interview result is done by using formula from Arikunto (2013) which then interpreted using category based on Koentjaraningrat (1997).

Table 2. Category of Percentage Koentjaraningrat (1997)

Percentage	Category
0%	Nothing
1%-25%	Small
26%-49%	Almost half
50%	Half
51%-75%	Big
76%-99%	Almost entirely
100%	All

RESULTS AND DISCUSSION

This research begins by identifying embryological concepts that are difficult for biology teacher candidates. When this identification was done, then made learning indicators related to the stage of embryological development of the animal. The next stage is about the essay about the concept of development stage of animal embryo. Table 3 shows sub-concepts and indicators on the concept of development stage of animal embryo

Table 3. Sub Concepts and Indicators on Development Stage of Animal Embryonic Concept

No	Sub concepts	Indicator
1.	Basic Concept of embryology	Explain the concept of embryology
2.	Stages of embryonic development	Mention the stages of animal embryo development
3.	Stages of cleavage	Describes cleavage goals
		Mention the cleavage field
		Determine the number of cleavage clearance cells
		Identify the type of cleavage
4.	Stages of Blastula	Understand the stages of blastula development
		Mention the type of blastula
		Analyze the relationship between the layer of blastulasi with gastrulation
5.	Stages of gastrulation	Describe the gastrulation stage
		Mention the primary germinal layer of the gastrulation process
		Analyze the effects of gastrulation movement on organ formation
		Understand the process of gastrulation in one Animal
6.	Stages of tubulation	Explain the concept of tubulation
		Understand the process of tubular mechanism
		Mention the extraembricial tissue tubulation Results
7.	Stages of organogenesis	Explain the concept of organogenesis
		Mention the results of organogenesis in the

No	Sub concepts	Indicator
		Epidermis
		Analyze the correlation of organogenesis to the mechanism of evolution
8.	Application of stages of animal embryo development in everyday life	Apply the benefits of studying the stages of embryological development

Based on the analysis of essay items which given to the students then obtained a score with an average of 27.78. The level of reliability of the tests conducted on the essay problem is sufficient because it has a reliability value of 0.56. This can be seen from the percentage of students' answers in answering questions. Recapitulation of the overall essay item analysis can be seen in Table 4.

Table 4. Recapitulation of Analysis of Essay Item

Average score	Correlation	Reliability
27,78	0,40	0,56

The result of identification of student answers, students can only respond to questions on certain sub-concepts only. This shows the mastery of student concepts on sub-concepts were different. Students are more likely to respond to essay questions about sub-concepts of basic understanding of embryology and the application of learning embryology. However, when faced with essays related to the stage of cleavage, the stages of blastulation stages, the stages of gastrulation, the stages of tubulation and the stages of organogenesis, students have difficulty Even from some who responded to find the answers of students who are less precise. This is one of the obstacles of researchers in preparing the next step is the preparation of multiple choice questions. Furthermore, the predicted source of difficulty in making the problem specification has appeared on the student's answer to this essay question. In the multiple-choice question, the question indicates that the reliability, validity, and distinguishing values are considered good enough and satisfy the validity of a test. This can be seen from the results of the reliability value is quite enough that is equal to 0.40. The Validity is quite valid because it has a validity value of 0.67. The results of this item analysis can be seen in Table 5.

Table 5. Recapitulation of Analysis of question item on the Application of Learning Difficulties Assessment

Average Score	Validity	Realibility
13,40	0,67	0,4

In the assessment of learning difficulties obtained from 43 students who took the test there were 12 high school students, 19 medium group students, and 12 low group students. This grouping is done based on data processing based on Anates Version 4.1.0 software which developed by Karnoto. This grouping is done just to make it easier to know which students are the least accomplished indicators. When compared to the conceptual mastery of each indicator between the assessment tools in the form of essays and multiple choices then the results can be seen in Figure 1.

Comparison of Mastery Concept of Students On the Essay Test and Multiple Choice (MC)

