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Development of *CO-MMUNE* Supplements on Immune System Material to Improve Concept Understanding and Health Literacy of High School Students

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Abstract

This study aims to analyze the validity, feasibility and effectiveness of health case-based learning supplements to increase the level of concepts understanding and health literacy of high school students on immune system material. It is a type of R&D research using the development method by Sugiyono. The development process is carried out by conducting links to various articles related to Covid-19 infection cases in national and international journals. The supplement testing phase consists of three stages, namely validity test, feasibility test and effectiveness test. Validity tests include material validity tests and media validity tests conducted by material and media validators. The feasibility test and effectiveness test were carried out at Senior High School 1 Tayu. The population of this study was all grade XI mathematics and natural sciences students at Senior High School 1 Tayu with class XI MIPA 4 as a sample. Sample selection is carried out using the purposive sampling method. In collecting data on the effectiveness of supplements to improve students' understanding of concepts and health literacy, a one group pretest-posttest design was used. Observation and interview sheets, validation questionnaire sheets, student and teacher response sheets, comprehension test questions and health literacy questionnaire sheets based on HLS-EU-Q indicators were the instruments used in this study. Based on the results of the material validity test and media validity, it shows that the supplement is in the very valid category with a percentage of material validity of 91% and media validity of 94%. Based on the results of the feasibility test from the responses of teachers and students, supplements get a percentage of 83% and 93.5% which are included in the very feasible criteria. Based on the results of the supplementation effectiveness test, students' concept understanding showed that 77.14% of students had reached the minimum completeness category whereas, the health literacy index score showed that 94.2% of students had achieved an adequate health literacy index. These results show that the *CO-MMUNE* learning supplement prepared based on Covid-19 cases is valid and feasible for use in learning and is effective in increasing understanding of the concept of immune system material and literacy student health. The use of health problems as learning materials in the classroom will provide a good understanding of health so that it has the opportunity to become a means of increasing health literacy.

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INTRODUCTION

Teaching materials are a set of learning materials / tools that contain information, tools and texts used by teachers and are arranged systematically to support learning activities (Kelana & Pratama, 2019). Competencies (KI and KD) that have been determined by the curriculum are the main foundation to be able to compile good teaching materials. Teaching materials with components that are in accordance with competency standards will support the achievement of competence by students. The suitability of a teaching material with the competencies that must be achieved and the accuracy of the concept of the material presented is one aspect that shows the criteria for a good learning resource (Ritonga et al., 2022). As a source of learning, teaching materials are also a factor in improving the quality of learning. Teaching materials that are developed and used according to student needs will make learning more meaningful so that teaching materials should contain concrete learning materials and close to students (Devi *et al.*, 2020).

Based on the evaluation results the High School Biology textbook, it shows that the material of the immune system is still limited with textual discussions, the use of case examples that are not updated and have not been shown colors, pictures, and tables so that they cannot describe the mechanism of the immune system in the body. In general, the material contained in the High School Biology textbook is in accordance with the basic competence of the immune system but has not explained the sequence of the body's resistance mechanism to pathogens and has not contained examples of everyday cases that are able to describe the mechanism of the immune system in carrying out its functions. The integration of material into everyday life to support students' understanding has also not been described in the immune system material textbook. This is in line with the results of an interview conducted with a biology teacher at Senior High School 1 Tayu which stated that the textbooks provided by the government have not been able to meet the learning needs of students and have not been in accordance with the conditions of students and their learning environment.

Further observations showed that immune system material became one of the biological materials considered difficult by students. Of the various class XI materials, immune system material is the material with the largest percentage of misconceptions, which is 58.8% (medium category) in the aspect of oversimplifications, the concepts presented are too simple so that they can cause misconceptions or cannot complete the proper concept depiction (Hanifah, 2021). For students immune system material tends to be complex and contains many confusing foreign terms, 76.1% of 159 students stated that the concept of material that tends to be rote and various foreign terms cause confusion so that students have difficulty in understanding immune system material (Yudistira *et al.*, 2021). Another study also showed that 73.53% of 34 students had not achieved learning completion. In the immune system material, the achievement of student understanding only reaches 10-30% because some sub-materials such as understanding of lymphocyte cells, the formation process and how antibodies work are still not well understood by students (Ginting *et al.*, 2020).

