The analysis of students' learning difficulties on the structure and function of animal tissue topic in second grade (science) in senior high school

Z Simatupang¹ and M C Manik¹

¹Biology Department, Faculty of Mathematics and Natural Science, State University of Medan, Wiliam Iskandar Street, Medan 20221, Indonesia

Email: *) zulkiflisimatupang@unimed.ac.id; #) melvacm21@gmail.com

Abstract. The objectives of this study are to know the level of students' learning difficulty on the structure and function of animal tissue topics based on the indicator and cognitive aspects and also identify the factor influences it could happen. This descriptive research conducted in SMA Negeri 1 Perbaungan and all second-grade students are the research population. They grouped into four classes and using a purposive sampling method, 50 students from each class who have difficulty on this topic taken as samples. The data were analyzed both in qualitative and quantitative ways. The multiple-choice test with 30 questions used to identify the student's ability on the topic. For influencing factors, an interview and a closed typed questionnaire employed to collect the data. The study revealed that the student's ability was less than the minimum score means that the student experienced difficulty on this topic. The difficulty based on cognitive and indicator found at a moderate to a high level. Furthermore, the factors that influenced learning difficulty were seven factors included learning habits, motivation, teacher, and learning activity. These factors influenced at a moderate level, while learning source, interest, and the nature of the topic influenced at a high level.

1. Introduction

During teaching and learning activities at school, students have different learning characteristics include personality, information literacy, and a learning experience [10]. Its characteristics influence the success of students in the learning process, and if its characteristics can support the student learning process, then they can also learn optimally. Therefore many students can go through the learning process smoothly without facing problems or obstacles. However, some students cannot pass through the learning process and get success in learning due to the presence of the problems or obstacles experienced during the learning process [15].

Learning difficulty is a students' condition with obstacle emerged during a learning process. This obstacle is causing students to suffer a failure or in achieving the learning objective [5]. An analysis of learning difficulty is an attempt made to determine whether a student has learning difficulties and the extent to which difficulties can hamper the student's learning process. The indications of learning difficulties are the score of subjects is below or equal to the minimum score (KKM), the achievement is
imbalanced with the level of intelligence, the students' feelings and condition who are less enjoyable during the learning process\textsuperscript{(5)}. The results of the analysis of learning difficulties can use to know what kinds of difficulty experienced by the student and to know the factors that influence the student's learning difficulty.

After conducting investigating activity before doing the research, the result revealed that students experienced difficulties in Structure and Function of Animal Tissue. They perceived that the topic is challenging to understand. As can be seen, about 70\% of the students have low scores on this topic. According to Anggani (2016), there are several difficulties on this topic, such as various sub-topics that still are not grasped by the student. Based on the nature of these topics. Muscle and Nervous Tissue classified as the most complicated topics. Another difficulty is the complexity of the topic, which means that hard to comprehend and require too much memorize. It also classified an intangible topic. This research was held to analysis the students' learning difficulty based on the cognitive and indicator aspect. Once the difficulty has known, then the factors that influenced it to happen could be identified.

2. Related Literature

Learning difficulty is a condition while a student cannot follow the learning activity optimally. It typically caused by threats, problems, or obstacles that emerged during the process. When students have low learning outcomes, or they failed in the test, it means that the learning difficulty is present during the learning process\textsuperscript{(16)}.

The student's interest in biology has discussed in much research, and according to Abe (2014), the students interested in learning biology. They stated that biology is very significant in their daily life. However, biology is boring and very monotonous. Particularly, when they learn without observable media to help students grasp the biology concepts. As a consequence, the student cannot achieve the learning indicator and have low learning outcomes and achievement. According to Cimer's research (2012), there are two main difficulties in Biology. Firstly, the nature of the topic as a student stated that biology is required too much memorize. Next, the teacher’s teaching style, where students stated there is a laboratory; however, they never use it.

