



Development of Innovative Teaching Supplement "*RESPICOV*" to Improve Student Learning Outcomes and Awareness of Respiratory System Health

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Abstract

The development of innovative teaching supplement is adjusted to students' needs and to complete exiting teaching material. Based on TP 11.8 until 11.11 for class XI in the Kurikulum Merdeka, topic is preceded by fact and concepts which are followed by the application of these concepts in daily life. Innovative teaching supplement is developed by integrating fact and research results, especially related to respiratory system and COVID-19. The purpose of this study is to develop innovative teaching supplement "*RESPICOV*" to improve students learning outcomes and awareness of respiratory system health. The study was Research and Development with pre-experimental one group pretest-posttest design. The entire students of grade XI SMAN 1 Pemalang on academic year 2023/2024 was chosen at the population. The method in taking the example was purposive sampling, class XI.4, XI.5, and XI.6. Observation, questionnaire, interview, and test were methods that used in collecting the data. The result showed that the inovatif teaching supplement "*RESPICOV*" is very worthy and effective to increase student learning outcome at 0,71 on N-gain analysis and awareness of respiratory system health at very care category. Based on the result, in can be conclude that the inovatif teaching supplement "*RESPICOV*" is very worthy and effective to be used in material of respiratory system to increase students outcome learning and awareness of respiratory system health.

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INTRODUCTION

Learning resource are all source that contain information, people, and items used by students both individually and in groups in informal situations to facilitate learning. Learning resource is the one of factor in the teaching and learning process in the school that determine learning outcomes students. Learning problem solving can be done pursued through the use of learning resources (Supriadi, 2015). Proper use of learning resources will have an impact on learning outcomes and students character development. Biology is the one of the subject whose substance consists of facts, procedures, and concept (Primasari *et al.*, 2014). One of the learning resource is teaching material. Teaching materials are all forms of material or media used for help teachers in learning activities in the classroom (Nurdyansayh, 2018). Teaching material which arranged appropriately will provide ease for teachers to convey material clearly and accurately. The existence of teaching materials in the schools influences the quality of learning. This quality can be show from a teachers' creativity in transferred the material. Teachers can involve themselves in creating creative learning through planning tools in the form of teaching material (Sulistiyosari, 2018). Teaching material that are arranged systematically can helps students to understand and implement concepts, skills, and knowledge in the form of fact, concepts, principles, procedures, and processes to achieve the learning competency standards (Bahtiar, 2015).

The limited availability of teaching materials in terms of quantity and content means that learning activity in the school also requires additional teaching materials in form teaching material supplement. Teaching material supplement are made as additional teaching materials for increase students' insight regarding a phenomenon to achieve the goals learning. Biology as a natural science must be understood well by students because it has a unique character for learned, so that the implementation of this learning must be innovate. One of the material which learned in biology is respiratory system. This material can be difficult because students learn things they can not see directly or abstract in nature, both in the form of organs located and processes which occurs during breathing (Panjaitan & Putri, 2020).

Based on the evaluation of the High School textbook, it shows that the material of respiratory system is still limited with textual content and use of the example case that not updated. The textbook is not contain tables or pictures that relevant with the contain material and minim with the part that can stimulate students to care of their respiratory system health. The result of interviews with biology teachers are known that the material is simply learned in the classroom because the educational calendar timeline requires all material to be completed in relatively short time. Based on these condition, the development of innovative teaching supplement is possible contribute to the success of the learning process at the school. Development of this supplement based on phenomena or issue those around students is possible students are able to relate learning to their surrounding environment (Wulandari, 2017). Because of this statement, this innovative teaching supplement will be able to link the theories learned from real phenomena in around environment. This supplement can help students in improving their learning outcomes and caring attitudes of health of respiratory system.

Students' outcomes are the accumulation of the learning process obtained by students to know, understand, and implement the knowledge acceptance (Ricardo & Meilani, 2017). Learning outcome indicators consists of cognitive, affective, and psychomotor aspects. Cognitive aspect include knowledge, understanding, application, analysis, creation, and evaluation. Affective aspect consists of the processes of receiving, answering, assessing, organizing, and determine the characteristics of a value. Meanwhile psychomotor aspect include fundamental movement, generic movement, ordinative movement, and creative movement (Moore, 2014). Students motivation and interest as well plays an important role in achieving this indicators.

