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VALIDITY OF HUMAN ANATOMY AND PHYSIOLOGY TEXTBOOKS BASED ON SCIENCE LITERACY

Rahmad H. Gultom[1], Shofia Lubis[2], Sri Masnita Pardosi[3], Alvi Sahrin Nasution[4]

[1,2] *Biology Education Program, Universitas Negeri Medan, Jalan Willem Iskandar Pasar V Medan Estate*

[3] *Science Natural Education Program, Universitas Negeri Medan, Jalan Willem Iskandar Pasar V Medan Estate*

[4] *Math Program, Universitas Negeri Medan, Jalan Willem Iskandar Pasar V Medan Estate*

Correspondene Author: rahmad.bioed@unimed.ac.id

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ABSTRACT

The study aims to validate the textbook of Human Anatomy and Physiology. The validation conducted leads to the analysis of the textbook on scientific literacy, namely to determine the scope of scientific literacy in the textbook. This study is a descriptive study that aims to explain the validation results. This module was validated by three validators. There are four components that validated, namely content validity consisting of module components and the suitability of module content, construct validity, language validity, and suitability with learning that uses conceptual changes. The results of the validation of human anatomy and physiology materials for semester VI Biology students at Medan State University found that the standards for human anatomy and physiology teaching materials based on scientific literacy have met the Very Good category with a percentage score and an average number of feasibility: Content feasibility is 88.67, presentation feasibility 93%, feasibility of scientific literacy components 93%. The results of the study concluded three textbooks used in university emphasize more on the presentation of facts, concepts, principles, laws, theories and models and emphasize that students can remember information through questions.

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INTRODUCTION

The development of science and technology today requires people to work harder to adapt to various aspects of life (Vahdat, 2022). One important aspect is education, which plays a major role in determining the progress of a nation amidst increasingly tight global competition (Tight, 2021). According to (Afful et al., 2020), science education aims to produce quality graduates with good scientific literacy, as well as high-level thinking skills. This is expected to form human resources who are able to think critically, creatively, make decisions, and solve problems. (OECD., 2019) defines scientific literacy as the ability to use scientific knowledge, formulate questions, and draw conclusions based on evidence to understand the natural world and make informed decisions about the impacts of human activities.

It is an essential skill, enabling individuals to apply scientific concepts and processes to make informed judgments regarding their daily lives, others, society, and the environment, including social and economic progress (Kauffmann et al., 2014). Indonesia began to focus on scientific literacy in 1993 after participating in the UNESCO forum . Scientific literacy was included in the 2006 curriculum (KTSP) and was further emphasized in the 2013 curriculum through inquiry-based learning and scientific approaches (Jannah et al., 2023). However, PISA results consistently show that Indonesia's scientific literacy level is low. In 2012, Indonesia was ranked 63rd out of 64 countries, and in 2015, Indonesia was ranked 69th out of 76 countries, both below Thailand. The score is also well below the international average, highlighting the ongoing challenges in improving science literacy in Indonesia (Rosana et al., 2020). PISA is a triennial international assessment for 15-year-old students (Rosana et al., 2020) .

The average Indonesian student's science ability is limited to basic fact recognition, thus hampering their ability to communicate, relate these facts to various scientific topics, and apply concepts (Tight, 2021). Several factors contribute to this low science literacy, including the education system, teaching methods and strategies, learning resources, students' learning styles, and facilities (Soeharto & Csapó, 2021). In particular, inadequate learning resources, such as textbooks, can negatively impact student learning (Santyasa et al., 2020). High-quality learning resources that align with curriculum learning objectives, particularly the development of science literacy, are essential (Hurd, 1998).

The current Indonesian curriculum emphasizes science literacy, defining science not only as memorizing facts, concepts, and principles, but also as a process of discovery about natural phenomena (Istyadji, 2023). Science education should enable students to learn about themselves, their environment, and future applications in everyday life (Sutiani et al., 2022). Therefore, science learning should focus on the content, context, and process of science. Effective learning, supported by appropriate resources that address curriculum objectives such as science literacy (covering content, context, and process), is essential (Afifah & Ardianti, 2021).

METHOD

This study uses the Research and Development (R&D) methodology (Sugiyono, 2017). Following Sugiyono's (2013) theory of teaching material development, the R&D process involves ten steps: identifying potential and problems, data collection, product design, design validation, design revision, product trial, product revision, usage trial, product revision, and mass production. The development stage is the implementation stage of the product planning that has been carried out in the previous stage (Yani et al., 1995).