Then, this research also collaborated with Rahmadani (2017). The finding of the study concluded that factors caused the most prominent students' learning difficulties during learning biology, namely: the talent factor, interest, and motivational factors. It also supported by Daworiye (2015), the factor affected the learning process included the lack of well-equipped biology laboratories, poor students' attitude to biology, non-conducive classroom environment, overloaded biology curriculum, and students inadequate communication skills. The different kinds of learning designs will affect to decrease the learning difficulty. The learning activity using varieties of learning design affected learning difficulty where the requirements of proper learning tools tested in terms of validity, practicality, and effectiveness. In order to implement device development, teaching required development models appropriate to the education system\textsuperscript{(13)}.

3. Methods

This research held at SMA Negeri 1 Perbaungan. It conducted in January till June 2018 School Year 2017/2018. The population of this descriptive research was all second-grade students at SMA Negeri 1 Perbaungan, which divided into four classes are XI MIA\textsubscript{1}, XI MIA\textsubscript{2}, XI MIA\textsubscript{3} and XI MIA\textsubscript{4}. By using purposive sampling, the students who have low learning outcome in each class has taken as the sample on this research. It was 50 students.

This descriptive research analyzed the student's difficulties; first, from the multiple-choice test that arranged according to the indicator and cognitive aspect on Structure and Function of Animal Tissue Topic, test result (wrong answers) will be shown which aspect that difficult according to the student. Second, using a questionnaire that contains factors that influenced the learning difficulty happens during the learning process, and the result will use to know which factors are dominant influenced student's
learning difficulty. It also supported by an interview with a student that has difficulty in learning this topic, and the result will give depth information on their difficulty personally. The type of analysis used in this study is logical analysis. It includes material, construction, and language evaluations. Instrument experts evaluate all instruments by using a logical analysis.

The data was analyzed to know the level of learning difficulty based on the cognitive and indicator aspect. The ability percentage of each category of cognitive (C₁-C₆) and all six indicators counted with formula as followed:

$$\text{Ability percentage} = \frac{\text{Achieved Score}}{\text{Ideal Score}} \times 100\%$$

After getting the value of ability percentage in every cognitive category (C₁-C₆ and learning indicator). Then, the level of learning difficulty counted by using the formula 100%-ability percentage. The criteria for learning difficulty level as below:

Table 1. The Criteria and Level of Difficulty of Test Instrument on Structure and Function of Animal Tissue Topic.

| Difficulty Level (%) | Difficulty Criteria |
|----------------------|---------------------|
| 0-20                 | Very low            |
| 21-40                | Low                 |
| 41-60                | Moderate            |
| 61-80                | High                |
| 81-100               | Very High           |

The questionnaire used in this research was a closed-typed questionnaire with rating scale means by multiple-choice answers. Rating scale showed level as an alternative answer to the question that put on the questionnaire that consists of 25 questions about seven factors influenced learning difficulty. The Percentage influence (P) of each factor will be counted with formula as followed. (n: achieved score, N: ideal score) So, the influence level and its criteria will identify.

$$P = \frac{n}{N} \times 100\%$$

The type of interview in this research was a semi-structured interview. In the early stage, the interviewer asks a series of structured questions, then one by one question is asked more specific to get more information. The sampling method of this interview is random sampling, where the student who not able to pass the test or their score is the same or below the minimum score (75) taken, 25 students.

Table 2. The Criteria and Level of Difficulty of Questionnaire Instrument.

| Influence Level (%) | Influence Criteria |
|---------------------|--------------------|
| 0-20                | Very low           |
| 21-40               | Low                |
| 41-60               | Moderate           |
| 61-80               | High               |
| 81-100              | Very high          |
4. Result

4.1. The Students' Learning Difficulty in Cognitive Aspects.
Once ability percentage has been counted. The learning difficulty level and its criteria could identify by using formula (100-Ability Percentage). The percentage of learning difficulty found in all six cognitive levels is more than 49%. Both C1 and C2 have learning difficulties at a moderate level (49%). On the other hand, the learning difficulty in C3, C4, C5, and C6 found at a high level with the most significant difficulty at C6. It supported a higher percentage of the wrong answer of more than 62% at this level. Thus, the learning difficulty based on the cognitive aspect of the second-grade student (Science) at SMA Negeri 1 Perbaungan found in moderate to a high level.