Health cases have a great opportunity to become learning materials that can integrate teaching materials with daily problems. The case of Corona Virus Disease 2019 (Covid-19) which had spread widely a few years ago can provide an overview of infection cases related to immune system material so that it has a great opportunity to be developed as learning material. The content of the immune system material is very close to the health literacy content which discusses the mechanism of disease and body immunity. The discussion related to how the immune system works in overcoming Covid-19 infection will be an interesting case example and close to students. The coverage of material based on health problems that are close to students is expected to be able to increase deep understanding and as a form of education on personal health care and the environment. The role of the immune system in carrying out the body's defense against disease is closely related to aspects of disease prevention in health literacy. Health literacy is one of the skills that has the potential to become an educational goal, especially in biology learning to be able to achieve the demands of 21st century skills on a global scale and to be able to compete internationally. The development of health literacy skills is needed so that people are able to be wise in assessing health issues circulating in the community both directly and through social media (Puspita & Subiantoro, 2022).

Education programs are one of the platforms that can be used to develop health literacy (Lamanauskas & Augiene, 2020). Students are in the phase of forming understanding so that with a good understanding of

health in students, it will have the potential to form a good understanding of health in the community. This shows that education plays an important role for health, on the contrary, health also plays an important role in education because health issues can be interesting and contextual learning materials for students (Nutbeam & Lloyd, 2020). Providing students with adequate health literacy interventions can help promote healthy behaviors and improve future health risks (Broder *et al.*, 2017).

The relationship between biology learning and health issues makes biology material very potential for improving health literacy in the school environment. In addition, the need for teaching materials that continue to grow and must be able to describe the relationship of material with daily problems is a strong basis for the development of teaching materials oriented to current health cases. This study aims to analyze the validity, feasibility and effectiveness of Covid-19 infection health case-based learning supplements in an effort to increase student health literacy on immune system material.

RESEARCH METHOD

This research is a type of Research and Development (R&D) research that refers to the steps by Sugiyono. Broadly speaking, this research is divided into 2 stages, namely the supplement development stage and the implementation stage. The supplement development stage is carried out in the Biology Department of FMIPA. The development of learning supplements was carried out by reviewing various articles about Covid-19 infection both in national and international journals. The supplement testing phase consists of three stages, namely validity test, feasibility test and effectiveness test. Validity tests include material validity tests and media validity tests conducted by material and media validators. Feasibility test and effectiveness test were conducted at Senior High School one Tayu. The feasibility test was carried out with a readability test in the form of teacher and student response tests by class XI Biology teachers and some grade XI MIPA 4 students. After the supplement was declared valid and feasible, the supplement was tested for effectiveness in an effort to improve student concept understanding and health literacy.

Supplements are said to be valid if the results of supplement validity tests by material and media experts show percentages with valid to very valid categories, while supplements are said to be feasible if the results of teacher and student responses show percentages with good to very good categories. In the effectiveness test, testing the effectiveness of supplements in improving student concept understanding and health literacy was carried out with the research sample being all grade XI MIPA 4 students. The research design used to collect student concept understanding and health literacy data is one group pretest-posttest design. The research instrument used was a comprehension test questions and health literacy questionnaire sheet based on HLS-EU-Q indicators. Supplements are said to be effective if students show an increase in the percentage of concept understanding of immune system material and health literacy index before and after learning to use *CO-MMUNE* supplements compiled based on cases of Covid-19 infection

RESULTS AND DISCUSSION

The preparation of the *CO-MMUNE* learning supplement is based on the potential and problems contained in biology learning and is adjusted to the learning needs of students while still being guided by the biology learning syllabus and basic competencies of the immune system, namely in KD 3.14 and 4.14. *CO-MMUNE* is prepared by combining understanding the concept of the immune system and the latest phenomena related to Covid-19 infection cases. It is a case-based learning supplement that provides a real picture of how the immune system runs its mechanism in handling infection. In the *CO-MMUNE* supplement, there is a detailed concept of the immune system material covering the mechanism of action of the immune system which is divided into the innate immune system and the adaptive immune system. Explanations related to the role of the innate immune system and the adaptive immune system and the various types of cells that play a role in it are clearly presented with relevant pictures.

