

Learning Media Development: Covid-19 Supplement Book-Based Science Literacy

Amalia Syah Putri
Biology Education
Postgraduate
Universitas Negeri Medan
Medan, West Sumatera
Indonesia

Hasruddin
Biology Education
Postgraduate, Lecture
Universitas Negeri Medan
Medan, West Sumatera
Indonesia

Tri Harsono
Biology Education
Postgraduate, Lecture
Universitas Negeri Medan
Medan, West Sumatera
Indonesia

Abstract: The purpose of this study was to determine the feasibility of the Covid-19 Supplement book on virus material and the effectiveness of the Covid-19 Introduction Supplement book in improving student learning outcomes. The development research method (Development & Research) produces products, so this research is oriented towards product development which has the process of describing it as well as possible and then its feasibility will be validated. In this study uses the ADDIE research model which includes the analysis, design, development, implementation, and evaluation stages. The subjects in this study were three expert validators (materials experts, linguists, and design experts), then teachers and class X students at SMA Negeri 1 Hutabayuraja. The results of this development research show that the Covid-19 Supplementary book on virus material was deemed appropriate by material experts, linguists, and graphic design experts, and the application of the Covid-19 Supplementary book on virus material can effectively improve student learning outcomes with student classical mastery of 75, 6%.

Keywords: instructional Media; supplement book; covid-19; scientific literacy; improve learning outcomes

1. INTRODUCTION

Viruses have become the most discussed topic in the last two years. This is because at the end of 2019, in Wuhan City, Hubei, China, a new type of disease was reported, which is currently known as Covid-19. This name was inaugurated by the World Health Organization (WHO) on 11 February 2020. COVID-19 is COVI for coronavirus, D for disease, and 19 to symbolize the year the virus was first detected [1].

The science that studies viruses or what is called virology is a branch of biology. Viruses are living things that are transitional between living things and inanimate things. Viruses are declared transitional living things because they have the characteristics of living things and inanimate objects. Viruses have genetic material which is the main characteristic of living things, but besides that viruses do not have protoplasm and can be crystallized which is characteristic of inanimate objects, and can only live if in the host's body. However, viruses are included in the scientific field of biology because they can reproduce and their presence has a major effect on the living things they infect.

The world of education is a place to prepare a new generation that is ready to compete in the future. So ideally matters related to educational interests need to be given specific attention and updated according to the latest knowledge. With the discovery of new knowledge about viruses that are included in the scientific field of Biology, information related to these discoveries also needs to be updated.

The learning process does not always run smoothly without obstacles, one of the problems in the learning process is that some students are not able to understand the learning material. Students only focus on memorization without being followed by a deep understanding. In short, learning difficulties are caused by students' lack of literacy skills. Literacy is defined as a reasoning ability related to the ability to analyze,

synthesize, and evaluate information that can be grown by integrating it into lessons [2].

Scientific literacy over the last few decades has been considered an important problem in the world of national and international education. Scientific literacy is considered important because understanding science is fundamental to one's readiness to live in modern society [3]. Textbooks that can support learning are books that emphasize scientific knowledge whose scope corresponds to the scientific literacy category in a balanced way. Books based on scientific literacy cover four categories, namely, science as a body of knowledge; science as a way of investigation (science as a way of investigation); science as a way of thinking (science as a way of thinking); and the interaction of science with technology and society (science and its interaction with technology and society).

