



CHARACTERISTICS OF VISUAL LITERACY-BASED BIOLOGY LEARNING MODULE VALIDITY ON PHOTOSYNTHESIS LEARNING MATERIALS

Diini Fitrahtun Nida¹, Muhyiatul Fadilah², Ardi³, Suci Fajrina⁴

^{1,2,3,4} Universitas Negeri Padang, Padang, Indonesia

¹dinifitrahunnida06@gmail.com, ²muhyifadilah@fmipa.unp.ac.id, ³ihfawa@gmail.com, ⁴sucifajrina20@yahoo.com

ABSTRACT

Visual literacy is the skill to interpret and give meaning to information in the form of images or visuals. Visual literacy is included in the list of 21st-century skills. The observation results indicate that most of the students have not mastered visual literacy well. One of the efforts that can be made to improve visual literacy is the provision of appropriate and right teaching materials. The research is an R&D (Research and Development) using a 4-D model, which is modified to 3-D (define, design, develop). The instruments used were content analysis sheets and validation questionnaires. The results of the research imply that there are three characteristics of the validity of the developed module. First, visual literacy produces students' critical thinking and communication skills by building their own meaning or conclusions regarding the given image object. Second, visual literacy produces students' creative thinking by recreating it in the form of images or other visual objects from the provided visual information. Third, visual literacy produces students' critical thinking skills by connecting visual objects or images that are distributed to them. The module is considered to be very valid (feasible) to use with a percentage of 94.23%.

Keywords: visual literacy, biology, learning module validity, photosynthesis

KARAKTERISTIK VALIDITAS MODUL PEMBELAJARAN BIOLOGI BERBASIS LITERASI VISUAL PADA MATERI FOTOSINTESIS

ABSTRAK

Literasi visual merupakan kemampuan untuk menginterpretasikan dan memberi makna sebuah informasi yang berbentuk gambar atau visual. Literasi visual termasuk kedalam daftar keterampilan abad 21. Hasil observasi menunjukkan bahwa mayoritas peserta didik belum menguasai literasi visual dengan baik. Salah satu upaya yang dapat dilakukan untuk meningkatkan literasi visual adalah penyediaan bahan ajar yang tepat dan benar. Penelitian merupakan penelitian R&D (Research and Development) menggunakan model 4-D yang dimodifikasi menjadi 3-D (define, design, develop). Instrumen yang digunakan adalah lembar analisis konten dan angket validasi. Hasil penelitian menunjukkan bahwa ada tiga karakteristik validitas pada modul yang dikembangkan. *Pertama*, literasi visual melatih kemampuan berpikir kritis dan komunikasi peserta didik dengan cara membangun makna atau kesimpulan sendiri dari objek gambar yang diberikan. *Kedua*, literasi visual melatih berpikir kreatif peserta didik dengan cara membuat kembali dalam bentuk gambar atau objek visual lainnya dari informasi visual yang diberikan. *Ketiga*, literasi visual melatih kemampuan berpikir kritis peserta didik dengan cara menghubungkan objek visual atau gambar yang diberikan. Modul dinyatakan sangat valid (layak) digunakan dengan persentase 94,23%.

Kata Kunci: literasi visual, biologi, validitas modul pembelajaran, fotosintesis

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INTRODUCTION

Literacy often refers to the ability to read and write. According to Wiedarti, et al (2018) the term literacy is more than just reading and writing, but includes thinking skills using knowledge sources in print, visual, digital, and auditory forms. In the 21st century, this skill is known as information literacy. One of its

components is visual literacy. Sidhartani (2016) states that visual literacy is the ability to understand visual language and communicate that understanding to interact with their environment.

Visual literacy has an important role in learning. According to Aggraini (2019), the existence of visual literacy, students are able to

interpret, interpret and analyze meaning in a media so that they can hone students' critical thinking. In addition, visual literacy skills need to be developed by learners because they include the demands of 21st century skills. This is in accordance with what Nurannisa (2017) conveyed that visual literacy is included in the list of 21st century skills, where learners must have the ability to interpret, recognize, appreciate and understand information presented through visible, natural or man-made actions, objects and symbols.

The distribution of questionnaires to 32 students of class XI F1 SMAN 3 Padang has obtained the results that not all students know and understand and communicate information from images correctly and precisely. This is evidenced by the questions given. The question directs students in recognizing the shape of the image and communicating information on the image using their own language. The results were obtained as many as 17 students who were able to recognize the shape of the image asked and 3 people who were able to communicate information on the image correctly and precisely. So, it can be concluded that not all students master visual literacy well so practice is needed to train students' visual literacy, especially on biological material.