In order to provide a real picture of material related to the resistance of the immune system against pathogens, the *CO-MMUNE* supplement contains immune response feeding against Covid-19 infection. Covid-

19 is an interesting topic for students because it is one of the new health issues and in its time raised many pros and cons. Learning related to natural sciences such as biology will be more effective if in teaching and learning activities bring up the relationship between material and phenomena of daily life so that it can increase student learning activities and motivation (Jannah et al., 2017). The relationship between biological material and Covid-19 cases will provide a real picture for students, students will also find the meaning of learning so that they can construct experiences they have with learning materials and then can apply their understanding to answer daily life problems.

Validity of *CO-MMUNE* Supplement

The assessment of supplement validity includes 2 assessments, namely material validity and media validity by material experts and media experts who are competent in their fields. The assessment of material validity is carried out by filling out a validity sheet which includes three aspects of textbook assessment criteria, namely material feasibility aspects, linguistic aspects and material presentation aspects based on BNSP indicators.

Based on the results of the calculation of the assessment score by the material validator, the percentage obtained is 91%, if categorized based on the validity table, the value is in the very valid category. The results of the validity by material experts can be seen based on the table below:

Table 1. Analysis of validity result by material expert

No	Aspect	Score
A.	Content Eligibility	46
B.	Linguistic Eligibilyty	40
C.	Presentation Eligibility	23
The total score		109
The total score maximum		120
Score percentage (%)		91
Criteria		**Very Valid**

Based on the results of the validity by the material experts presented in Table 1 the *CO-MMUNE* supplement is declared usable in learning. The assessment of the validity of the *CO-MMUNE* supplement consists of three aspects, namely aspects of material feasibility, linguistic feasibility and presentation techniques. Indicators on the aspect of material feasibility consist of 4 indicators, including: conformity of the material with KI and KD, accuracy of the material, up-to-date material, and stimulating curiosity (Curiosity) of the four indicators divided into twelve statements. The feasibility aspect of the material is presented in 12 statements with the results of ten statements getting a score of 4 (four) and two statements getting a score of 3 (three). After scoring, the feasibility aspect of the material gets a percentage with a value of 97% or a very valid category. Compared to other aspects, the feasibility aspect of the material gets the highest percentage. These results are influenced by the preparation of supplements that present material in accordance with the development of knowledge coupled with the use of actual examples and cases in accordance with the development and problems of daily life.

The assessment of linguistic aspects consists of 6 (six) assessment indicators including: straightforward, communicative, dialogical and interactive, conformity with the level of student understanding, conformity with good and correct Indonesian rules, and the use of terms and symbols. The linguistic feasibility aspect consists of eleven statements with seven statements getting a score of 4 (four) and four statements getting a score of 3 (three). After scoring the assessment results on the linguistic indicators, a percentage with a value of 92% or a very valid category was obtained. This is because the grammar in the *CO-MMUNE* supplement has been prepared in such a way as to adjust the provisions of the correct language rules and in accordance with the level of student understanding which includes learning indicators on the immune system material.

Assessment on the feasibility aspect of presentation consists of four indicators including: presentation

technique, presentation support, presentation of learning and coherence and coherence of mindset. The presentation aspect consists of seven statements with two statements getting a score of 4 (four) and five statements getting a score of 3 (three). From the scoring results on the feasibility indicator of presentation, a percentage with a value of 83% or a very valid category was obtained. Material experts provide some advice and input in aspects of presentation techniques. This is because some systematics in writing still need to be improved. For example, consistency in the use of capital letters, bold, italics and consistency in the use of terms. The final results of the material expert validator assessment show that the *CO-MMUNE* supplement meets all aspects of the assessment with very valid results.

For the aspect of graphic feasibility and linguistic is validated by the media expert. Based on the results of the validation of the media obtained an average percentage of 94 % with a very valid category. The results of the validity by the media expert for *CO-MMUNE* supplement can be seen based on the table below:

Table 2. Analysis of validity result by media expert

No	Aspect	Score
A.	Graphic Eligibility	73
B.	Linguistic Eligibility	40
The total score		113
The total score maximum		120
Score percentage (%)		94
Criteria		**Very Valid**

Based on the results of the validity by the media expert presented in Table 2 the *CO-MMUNE* supplement is declared usable in learning. The assessment of the media validity of the *CO-MMUNE* supplement consists of two aspects, namely aspects of graphic feasibility and linguistic feasibility. Indicators on the aspect of grapich feasibility consist of 4 indicators.

