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CONFORMITY ANALYSIS OF CELL TOPICS IN BIOLOGY TEXTBOOK FOR 11TH GRADERS WITH THE BASIC COMPETENCIES OF CURRICULUM 2013

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Abstract

Textbooks are prepared to help teachers convey material to students in class easily. The textbook must meet the needs of students in its presentation by considering the suitability of the content of the material with the basic competencies to be achieved. This study aims to determine the level of conformity between the cell topics in the biology textbook for class XI and the basic competencies of the curriculum 2013 in terms of the breadth and depth of the material. This research is a quantitative descriptive study by analyzing the biology textbook for class XI from Erlangga and Yudhistira. The data collection technique used is observation using the observation sheet. The data analysis used descriptive quantitative. At the data analysis stage, it was carried out by several reviewers consisting of researchers, colleagues, and high school teachers in a Focus Group Discussion (FGD). The results showed that the suitability of the topic of cell in terms of the breadth of the material in textbooks A and B obtained a percentage of 75%. While the suitability of the content in terms of the depth of the material, the results obtained are 95.83% in textbook A and 83.33% in textbook B. It is because textbook A only fulfills 23 of the total 24 scores. Meanwhile, textbook B only fulfills 20 of the total 24 scores. Based on the study results, it can be concluded that the level of material breadth in textbooks A and B have an appropriate category. On the other hand, the level of material depth in textbook A and textbook B has a very appropriate category.

Keywords: Cell topics, material breadth, material depth

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INTRODUCTION

Teachers use a textbook as learning resources that make it easier for teachers to deliver material to students in class. Therefore, the textbook must meet the needs of the material that students will learn to achieve the basic competencies of the applicable curriculum. According to research conducted by Iskandar (2016), textbooks that are widely used by teachers in schools do not contain all the material that can be analyzed by students, and the explanations in them have not directed students to learn scientifically.

Biology is a science that contains abstract concepts and processes of events (Maryanti & Kurniawan, 2018). The presentation of material in biology textbooks needs to be considered in order to assist students in meeting their knowledge needs in accordance with basic competencies to make it easier for students to understand the material contained in the textbook. The suitability of the content of the material can be seen from the basic competencies at each grade level. This relates to the breadth and depth of the material presented in the textbook. The scope of the material describes the amount of coverage of the subject matter contained in the learning material (Djelita, 2013). In contrast, the depth of the material contains the completeness and suitability of the sub-coverage of the material based on basic competencies according to the level of education (BSNP, 2006).

Based on the results of a survey conducted by researchers on 11 state senior high schools and 7 Muhammadiyah high schools in the city of Yogyakarta, it was found that the class XI senior high school biology textbooks used were quite diverse. The textbooks used in this study were textbooks from two publishers, namely Erlangga and Yudhistira. This is based on the results of the survey, which showed that the class XI senior high school biology textbook from these two publishers was the first and second rank textbook that were widely used in 11 state senior high schools and 7 Muhammadiyah senior high schools in the city of Yogyakarta.

The scope of biology material for class XI senior high school, which is contained in basic competencies 3 Curriculum 2013, contains 14 materials that must be achieved by students. Based on the results of a survey conducted by researchers on students of class XI science at state senior high school and Muhammadiyah senior high school in the city of Yogyakarta, it was found that the biology material for class XI senior high school that was difficult for students to understand was the Cell material listed in basic competence 3.1. Based on research conducted by Melati (2016), the learning difficulties experienced by students in understanding cell material consisted of 21 students experiencing difficulties and ten students having no difficulties. Difficulties experienced are difficulties in understanding concepts and terms. Factors that influence the difficulty come from internal factors and external factors. According to Cimer (2012), one of the factors that cause students to find it difficult to understand the material is the characteristics of the biological material itself, in which there are many concepts that must be studied and biological objects that cannot be observed directly.

