

# Validity of Digital-Based COVID-19 Preventive Supplement Book to Empower Scientific Literacy and Critical Thinking Skills of Senior High School Students

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**Abstract:** The development of learning materials such as digital-based supplement books needs to be done regarding the lack of integration of COVID-19 in biology subjects. Students need to dig up information about COVID-19 through scientific literacy and solve problems through critical thinking. Data collection techniques in this study consisted of a questionnaire. From the data collection, the instruments needed in this study include validation sheets by experts. The data were analyzed quantitatively to determine the category of validity and deepened with a qualitative analysis of the strengths and weaknesses of the book. Based on the results of validation by validators or experts, the COVID-19 preventive supplement book is generally very valid with the average validation score of the four validators being 93.8. The feasibility of the material is also determined by its quality. The material contained in the supplement book must also be adapted to current scientific developments, of course, related to COVID-19. The book developed is predicted to be very useful and supportive in learning biology, especially relevant materials such as material on viruses, the respiratory system, and the immune system. The feasibility of the book has been supported from the aspect of appearance, content, and language which was revised in such a way after validation.

**Keywords:** COVID-19, Critical Thinking Skill, Scientific Literacy, Supplement Book, Validity

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## INTRODUCTION

COVID-19 has been declared a global pandemic by the World Health Organization (WHO) since late February 2020 (Widyaningrum, 2020). The current condition explains that students have fear and anxiety about COVID-19, but do not have high awareness to take preventive measures. In this regard, it is very important to integrate health education into learning themes (Sudiana *et al.*, 2020). There are still many students who are ignorant of health protocols. This is determined by the information students receive and is determined by scientific literacy and critical thinking skills against COVID-19. Preliminary analysis shows that students' scientific literacy and critical thinking skills are still relatively low (Ferdyan & Arsih, 2021). Subjects that can play a role in this matter are biology in high school, especially on viruses, the respiratory system, and the immune system.

The description of biology learning during a pandemic is digital-based learning. In digital learning, the limitations of structured learning resources are felt by both teachers and students (Sofyana & Abdul, 2019). Based on interviews conducted with biology teachers at SMAN 16 Padang, biology learning, especially material about viruses and the respiratory system, which was carried out during a pandemic with digital learning was less effective, especially from the proportion of material obtained by students. The material obtained by students in learning biology only reaches 60% (Ferdyan, Lufri, & Zulyusri, 2020). In addition, the availability of teaching materials that include preventive measures against COVID-19 does not yet exist in the

biology learning conducted at SMAN 16 Padang during digital learning. Biology subjects can be capital for students to prevent the transmission of COVID-19 if learning is maximized by providing supplementary books to support learning.

Previous development research has done a lot of development on biology learning supplement books (Weng, Otanga, Christianto, & Chu, 2020)(Supriyatin, Nailul, Ichsan, Rahman, & Gomes, 2020). Previously, there had been the development of a virus material learning supplement book for cognitive strengthening of high school students by providing animation media (Puspitasari, Praherdiono, & Adi, 2020). In addition, there is also a respiratory system material supplement book that was developed to improve students' understanding and attitudes towards smoking (Elisa, 2019). However, there are no developments that lead specifically to the presentation of information about COVID-19 for increasing scientific literacy and implementing healthy lifestyle behaviors for students. This is of course also due to the outbreak of COVID-19 which began in early 2020.

The development of learning materials such as digital-based supplement books needs to be done regarding the lack of integration of COVID-19 in biology subjects. Students need to dig up information about COVID-19 through scientific literacy and solve problems through critical thinking. This starts from improving science process skills and problem-solving, one of which is through digital learning resources (Darmaji *et al.*, 2019). There needs to be a preparation of supporting digital-based practical teaching materials to convey material, especially regarding viruses, the respiratory system, and the immune system systematically and coherently, and provide complete information related to COVID-19. One of the software that can provide supplementary books is FlipPDF Professional which is very interesting by displaying books in three-dimensional format. This is the difference between previous studies and motivates researchers to carry out this development.