The first aspect of assessment is the graphic feasibility aspect which consists of three indicators including module size, module cover design, and module content design. The graphic eligibility tackle consists of nineteen statement items with sixteen statements getting a score of 4 (four) and 3 statements getting a score of 3 (three). This result is influenced by the preparation of a cover design that is able to describe the content of the material contained in the supplement. Also supported by the size and placement of the supplement title that is more prominent than the background color so that it can provide information quickly about the material in the supplement. The placement of layout elements from headings, subheadings, prefaces, table of contents, and illustrations used in the *CO-MMUNE* supplement has also shown consistency and proportionality. The placement of layout elements on each page has followed the appropriate pattern, layout and rhythm, besides that the illustrations and information presented in the supplement can also support the delivery of the material. Media experts provide some advice and input in aspects of supplement content design. This is because some systematics in writing still need to be improved. For example, the selection of type and font size that must be adjusted to the level of understanding of the reader. After scoring the results of the assessment on the graphic feasibility aspect, a percentage with a value of 97% or a very valid category was obtained.

In the assessment sheet, media experts also present assessments related to linguistic aspects to ensure that linguistically the supplement contains explanations that are in accordance with good and correct language rules. This is because the appropriateness of the use of sentence writing rules can affect the level of understanding of a textbook. The linguistic aspect consists of 6 (six) assessment indicators including: straightforward, communicative, dialogical and interactive, conformity with the level of understanding of students, conformity with good and correct Indonesian rules, and the use of terms, symbols or icons. The language feasibility aspect consists of eleven statements with seven statements getting a score of 4 (four) and four statements getting a score of 3 (three). This is influenced because the delivery of material in the *CO-MMUNE* supplement is presented attractively and habitually according to the rules of correct writing so that

the content of the material can be conveyed well to students.

The *CO-MMUNE* supplement is also equipped with factual information about health cases that are hotly discussed so that it is interesting and able to arouse students' reading interest and stimulate students to get understanding and conclusions from the information presented. In the explanation of each material is also equipped with interesting and informative images. The scoring results from the assessment by media expert validators on linguistic indicators get a percentage with a value of 91% or a very valid category. From the two aspects of assessment in media validation, it shows the final result that in terms of media aspects the supplement has met the assessment standard with very valid results.

Teacher and Students Responses of *CO-MMUNE* Supplement

The criteria for a good textbook can be reviewed from the results of the validity test and can also be reviewed from the feasibility test through the response of the subject teacher and student response. The feasibility test was conducted at a small-scale test stage by providing response questionnaires to teachers and 15 students at Senior High School 1 Tayu. Student response questionnaires are given in the form of response questionnaire sheets with fifteen statement items while, teacher response questionnaires are presented in the form of google form. The answer from the questionnaire will later be converted into a Likert scale to calculate the scoring results. The results of teacher responses are presented in Table 3.

Table 3. Analysis of teacher responses result

Indicator	Score(%)	Criteria
Presentation Tehnique	93	Very Good
Language Compatibility	88	Very Good
Material Suitability	100	Very Good
Material Accuracy	93	Very Good
Average	**93,5**	**Very Good**

The teacher response questionnaire consists of 20 statements representing 4 aspects of assessment including: presentation technique, language suitability, material suitability and material accuracy. In his assessment, the teacher stated that the *CO-MMUNE* supplement was feasible and could be implemented in biology learning in the classroom. This is shown by the scoring results on each aspect that show very good criteria and overall the teacher response questionnaire gets a final score of 93.5 percent which shows very good criteria. *CO-MMUNE* supplements have been able to meet aspects of assessment which are good textbook criteria so that they are said to be suitable for use by students in learning activities of immune system material in grade XI high school. Furthermore, the student response questionnaire result can be seen in Table 4.

Tabel 4. Analysis of the results of students' responses to *CO-MMUNE* supplement.