21st Century Biology Learning must adapt to changing times. The 21st century demands the field of education to be able to prepare students who have the skills to be able to face the information age which is faced with global economic competition. The skills that every student must have in the 21st century learning are critical thinking skills, knowledge, and literacy skills both personally and professionally. Individuals who have scientific literacy skills will be able to complete using scientific concepts obtained with the help of technology according to their level. Scientific literacy skills are an independent ability to find solutions to problems according to actual procedures and facts [4]

Problems in the learning process certainly have an impact on student learning outcomes that have not been completed [5]. The achievement of student learning outcomes in viral material still has not reached the Minimum Completeness Criteria (KKM) specified, namely ≥ 76 . Researchers conducted pre-research observations at SMAN 1 Hutabayuraja to obtain data on student learning outcomes as

seen from assignment assessments and daily test assessments on the subject matter virus in class X MIA SMAN 1 Hutabayaraja as many as 94 students. Student learning outcomes that complete less than 50% for assignment scores and daily tests. The data reflects that student learning outcomes have not been achieved optimally.

Supplementary books are supporting books for the main textbooks which contain additional material not included in the textbooks. The function of the supplement book is to support students to get more information. Books that become reading are part of an unlimited self-development effort. The ability and willingness to seek information through books can become knowledge for readers.

1.1 Supplement Book

Supplement books are enrichment books or complementary books. This supplement book is used to complement the main textbook [6]. Supplementary books are books that enrich and improve mastery of science and technology, and skills, and shape the personality of students, educators, education administrators, and other communities. This type of book is not only for students but also for other parties or the general public, (Center for Bookkeeping, 2008). Several supplement books that have been developed can increase reader motivation through the good responses shown.

Supplementary books in learning are designed to increase reading interest, written for readers who are used to learning, can explain instructional objectives arranged based on flexible, systematic, and structured learning patterns based on student needs and the final competencies to be achieved, focus on providing opportunities for students to practicing, giving summaries, communicative writing style, providing feedback, accommodating student learning difficulties, explaining how to study teaching materials and written by experts in related fields [7].

The supplement book includes learning resources that may be used by users to make learning behavior occur. Supplementary books are practical learning resources because of their flexible use, low maintenance, and easy availability. The use of supplementary books is not limited by the time, place, or age of the user, but there are still provisions for their preparation and use. This makes the supplement book can be used as a learning resource.

Four aspects of Supplementary Book Writing Techniques, namely: (1) Aspects of Book Content. Designing supplementary books must adhere to three main principles namely, consistency with educational goals, adaptation to scientific developments, and development: of reasoning skills. (2). Aspects of Presentation In presenting supplementary material four main principles need to be considered, namely inductive and systematic logical systems, Presentation of Material, Stimulating the development of creativity (3) Aspects of Language When writing guides (both knowledge, skills and personality). You must comply with the standard rules of language use. Textbook language rules must be followed by the author. Without the careful application of language rules, readers often lose their written communication. Authors should use correct, harmonious, and rhythmic sentences, words, and terms. (4) Additional Graphical Aspects Graphical aspects that must be considered relate to the layout of attractive graphic elements to explain the contents of the book. It should also be noted that the typography used must be highly readable [8].

1.2 Corona Virus

Director General of the World Health Organization (WHO) Tedros Adhanon Ghebreyesus on 11 February 2020 stated that they had chosen the name of the disease caused by the coronavirus which is very dangerous and very threatening to the world. The name given is COVID-19 which is an acronym for Corona Virus Disease and 19 refers to 2019 when this virus was first detected.

The Covid-19 pandemic is an event where a disease spreads across the globe, killing more than 1,800 people within 50 days of its emergence. This disease is caused by a new type of coronavirus that has never been detected before. Initially called (2019-nCov) by the Centers for Disease Control and Prevention, the number 2019 indicates the year, the letter n indicates novel which means new, and CoV indicates coronavirus.

This disease was first detected in Wuhan, which is a business center in China, namely a trader at the Huanan Market. The first confirmed case of the Sars CoV-2 virus allegedly appeared on November 17, 2019. However, this case was still unknown at that time. This patient is then referred to as the "Zero Patient". The search for the "Zero Patient" was then carried out by health authorities in China to find out traces of the spread.