The development of the COVID-19 Preventive E-Module can be used as an innovation in biology learning to improve scientific literacy skills and the application of students' healthy living behavior which departs from the Decree of the Minister of Health of the Republic of Indonesia No. HK 01.07/MENKES/382/2020 regarding health protocols for the community. A quality supplement book is a book that has been tested for feasibility or validity. Book development certainly requires stages of examining and extracting the contents of the book so that it can be used properly. The feasibility of the book can be done by testing the validity. The purpose of this study was to determine the validity of the COVID-19 preventive supplement book in biology learning to empower high school students' scientific literacy and critical thinking skills.

## **METHODS**

The model used in the research is the Research and Development (R&D) development research model. The resulting product is a COVID-19 preventive supplement book. The development model chosen in this study is ADDIE (Analysis, Design, Development, Implementation, Evaluation) (Pribadi, 2016). The data collection technique in this study consisted of a questionnaire. From the data collection, the instruments needed in this study include validation sheets by experts. The data were analyzed quantitatively to determine the category of validity and deepened with a qualitative analysis of the strengths and weaknesses of the book.

## **RESULTS**

### **Selection of Expert Validators**

The validity test is carried out by providing a COVID-19 preventive supplement book validation sheet. The aspects that will be assessed in the book are aspects of appearance, content, and language. Product validity is tested through expert validators or experts who have the capacity in IT learning media, materials, and learning strategies as well as practitioners in the field of education or teachers. The validity test was carried out in October 2021. The validator assessed the product after receiving a letter of assignment and a request from the researcher and receiving

a product that had been packaged in the form of a link.

### Book Development

Pre-compilation of supplement books is carried out by searching for references, library sources, and observations regarding the characteristics of biological materials and all information regarding COVID-19 that supports the biology learning process that students must possess. Next is the preparation of the draft. Drafting is carried out based on the framework of the supplementary book that has been made. The materials that have been explored are designed according to the subtopics in the book framework.

The material is first packaged and typed in a Microsoft word file. The subtopics still display in general the main material from the KD presented, then added with integrated material. One study shows that the integration of information literacy in biological material will increase literacy ability (Hanurani, 2020). Editing is the stage of re-examination after the preparation of the draft book which is transferred from a Microsoft word file to the actual book format. Editing by the author also intends to prepare the book before discussing it with an expert validator or expert. Information appropriate to the subtopic regarding COVID-19. Furthermore, the conversion of the book in PDF form into a digital book is carried out with the help of the FlipPDF Professional application. Books in PDF format are inputted into the application and some editing is done, such as activating links to articles, youtube videos, and also sending responses to practice questions. Books that are ready to be given to validators are available at the following link: <https://online.flipbuilder.com/hylbu/wicv/>

### Book Validity

Based on the assessment carried out by the validator, the results of the validation of the COVID-19 preventive supplement book product were obtained as follows:

Table 1. Results of Validation of COVID-19 Preventive Supplement Book Products

No	Aspect	Validation Score
1	Appearance	92,9 (Very Valid)
2	Contents	95,8 (Very Valid)
3	language	92,8 (Very Valid)

Based on the results of validation by validators or experts, the COVID-19 preventive supplement book is generally classified as very valid with the average validation score of the four validators being 93.8. The results obtained from this validation test illustrate that the COVID-19 preventive supplement book product is very suitable for use in biology learning activities.