Biological material is one of the sciences that needs to be learned by students in explaining concepts or phenomena that occur using visualization. When viewed from the material aspect, Sudarisman (2015) suggests that biological material is not only related to scientific facts about concrete natural phenomena, but also related to abstract things or objects such as chemical metabolic processes in the body, hormonal systems, coordination systems, and others. Tsui & Treagust (2013) state that there are four levels of representation required to understand biological phenomena, namely: 1) macroscopic; 2) microscopic; 3) submicroscopic; and 4) symbolic. Based on the characteristics of these materials, one of the abstract biological materials is photosynthetic matter. Therefore, practice is needed to train students' visual literacy in reading and understanding images, especially on photosynthetic material.

The above statement is supported by the results of an interview with Mrs. Dra. Azhira, M.Pd., a Biology teacher at SMAN 3 Padang, who stated that photosynthesis is abstract. The abstract referred to here is material that cannot be seen directly in the process and in general the material is in the form of text so it needs a visualization process of the text. In addition, based on the results of observations during PLK, photosynthesis material is one of the materials that contains images that are difficult for students to read, especially in calvin cycle images, cyclic and non-cyclic photophosphorylation. The difficulty experienced by learners is seen in understanding the grooves of arrows, symbols such as chemical names (H_2O , CO_2 and others). Therefore, practice is needed to train learners in reading and understanding images, especially on photosynthetic material.

One form of the visualization process of photosynthetic material can be presented in the form of visual representations on learning media. Visual representation is one component that is able to make written explanations in the form of sentences in textbooks more concrete because of the visualization represented in the textbook Elfada, et al (2015). According to Mulyani (2017) visual representation in biology can be presented in various forms of visualization, such as photos, images, tables, charts, diagrams, and others. High visual literacy skills are required in order to understand the concepts represented visually. Therefore, efforts that can be made are by loading visual literacy competencies into learning media.

Learning media is one of the important aspects of the learning process, where learning media can be used as an intermediary from teachers to students. According to Kurniawan (2017), the use of learning media is to increase desire, interest and arouse motivation of students to learn. In line with that, the selection of learning media can be adjusted to the characteristics of students. One of the characteristics of learners can be determined from the modality of learning style. Based on the results of the learning style test that has been conducted by students XI F1 SMAN 3 Padang, it was obtained that students are dominant with

visual learning style modalities so that visual literacy-based learning media is one of the main alternatives to support students with visual learning style modalities.

The development of visual literacy-based learning media has been carried out by previous researchers. Some previous studies that have developed visual literacy-based learning media include research by Damayana, et al (2018) in the form of student worksheets on acid-base material. Furthermore, Marwanti, et al's (2019) research is in the form of comic media on Static Fluid material. In Putri & Muthmainnah's research (2022) in the form of *E-Modules* (Digital Modules) in the *phanerogamae* botany course. Based on this research, the development of visual-based learning media that has been carried out in general has met the criteria of valid and feasible use in the learning process so that it becomes a reference for developing learning media in the form of learning modules with photosynthesis material for class XI Phase F students.

Based on the results of the interview, it is known that the difficulties faced by teachers in learning biology are in conducting varied learning. According to Syaodih, et al (2019) varied learning methods are simply interpreted as a way of presenting lessons or learning by teachers to students who are directed to achieve certain goals and presented in varied forms in several ways. One way that can be done in varying learning is to vary the use of learning media, especially in teaching materials. The results of the distribution of observation questionnaires show that the teaching materials that are often used by students are printed books and LKPD. However, not all learners have printed biology books and few modules are used. Modules are printed teaching materials designed to be learned independently by students (Kosasih, 2021). So, it can be concluded that the use of modules has not been optimally used in the learning process so that it can be used as an effort to vary teaching materials.

One of the characteristics of teaching materials is that they are specific. According to Supardi (2020), specific means teaching materials

that are designed in such a way only to achieve certain competencies and goals so that each teaching material has certain characteristics. According to the Big Indonesian Dictionary (KBBI), characteristics are signs, characteristics, or features that can be used as identification. Therefore, it is necessary to pay attention to the characteristics that will be contained in the module, especially from the results of the validator assessment. The characteristic of the module to be developed is the presence of visual literacy competence. Based on the background of the above problems, this study aims to: a) develop biology learning modules based on visual literacy on valid photosynthesis material. b) Describe the validity characteristics of biology learning modules based on visual literacy on photosynthesis material.

LITERATURE REVIEW

The word literacy in general is inseparable from the meaning of reading and writing. According to Kharizmi (2015) literacy is defined as the ability to read, write, understand and plan something accompanied by critical thinking that allows a person to communicate effectively and efficiently to create his own understanding. So, it can be concluded that literacy is not only about the ability to read and write but also accompanied by the ability to understand, interpret and think critically using various sources of information (print, visual, digital and audio forms) to communicate that can cause meaning.

Literacy is more than just reading and writing, but includes thinking skills using print, visual, digital, and auditory sources of knowledge. In the 21st century, this ability is referred to as information literacy (Wiedarti, et al., 2018). Ferguson (2001) states that information literacy includes five essential components, namely initial literacy, library literacy, media literacy, technological literacy and visual literacy. In the Indonesian context, early literacy is needed as a basis for literacy acquisition. There are 11 competencies/indicators of visual literacy according to Avgerinou (2009) listed in table 1 as follows.