The coronavirus that causes the Covid-19 infection has spike proteins on the surface. The spikes are used by viruses to attach to the surface of body cells and cause pain. The coronavirus vaccine works by recognizing the spike coronavirus and destroying it so it can't attach to body cells. If the vaccine used works optimally, it will be effective in protecting you from Covid-19 infection, and if the infection persists, it will reduce the risk of serious illness or death.

Several vaccines must be given in several doses, with intervals of weeks or months. This is sometimes necessary to encourage the body to produce stronger, longer-lasting antibodies and to allow immune cells to remember the disease. In this way, it is hoped that the body's defense system will be able to fight against incoming pathogens in the future, including fight the virus that causes COVID-19.

1.3 Science Literacy

Literacy is defined as a reasoning ability related to the ability to analyze, synthesize, and evaluate information that can be grown by integrating it into lessons [9]. The benefits of literacy include various aspects of development, namely cognitive, social, language, and emotions. Literacy is related to learning and decision-making skills, as well as adaptation to the environment. One of the characteristics of today's society and in the future is the enormous amount of information, a life that is increasingly digitized, and types of work that require high levels of reasoning - all of which require literacy. Literacy achievement indicators cover many aspects of reading comprehension, evaluating ability, ability to conclude and link information with other information or results of observation and ns, reflections, which are expressed by exposure to information, and so on. There are queseveralr of tested scales and continuums that schools can use to assess those that are integrated with various disciplines.

Scientific literacy is formed from 2 words, namely literacy, and science. Literacy comes from the word Literacy which

means literacy/illiteracy eradication movement [10]. While the term science comes from the English language Science which means knowledge. The first person to use the term scientific literacy was Paul de Hurd in 1958 [11], who stated that scientific literacy means understanding science and applying it to society's needs. Pudjiadi [12] says that: "science is a group of knowledge about objects and natural phenomena obtained from the thoughts and research of scientists who are carried out with the skills of experimenting using scientific methods". Scientific literacy according to the National Science Education Standards (1995) is: Scientific literacy is knowledge and understanding of scientific concepts and processes required for personal decision-making, participation in civic and cultural affairs, and economic productivity. It also includes specific types of abilities. The National Research Council (NRC, 1996) [13] in the National Education Standards (NSES) explains that scientific literacy is knowledge and understanding of scientific concepts and processes needed to make personal decisions, participate in society and economic productivity, and other types of special abilities.

Scientific literacy is defined by PISA (OECD, 2003) as the ability to use scientific knowledge, identify questions, and draw conclusions based on evidence, to understand and make decisions regarding nature and changes made to nature through human activities. This definition of scientific literacy views scientific literacy as multidimensional, not only an understanding of scientific knowledge but more than that. According to the National Science Teacher Association INSTA (1997) [16], individuals who are scientifically literate are people who use science concepts, process skills, and values in making everyday decisions when they relate to other people or their environment, and understand the interrelationships between science, technology, and society. , including social and economic development.

Scientific literacy has four categories. The category of scientific literacy can be stated to have a balanced proportion if it fulfills a ratio of 2:1:1:1 in the following order of categories: (1). Science as the body of Knowledge; (2). Science as a path of inquiry; (3) Science as a way of thinking; checkers (4). The interaction of science with technology and society.

Based on these problems, the researcher is interested in developing a supplement book that is a source of learning to support Virus material. The book will later contain information about the SARS-CoV-2 virus that causes the Covid-19 outbreak. The products resulting from this research are expected to be learning resources that can improve learning outcomes.

2. METHOD

This research is a type of research and development (R & D). Development research (Development & Research) is a model in research that is used to produce certain products as well as test the feasibility of the media and the effectiveness of a

product. In this research what will be developed is the Covid-19 supplement book learning media to improve student learning outcomes.

The subjects in this study were three expert validators (materials experts, linguists, and design experts), then teachers and class X students at SMA Negeri 1 Hutabayuraja, where the number of students in class X MIA was 94 people. As a trial sample, a large group of 20 students was taken, a medium group of 8 students and a small group of 3 people were taken as a total sample of 1 sample class with varying abilities, gender, and levels of intelligence. The object of this research is the Covid-19 supplement book to improve student learning outcomes.