Attitude is a persons' point of view towards something or someone in the form of an assessment of view, beliefs, feelings, and behavior. Attitude is the accumulation of persons' reactions to something in the form of good-bad, positive-negative, or like-dislike judgments (Azwar, 2015). Attitude can be said to be an evaluative response that only appears if a person is given a stimulus that wants an individuals' body to respond which is based on self-evaluation process by providing an assessment of something (Syamaun, 2019). Caring about the condition of the surrounding environment is the one of attitudes which necessary to pay attention to student development because it is included in one of the scientific attitude. Caring about the condition of the surrounding environment is not just about environment, but also caring their ownself. To increase students' awareness, teaching materials are needed to provide direct experience to them so that they can feel more,

thereby creating a sense of caring.

Based on the background of the study, it needs to be studied in development of innovative teaching supplement to improve students' learning outcomes and awareness of respiratory system health. This supplement can be used in biology class especially in respiratory system material.

RESEARCH METHOD

This research was conducted at SMAN 1 Pemalang and MAN 1 Kota Semarang in the academic year of 2023/2024. The population of this study was all the entire students of grade XI SMAN 1 Pemalang consisting of 8 classes that was class XI.1 until class XI.8. The sampling technique was Purposive Sampling. The sample used was 3 classes, namely class XI.4, XI.5, and XI.6 with the consideration of the students total number was 108 students. In this study, the data include media and material expert response, teachers and students response, students learning outcomes, and data of students awareness of respiratory system health in the form of a questionnaire.

The purpose of this study is to develop innovative teaching supplement "*RESPICOV*" to improve students' learning outcomes and students awareness of respiratory system health. The effectiveness of the supplement is measured from the achievement based on the characteristic of supplement media and material experts responses, teachers and students responses, students learning outcomes, and students awareness of respiratory system health, namely (1) students learning outcomes reaches $0,3 \leq N\text{-gain} < 0,7$ of students in the medium and or high category, (2) learning classical mastery $\geq 75\%$ with criteria minimal mastery is 68, (3) students awareness reaches care enough category 75%.

RESULTS AND DISCUSSION

The development of "*RESPICOV*" supplement is based on the latest research published in national or internasional articles or journals relating to the respiratory system and problems that can attack this organ system such as COVID-19. This supplement prepared based on students' needs in learning objective 11.8 to 11.11 grade eleven of Kurikulum Merdeka. If the supplement was compared with teaching material used in the school, this supplement has characteristics such as equipped with self-reflection section, sections which sparked students curiosity about COVID-19 as well case studies to spark students critical attitudes regarding the COVID-19 pandemic. The supplement is also equipped with material about Personal Protective Equipment (in Indonesian called APD) along with case studies related to them. Supplement also containing the case studies focused on COVID-19 survivors and solving problem related to the pandemic to trigger a critical attitude and sense of empathy students towards COVID-19 as a respiratory system problems. "*RESPICOV*" teaching supplement that has been developed is used to complete students' needs by providing concise, clear, and interesting material accompanied by colored images and barcodes which provide innovation in the continuity of biology learning, especially in material of respiratory system. An attractive and representative cover image with the content is the main reason students are interested in studying the supplement.

Appropriateness of "*RESPICOV*" Supplement

The assessment of supplement appropriateness includes 2 types namely media and material validity and also user responses in the form of teachers and students who finished the material of respiratory system. The assessment of media validity is carried out by filling out a validity questionnaire include three aspects of book size, cover book design, and content book design based on BSNP indicators. Aspect of book size is assess the suitability of the book size with ISO standards. Aspect of the cover book design is assess the suitability size of the book with content material inside the book, use of cover, color, letters, and book illustration. Meanwhile aspect of content book design assess layout consistency, layouts harmony, and typography used in the book. Based on the results of calculation of the assessment score by media validator, the percentage obtained is 97% with very valid category. The results of this validity by media expert can be seen based on the table below.