Indicator	Score(%)	Criteria
Presentation Tehnique	86	Very Good
Language Compatibility	80	Very Good
Material Feasibility	84	Very Good
Average	**83**	**Very Good**

In the small-scale test stage, students were asked to answer several statements contained in the student response questionnaire. The questionnaire aims to determine students' responses to the level of readability and comprehension of the information presented in the *CO-MMUNE* supplement. The student response questionnaire consists of 3 aspects of assessment with 15 statement items. The three aspects used consist of presentation techniques, language feasibility and material feasibility. Based on the results 40% of students think

that *CO-MMUNE* supplements are good and 60% of students think *CO-MMUNE* supplements are very good for use in immune system learning. The average score results from all three aspects of student response assessment also showed results with very good criteria of 83%, indicating that the *CO-MMUNE* supplement is suitable for use in learning.

The Effectiveness of Supplement to Improve Students Concept Understanding and Health Literacy Skilss

The effectiveness of the supplement was obtained by testing the *CO-MMUNE* supplement in improving students' concept understanding and health literacy skills. This effectiveness test was carried out through a large-scale trial that lasted for approximately two weeks with the trial sample being grade XI MIPA 4 students at Senior High School 1 Tayu. Data on the effectiveness of supplements in improving the concept understanding and health literacy skills of students were taken by providing comprehension test questions and health literacy questionnaire sheets both before and after the use of supplements in learning. Comprehension test questions are arranged based on material indicators of the immune system while the health literacy instrument used was adapted from the HLS-EU-Q international health literacy questionnaire. These questionnaires are the results of health education and communication activities that represent cognitive and social skills that determine an individual's motivation and ability to gain access to, understand and use information in a way that promotes and maintains good health. Supplements will be declared effective if the results of the comprehension test questions and health literacy questionnaire show an improvement in the results of students' answers after learning with the *CO-MMUNE* supplement**.** Analysis of the results of student comprehension test questions is presented in the Table 5.

Tabel 5. Analysis of the results of students' comprehension test questions.

No.	Indicator	Number of students
1	Total students	35
2	Students achieve completeness	27
3	Students do not achieve completeness	8

Based on the results of the analysis, it shows that the application of CO-MMUNE supplements on immune system material is effective in increasing students' understanding of concepts, shown by 77.14% of students have achieved completeness in immune system learning. Thus, the applied learning is able to provide an understanding of the immune system material appropriately. Case-based learning will change the learning procedure that initially only received, recorded and memorized the material changed towards seeking and finding knowledge so that there is an increase in understanding (Juliawan, 2012). In addition, the use of everyday cases in learning will create a pleasant learning situation, encourage students to learn and provide opportunities for students to construct the concepts they learn so as to achieve good student learning outcomes (Siregar, 2011). To strengthen data on improving students' concept understanding, 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 below.

Table 6. N-Gain Test Results

N-Gain	Totals Students	Precentage	Criteria
$0.7 \leq g \leq 1.0$	6	18%	High
$0.3 \leq g < 0.7$	29	82%	Medium
$0.02 \leq g < 0.3$	0	-	Low
Average		**Medium**	

Based on table 6 shows that more than 70% of students are in the medium grade range. Based on post-test scores and N-gain, *CO-MMUNE* supplements are effective in learning to improve students' concept understanding in immune system material in senior high school.

The use of cases in this study in the form of Covid-19 infection health cases, not only acts as an example

of cases in teaching materials that can increase students' understanding of concepts. The content of health cases has also become a medium for promoting health understanding in the school environment. Education is one of the means that allows the development of good health understanding in students for health improvement in the future. It is specifically conveyed by WHO that health literacy plays a role as a critical prevention of health and states that health literacy should be an integral part of the skills, and competencies developed during the age of learners especially through the school curriculum (WHO, 2017).

The health literacy assessment instrument used in this study has been adjusted to the discussion, environmental conditions and level of understanding of students. In this study, statements were measured by 4 criteria, namely very agree, agree, disagree, and strongly disagree. The strongly agreed criteria represent the answer that students are able to very easily access, understand, assess and apply information around health care, disease prevention and health promotion. The results of the health literacy assessment with HLS-EU-Q can be categorized into four different categories including, inadequate (0-25), problematic (25-33), sufficient (33-42) and excellent (42-50). Analysis of the results of student health literacy is presented in the Table 7.

Tabel 7. Analysis of the results of students' responses to *CO-MMUNE* supplement.