Previous research regarding the analysis of the depth and breadth of material from the textbook, in Utami's research (2018), obtained the result that the suitability of Bacteria material in class X biology textbook from Erlangga and Yrama Widya publishers in terms of the aspect of material breadth has the "appropriate" category and from the aspect of the depth of the material has a category of adequately suitable. In previous research, there was no research that discussed the breadth and depth of Cell material in class XI high school biology textbook. Therefore, it is possible that from the biology textbook for class XI high school, which is widely used in public high schools, and Muhammadiyah high schools in the city of Yogyakarta, there are textbooks that are stuck not in accordance with the basic competencies in the 2013 curriculum. It is necessary to analyze high school biology textbooks XI, which aims to describe whether the textbook is used by teachers and studied by students at SMA Negeri and SMA Muhammadiyah in the city of Yogyakarta. It is in accordance with the basic competencies of the applicable curriculum.

METHOD

This type of research is descriptive quantitative research. Descriptive research aims to collect data about the research subject at a certain time (Muchtar, 2013). The data source of this research is primary data. According to Sugiyono (2012), primary data is data that directly provides data to researchers as data collectors. The primary data source of this study was obtained from the analysis of cell material in a biology textbook for class XI from publisher A and publisher B with basic competencies in the Curriculum 2013.

The subject of this research is a biology textbook for class XI Curriculum 2013 published by two publishers, including Erlangga and Yudhistira publishers. The object of the research is the content of cell material in the biology textbook for class XI senior high school with the basic competencies of Curriculum 2013. The determination of the subject and object of the

research was taken based on a survey conducted on 11 state senior high schools and 7 Muhammadiyah senior high schools in the city of Yogyakarta using a purposive sampling technique. Purposive aside, namely research sampling based on certain goals (Muchtar, 2013).

The criteria for selecting research subjects are books that are widely used in state high schools and Muhammadiyah senior high schools in the city of Yogyakarta, ranked first and second. The criteria for selecting the object of research are materials that are considered difficult to rank first by students from state senior high school and Muhammadiyah senior high school in the city of Yogyakarta. The place used for research is Ahmad Dahlan University. The study took place on June 3, 2021 – July 9, 2021.

The data collection technique used in this study was an observation technique. The instrument in this study was an observation sheet on the breadth and depth of cell material in a biology textbook for class XI with the basic competencies of the 2013 curriculum filled out by researchers, colleagues, and senior high school teachers. The observation sheet is used to obtain data on the suitability of the material in the textbook with basic competencies. The data obtained from the observation sheet is quantitative data.

The data analysis technique used is descriptive quantitative. The data analysis technique begins by noting the items of learning material in the predetermined biology textbook. Then match the description of the existing material with the basic competencies of the Curriculum 2013. After that, the results obtained are presented and classified based on the suitability criteria, namely the breadth and depth of the material. The data analysis technique in this study was carried out by several reviewers consisting of researchers, colleagues, and high school teachers in Focus Group Discussions (FGD). This is done to avoid the results of research data that are subjective from researchers only. The percentage of conformity of learning materials is calculated by the following formula.

$$P = \frac{S}{N}\ x\ 100\%$$

Information:
P = Percentage of sub-variables
S = Total scores of each sub-variable
N = Total maximum scores

Table 1. Criteria for Material Suitability with Basic Competencies

No.	Percentage Interval	Category
1.	76% - 100%	Very Appropriate
2.	51% - 75%	Appropriate
3.	26% -51%	Less Appropriate
4.	0% - 25%	Very Less Appropriate

Source: Akdon (2011)

RESULT AND DISCUSSION

Based on the observations obtained from the analysis of the suitability of cell material in biology textbooks for class XI senior high school with the basic competencies of the Curriculum 2013, the textbook used in the study were book A and book B. Textbook A, with the title Biology for SMA/MA Class XI, was written by Irnaningtyas and published by publisher Erlangga. Meanwhile, textbook B, titled Biology book for Class XI, was written by Arif Priadi and Yanti Herlanti and published by Yudhistira Publisher.