Table 1. Validity of Media

No.	Aspect	Score
1.	Book size	4
2.	Cover book design	30
3.	Content book design	71
Total Score		105
Total Maximum Score		108
Score Percentage		97%
Category		Very valid

Based on the results on the table 1 the “*RESPICOV*” supplement is declared usable in learning. Aspects assessed in media validity includes book size, cover book design, and content book design. The book size which use of B5 paper is simple and efficient to serve images and writing that are easy to observe. The cover book design is matches with the content of the material that can reveal the character of the object very well, the colors and letters used also have a combination that is not too much that make the readers attention more optimally focused on the content of supplement material. This results are in line with research revealed by Masrur *et al.*, (2017) that the visual appear of the book has an important role in conveying the message contained in the book.

Harmonious layout elements and simple typography of supplement content can facilitate students understanding material using the supplement. Creative and dynamic content illustrations can also attract students’ attention to study the books’ contents more deeply. Colored images with short and clear descriptions can provide clear visualization that can make students encourage to read and understand the material. Rohemah and Mighhfah (2022) revealed that the use of teaching materials equipped with representative images can attract students’ interest, make learning easier, and speed up students’ understanding of the topic being studied. From the three aspects of assessment in media validation, it shows the final result that in term of media aspect the supplement has met the assessment standart with very valid category and worth for use in biology learning especially in material of respiratory system. Another component in validating this teaching supplement product is the validity of material expert. The aspects assessed including aspects of content, presentation, and aspect of language. The results of the validity of innovative teaching supplement “*RESPICOV*” can be seen in table 2 below.

Table 2. Validity of Material

No.	Aspect	Score
1.	Aspect of Content	36
2.	Aspect of Presentation	33
3.	Aspect of Language	29
Total Score		98
Total Maximum Score		112
Score Percentage		88.30%
Category		Very valid

Overall, the results of validity analysis by material expert obtained a percentage of 88.30% in very valid category. This is because the material presented is appropriate to the learning objectives to be achieved. The accuracy and suitability of the material with the latest scientific developments is also a strong reason why the innovative teaching supplement “*RESPICOV*” is said to be very valid for testing on students. The sequence of presentation an appropriate illustrations support the presentation of supplement. The clarity and use of language that is in accordance with the rules for using terms and symbols makes it easier for readers to understand the materian presented in the supplement.

The highest score was obtained in presentation aspect include presentation techniques, presentation support, and presentation completeness. The supplement that has been developed has a sequential presentation of concepts that helps students to understand the material from an easy level first to more difficult material, the use of illustrations that are appropriate to the material presented also helps students provide a general overview of the material being studied. Wahyudi (2022) emphasized that the sequence of material presented in teaching materials really helps teachers and students in the learning process in order to carried out in

accordance with the learning sequence.

Meanwhile, the lowest score was obtained in the language aspect with very valid category. It cause during the development, the supplement still contained several writing errors and less effective sentences used so the ability of the supplement to help students' capture information was less than optimal. But, the supplement has been corrected in accordance with suggestions and input from material expert validator so that the supplement used in learning is in accordance with applicable linguistic rules. As explained in Wicaksono (2016), linguistic aspects play an important role in learning success. Using appropriate language will make learning success factors work as expected. The validity of material in this supplement is also supported by data from teacher and students responses which are presented in table 3 below.

Table 3. Teacher's Responses

No.	Aspect	Score
1.	Aspect of Graphic	19
2.	Aspect of Material	27
3.	Aspect of Language	11.50
Total Score		57.50
Total Maximum Score		60
Score Percentage		95.75%
Category		Very valid

Based on the results of teachers' responses, the supplement received a percentage of 95.75% in the very good category. The indicators used in assessment include graphic, material, and linguistic aspects. The results are data supporting the validity of the supplement which has previously been assessed by media expert and material expert.

The material aspect received the highest score because the teacher assessed that the supplement includes extensive and indepth material about the respiratory system. The collaboration of respiratory system material with respiratory system problems in the form of COVID-19 provides additional information that students really need to study material with concrete examples that in line with latest phenomena and science around it so that abstract respiratory system material will be easier to learn.