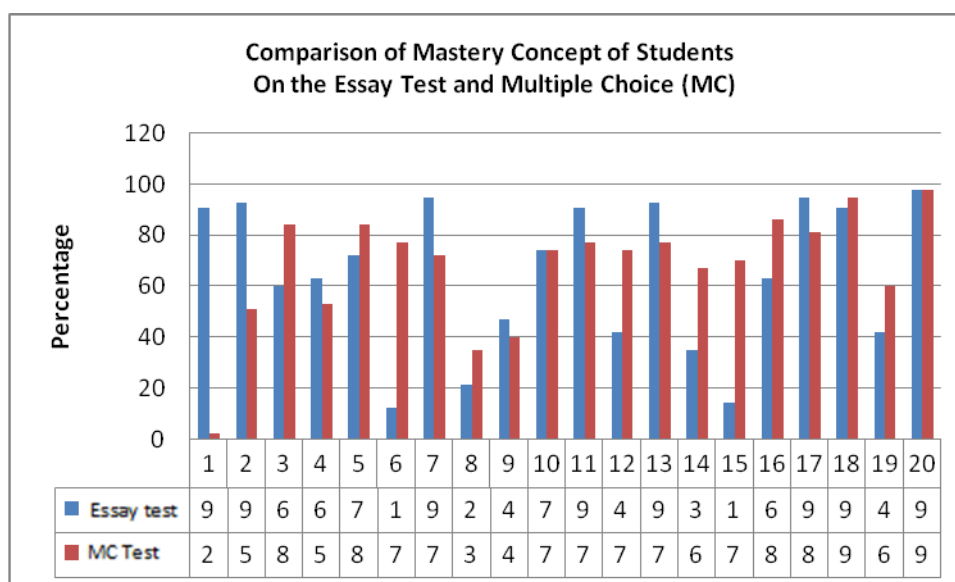|	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Essay test	9	9	6	6	7	1	9	2	4	7	9	4	9	3	1	6	9	9	4	9
MC Test	2	5	8	5	8	7	7	3	4	7	7	7	7	6	7	8	8	9	6	9

Figure 1. Comparison of Mastery Concept of Students
On the Essay Test and Multiple Choice

Figure 1 shows that the mastery of student concepts with essays and multiple choice tests has similarities and differences. The equation lies in the mastery of indicators 10 and 20 that have the same percentage. The difference in concept mastery lies in indicators other than 10 and 20. In general, the percentage of mastering concepts on the essay test is less than the multiple choice test (see difference in percentage of essay test and multiple choice on indicators 6, 8, 7, 12, 14, 15, and 19). This is one of them because the essay test requires a more difficult task than the multiple choice test. Essay test work requires disclosure of answers with the language itself so that the essay requires students to think high level. Meanwhile, at indicators 1, 2, 7, 11 and 13 the difference lies precisely in mastery of the essay test concept higher than the multiple choice test. The results of mastery of the concept of students

revealed through the assessment of learning difficulties can be seen in Figure 2.
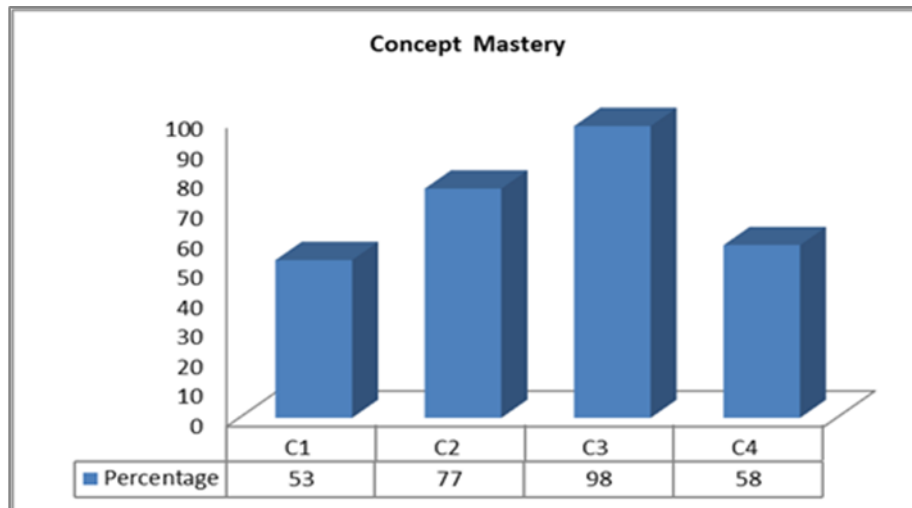

Figure 2. Concept Mastery of Student through the Learning Difficulties Assessment

