

# Student's Misconception Profile of First Semester 10<sup>th</sup> Grade on Biology

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## ABSTRACT

This research aims to describe the student's misconception of first semester on biology subject at 10<sup>th</sup> grade senior high school. There are seven concepts on first semester such as scope of biology, biodiversity, classification of living things, virus, bacteria, protist, and fungi. The participants consisted ten students from public and private schools. The data collection instrument contains 35 biology test items. The diagnostics instrument were valid and reliable tested on *Lawshe's CVR* and *Aiken's V*. Initially determined of *Lawshe's CVR* that only one item lacked interrater proportion agreement (CVR = -0,2) and *Aiken's V* analysis of validity shows only three items had low coefficient of content validity. The findings confirm the results, majority of the students in science class have misconceptions which were caused by incorrect understanding on biology concepts. Highly misconception happens in the protist concept and followed by biodiversity concept.

**Keywords:** *Misconception, Biology*

## 1. INTRODUCTION

Biology is one of science that learning of living things and its life [1]. Biology covers about simple until complex knowledge, abstract until concrete knowledge of living things. The complexity of theory can be a potential obstacle on reaching aims of biology learning. Teachers are charged to facilitate and guide students on understanding concept, principle, law, theory etc. There are many problems in student knowledge dimensions at science class. The most common phenomena that happens at the science class are misconception [2].

Misconception is one of learning difficulties phenomena in Biology. The student's misconception must be identified then remedied so it will not interfere the further learning. In fact, misconceptions can be caused by information from the internet that is received by students [3], [4]. Pearsall, et al. [5] shows there is a significant correlation between initial knowledge of biology concept with further learning. When students had transferred new information with inappropriate knowledge to form a cognitive structure, this misconception interferes with subsequent learning [6]. Initial knowledge of biology concept is needed to construct a new knowledge so the learning process will be more meaningful. In learning process of biology,

Tekkaya [7] emphasize that misconception as barrier to understanding biology.

In term to fix the misconception, identifying the source of the misconception are crucial. Soyibo [8] said that the sources of misconception were identified such as student's book, book references, teachers, language, culture or belief, and daily activities. Rahmawati, et al. [9] added that learning methods are related with misconception. Biology teachers are need to filter the concept on the text books to reduce of students misconception potential [10]. Further, Deshmukh & Deshmukh [11] explain strongly that text book used by the students are the main source of misconception.

Based on research findings above, biology is one of subject that contains descriptive and analytical concepts, its known that cause big potential misconception happens in biology. Bahar [12] and Boo [13] said that misconception are strong enough to stand at someone and difficult to eliminated. Therefore, misconception is urgent to be noticed, identified, and remediated.

**2. METHOD**

The descriptive method was the method used in this research. The object in this study were students in two senior high school categories, public and private senior high school in the city of Sidoarjo. The population in study consist of one hundred fifty students and the sample choose randomly ten students, five students from public and five students from private school. Data on students were collected by online tests. The instrument that be used to identify student’s profile misconception were developed by Ikhsanudin [14].

The instrument was determined by quantitative analysis and qualitative analysis. Two quantitative of content validity (*Lawshe’s CVR* [15] and *Aiken’s V*

[16]) were compared in the analysis of developed instrument which consists of 35 questions. The data obtained from five expert judges. Five experts are consist of two experts of biology education (Validitor 1 and Validitor 2), one expert biologist (Validitor 3), one expert of learning assessment (Validitor 4), and one practitioner; senior high school biology teacher (Validitor 5). *Aiken’s V* validity analysis shows only three items had low coefficient of content validity and *Lawshe’s CVR* initially determined that only one item lacked interrater proportion agreement ( $CVR = -0,2$ ). The number test items come from various concepts of first semester on grade ten as shows at Table 2.

Student responses were grouped in three levels of understanding, which is understand, misconception and don’t understand. The scoring responses is as follows at Table 1.

**Table 1.** Scoring of responses

Student Answer		Score	Level of Understanding
First Tier	Second Tier		
True	True	3	Understanding
True	False	2	Misconception
False	True	1	Misconception
False / No Answer	False / No answer	0	Don’t Understand

**Table 2.** Concepts of biology on each number test items

Concepts of Biology on First Semester	Number of Test Diagnostics
Scope of Biology	1, 2, 3, 4, 5
Biodiversity	6, 7, 8, 9, 10
Classification of Living Things	11, 12, 13, 14, 15
Virus	16, 17, 18, 19, 20
Bacteria	21, 22, 23, 24, 25
Protist	26, 27, 28, 29, 30
Fungi	31, 32, 33, 34, 35

**3. RESULT AND DISCUSSION**

Measuring and identifying student’s misconception is a must. Diagnostic test were developed by Ikhsanudin [14] with a good result on content validity (*Lawshe’s CVR* [15] and *Aiken’s V* [16]) were compared in the analysis of developed instrument which consists of 35 questions. There are seven concepts on the diagnostic test such as scope of

biology, biodiversity, classification of living things, virus, bacteria, protist, and fungi. The most of misconceptions on the question number 3, 4, 6, 7, 9, 15, 19, 21, 25, 26, 28, 29, 30, 34. For the details, the profile of student’s misconception will be described in the table 3.

