Misconceptions Analysis on The Virus Chapter in Biology Textbooks for High School Students Grade X

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Info Articles	Abstract
	Source of learning is something that can not be separated from the learning activities. One source of learning is learning materials. The book is one example of teaching materials from learning resources. The book is one source of information for learning. Problems often occur in the textbook is a misconceptions. This study aimed to analyze misconceptions on the virus chapter in biology textbook grade X. This research is a qualitative descriptive study provides the interpretation of data obtained in a rational and objective. This research subject is the content of the biology textbook for high school students grade X. While the object under study is the truth of the concept virus chapter biology textbook for high school students grade X. The results showed that the textbooks studied Biology class X are misconceptions which are divided into five categories, namely Misidentifications, Overgeneralizations, Oversimplications, Obsolete Concept and Terms and Undergeneralizations. Percentage of misconceptions found in every of biology textbook students grade X on the virus chapter that is 11.10% on the textbook A; 21.05% on the textbook B; and 31.03% on the textbook C. Criteria misconceptions most commonly found on the virus chapter in biology textbook students grade X is *Oversimplications* as much as 36.73%.

How to Cite

INTRODUCTION

Source of learning is something that can not be separated from the learning activities. Textbooks student plays an important role in the learning process. The beginning of each new school year, the parents to mess around with money should be spent for school is payment including the cost of buying textbooks. Textbook problems not only for the parents but also teachers. Teachers mess around with the many publishers who come to the school to offer a textbook with different qualities to be used in schools as a textbook. The number of bids to add the obligation of teachers to choose the textbooks they use. In the fact, in the school, the textbooks for the same subjects can be different depending on the consideration. The study shows some textbooks from different publishers still contains many misconceptions (Adisendjaja, 2007).

Books used in learning process is called textbook. Problems often found in the textbook is the relevance to the curriculum and misconceptions. The misconceptions in the textbook can affect the concept of students. Students would have misconceptions because the science is not received correctly. It supported the statement Kaltakci and Eryilmaz (2013: 241) "However, sometimes textbook could be a source of misconceptions students from the information

available". According to Suparno (2005: 29) the cause of the misconception of the textbook are usually found on the wrong explanation or description in the book. With the misconceptions books, teachers must be good at choosing books that are used in learning, so that students obtain the correct concept.

The importance of understanding the concepts in the educational process, the biology curriculum was developed so that students are able to understand concept the relate them to other concepts to solve problems (Depdiknas, 2007). In Biology, virus is an abstract material because the virus is smaller and simpler than bacteria, viruses do not have the structures and mechanism outside the host metabolism. So it is difficult to learn and need special understanding so that students understand better.

Muller & Sharma (2007) said that misconception is dangerous because it gives mistake to think and feel this limiting learning effort and interference between the concepts learned (false) with being studied (right). If misconception not corrected, it will have a negative impact on future learning. Misconceptions can understanding comprehension in biological materials, because the concept in biology are closely linked and are key to understanding other concepts, so that misconceptions on the concept lead to misconceptions on other concepts.

There are so much textbooks from different publishers arround us. The number of books circulating in the community to make the government take action to assess the feasibility of textbooks through Badan Standar Nasional Pendidikan (BSNP) which is based on the National Education Minister Regulation No. 22 Year 2007 dated June 25, 2007 regarding the Stipulation Textbooks are requirements eligibility for use in learning process. Despite their due diligence did not make an outstanding textbook avoid misconceptions. Therefore it is necessary to identify in the textbook. In identifying misconceptions used standard criteria refer to Dikmenli, Cardak, Oztas (2009) and Hersey (2004). To analyze the research results are used textbook of Campbell (2008) because this book has long been used as a reference or reference internationally in schools and universities in various countries. The referance book presents a precise science, introduces scientific thinking and also have a clear picture so that easy and informative.

METHOD

This research was conducted at the Campus 3 Library of the University of Ahmad Dahlan April to September 2016. This study is a qualitative descriptive study provides the interpretation of data obtained in a rational and objective. This research subject is the content of the textbook for high school biology class X.

While the object under study is the truth of the concept virus chapter textbook for high school biology class X Books used 3 pieces textbook class X. This study uses analysis tables. According to Puji (2011: 25) the steps taken to obtain research data is as follows:

1. Preparation

Things that need to be prepared before doing research on the suitability of the concept with a bouquet biology textbooks Campbell & Recee volumes 1 to make data analysis instrument table first. Table instrument based on the opinions Dikmenli, Cardak, Oztas (2009: 430) and Hersey (2004) with 5 categories of misconceptions that, Misidentification, Overgeneralization, Oversimplification, Obsolete Concept and Term, and Undergeneralization.