The development model that will be planned in this study uses the ADDIE research model which includes the analysis, design, development, implementation, and evaluation stages.

Valid products will be applied to learning to see the level of effectiveness in improving student learning outcomes. In addition to being feasible and effective, the media developed must also have practical value, by what is needed when learning takes place, teachers who play a role in learning know what students need, and vice versa the responses given by students must be by what needed, the conditions for the media to be feasible to develop must pay attention to feasibility and effectiveness.

Data analysis techniques in this study include quantitative and qualitative analysis. Quantitative analysis was used to analyze the questionnaire score data, while qualitative analysis was used to describe the results of the quantitative analysis as well as suggestions and product improvements. Quantitative data obtained from the questionnaire were then converted to qualitative data with a scale of 5 (Likert scale) as described in Table 1 below:

Table 1. Likert Scale

Criteria	Score
Very good	5
Good	4
Enough	3
Not enough	2
Very less	1

The feasibility test uses a validator questionnaire percentage score of material experts, linguists, and design experts, namely:

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

Information:

P: Score Percentage

f: Total score obtained

N: Total maximum score

Table 2. Classification of eligibility for the Covid-19 Supplementary Book

Achievement Level	Validity Classification	Eligible Classification
84% < P ≤ 100%	Very Valid	Very worth it
68% < P ≤ 84%	Valid	Worthy
52% < P ≤ 68%	Fairly valid	Pretty decent
36% < P ≤ 52 %	Invalid	Less Eligible

20% < P ≤ 36 %	Not Valid	Not feasible
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To calculate the mastery of classical student learning is as follows:

$$PKK = \frac{\sum \text{students who complete learning}}{\sum \text{all student}} \times 100 \% \quad [17]$$

According to the Ministry of Education and Culture "a class is said to have completed learning if in the class there are 85% who have achieved 70% mastery of learning.

After the individual and classical student learning completeness is analyzed, the pre-test and post-test scores are calculated by N-Gain to assess the increase and effectiveness of books before and after the use of scientific literacy-based supplementary books. The N-Gain formula is as follows:

$$N\text{-Gain} = \frac{S_{\text{post Spretest}}}{S_{\text{Maks Spretest}}} \quad [18]$$

N-Gain is a good indicator to show the level of effectiveness of the treatment from the acquisition of post-test – pre-test scores. The N-Gain category is grouped in Table 3 below:

Table 3. Criteria for the N-Gain value

Coefficient Intervals	Criteria
0,7 < gs ≤ 1,0	High
0,3 < gs ≤ 0,7	Medium
0,0 < gs ≤ 0,3	Low

3. RESULTS AND DISCUSSION

3.1 Results

The designed book is a book based on scientific literacy which can be explained in detail in the following table:

Table 4. Scientific Literacy-Based Covid-19 Book Design for Class X High School Students

No	Science Literacy Component	Book Design
1	Science as a body of knowledge	The Science component as a body of knowledge encompasses concepts, principles, laws, and theories. So the book has designed materials consisting of: - History of Covid-19 - Characteristics of the Covid-19 virus - Transmission of Covid-19 - Clinical symptoms of being infected with Covid-19 - Prevention of transmission of Covid-19 - Covid-19 vaccine
2	Science as a way to investigate	Science as a way to investigate consists of: (1). Answering questions about the use of ingredients; (2) Answer questions through the use of tables, charts, etc.; (3) Perform Calculations; (4) Giving reasons for an answer; (5) Conducting experiments or other activities.
3	Science as a way of thinking	Science as a way of thinking consists of (1) Describing the experiments carried out by scientists; (2) Showing the historical development of an idea; (3) Emphasizing the empirical nature and objectivity of science; (4) Providing an overview of the use of assumptions; (5) Shows that science is obtained through inductive and deductive reasoning, (6) Provides a causal relationship; (7) Discuss the evidence, and (8) Show the scientific method and problem-solving.
4	The interaction of science with technology and society	The interaction of science, environment, technology, and society (interaction of science, technology, and society) consists of: (1) Explaining the benefits of science and technology for society, (2). Demonstrates the negative influence of science and technology on society; (3) Discusses social issues related to science and technology; and (4) Discusses careers and jobs in science and technology.