Figure 1. The Distribution of Learning Difficulties Based on Cognitive Aspect in Structure and Function of Animal Tissue Topic.

Figure 2. The Distribution of Learning Difficulties Based on Indicator Aspect in Structure and Function of Animal Tissue.

4.2. The students' learning difficulties levels in each indicator aspects.
As illustrated in Figure 2, the learning difficulties in all six indicators are more than 45%. The first, second, and third indicators have a moderate level of learning difficulty. Contrastly, a high level of learning difficulty has found in the fourth, fifth, and sixth indicators with more than 60%. The percentage of wrong answers is more than 68% means that students have a low score in these indicators. So, the learning difficulty based on indicator aspect of second-grade student (Science) class at SMA Negeri 1 Perbaungan found in moderate to a high level.

4.3. The Factor Influences Students’ Learning Difficulty.
Regarding Figure 3, four factors influenced learning difficulties at a moderate level, such as Learning Habit, Motivation, Teacher, and Learning Activity. Meanwhile, another factor, namely; Learning Source, Interest, and The Nature of Topic, gave influence to learning difficulty at a high level. The nature of the topic is the highest influencer, but it just slightly different from Interest and Learning resources, respectively 71.4%, 70.8%, and 71%. These factors are the primary influencer for students' learning difficulty on this topic. Similarly, the result of the personal interview supports the questionnaire result to identify the factors that influence the learning difficulty.
5. Discussion

5.1. The Cognitive Level

5.1.1 Remembering Level (C1).
The remembering level is the lowest percentage of the wrong answer than another level. It means the lowest of learning difficulty found at this level, with 49.2% (moderate level). The student experienced difficulty in a recall, restate and remember the knowledge of Structure of Function of Animal Tissue Topic that they had studied before, especially in the characteristics of connective and muscle tissue, which caused 34 students failed to answer question number 26 and 29.

5.1.2 Understanding Level (C2).
Based on the result of the test analysis in understanding level, it has confirmed that learning difficulty found at a moderate level (49.5%). Compared with remembering level, the learning difficulty on these levels is the same, and it confirmed that both these level belongs to the most straightforward question for the student with the lowest students’ learning difficulty among cognitive aspects. According to the test result, the student experienced difficulty during the recall and understanding of the learned-information about the structure and function of animal tissue concepts (kinds, characteristics, and function), especially in the function of the epithelial tissue. It makes 40 students failed to answer question number 7.

5.1.3 Applying level (C3).
There are ten items of test that belong to this level, with an interval of the wrong answer is from 24% to 86%. According to the test result in this level, a high level of difficulty found in this level with just under two-thirds (62.6%). The student experienced learning difficulty in applying or using their learned-knowledge about the concept of structure and function of animal tissue to answer the question belongs to this level, especially using their knowledge about connective and muscle tissue. It caused 43 students failed to answer question number 19, 21, and 25.

5.1.4 Analyzing level (C4).
There are five items of tests that belong to this level. The difficulty found at a high level (71.2%). The student has difficulty during breaks their learned knowledge of structure and function of animal tissue concept to identify the kind of animal tissues, especially in identifying the epithelial tissue of the endocrine gland and identifying kind of muscle tissue. As a result, there are 37 students failed to answer question number 12 and 22.

5.1.5 Evaluating level (C5).
According to the test result from analysis based on cognitive in the evaluating level shown that the difficulty in high level (67.5%). In this level, the student has failed in answering the test because they have difficulty while evaluating the kinds, characteristics, and functions of animal tissue to decide the location of tissue in the animal body, especially in deciding the right characteristics and location from a kind of muscle tissue. It caused 40 students failed to answer question number 18.

5.1.6 Creating level (C6).
The creating level is the highest level in the cognitive domain and the most challenging question of this test. In the creating level, the difficulty was at a high level with nearly a quarter of student failed to answer questions. It was the highest difficulty experienced by the student in second grade. They failed to create a new idea about the physiological aspect of animal tissue from their existed knowledge.