Based on the analysis of the suitability of the cell material in the biology textbook for class XI SMA with the basic competencies of the Curriculum 2013 in terms of the breadth and depth of the material, the results are presented in Table 2 and Table 3.

Table 2. Data on Suitability of Cell Material in Terms of Breadth

Basic Competencies 3.1 Class XI		
Describes the chemical components that make up cells, structures, functions, and processes that take place in cells as the smallest unit of life.		
Aspects Assessed	Broadness	
Coverage of Main Material	**Textbook**	
	A	**B**
1. Chemical Components Cell Composer	√	√
2. Cell Structure	√	√
3. Cell Organelles and Their Functions	√	√
4. Processes that Take Place in Cells	-	-
Total	3	3

Percentage	75%	75%
Category	Appropriate	Appropriate

Information: √ = Available; - = Unavailable.

Table 3. Data on Suitability of Cell Material in Terms of Depth

Basic Competencies 3.1 Class XI		
Describes the chemical components that make up cells, structures, functions, and processes that take place in cells as the smallest unit of life.		
Aspects Assessed	Depth	
Coverage of Main Material	**Textbook**	
	A	**B**
1. Chemical Components Cell Composer		
a. Carbohydrate	√	√
b. Fat	√	√
c. Proteins	√	√
d. Nucleid Acids	√	√
Total	4	4
Percentage	100%	100%
2. Cell Structure		
a. Prokaryotic Cells	√	√
b. Eukaryotic Cells	√	√
Total	2	2
Percentage	100%	100%
3. Cell Organelles and Their Functions		
a. Plasma Membrane	√	√
b. Nucleus	√	√
c. Cytoplasm	√	√
d. Ribosome	√	√
e. Endoplasmic Reticulum	√	√
f. Golgi Aparatus	√	√
g. Lysosomes	√	√
h. Peroxisome	√	-
i. Glyoxysome	√	-
j. Mitochondria	√	√
k. Plastids	√	√
l. Vacuole	√	√
m. Centrosomes dan Centrioles	√	√
n. Cytoskeleton	√	-
o. Cell Wall	√	√
Total	15	12
Percentage	100%	80%
4. Processes that Take Place in Cells		
a. Respiration	√	√
b. Excretion	-	-
c. Secretion	√	√
Total	2	2
Percentage	66,67%	66,67%
Total	23	20
Percentage	95,83%	83,33 %
Category	Very Appropriate	Very Appropriate

Information: √ = Available; - = Unavailable.

Based on the suitability analysis of cell material in class XI high school biology textbooks with the basic competencies of the 2013 curriculum in terms of the aspect of breadth and depth of the material, the obtained results cover the subject matter in textbook A and textbook B which are not contained in the standard breadth and depth of cell material presented in Table 4.

Table 4. Data Coverage of Unavailable Materials in the Standard Breadth and Depth of Cell Material

Textbook	Coverage of Main Material
A	1. Cell Discovery and Cell Theory
	2. Cell Size Range
B	1. Cell Discovery
	2. Cell Size and Shape
	3. Chemical Components Cell Composer : Water

Material Breadth

The textbook analyzed in this study was textbook A which obtained a percentage of the material breadth of 75%, and the same percentage was obtained in textbook B. Both books are in the appropriate criteria for the aspect of the breadth of the material. According to Akdon (2011), a textbook is said to be very suitable for the aspect of the breadth of the material if it gets a score of 100%. The results of the data obtained after identifying the contents of the book for the aspect of material breadth are that there is one coverage of the main material in textbook A and textbook B that is not in accordance with the material standards of breadth and depth of cell material. According to Putri *et al* (2018), the breadth of the material has an important role because it provides an overview of the coverage of the material contained in the basic competencies, the sequence, and the relationship between one material coverage and another.