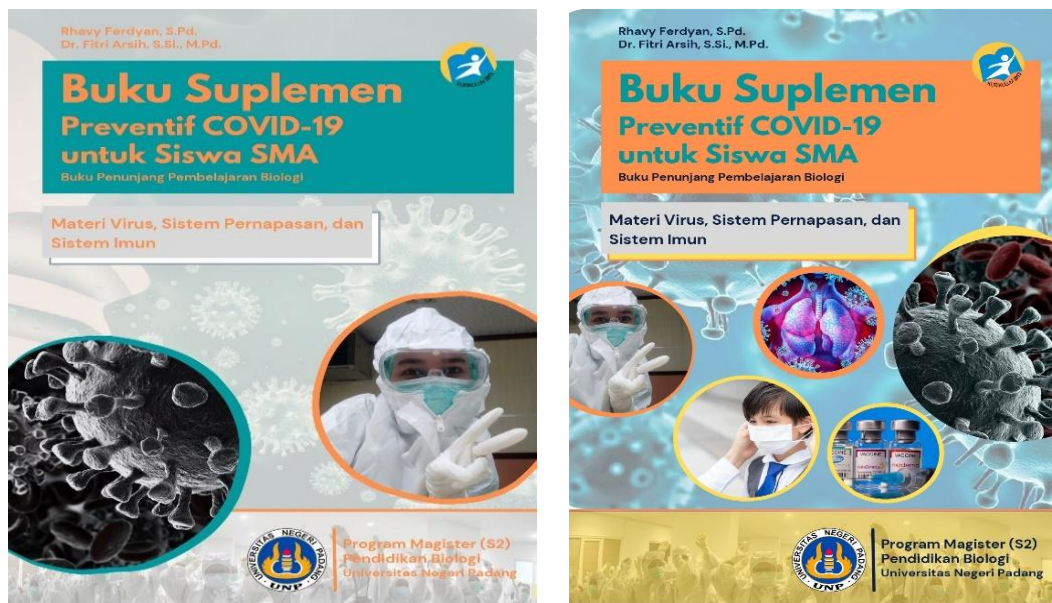
The validation results are also supported by the validation of each aspect of the book, including aspects of appearance, content, and language. The display aspect has an average score of 92.9. This shows that the book is feasible in the graphic aspect. Then the content and linguistic aspects also show very valid scores, namely 95.8 and 92.8 which illustrate that the didactic and construct aspects of the book are also very feasible. So, the validation of supplement book products in general and in each aspect can be said to be very valid. Based on the suggestions given by the validator, revisions were made to all aspects of the COVID-19 preventive supplement book, both in terms of appearance, content, and language. Then to enter the implementation stage, the revised results are converted back into digital books via FlipPDF Professional which is presented on: <https://online.flipbuilder.com/hylbu/ient/>.

Table 2. Product Revision Suggestions and Follow-ups

No	Suggestion	Follow-up
1	It's better if the cover can use a more vibrant color	The color on the scarf is replaced with a color that is more supportive and matches the color of the book title font, as well as the dilator to make it more attractive and eye catching.

2	The image on the cover is better relevant to the material	The picture on the cover is added with pictures that are relevant to the virus and COVID-19 material. The images added include images of lungs shaded by the COVID-19 virus, images of children wearing masks, and images of vaccine bottles.
3	The white color on the background should be revised	The background color, especially the cover, has been revised with a dominant blue color. This is because the white color is not attractive, especially when it has been included in the FlipPDF Professional application.
4	Pictures in books should include the original source.	The pictures in the book are written from the original source.
5	There is an inscription that looks sparse with other letters	Infrequent writing in the text of the book has been corrected.
6	Add reference	The contents of the book are already from various references such as national and international books and articles.
7	Materials need to be completed	Materials that are still not equipped to make it more complex.
8	There are still a few sentences that motivate students to read books	Added motivating and inviting sentences to the book.
9	Some sentences are still difficult for students to understand	Sentences are changed to be more effective and simplified.
10	Foreign terms written in italics	All foreign terms in the book are italicized.

The results of the revision can be seen in more detail in the following Fig 1. The revisions presented include the changing appearance of the book cover and the appearance of images on books that already include sources.



Cover before revision

Cover after revision

Fig 1. Cover before and after revision



The cover display is given a lot of advice by the validator, especially regarding the background color and images that are relevant to the material. Furthermore, the background of the content page is also asked to be revised so that the writing is clearer.