The instrument table is used to record discrepancies concepts in the textbook Biology class X which does not correspond to the text book along pembetulannya. 2 book publishers Biology Erlangga, coded A for book publishers Biology Erlangga first and a code B for biology book publishers Erlangga second. While BSE was coded C.

2. Implementation

Research carried out by analyzing the suitability of the concept of compatibility with the concept of material. The steps are as follows:

a. Analyzing

This step is material analysis on virus chapter at biology textbooks for grade X. By reading, observing, and understanding the material. The researcher, searched for the misconception between textbook and .

b. Recording

Step recording is done by recording the results of the analysis into analysis tables. Listening on the table analysis accompanied by (pembetulannya)?.

c. Grouping

After all the concepts in textbooks recorded on the table and analyzed, then grouped into 5 categories of misconceptions that Misidentification, Overgeneralization, Oversimplification, Obsolete Concept and Term, and Undergeneralization.

3. Conclusion

The researcher made the conclusions to described the quality of the Biology textbooks for grade X.

RESULT AND DISCUSSION

Percentage of misconceptions of each category

Here is a comparison chart of the percentage of the misconceptions of each category as follows:
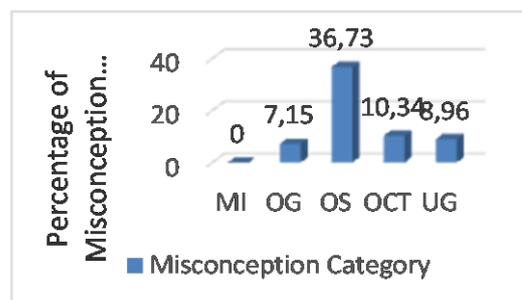
Figure 1. Diagram Percentage Misconception each Category

Gloss:

MI   : Misidentification
OG   : Overgeneralization
OS   : Oversimplification
OCT   : Obsolete Concepts and Term
UG   : Undergeneralization

Based on the diagram (figure 1) number of misconceptions category three books that Misidentification of 0%; Overgeneralization category at 7.15%; Oversimplification category amounted to 36.73%; Obsolete Concept and Term category 10.34%; and Undergeneralization category of 8.96%.

1. **Percentage of misconceptions in the textbook of biology class X**

Here is a comparison chart of the percentage of misconceptions in the biology textbook grade X.

11.10%

31.03%

21.05%

■ Textbook A ■ Textbook B ■ Textbook C

Figure 2. Diagram Percentage of Misconceptions on the Biology Textbook Grade X

The diagram (figure) that the shawn percentage of misconceptions analysis biology textbook on the textbook A class X 11.10%; textbook B by 21.05%; and textbook C by 31.03%.

Concept analyzing is a developed procedure to help teachers in planning instruction sequences for the achievement of the concept. According to Dahar (2011: 93) to analyze the concept, teachers want to pay attention to things: (a) Name the concept, (b) attributes the criteria and attributes of the variables of the concept, (c) Definition of the concept, (d) Example and non examples of the concept, and (e) Relationship concepts with other concepts.

In analyzing the Virus chapter misconceptions in biology textbook for grade X using the instructions referred to journal of Dikmenli, Cardak, Oztas (2009: 430) and Hersey (2004). Ratings are divided into five categories: Misidentification, Overgeneralization, Oversimplication, Obsolete Concept and Term, and Undergeneralization.

In the textbook A found three misconceptions that devide into a Overgeneralization category, a Oversimplification category, and a Undergeneralization category. In the textbook B found four misconceptions among 3 Oversimplification categories and a Undergeneralization category. While the textbook C found nine misconceptions among a Overgeneralization category, 5

Oversimplification categories and 3 Obsolete Concept and Term categories.

In the textbook A, Undergeneralization category was found. It didn't explain in detail about the sixe of the virus. In textbook A elaborated that the virus very small size does not allow it to have a structure as the structure of the cell. However, the concept is not disclosed in detail according to the reference book on Campbell and Reece (2008: 413) is the smallest virus is a 20 nm-diameter smaller than the ribosomes. According to Mims (2004) virus size smaller than the bacterial cells. Its size ranges from 0.02 micrometer to 0.3 micrometer (1 μm = 1/1000 mm). The unit of measurement virus is usually expressed in nanometers (nm). 1 nm is 1/1000 of a micrometer and a millionth of a millimeter. The chickenpox virus is a virus which is the largest size that a diameter of 200 nm, and the polio virus is a virus of the smallest measuring only 28 nm.

Oversimplification category in textbook A because part of virus picture do not depict the original object. Part of virus picture (Figure 4) can to clarify the picture of textbook A (Figure 3).