The score obtained from textbook A and textbook B is 3 out of the total score of the overall coverage of the subject matter of cell material is 4, as listed in Table 2. In textbook A and textbook B, there are only three coverages of the subject matter, namely, the chemical components of the constituents. Cells, cell structure, and cell organelles and their functions. The scope of subject matter that is not found in textbook A and textbook B in cell material is a process that takes place in cells.

The percentage aspect of the breadth of material obtained between textbook A and textbook B is 75%. Both were declared suitable for use in learning activities because they still showed conformity criteria to the basic competencies of the 2013 curriculum. The results of this analysis support the results of previous research conducted by Utami (2018) that the results of the analysis of the suitability of bacterial material in a Biology textbook for class X senior high school from publishers Erlangga and Yrama Widya with the basic competencies of the 2013 curriculum in terms of the breadth of material aspects obtained a percentage of 80%. Another study conducted by Saadah (2013) found that the breadth of material on the digestive system in Biology textbooks for junior high school and senior high school publishers Erlangga and Yudhistira was included in the high category with a percentage of 85%. Thus, the aspect of the breadth of cell material in Publishers A and Publishers B is suitable for achieving basic competence 3.1 in class XI, which is to explain the chemical components that makeup cells, structure, function, and processes that take place in cells as the smallest unit of life.

Based on the results of the analysis of the material in the biology textbook in terms of the breadth of the material, there is an excess of material content from the textbook studied (Table 4). This material is material that is not listed in the standard for the breadth and depth of cell material in the assessment instrument. Excess material content in textbook A includes the discovery of cells and the theory of cells, and the range of cell sizes. Meanwhile, textbook B includes the discovery of cells, the size and shape of cells, and the chemical components that makeup cells in the sub-coverage of water. The advantages of the material found in the textbook can be additional knowledge for students, but the material presented in the textbook should be in accordance with the needs of students according to their grade level. This is in accordance with Djelita (2013) that the material should not be too little or too much. According to Setiawan, *et al* (2018), if the material presented is too little, it will not help students to achieve the basic competencies that have been determined. On the other hand, if there are too

many, it will take a relatively large amount of time and waste unnecessary energy to learn it.

Material Depth

Aspects of the depth of material in each textbook obtained a different percentage, as listed in Table 3; in textbook A the results were 95.83%. Meanwhile, in textbook B, the results were 83.33%. Thus, the sub-coverage of the material in textbook A has more detailed concepts than in textbook B. However, the two textbooks studied have a very suitable category for use in terms of the depth of the material. The results of this study are in line with research conducted by Setiawan, *et al* (2018) that the depth aspect of the subject matter of the scope of biology in biology textbooks from publishers Erlangga and Yrama Widya obtained a percentage of 83.33% and 89.9% so that it is categorized as very suitable. The textbook used by teachers and students must meet the eligibility requirements for use in the learning process in accordance with the provisions set by the BSNP, one of which is fulfilling the eligibility requirements for content. The depth of the material contains the completeness and suitability of the sub-coverage of the material based on basic competencies according to the level of education (BSNP, 2006).

In the scope of the subject matter of the chemical components that make up cells, there are sub-coverages of material, including carbohydrates, fats, proteins, and nucleic acids. Aspects of the depth of the material on the subject matter coverage of the chemical components that make up cells obtained a percentage of 100% in textbook A and textbook B. This shows that textbook A and textbook B meet the category very well in accordance with the basic competencies of the 2013 curriculum on cell material. The results of this study are in accordance with Tarigan's statement in Utami (2018) that the ideal textbook used in the learning process is a textbook that has criteria, one of which is relevant to the applicable curriculum.

The percentage of the same depth aspect in both textbooks does not guarantee the similarity in the presentation of material in each book. In textbook A and textbook B, there are differences in the presentation of the material. In textbook A, on the sub-coverage of carbohydrate material, it is described in detail containing the types of carbohydrates based on the number of monomers, including monosaccharides, disaccharides, and polysaccharides. Meanwhile, in textbook B, the sub-coverage of carbohydrates only describes the function of carbohydrates.