Health Literacy Index	Score		Criteria
	Before	After	
0-25	-	-	Inadequate
25,1-33	20	2	Problematic
33,1-42	15	20	Enough
42,1-50	-	13	Very Good

The data presented in table 7 showed that before learning with *CO-MMUNE* supplements, students showed a level of health literacy that tended to be problematic. 57% of the 35 students who were the study sample were in the problematic health literacy category and there were no students with good health literacy levels. After learning using *CO-MMUNE* supplements, it showed an increase in students' health literacy skills where the level of problematic literacy decreased rapidly to 90%. This means that most students already have a good understanding of health literacy. At a sufficient level of health literacy an increase of 33% from the previous results and at an excellent level of health literacy can be achieved up to 13 students. These results showed that students experienced improved health literacy after learning with *CO-MMUNE* supplements.

In this test there are 12 sub-sub-indices consisting of: (1) health care access/finding index, (2) understanding index of health care, (3) process index/assessing health care information, (4) index of applying/using health care information, (5) index of access/finding disease prevention information, (6) index of understanding of disease prevention, (7) index of process/assessing disease prevention information, (8) index of applying/using disease prevention information, (9) index of access/finding health promotion, (10) index of understanding of health promotion, (11) index of process/assessing information about health promotion, and (12) index of implementing/using information about health promotion. The elaboration of student health literacy outcomes on each competency for each health domain is shown in figure 3

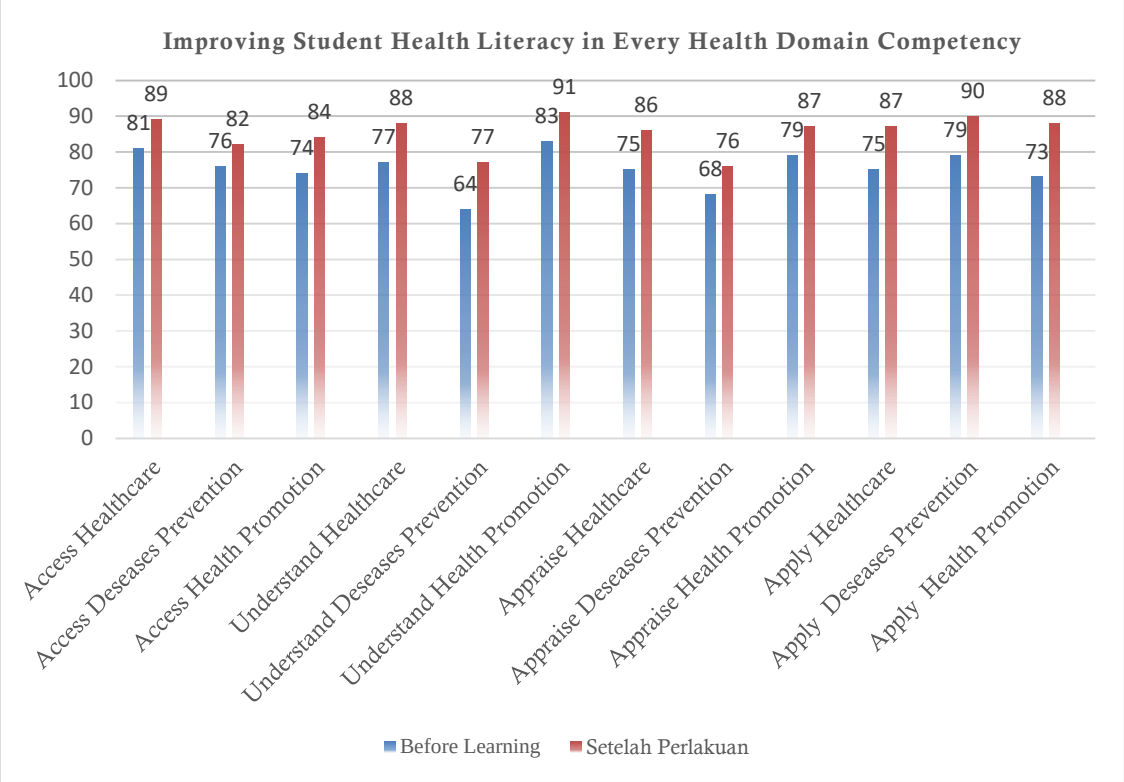

Figure 1. Student Health Literacy Result in Every Health Domain Competency

Figure 1 shows that for each competency in each health domain there is an increase in student health literacy outcomes by 6-15%. This is influenced because the *CO-MMUNE* supplement is structured based on health cases that are close to students. The scope of material about health and discussions during the learning process about health problems experienced by students provide students with a good understanding of health.