Figure 3. Textbook A Virus   **Figure 4.** Clarification

The next concept experienced Overgeneralization on textbook A about the concept of the number of virus genes, with by indicators misconceptions, the concept outlined incomplete. In the textbooks described that estimated the virus is only made up of 2 to several hundred genes. However, the translation of the complete lack of reference according to the book. Then it can be fitted into a sentence such as this smallest known viruses have only four genes in their genomes, while the largest has a few hundred to a thousand genes (Campbell and Reece, 2008: 414).

In the textbook B found three categories of oversimplifications with indicators image is too simple. The first image in the image bacteriophage, which is second in the image TMV shape and Influenza virus, and the third on the structure of HIV.

The first Oversimplification category on image of bacteriophage body structure. It is too simple and does not portray the authenticity of the object. Figure 6 can be used to make Figure 5 more objective
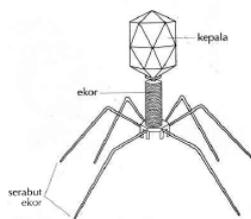
Figure 5. Textbook B Picture
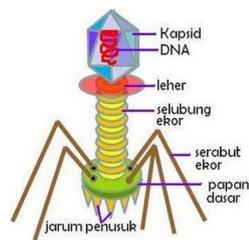
Figure 6. Clarification

The second Oversimplification, the image is too simple and does not portray the authenticity of objects in the image when mosaic virus attacks tobacco and influenza virus. Figure 8 can be used to make Figure 7 more objective and spesific.
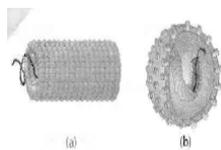
Figure 7. Textbook B Picture
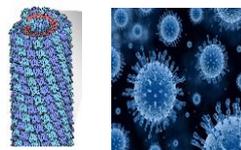
Figure 8. Clarification

The third Oversimplification the image is too simple and does not portray the authenticity of the HIV virus. Figure 10 can be used to make Figure 9 more objective and spesific.
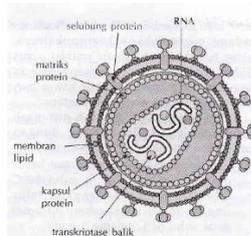
Figure 9. Textbook B Picture
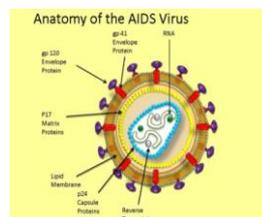
Figure 10. Clarification

The next category Undergeneralization in the textbook B concept is not disclosed in detail. Textbook B, elaborated that one of the characteristics similar to the virus organism obligate parasites, which can only multiply inside living cells. But the concept is not disclosed in detail as in a reference book that viruses are obligate intracellular parasites that use equipment and small molecules of its host cell to reproduce (Campbell and Reece, 2008: 415).

In the textbook C there were a Overgeneralization category, five Oversimplification categories, and three Obsolete Concept and Term category. Categories were found by incomplete concepts outlined. In the textbook C described that some viruses, such as herpes viruses and influenza viruses, can also be equipped by a cover or envelope of lipoprotein (lipid and protein). However the concept is not spelled out in full as in the reference book. Packaging is a plasma membrane derived from the host cell of virus. Sentence can be equipped with an envelope virus (viral envelopeI), which is derived from the membrane of the host cell, containing phospholipids and proteins of the host cell membrane (Campbell and Reece, 2008: 414).

Category Obsolete Concept and Term found in the image of lysogenic cycle, lytic cycle, and various shape of the virus with the reference indicators on the concept has exceeded the time limit Scientifics (± 10 years) without a valid update.

In the textbook C found three pictures experiencing misconceptions by Obsolete Concept and Term categories. The first picture in the book who suffered Obsolete C Concept and Term with the image reference indicator has exceeded the time limit Scientifics (± 10 years) without a valid update, contained in the image of different kinds of viruses. So that needs correcting images Figure 11 with newer reference Figure 12.