Students' responses as supplement users are also considered in developing the supplement. The feasibility of the innovative teaching supplement "*RESPICOV*" based on students' responses generally has an average percentage of 87.42% in the very good category. The indicators used to determine students' responses include four aspects namely graphics, presentation, language, and material. These results are influenced by the presentation of completeness of the material covarge in the supplement. The application of case studies and theoretical basis presented in the supplemen is able to increase students' insight into the respiratory system and COVID-19 as two things that are actually interrelated. The supplement content is equipped with new information integrated on the internet, providing new innovations in biology learning.

The results of students responses about innovative teaching supplement "*RESPICOV*" can be seen on the table 4 below.

Table 4. Student's Responses About "*RESPICOV*"

No.	Aspect	Score
1.	Aspect of Graphic	20.80
2.	Aspect of Presentation	21.73
3.	Aspect of Material	10.47
4.	Aspect of Language	18.93
Total Score		69.93
Total Maximum Score		80
Score Percentage		87.42%
Category		Very good

The intergration of research-based material and the latest phenomena into teaching supplements in interesting because the material presented in new and contextual so it can helps students achieve learning goals. Rahayu & Sudarmin (2015) also revealed that the completeness of implemented teaching materials

can help teachers and students to achieve learning goals. In line with the teachers' responses, students also gave the highest percentage to aspects of the material presented in the supplement. This proves that the material presented in the supplement is suitable for use in studying the respiratory system. These students' responses imply that the innovative teaching supplement "*RESPICOV*" was declared very good and worthy of being tested on students in learning material about the respiratory system.

Effectiveness of "*RESPICOV*" Supplement

The effectiveness of "*RESPICOV*" is divided into two, namely to improve learning outcomes and student awareness of the health of respiratory system. The effectiveness of "*RESPICOV*" in improving student learning outcome in respiratory system material is based on the test scores before and after learning with the "*RESPICOV*" innovative teaching supplement. The effectiveness test was carried out through a large-scale trial with the sample being grade XI.4-XI.6 students at Senior High School 1 Pemalang. Data on the effectiveness of supplement in improving students' learning outcome and awareness of health of respiratory system were taken by providing comprehension test questions and caring sense questionnaire sheets before and after the use of supplement in learning. Supplement will be declared effective if the results of the comprehension test questions and caring sense questionnaire show an improvement in the results of students' answers after learning with the "*RESPICOV*" supplement. The results obtained can be seen in table 5 below.

Table 5. Results of Students Learning Outcome with "*RESPICOV*"

No.	Indicators	Number of students
1.	Total students	108
2.	Students achieve completeness	106
3.	Students do not achieve completeness	2

Based on the results of the analysis, it shows that application of "*RESPICOV*" supplement in respiratory system material is effective in increasing students' learning outcome shown by 98.15% of students have achieved completeness in respiratory system learning. To strengthen data on improving students' outcome learning, pre-test and post-test scores were analyzed using N-gain testing. The results of the N-gain test can be seen in the table 6 below.

Table 6. N-gain Test Results

Class	Score Average		N-gain	Category
	Before	After		
Class 1	49.70	82.80	0.66	Medium
Class 2	52.90	90.40	0.82	High
Class 3	53.10	84.10	0.65	Medium
Average	51.90	85.76	0.71	High

Based on the table 6 shows that all students are not in the low grade range. This shows that the application of the innovative teaching supplement "*RESPICOV*" is effective in improving students' learning outcomes in respiratory system material. These results are confirmed by the opinion of Anggraeni & Yolanda (2018) who say that the effectiveness of a product can be assessed from the increase in pretest and posttest results. Improving learning outcome in one of the roles of textbooks which functions to encourage students to learn. Based on the results interview with students, the innovative teaching supplement "*RESPICOV*" contains the latest information that students have never known before so arouse curiosity and enthusiasm for learning about the respiratory system. Explanation with simple sentences is also the reason why students prefer it enthusiasm for studying the respiratory system which is supported by "*RESPICOV*". Students' enthusiasm for learning increases after learning using the "*RESPICOV*" supplement has an impact on achievement learning objectives as measured by learning outcomes regarding respiratory system material. Teaching materials that are prepared according to students' needs will more easily helps students achieve optimal learning outcome. The success of a teaching material in improving students' learning outcome is one of indicator of the success of achieving learning objectives.