In this study, the disease prevention health domain showed the smallest improvement compared to the other two domains. Referring to the initial framework of HLS-EU-Q, it is reported that questions around the domains of disease prevention and assessment competence tend to score low. There are various things that may affect the difficulty of this health literacy assessment such as the tendency of views on health, one's health experience, and understanding of health topics will make participants hesitant in giving an appropriate response (Storms et al., 2017). In addition, the health care domain showed the highest increase compared to other domains. Awareness of health care is formed through students' understanding of the importance of maintaining and improving the immune system as well as information about the dangers of pathogenic microorganisms spread around us.

From the results of scoring, competence accesses and assesses competencies that are included in the problematic category. Respondents to health literacy testing showed difficulty in accessing and assessing information about care and improvement in their health. This is in line with a study conducted on 1,000 residents of Zurich (Switzerland) which showed that 22% of respondents reported difficulties in finding and assessing information for the improvement of their health and 28% reported difficulties in understanding information on how to keep themselves and the environment healthy (Schneider et al., 2021).

To strengthen data on improving students' health literacy skills, 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 below:

Table 8. N-Gain Test Results

N-Gain	Totals Students	Precentage	Criteria

$0.7 \leq g \leq 1.0$	3	8%	High
$0.3 \leq g < 0.7$	26	75%	Medium
$0.02 \leq g < 0.3$	6	17%	Low
Average		**Medium**	

Based on Table 8 shows that more than 50% of students are in the medium grade range. Based on post-test scores and N-gain, *CO-MMUNE* supplements are effective in learning to improve students' health literacy in immune system material in senior high school.

The use of books based on daily life problems in biology learning will provide students with close and concrete learning materials. The knowledge they gain will be constructed with the experiences experienced so as to form meaningful learning. The learning process should be able to foster new experiences in students' lives (Andrian, 2017). Students with a deep understanding of material concepts will have the ability to be able to integrate their understanding into everyday problems. A deep understanding of health issues will lead to better health literacy skills. With a good understanding of the concept, individuals can know how to prevent, transmit diseases and how to prevent and treat certain health cases (Edyawati et al., 2021).

Classroom learning that focuses on improving cognitive skills can largely be directed to support the development of more critical health literacy skills (Bruselius-Jensen et al., 2017). Health literacy is becoming important in public health and health care for future health improvement (Rachmani et al., 2019). Adolescence like school age is considered a transitional stage that involves a variety of changes including physical, locomotion, and cognitive changes. At this time children will enter development that makes themselves able to develop an understanding of values and norms in the environment around them or build their identity so that this period is very suitable for the formation of good health understanding (Sukys et al., 2017). The *CO-MMUNE* supplement developed has been tested for validity and feasibility both materially and medially and tested for its effectiveness in improving student concept understanding and health literacy skilss. From this study, it was concluded that the learning supplement on the immune system material entitled *CO-MMUNE* which was compiled based on Covid-19 cases is suitable for use in learning and is able to improve students' concept understanding and health literacy skills.

CONCLUSION

Based on the analysis and discussion of the results of the research that has been done, it can be concluded that the teaching material supplements developed are suitable for use as teaching materials in learning immune system materials. This is proven based on the results of material validity tests and media validity which show that supplements are in the very valid category with a percentage of material validity of 91% and media validity of 94%. Based on the results of the feasibility test from the responses of teachers and students, supplements get a percentage of 83% and 93.5% which are included in the very feasible criteria. *CO-MMUNE* supplements are declared effective in improving students' understanding of concepts shown by 77.14% of students have been able to achieve a minimum level of completeness. *CO-MMUNE* is also effective in improving student health literacy as evidenced by an increase in the percentage of student health literacy before and after using supplements by 51.43%. This suggests that learning supplements compiled using surrounding health case examples can be a means to improve students' understanding of material concepts and health literacy skills.

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