Pages before revision

Pages after revision

Figure 2. Display of Book Contents Before and After Revision

The expert validator or expert provides an assessment of the product in the editing stage. Based on the validation results, the COVID-19 preventive supplement book is generally classified as very valid with the average validation score of the four validators being 93.8. The results obtained from this validation test illustrate that the COVID-19 preventive supplement book product is very suitable for use in biology learning activities. The book developed is certainly of good quality and can be used (Hera, 2014). A valid book can be judged from the aspect of appearance, content, and language (Sutanto, 2017).

The results of the validation are also supported by the validation of each aspect of the book, including aspects of appearance, content, and language. The display aspect has an average score of 92.9. This shows that the book is feasible in terms of. The appearance of the book with interesting writing and pictures of course also creates an attraction for readers. The brain will respond more quickly to accept the meaning of a text if it is followed by a colorful picture or illustration. The existence of images with attractive colors will help the reader to more quickly visualize the description of the material in the book (Maria & Kurniawan, 2014). In addition, the book that was developed also has a good assessment of the layout. A consistent layout between all components of the book and by Basic Competencies (KD) will provide a good rating category for the product (Yazid, 2016). On the other hand, the display in digital form is also decisive. Along with the advancement of technology, the popularity of computers and androids greatly determines the development of digital book applications and has brought the use of digital books as learning tools (Hwang *et al.*, 2018).

Then the content and linguistic aspects also show very valid scores, namely 95.8 and 92.8 which illustrate that the didactic and construct aspects of the book are also very feasible. So, the validation of supplement book products in general and in each aspect can be said to be very valid. The content aspect consists of the suitability of the material with Basic Competencies (KD), book content, and assignments. The essence of content validity certainly leads to material in the form of concepts presented by the book. Concepts can be defined as something that has components, elements, characteristics so that it can be given a name (Ibrahim, 2010). The feasibility of the material is also determined by its quality. The material contained in the

supplement book must also be adapted to current scientific developments, of course, related to COVID-19 (Yazid, 2016). Overall the feasibility of the content will support the knowledge and skills of students (Suhaini *et al.*, 2021).

The linguistic aspect of the supplement book is also assessed based on conformity with Indonesian and communicative language rules. Based on this, it can be determined that in selecting and developing learning media, it is necessary to pay attention to aspects of the language used, because it will relate to whether or not the message in the learning media is conveyed to students. (Alonzi-Gold & Grajo, 2021). In the language aspect, the determining component is the language used in the pocketbook by the General Guidelines for Indonesian Spelling (PUEBI), sentence structure, such as inviting, motivating, and guiding as well as the terms used by scientific language (Karyati, 2016). The supplement book is supported by some content that functions in empowering students' scientific literacy regarding COVID-19. The content includes the presentation of COVID-19 information that is integrated in virus material, the term column, and the digital literacy column. The three contents provided basically lead to an understanding of the nature of science through the delivery of scientific information related to COVID-19 so that students have broader knowledge that can be used every day. The characteristics possessed by scientifically literate people are having an understanding of the nature of science (Anjarsari, 2014).

In general, the books developed have implemented scientific literacy and critical thinking, especially regarding COVID-19 which directs students to understand COVID-19 information as a capital in prevention. The concepts obtained can be evaluated and applied by students in everyday life in dealing with pandemics. The book has also prepared steps to empower scientific literacy and critical thinking skills.

## CONCLUSIONS

Based on the results of validation by validators or experts, the COVID-19 preventive supplement book is generally very valid with the average validation score of the four validators being 93.8. The feasibility of the material is also determined by its quality. The material contained in the supplement book must also be adapted to current scientific developments, of course, related to COVID-19. The book developed is predicted to be very useful and supportive in learning biology, especially relevant materials such as material on viruses, the respiratory system, and the immune system. The feasibility of the book has been supported from the aspect of appearance, content, and language which was revised in such a way after validation.

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