The purpose of this stage is to produce a final product of human anatomy and physiology teaching materials that are suitable for use. The steps taken are as follows: The results of the development of human anatomy and physiology teaching materials draft 1 designed and created by the researcher are first consulted with the course lecturer before entering the validation of expert lecturers and lecturers of the human anatomy and physiology course and will receive input, suggestions and criticisms, which are provisions for the researcher to revise the product being developed.

At the stage of developing teaching materials for human anatomy and physiology, the products developed are validated by expert lecturers and

lecturers of human anatomy and physiology to determine the feasibility of human anatomy and physiology developed by researchers before being used for field trials. The results of validation from expert lecturers and lecturers of human anatomy and physiology are draft III and as revision material so that the teaching materials for human anatomy and physiology developed will be even better with criticism and suggestions from expert lecturers and course lecturers.

RESULTS AND DISCUSSION

Presentation of Data from the Results of the Development Research

Based on product validation through a series of trials and revisions that have been carried out, the Anatomy and Physiology of the Human Body teaching materials based on scientific literacy that have been developed are declared valid and suitable for use as teaching materials.

Validation of the product is intended to determine the opinions of material experts on the feasibility of the content, feasibility of presentation, and components of scientific literacy as input for improving the quality of the teaching materials that have been developed. The validation results in the form of assessment scores for the feasibility of the content of the Anatomy and Physiology of the Human Body learning materials can be seen in Figure 1.

Based on the results of the validation of the feasibility of the content of the material, the teaching materials shown in Figure 4.1 show that out of 3 categories, it is included in the very good category. Overall, it can be concluded that the assessment of material experts on the feasibility of the content is in the very good criteria, namely 88.67%.

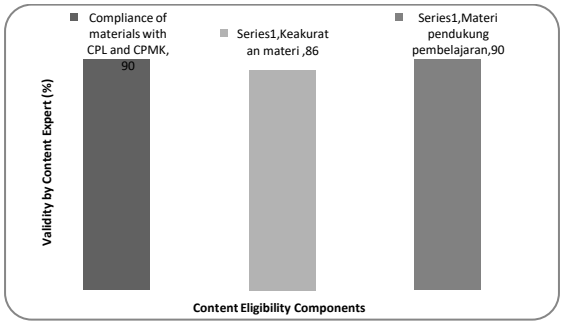

Figure 1 Average Validation of Material Experts for Content Suitability

The following is a graph of the feasibility of the presentation from the validation of material experts.

Based on the results of the validation of the feasibility of the presentation of the material, the teaching materials shown in Figure 1 show that out of 3 components, one is in the very good category with a score of 90-96%. Overall, it can be concluded that the assessment of material experts on the feasibility of the presentation is in the very good criteria, namely a score of 93%.

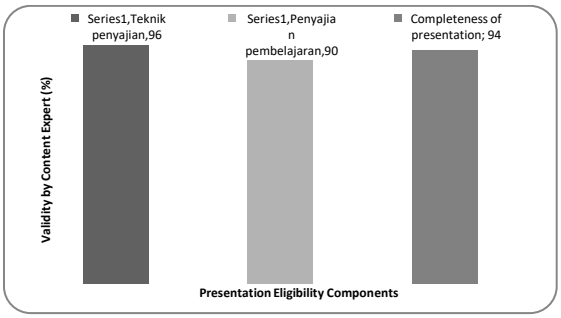

Figure 2 Average Validation of Material Experts for Presentation Eligibility

The results of the validation of material experts on the components of scientific literacy, with indicators assessed as science as a body of knowledge, science as a way to investigate, science as a way of thinking and the interaction of science, technology with society can be seen in picture 1. Based on the results of the validation of the feasibility of the components of scientific literacy, the teaching materials shown in figure 3 show that out of 4 categories, one of them is in the very good category with a score of 85-97%. Overall, it can be concluded that the assessment of material experts on the components of scientific literacy is in the very good criteria, namely 93%.