Figure 2 shows that the highest percentage of master student concept is obtained by C3 (analyze) aspect of 98% (excellent), and the lowest on C1 (remembering) aspect is 53% (enough). Meanwhile, the percentage aspect of C2 (understanding) is 77% (good) and C4 aspect (analyze) is 58% (enough). The results of the interview aims to validate the findings of students who have difficulty learning to learn. This interview was conducted using a snippet test of several students based on the grouping of students (focus group discussion). Problems that are tested at the time of the assessment is asked back to the student just not given the option answers so that it can be said the questions given at the time of interview is a matter of multiple choice made in the form of essay. Problems that are tested at the time of the assessment is asked back to the student just not given the option answers so that it can be said the questions given at the time of interview is a matter of multiple choice made in the form of essay. Low group (3 students), medium group (1 student), and high group (1 student). The selection of sample of cuplik test in each group is determined based on the achievement of each student indicator. The interview result can be seen in Figure 3.
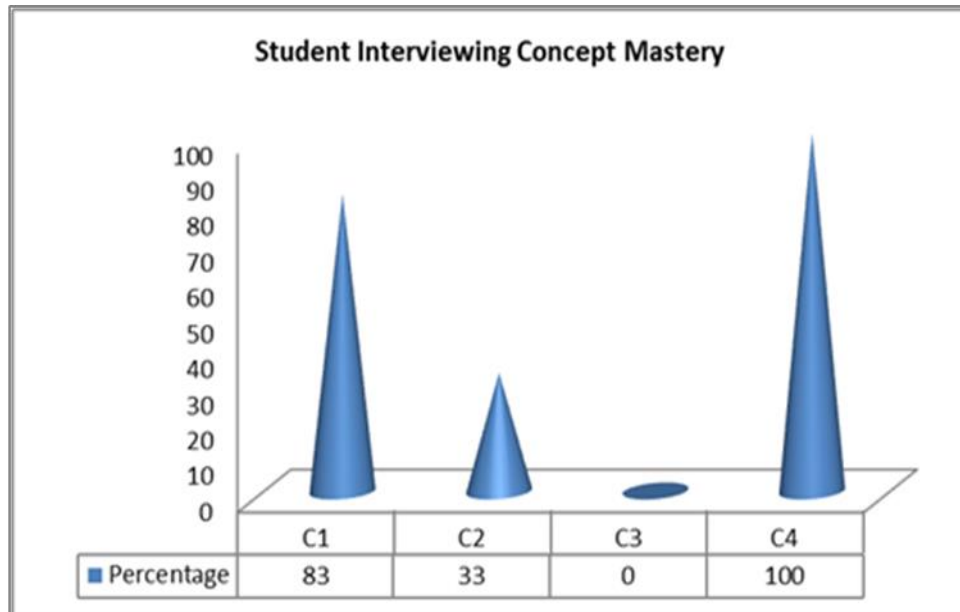
Figure 3. Result of Interview of Student Learning Difficulties
to Concept Mastery

Based on Table 3 it is known that all students (100%) have difficulty learning in answering C4 (analyzing) questions, almost all students (83%) have difficulty learning to answer C3 (applying) questions, almost half of students (33% Learning difficulties in answering C3 questions, and no (0%) students who have difficulty in answering C3 (applying). The existence of these findings is actually difficult for students to answer between questions with other problems are interrelated, for example when students are not exactly in answering the problem about the stages of gastrulation because they do not understand the stage of blastulasi. Furthermore, when the students can't answer the question of tubulation, it because of they don't understand about

the process of gastrulation and blastulation stage which is the beginning of the stage of development of animal embryos. Therefore, the results of this interview prove that the assessment of learning difficulties can diagnose the students' learning difficulties in the concept of development stage of animal embryology.

The learning difficulty assessment used included diagnostic tests (essay and multiple choice) and interview format. The result of recapitulation of essay item analysis conducted on the students who contracted animal embryology subjects obtained the result of reliability value of 0.56 which belonged to enough. This shows that the assessment of learning difficulties assessment tool is said to be

valid enough to measure the objectives to be measured. Problems can already be said to have a sufficient reliability in each test (Arikunto, 2010). In addition, multiple choice test results also show good reliability and validity values and meet the validity of a test. This can be seen from the results of the reliability value is quite enough that is equal to 0.40. Validity is quite valid because it has a validity value of 0.67. The findings are in line with the opinion of Wulan and Nurlaelah (2011) Who states that assessment of student learning difficulties can be done either through written tests (essays and multiple choice), or through oral tests. Mastery of concepts acquired through the learning difficulties assessment shows different percentage results. Students can master the concept very well on indicators about aspects of C3 (applying). This indicates that the students have mastered the concept not only understand it, But can use them in real.

On the aspect of C1 (remembering), students can memorize enough and recognize the concepts contained in the development stage of animal embryology. It's just that the validation of the interview results shows that almost all students have difficulty in answering the question. The existence of these findings indicates that the concept of memorization is often forgotten by

students. Though aspect C1 is a capability as a result of learning process with reading, listening, doing and the like (Nurhayati, 2015).

On the aspect of C2 (understanding), students can master the concept well. Almost half of the students have difficulty in answering this question. According to Widodo (2006) understanding means constructing meaning or understanding based on the initial knowledge possessed, linking new information with existing knowledge, or integrating new knowledge into existing schemes in students' thinking. Therefore, students who have been able to answer this matter means they already have that ability.

In the aspect of the problem of C4 (analyze), students suffered difficulties in answering the question. Based on the results of interview validation of a group of students who have difficulty states that almost all agree that to answer this problem is difficult. This issue has the characteristics of describing a problem or object to its elements and determining how the interconnectedness between the elements and the structure of magnitude. The ability of students in answering this type of problem shows that they already have a high-level thinking process. Anderson & Krathwohl (2010) suggests

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that one of the indicators for measuring high-order thinking in the C4 (cognitive) Is to analyze incoming information and divide or structure information into smaller sections to recognize patterns or relationships.

CONCLUSION

The assessment of learning difficulties can reveal the mastery of a biology teacher candidate concept with different percentages. Aspects about C3 (apply) have the highest percentage compared with other aspects with very good category. The findings of interview results are in line with the level of student learning difficulties achieved through diagnostic questions.

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