Table 5. Expert Validation

No	Expert Validation	Presents	Classification
1	Material Expert Validation	81,5 %	Very Valid and Feasible
2	Expert Validation of the Book Science Literacy Assessment Material	76%	Valid and Feasible
3	Language Expert Validation	72,5 %	Valid and Feasible
4	Design Expert Validation	84 %	Very Valid and Feasible

Product effectiveness is seen from the pretest and posttest values by looking for the N-Gain value. The average pretest and posttest values used to find the N-Gain value are described in Table 5 below:

Table 5. Average Pretest and Posttest Scores of Students

No	Trials	Average value	Percentage Average
1	Small Group	17	71
2	Medium Group	42	78
3	Total	59	149
4	Average	34	75,6

No	Trials	Average value	Percentage Average
	Standard Deviation	12,5	3,5

The effectiveness of learning resources developed in the form of supplementary books can be calculated using the N-Gain formula. The N-Gain category for assessing the effectiveness of the book is as follows:

0,70 < gs ≤ 1,00 = High
 0,30 < gs ≤ 0,70 = Medium
 0,00 < gs ≤ 0,30 = Low

The average pretest and posttest were obtained then converted into the formula to calculate the following N-Gain value:

$$g = \frac{75,6-34}{100\%-34} = 0,63$$

Calculation of the N-Gain value obtained a score of 0.63 which is included in the category of moderate effectiveness. With this ADDIE research phase that the researchers have gone through, it was found that the product being developed, namely: the Scientific Literacy-Based Covid-19 Supplement Book for class X SMA/MA, has met the elements of feasibility and effectiveness.

3.2 Discussion

The final product of this research and development is a scientific literacy-based Covid-19 supplement book for class X SMA/MA students. Based on the data validation results and product trials on students, it can be stated that this book product has the following advantages:

1. The developed scientific literacy-based Covid-19 supplement book received the title of "very decent" in all assessment indicators. So that the book is suitable for use as additional teaching materials in schools.
2. The developed scientific literacy-based Covid-19 supplement book can be used independently by students.
3. Not only acting as teaching materials, but the Covid-19 supplement book based on scientific literacy also trains analytical skills.
3. Scientific literacy-based Covid-19 supplement books developed on aspects of science as a way of thinking and science as problem-solving provide space for students to express ideas, thoughts, and hypotheses. They can convey the results of the analysis in the given room.
4. In the scientific aspect the body of the Covid-19 supplement book based on scientific literacy displays facts and a history of discoveries so that students get an accurate source of information.
5. A scientific literacy-based Covid-19 supplement book that was developed on aspects of science as a process of developing student creativity by searching for data directly in the neighborhood.
6. In the aspect of the interaction of science with technology, and society, the developed scientific literacy-based Covid-19 supplement book inspires students to be open to technology and utilize technology as a positive learning resource.

Scientific literacy-based Covid-19 supplement books also have drawbacks as teaching materials because the sources of information used are still very limited so further improvements are needed so that books can be more effectively used as teaching materials.

Supplementary books are textbooks that can be used as additional teaching materials in Biology subjects. Supplementary books can enrich and increase mastery of knowledge, and skills, and shape the personality of students, educators, education managers, and other communities. Books play an important role in the learning and learning process [19]. Learning and textbooks are two things that complement each other. Books are media in education that contain information about learning materials that are formulated from the basic competencies contained in the curriculum. Supplementary books are used by students in the learning process. Therefore books must not only make their readers

smart but also be able to arouse curiosity that is much better than before as a result of increased scientific literacy [20]. Teaching materials in supplementary books must be more applicable to increase interest in reading for students because they do not just get concepts but are useful in their lives [21].