As can be expected, this level was being the peak level of difficulty since students have started to struggle in answering the question at the previous level, even with the most straightforward questions (C1). This result also supported by Anggani (2016); the difficulty is rising as the cognitive level is getting higher, and it is suitable for this study. Looking at the details, the difficulty in C1 and C2 was at a moderate level. This level belongs to the lower order thinking of the cognitive aspect. Hence, it was at the bottom of the list. While C3, which belongs to middle-order thinking, has a high level of difficulty. Next, higher-order thinking in the cognitive aspect (C4, C5, and C6) has difficulty at a higher level or more than three-fifths.

5.2 The indicator aspect
5.2.1 Knowing the type and each characteristic of animal tissue in an animal body.
In this indicator, the student experienced learning difficulty at a moderate level (59.4%). Hence, they cannot answer the question correctly. There are six items of this. The student has difficulty mainly in knowing the characteristic of connective, nervous, and epithelial tissue in an endocrine gland.

5.2.2 Describing the function in each type of animal tissue in the animal body.
The percentage of difficulty in this indicator was 45% grouped at a moderate level and being the lowest difficulty in all indicators. There was six test's item in this indicator with the highest percentage of the wrong answer was four-fifths. It found in test item number 7 about the function of the epithelial tissue. It means that the student has a high level of difficulty in knowing the characters in each animal tissue than knowing animal tissue's function.

5.2.3 Applying the characteristic and the function of animal tissue.
The difficulty of this indicator found at a high level (56.7%). It means the student has the most severe difficulty during applying the function and the characteristic of each kind of tissue, connective tissue in particular, as it has the most significant difficulty among test items in this indicator.

5.2.4 Relating the characteristic and the function of animal tissue.
There was four test item in this indicator, The difficulty found in a high level (68.5%). The majority of difficulty was in relating the function and characteristic both of muscle and nervous tissue to muscle contraction.

5.2.5 Evaluating the characteristics, the function, and the location of animal tissue.
The percentage of difficulty in this indicator is 72.5%, which classified as a high level. The percentage of difficulty in this indicator at 72.5%, which was at a high level, means that the student is confirmed experienced difficulty as they failed to answer the question correctly. Most of the difficulty was in evaluating the characteristics of skeletal muscle tissue and its function.

5.2.6 Combining the functions, the location, the characteristics, and the physiology aspect of animal tissue.
The percentage of difficulty in this indicator is 72.5% at the high level with four test items belongs to the sixth indicator, and the student confirmed experienced difficulty makes them did not answer the question optimally. It means the student has the most severe difficulty in evaluating the characters and functions each part of the nervous tissue to know the location or order of each part during impulse processing in nervous tissue.

5.3 The Influencing Factor
5.3.1 Learning resource.
All students stated they do not read their biology books regularly at their home, and they think that read a biology book was boring. They perceived biology book is monotonous because of a lack of pictures and complicated explanations. Moreover, they never watch the video about The Structure and Function of Animal Tissue.

This result, also supported by the founding of Mushtaq(2012), the student performance affected by learning facilities such as laboratory, book, and library. They found that inadequate facilities significantly affect the student's academic performance. Hence, the learning resource becomes is a crucial factor for all learning processes, and a useful learning resource can make a better learning process. As a result, the student's outcomes will improve gradually. Therefore, the lack of learning sources positively influences the difficulty found in the student on this topic.

5.3.2 Learning habit;
All students stated they were not an active student; they rarely asked or answered a question during the learning process in the structure and function of animal tissue. They barely raise their hands and feel worried about how if their teacher asked them a question. So, if they have a question in their mind, they prefer to ask their friend or seek the answer in their way. They also stated they did not study regularly at home.