virus cacar   virus herpes   virus mosaik
                              tembakau

virus influenza   virus polio   adenovirus

virus HIV   virus gondong
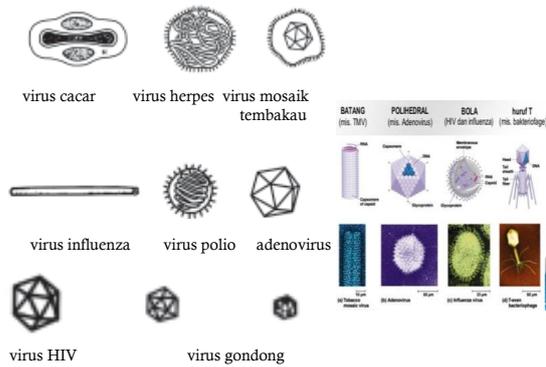
Figure 11. Textbook C   **Figure 12.** Clarification Picture
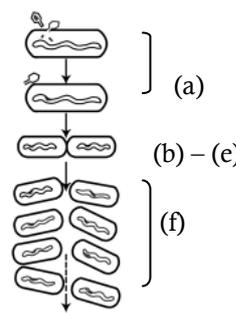
Figure 15. Textbook C   **Figure 16.** Clarification Picture
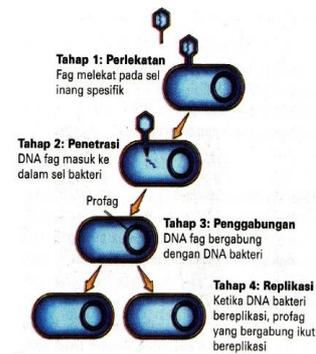
The second picture in the textbook C who have Obsolete Concept and Term with the image reference indicator has exceeded the time limit Scientifics (± 10 years) without a valid update, at the lytic virus replication. So that needs correcting images Figure 13 with newer reference Figure 14.

(a) adsorpsi

(b) injeksi

(c) sintesis (pembentukan

(d) perakitan

(e) litik
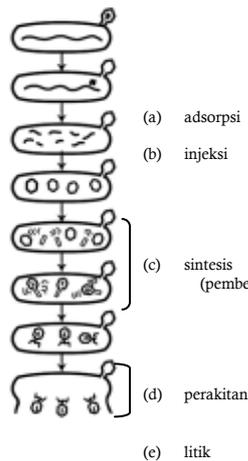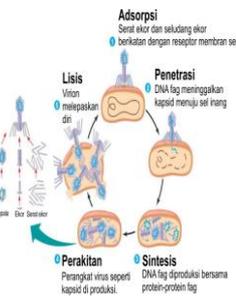
Figure 13. Textbook C   **Figure 14.** Clarification Picture

The third picture in the textbook C who suffered Obsolete Concept and Term by the image reference indicator has exceeded the time limit Scientifics (± 10 years) without a valid update, on the lysogenic virus replication. So that needs correcting images Figure 15 with newer reference Figure 16.

In the book C is also found in the Oversimplification category, on five virus picture: influenza virus, herpes virus, polio virus, the AIDS virus, and Ebola virus by indicators image is too simple and does not portray the authenticity of the object. Correction for the five to make image with the image looking more needed objective and specific.

Recapitulation miksonsepsi analysis on the textbook A had 3 concept of 27 overall concept, textbook B had 4 concept of 19 overall concept, and textbook C had 9 concept of the 29 overall concept. Recapitulation percentage misconceptions analysis in the book are calculated by dividing the number of misconceptions with a total concept.

From the calculations, the total percentage of misconceptions on the textbook A 11.10%; textbook B 21.05%; and textbook C 31.03%. While the percentage of each category obtained 0% for the misidentification category; 7.15% for the Overgeneralization category; 36.73% for the Oversimplification category, 10.34% for the Obsolete Concept and Term category; and 8.96% for the Undergeneralization category. If the percentage is ranked number misconceptions first order by 31.03% on textbook C; The second order of 21.05% on textbook B, and the last order of 11.10% on textbook A. Oversimplification category is most prevalent in the amount of 36.73% in the first place; Obsolete Concept and Term category

second order of 10.34%; Undergeneralization category third of 8.96%; Overgeneralization category fourth at 7.15%; and the last number in the of misidentification category by the percentage of 0%.

For a misconception that could occur due to the author of the less scrupulous so there is still a discrepancy concept. While the image suffered due to lack of clear misconceptions in the designation of parts of images and incomplete parts of the image or the image too simple. This is possible because the print quality is not good, so the presence of a picture or illustration that accompanies the paragraph which is intended to enhance students understanding the confused paragraph. From here also can be seen that the print quality also plays an important role in the preparation of textbooks.

CONCLUSIONS

Based on the description of the results misconceptions analysis on the virus chapter in biology textbook for high school student grade X, it can be deduced that the percentage of misconceptions that misidentifications of 0%, Overgeneralizations as much as 7.15%, Oversimplications as much as 36.73%, obsolete Concept and Terms as much as 10.34%, and Undergeneralizations as much as 8.96%. While the percentage of the misconceptions found in every on the virus chapter biology textbook grade X that is 11.10% on the textbook A; 21.05% on textbook B; and 31.03% on the textbook C.

For biology teachers are expected to be more careful in choosing the book and if there is a misconception in the book is given rectification. For the author, the book is expected in order to make corrections on the book of the misconceptions so that no misconceptions for readers, especially for teachers and students.

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