Based on the assessment by the expert validation team, the results were obtained: the criteria are valid and feasible to be tested with revisions, meanwhile, for the assessment of the scientific literacy component a score of 51 is obtained with a percentage of 70% with valid criteria and is feasible to be tested with revisions. After the revision was carried out, an assessment was carried out at the second meeting with an increase in the score increase to 73 with a presentation of 90%, in very valid criteria and very feasible to try out, then the assessment of the book science literacy component got a score of 59 with a percentage of 82%, in the valid criteria and worth trying. The material expert validator said that the book developed was by the validation indicators so that it was suitable for use and testing to become a supplementary book supporting learning.

According to Lepiyanti [22] Development products that are declared good by the validator must still go through the refinement stage according to expert advice. Referring to the regulation of the Minister of National Education of the Republic of Indonesia Number 2 of 2008 explaining that books that are suitable to be used as teaching materials must include quality criteria (standards) including, (1) Eligibility of content/material, (2) Adequacy of presentation, (3) Adequacy of language, and (4) Graphical feasibility. These criteria have been listed in the components of the validation sheet which have been assessed by a team of experts. The criteria for good teaching materials are declared valid. The validity of books can be seen through validity tests with intervals obtained by $81\% \leq X \leq 100\%$ and $61\% \leq X \leq 80\%$ with very good and good criteria [23].

The student response questionnaire was filled out by students after using the book in the learning process which contained questions about students' opinions regarding the supplementary book that was developed. Data was obtained from the student response questionnaire that the Covid-19 supplement book could increase student scientific literacy, which was known from the student response to the 16th aspect of the questionnaire, which was 4 (very good). Students are also interested in the overall appearance of the developed scientific literacy-based books. It is known from the average student response in aspects 1 and 3 of the questionnaire which is 4 (very good). Students find it easy and happy to understand the material from the supplementary book that was developed because the book displays supporting illustrations [24].

The average percentage of students' classical completeness in the pretest questions obtained was 34% and the pretest score obtained a percentage of 75.6%. The percentage of classical completeness was obtained from students' scientific literacy tests before and after using books. Next to see the effectiveness of the media by using the N-Gain formula. From the average pre-test and post-test scores, a score of 0.63 was obtained. In line with research conducted by Suraida [25] which states that the development of teaching materials is effective if the level of completeness of the test results is greater than the results of the previous test. Afifah's research [26] also shows that the proper use of scientific literacy-based teaching materials has proven to be effective in increasing students' scientific literacy scores. In line with that, Juhji's

research [27] also conveys that scientific literacy-based books significantly increase students' scientific literacy scores.

4. CONCLUSION

Based on the formulation, objectives, results, and discussion of research and development regarding the scientific literacy-based Covid-19 supplement book for SMA/MA previously stated, it can be concluded as follows:

1. The feasibility of the Covid-19 Supplement book on class X virus material at SMAN 1 Hutabayuraja, Simalungun Regency based on material experts obtained a percentage of 90% with a very valid category.
2. The feasibility of the Covid-19 Supplement book on class X virus material at SMAN 1 Hutabayuraja, Simalungun Regency, based on linguists, obtained a percentage of 92% with a very valid category.
3. The feasibility of the Covid-19 Supplement book on class X virus material at SMAN 1 Hutabayuraja, Simalungun Regency, based on design experts, obtained a percentage of 83% in the valid category.
4. The Covid-19 Supplementary Book for class X SMA/MA was declared effective in increasing student learning outcomes with an average percentage of students' classical completeness on pretest questions obtaining 34% and pretest scores obtaining a percentage of 75.6% with an n-gain of 0.63.

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