The result of this study also corroborates with the finding of Ebele (2017), who conducted a study to find out the relationship between academic success and study habits. The study revealed that there is a significant relationship between study habits and students' academic performance. Good learning habits will help students to have excellent performances. Ask a question, be an active student, study regularly at their home, taking notes, and organizing notes in a notebook or folder are examples of good learning habits. Contrastly, these habits did not found in the student of XI MIA at SMA Negeri 1 Perbaungan. Therefore, the unfortunate student's habit positively influences the difficulty found in the student on this topic.

5.3.3 Interest
All students stated they did not have an interest in Structure and Function of Animal Tissue topic at all (76%), and some of them just have a little bit of interest in this topic (24%). Students' interest in learning has a significant influence on learning outcomes. Students who interested in learning topic makes they enjoy and into the process so they will follow the process optimally and have a better result compared with the student who less interest or no interest in learning that found in the student of XI MIA at SMA Negeri 1 Perbaungan. Therefore, less interest or no interest positively influences the difficulty found in the student on this topic.

5.3.4 The Nature of Topic
This factor is the reason why the students possess less interest or even no interest in this topic. They perceived that the topic is not attractive and too complicated due to various kinds of animal tissue (56%). Also, they think the topic is abstract (hard to imagine) since they never see the real image of what animal tissue looks like, they just read it from books. The picture did not give a significant contribution to help them understand (44%).

The result of this study also collaborated with the finding of Anggani (2016) studied about student's learning difficulty on Structure and Function of Animal Tissue found that the high learning difficulty on nervous tissue and the dominant influence for difficulty came from the nature of the topic. The result of this research is suitable for Angganis research, which is the nature of the topic has a strong influence on the learning difficulty.

5.3.5 Motivation
All students agreed that they want a high score in The Structure and Function of Animal Tissue topic, but they stated that this topic was difficult. They are lazy to study (40%) due to the explanation in their biology book was complicated and blunt. Moreover, they did not have another learning resource (20%), and they did not have any plans to learn this topic in the future (24%). They did not have a plan connected to biology or Structure and Function of Animal Tissue, so they did not have a desire or motivation to study more (16%).

The result of this study also corroborates with the findings of Tella (2007), the findings show that motivation has an impact on the academic achievement of students. Where their achievement differs significantly based on the extent to which they are motivated. The results reveal that highly motivated students perform better academically than lowly motivated students learning that found in the student of XI MIA at SMA Negeri 1 Perbaungan. Therefore, less or no motivation positively influences the difficulty of a student on this topic.

5.3.6 Teacher
The student stated that they understood their teacher explanation, yet sometimes their teacher teaches too fast and makes them hard to follow and understand that. They also stated that their teacher infrequently used a media, especially in The Structure and Function of Animal Tissue.

The result of this study also corroborates with the finding of Lee (2011), the teacher gives a significant contribution to student achievement. Teacher's instructional attitude exerts a considerable positive influence on learning outcomes. The three aspects of a teacher's instructional attitude, namely: the teacher-student relationship: whether or not the teacher interacts with students well; the teacher's professionalism: which involves the two aspects of teaching skills and teaching materials. If the student feels comfortable and cozy toward their teacher, the learning process will be going well as the student stated in the interview, and the learning process with tools will be more effective. It means the style or the way the teacher used during a teaching in the classroom gave impact to the student learning outcome.

5.3.7 Learning Activity
All students stated that they used learning media infrequently; they never experienced an experiment activity on this topic. They stated if, during the learning process using media, it would be easier to understand the topic such as a video, so they got help to imagine how the animal tissue-like and it will help them to understand the explanation from their biology book. Then all student wants to experience an experiment activity because they perceive it would be interesting.

The result of this study also corroborates with the finding of Patrick (2010). The experimental activity and field trip have a significant influence on learning outcomes. The student's engagement has increased cooperation between pupils, develop new friendships, build interaction with teachers, improve knowledge and essential skill. Furthermore, students who often demonstrate a challenging behavior will improve their attention and participation in the classroom than monotonous learning activity, which found in the student of XI MIA at SMA Negeri 1 Perbaungan. Therefore, the learning activity positively influences the difficulty found in the student on this topic.