The scope of the basic material of cell structure consists of only two sub-areas of matter, namely prokaryotic cells and eukaryotic cells. In textbook A and textbook B, the sub-coverage of material for prokaryotic and eukaryotic cells is clearly explained regarding cell components, cell size, and cell shape. This is in line with the statement explained by Muslich (2009) that the depth aspect of the material contained in the textbook contains a description of concepts, definitions, principles, procedures, examples, and training so that students are able to recognize, identify, and construct new knowledge. The results of the percentage of the depth aspect of the material on the coverage of cell structure material obtained results in textbook A and textbook B worth 100%. Therefore, textbook A and textbook B are very suitable and meet the criteria for the suitability of the material in the scope of the cell structure subject matter from the depth aspect of the material with the basic competencies of the 2013 curriculum.

The discussion includes the results of the analysis of the results, which were studied further by the author so that novelty was found in this research. The results and discussion are made in the form of flowing paragraphs and/or separated in the form of sub-chapters. In the discussion, the relationship between the research results obtained and previous research should be written. The discussion also contains the novelty of the research as well as its implications.

In the scope of the basic material of cell organelles and their functions, there are sub-coverages of material consisting of the plasma membrane, nucleus, cytoplasm, ribosomes, endoplasmic reticulum, Golgi apparatus, lysosomes, peroxisomes, glyoxysomes, mitochondria, plastids, vacuoles, centrosomes and centrioles, cytoskeleton, and cell walls. The results of the percentage aspect of the depth of material in textbook A obtained 100% results, while textbook B obtained results of 80%. In textbook B, there is a lack of sub-coverage of 3 points, including no sub-coverage of peroxisomes, glyoxysomes, and cytoskeletons. Meanwhile, textbook A has the completeness of the sub-coverage of material as stated in the material standards of the breadth and depth of the material in accordance with the basic competencies of the 2013 curriculum on cell material. Based on research conducted by Melati (2016) that cell material with the scope of the main material of cell organelles and their functions is one of the main material coverages that are difficult for students to understand. This is because there are many concepts that must be understood by students.

The scope of the subject matter of processes that take place in cells is not clearly stated as the three other subject matter coverages in the cell material in textbook A and textbook B. However, the sub-coverage of the material is listed in another sub-

coverage which shows the process that occurs in cells. It can be seen from the sub-coverage of respiration material in book A and textbook B. It is explained that the process of respiration occurs in cell organelles, namely mitochondria. The percentage of the results of the depth of material in textbook A and textbook B covering the material for the process that takes place in the cell is 66.67% in the appropriate category. This is in line with Mulyani (2013) that the depth aspect of the material in the textbook must be adjusted to the basic competencies in the curriculum and the intellectual level of students so that the material contained in the textbook can be conveyed properly.

CONCLUSION AND SUGGESTIONS

Conclusion

Based on the research that has been done, it is concluded that the level of suitability of cell material in high school biology textbooks for class XI in terms of the breadth of material in biology textbooks from publisher A and publisher B with basic competencies in the 2013 Curriculum class is in the appropriate category. In contrast, the level of suitability of cell material in biology textbooks for class XI SMA in terms of the depth of material in biology textbooks with the basic competencies of the 2013 Curriculum in textbook A and textbook B has a very appropriate category.

Suggestions

Based on the research conducted, suggestions from this study include:

1. For teachers, the books under study can be used in the learning process of cell material because the material under study has met the aspects required in the basic competencies of the Curriculum 2013.
2. For other researchers, it is hoped that this research can be used as information material related to textbook analysis.
3. Book writers are expected to pay attention to the books to be written by looking at the preparation of the textbook based on the Curriculum 2013 that has been set by BSNP.

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