The significant increase in learning outcome and being in the high completeness category is also supported by the learning model applied during the research. The discovery learning model helps students build their own knowledge of a learning topic. Teachers only act as facilitators and providers of confirmation of the concepts and knowledge they gain from various sources and learning activities. Salmina & Mustafa

(2019) also argue that the discovery learning model is learning that can guide students in constructing their knowledge and ideas under the supervision and direction of the teacher. Providing stimulus in the form of statements or related questions respiratory system material as an initial stage of learning stimulates students to prepare themselves better in exploring the respiratory system material. Giving different problems in each group of students lead to stage data collection that can help students to gather information as much as possible regarding the respiratory system material. The wealth of information processes and verified together in group presentation activities. Activity communicating learning results in front of the class causes this to happen the exchange of new information between students raises questions as a form of their curiosity about respiratory system. This activity also provides a new perspective students in responding to health problems of the respiratory system, especially COVID-19.

Appart from learning outcome, the supplement developed also serve to increase students' awareness of the health of respiratory system. The measurement of students' caring attitude towards the health of the respiratory system is based on the results of a questionnaire consisting of 20 statements with answers on scale of 1-4 and the maximum total score is 100. Analysis of students' concern for the health of respiratory system before and after learning with the innovative teaching supplement "*RESPICOV*" can be seen on the table 7 below.

Table 7. Results of students' awareness of the health of respiratory system

Class	Score Averages			
	Before	Category	After	Category
Class 1	72.74	Care enough	91.88	Very care
Class 2	75.80	Care enough	92.57	Very care
Class 3	74.24	Care enough	92.36	Very care
Average	74.26		92.27	
Category	Very care			

Based on the results obtained before using the supplement carried out, the average student concern was at a value of 74.26 per 100 and increased after learning to use supplements, the average caring attitude of students increase to 92.27 per 100. This is because the supplement contains content to be more grateful for health and case studies that encourage students to create a sense of empathy for others related to problems of the respiratory system, especially COVID-19. Rahmat *et al.*, (2021) said that maintaining the health of oneself and others is part of environmental care that must be instilled in students. By learning the respiratory system using the "*RESPICOV*" teaching supplement and the discovery learning model, students can be actively involved in the learning process so that it has a positive impact in forming a caring attitude towards the health of the respiratory system.

This supplement has a role in building new knowledge about COVID-19 which is realted to respiratory system problems in humans. This new knowledge trigger students' feelings and actions to care more about the health of the respiratory system. A deeper discussion of COVID-19 as a contextual case that has not been widely included in order teaching materials also helps students become more aware and concerned about the health of the respiratory system. This can be seen from students' tendencies to make decisions that can be detrimental to their health and the attitudes they take to prevent respiratory system health problems in students. The caring attitude that increases on students after studying respiratory system material using "*RESPICOV*" teaching supplement can be influenced by several things such as personal experience and the influence of environment. Azwar (2015) also emphasized that teaching materials that are prepared to fulfill cognitive, affective, and conative components can influence tendencies in taking action and behavior toward an object.

The increase in line with cognitive aspects of learning outcomes also shows that students have received the research-based material and case studies presentes in the innovative teaching supplement "*RESPICOV*" very well. Based on the description and discucssion of the research, it can be concluded that the innovative teaching supplement "*RESPICOV*" is very valid, has received very good feedback from teachers and students, and it is effective in improving learning outcome and students awareness of the health of respiratory system.

CONCLUSION

Based on the research results and discussion description, the following conclusions can be obtained are the innovative teaching supplement “*RESPICOV*” developed has characteristics that can improve learning outcomes and student awareness of the health of the respiratory system, the innovative teaching supplement “*RESPICOV*” developed is suitable for use in the respiratory system learning process. The innovative teaching supplement “*RESPICOV*” developed is effective in improving learning outcomes and students’ awareness of the respiratory system health.

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