6. Recommendation

6.1 Learning Resources

According to the student's condition in SMA Negeri 1 Perbaungan, that has shown from research results where they lack learning resources and based on the factors influence the students' difficulty. The intangible factor means the unobservable or abstract topic, where the student will hard to understand if just used their imagination.

They will not understand the shape and structure of each animal tissue without seeing the object that able to observe. Hence, the learning resource should be a real object, and observable media to emphasize hands-on learning. So, the recommendation offered a real object as a learning resource that needed to minimize the students' learning difficulty at SMA Negeri 1 Perbaungan, such as a video, a picture, or media that able to observe.

6.2 Learning Activity

The productive learning activity means when teachers and students together into the process make a student take apart or role. The student follows the process where they become active students (asked or answered a question); the student does not have difficulty in their task makes they will submit their assignment on time. The achievement or cognitive outcome is high; are circumstances for learning belongs to an active learning activity.

However, the real condition has shown that the student does not belong to an active student (infrequently and even never asked or answered a question). It means they did not follow the learning process optimally, and they also stated they have difficulty doing their homework.

There is two learning activity so that they can use in Structure and Function of Animal Tissue-based on the student's needed at SMA Negeri 1 Perbaungan, as below:

- Student Experiment ➔ Lecture Method ➔ Slide Demonstration
- Slide Demonstration ➔ Student Experiment ➔ Lecture Method

By using the school's science laboratory that available in this school, active learning can do in there, such as an experiment activity. The student experiment's aim to provide a simple experiment to observe the specimen of animal tissue (epithelial, connective tissue, muscle tissue, and nervous tissue), the experiment which can easily manage by using a microscope that available at school's science laboratory in SMA Negeri 1 Perbaungan.

To support the experiment activity, the teacher can use available torso at the laboratory. Also, the teacher prepares a slide demonstration such as video, picture or animation that displayed using a projector to provide more information about the experiment topic in the lecture method, and a teacher presented orally on the general knowledge of animal tissue without using any kind of media. This activity can use to support information that already found during the experiment or slide demonstration.
6.3 Improving Motivation
The student who has high motivation in something belonging to the student who has a high or good achievement or outcome, have high curiosity, be an active student, submitted their assignment on time and work on it optimally. While the real condition of the student at SMA Negeri 1 Perbaungan has a low achievement that already shown in the research's result, they also stated during an interview that they have low motivation toward this topic. It proofs by their behavior such as never asked or answered a question (not an active student), they do not have a curiosity on this topic, and they also have struggled to do their homework. It means they are a low motivated student.

To improve their motivation, the teacher must take a role to help and make it could happen. The teacher gives praise to a student after do a pleasant activity such as asking a question, answer a question, do their homework. Although their result is not right (wrong answer, lousy question, or harmful homework), they must be praised well because if they got an appreciation, they would try to do better than before. It will stimulate by another student. Second, the teacher will give a pass-ticket to avoid daily exam if a student did his homework and asked her to bring out the best finishing their work. This action would motivate a student to do their homework due to avoid the exam that hated by the most student.

6.4 Improving Interest
Interest becomes the factor which gave a significant influence on learning difficulty on Structure and Function of Animal Tissue. Hence, improving the interest of students toward this topic would be necessary. Making the learning process fun is the way to make student interest in it. The learning process using attractive learning sources such as video and real object make student will follow the process optimally.

Then the learning activity will able to improve the student's interest. The learning activity that makes the student feels the process as the main actor or experienced it will increase their interest in this topic, such as an experimental activity that has a strong influence on learning the outcome.

7. Conclusion
According to the findings and discussion, the following conclusions can be drawn: the students' learning difficulty level in both cognitive and indicator aspect on Structure and Function of Animal Tissue topic found at moderate to a high level. The factors influence students' learning difficulty on Structure and Function of Animal Tissue topic at SMA Negeri 1 Perbaungan include learning habit, motivation, teacher, and learning activity influence at a moderate level. Meanwhile, the factor such as learning source, interest, and the nature of the topic influence at a high level.

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