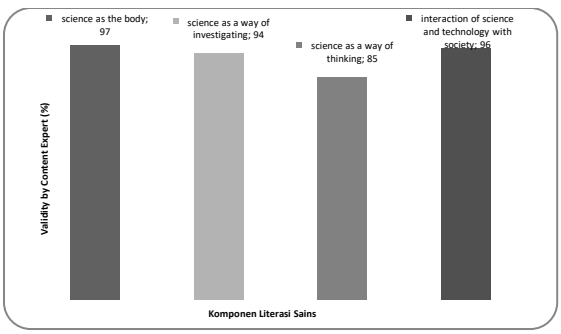

Figure 3 The Average Expert Validation for the Scientific Literacy Componen

From the results of the validation of material experts on the developed teaching materials, it can be concluded that the teaching materials for Human Body Anatomy and Physiology Based on Scientific Literacy are overall in the "Very Good" criteria with an average percentage of 92%. Design experts validated the teaching material products on aspects of learning design regarding book size, cover layout, cover typography, cover illustrations, content layout, content typography and content illustrations. The validation results in the form of teaching material assessment scores can be seen in picture 2. The following is a design expert validation graph for teaching materials.

The results of the teaching material design validation concluded that the design of the Human Body Anatomy and Physiology teaching material Based on Scientific Literacy is in the "Very Good" criteria, with an average percentage of 96.42% Results of the Assessment of Human Body Anatomy and Physiology Teaching Materials by Course Lecturers.

The assessment of Human Body Anatomy and Physiology teaching materials by reviewers is carried out to obtain information that will be used to improve the quality of teaching materials to be developed. The components that will be assessed by reviewers are regarding the components of scientific literacy, namely: science as the body of science, science as a way to investigate, science as a way of thinking, interaction of science, technology with society.

From the results of the reviewer validation, it can be concluded that the Human Body Anatomy and Physiology teaching materials based on Scientific Literacy are in the "Very Good" criteria with an average of 94%.

Results of the Assessment of Human Anatomy and Physiology Teaching Materials by Individual Trials

The assessment of Human Anatomy and Physiology teaching materials by biology students was carried out to obtain information that will be used to improve the quality of teaching materials to be developed. The components that will be assessed by the reviewer are the components of scientific literacy, namely: science as the body of knowledge, science as a way of investigating, science as a way of thinking, interaction of science, technology with society.

Table 2 Individual Test Assessment by Biology Students

Individual Assasment	Student (3 people)		
	1	2	3
Score Total	96	94	96
% assasment	89%	87%	89%
Avarage %		88.33%	
Criteria		Very Good	

From the results of individual trials, it can be concluded that the teaching materials for Human Anatomy and Physiology Based on Scientific Literacy are in the "Very Good" criteria with an average percentage of 88.33%.

Results of the Assessment of Human Anatomy and Physiology Teaching Materials by Small Group Trials.

The assessment of Human Anatomy and Physiology teaching materials by biology students was carried out to obtain information that will be used to improve the quality of teaching materials that will be developed. The components that will be assessed by the reviewer are the components of scientific literacy, namely: science as the body of knowledge, science as a way of investigating, science as a way of thinking, the interaction of science, technology with society.

Table 3 Small Group Trial Assessment by Biology Students

Individual Assasment	Student (7 people)						
	1	2	3	4	5	6	7
Score Total	96	97	97	96	97	99	98
% assasment	89%	90%	90%	89%	90%	92%	91%
Avarage %				90.14%			
Criteria				Very Good			

From the results of the Small Group Trial, it can be concluded that the teaching materials of Human Anatomy and Physiology Based on Scientific Literacy are in the criteria of "Very Good" with an average percentage of 90.14%.

Results of the Assessment of Human Anatomy and Physiology Teaching Materials by Limited Group Trial

The limited group trial data was conducted on biology students. This trial was conducted on 13 students. This group trial was intended to produce

data that would later be used to determine the benefits and responses of students to the textbook.

Table 4. Assessment of Limited Group Trial by Biology Students

Limited Group Assasment	Mahasiswa (13 orang)
Skor Total	1277
Rata-rata % penilaian	**91.23%**
Kriteria	**Very Good**

From the results of the limited group trial, it can be concluded that the teaching materials for Human Anatomy and Physiology Based on Scientific Literacy are in the "Very Good" criteria with an average percentage of 91.23%.

CONCLUSION

The validation results from material experts on the feasibility of the content and suitability of the scientific literacy criteria of the human anatomy and physiology teaching materials based on scientific literacy that were developed as a whole are included in the very good category and the validation results from learning design experts on the presentation of the human anatomy and physiology teaching materials that were developed, as a whole are included in the very good category, so that they can be accepted and are suitable for use in the learning process

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