**Table 3.** Misconception on scope of biology concept

Students	Number of Questions	Misconception
2, 3, 4, 7, 8, 10	3	Students assume that organ come first after tissue
3, 7, 8, 9, 10	4	Student knows about the step after obtaining data is analyzing data, but misleading why the data must be analyzed.

Table 3 shows that there are most misconception on question number 3, this type of question is C5 which persuade the student to conclude about concept. Number 3 is discussing about level of living things in scope of biology. The students still wrong assuming and conclude the level of living things based on topic. From question number 4, this question persuade student to think about science methods. In this case, student can't explain why the data must be analyzed. They think analyzing data is just formality step on science.

**Table 4.** Misconception on biodiversity concept

Students	Number of Questions	Misconception
1, 4, 5, 8, 10	6	Student understand why the phenomena happens, but can't determine the name of phenomena.
2, 4, 6, 7, 9	7	Students can't explain about the concept of diversity
2, 6, 7, 8, 9	9	Student determine the choice very well, but misleading about their reason

Table 4 shows about misconception biodiversity concept. There are 3 questions that cause the most misconception. On number 6, the question persuaded students to determine about phenomena in variation gen and species. The students explain very well about variation gen and species, but wrong when choosing the term of phenomena. From number 7 and 9, the students having the same problem about explaining reason they choose which is making misconception.

**Table 5.** Misconception on classification of living things concept

Students	Number of Questions	Misconception
2, 3, 4, 5, 9, 10	15	Students knows where the right choice, but they don't understand about the Binomial nomenclature rules

**Table 6.** Misconception on virus concept

Students	Number of Questions	Misconception
2, 5, 6, 7, 8, 9, 10	19	Students can identify between virus and bacteria based on differences, but they wrong in explaining the differences both of them.

**Table 7.** Misconception on bacteria concept

Students	Number of questions	Misconception
4, 6, 8, 9, 10	21	Students still wrong when giving explanation bacteria concept.
2, 3, 4, 7, 8	25	In this case, student don't give explanation about the case.

**Table 8.** Misconception on protist concept

Students	Number of questions	Misconception
1, 2, 5, 8, 10	26	Most of student only choose the option answer without explaining the reason.
4, 5, 6, 7, 8, 9	28	Students assume that <i>Cillia</i> move with <i>pseudopodia</i> not <i>cilia</i> .
2, 4, 5, 7, 9	29	Students were confused about locomotion method which <i>Amoeba</i> use cytoplasmic as their <i>pseudopodia</i>
3, 4, 7, 8, 10	30	Most of student only choose the option answer without explaining the reason.

Number 15 is about binomial nomenclature case. In this question, students are persuaded to choose the right option that contain types of scientific name. Students can choose the right option, but they don't know why they choose it. Number 19 is question about differences between virus and bacteria. The students are persuaded to choose the right statement about virus and bacteria, and most of the students are correct. But in another side, the student goes wrong when explaining about the statement. Table 7 shows the data of misconception on bacteria concept. In this number 21 and 25, the question persuades students to identifying bacteria and product biotechnology using bacteria. Most of the students just choosing the option without giving an explain, it means the students just choosing the option by luck.

**Table 9.** Misconception on fungi concept

Students	Number of questions	Misconception
4, 5, 7, 9, 10	34	Students have no ability to explain the option. It means the student just bet the luck to answer the question.

Protist concept is the most concept that cause misconception. There are four number of questions that highly misconception above 50% of students. From number 26 and 30, the students did not explain their option, although the answer of option were true but it is not representative their understanding about this concept. From number 28 and 29, the students have misconception about locomotion method of the protist. Students assume that *Cillia* move use *pseudopodia* and *Amoeba* move use *cilia*, which is reverse from the fact.

Fungi is the last concept in first semester on grade ten. Question number 34 is giving case about the fungi and persuade the student to determine the right answer based on case. Students mostly choose the right answer but giving no explanation.

Misconception is not only caused by students, but also biology teacher. Methods that inappropriate would be the one of caused misconception. The teacher must learn simultaneously about effectively teaching methods and able to stop improper teaching methods [17]. The wrong or incorrect concept of students has been deeply connected in minds are very difficult to renewable. The method to minimalize the incorrect preconceptions is to always renew biology concepts with authentic and empirical new experiences that contain correct contain [17]. In this case, conducting of biology teacher, conduct the students to do lot of new activities or experiences will involving their senses; the experiences should be different and frequently.

#### 4. CONCLUSION

This research is to determine the profile of student misconceptions on first semester 10th grade at Senior High School for the concept of biology scope, biodiversity, classification of living things, virus, bacteria, protist, and fungi. Misconception identification has been completed. The findings results shows that majority of the students in science class did suffer misconceptions which were caused by a incorrect initial understanding on biology concepts. Highly misconception happens in the protist concept and followed by biodiversity concept, without ignoring misconception in other concepts. It is the responsibility of biology teachers to take an action to minimalize the misconception.

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