Table 1. Visual Literacy Competence

No	Competence	Description
1	Knowledge of visual vocabulary	Knowledge of basic components such as points, lines, shapes, space, textures, light, color, motion visual language.
2	Knowledge of visual rules	Knowledge of visual signs and symbols, as well as their socially agreed meanings (in western culture).
3	Visual thinking	The ability to transform any type of information into images, graphics, or other forms that help communicate that information.
4	Visualization	The process of forming a visual image
5	Visual Reasoning	Coherent and logical thinking through an image
6	Critical Viewing	Apply critical thinking skills to visuals.
7	Visual Discrimination	The ability to perceive the difference between two or more visual stimuli.
8	Visual Reconstruction	Ability to reconstruct partially enclosed visual messages in their original form
9	Visual Association	The ability to connect visual images that display the unity of the theme. The ability to connect verbal messages and their visual representation (and vice versa) to enhance meaning.
10	Reconstruction of Meaning	The ability to visualize and reconstruct the meaning of visual or verbal messages only to supplement incomplete information
11	Construction of meaning	The ability to identify visual messages contained in a given visual object.

METHOD

The type of research used is R&D (*Research and Development*) research with 4-D models that have been modified into 3-D, namely through the *define* stage, *design* stage, and *development stage*. At the stage of disseminate

disseminate is not carried out due to time and cost constraints. After the developed module is valid, an analysis is then carried out to describe the validity characteristics of the developed module. The research procedure can be seen in Figure 1.

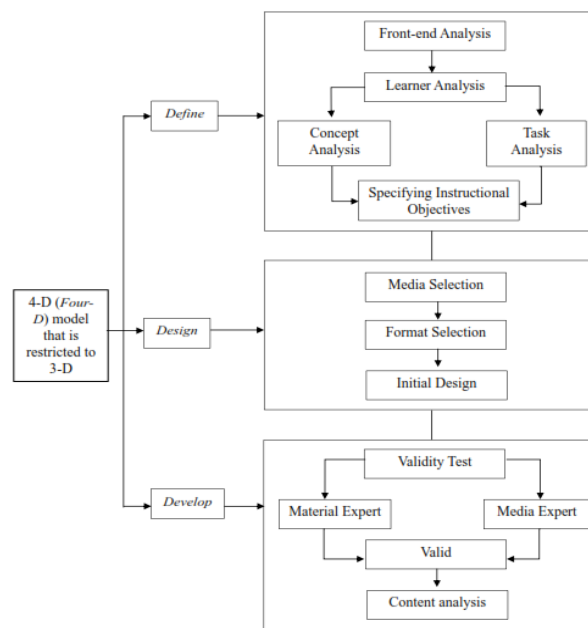


Figure 1. Research Procedure

The research was conducted from June 2022-July 2023 at the Department of Biology FMIPA UNP and SMAN 3 Padang. Research data collection instruments are validation questionnaires and content analysis sheets. The content analysis sheet includes aspects of the analyzed content, the results of the researcher's analysis and the validator's response. The validation questionnaire used to check the validity (validity) of the product includes the feasibility of content, language, presentation, and graphics of learning biology based on visual literacy on

photosynthetic material. Validation was carried out by three validators, two lecturers of the Department of Biology FMIPA UNP and one teacher of SMAN 3 Padang. The analysis techniques used are descriptive, quantitative and qualitative. Validity data is obtained from the validity questionnaire that will be filled in by the validator. The steps that can be taken to determine the level of validity of the module created are as follows:

- 1) Provides an answer score with a Likert scale with the following criteria:

Table 2. Likert Scale

Instrument item answers	Score
Very agreeable	4
Agree	3
Disagree	2
Very Disagree	1

- 2) Determine the highest score, with the following formula:
 Highest score = number of validators x maximum score x number of indicators
- 3) Determine the sum of the scores of each validator by summing up all the scores obtained from each indicator.
- 4) Determine the score obtained by summing the scores of each validator.

- 5) Determination of validity value using the formula:

$$V = \frac{Tsp}{Tst} \times 100\%$$

Information:

V = Validity

Tsp = Total Earned Score

Tst = Highest Total Score

- 6) Provide an assessment of product validity in accordance with the modified criteria from Purwanto (2012) as follows:

Table 3. Validity Assessment

Interval Percentase	Category
90% – 100%	Highly Valid
80% – 89%	Valid
65% – 79%	Quite Valid
55% – 64%	Less Valid
≤ 54%	Highly Invalid

RESULTS AND DISCUSSION

Research Result

The development research carried out has produced products in the form of biology learning modules based on visual literacy on correct and appropriate (valid) photosynthesis material.

Research that has been carried out uses 3 stages of the 4-D (Four-D) research model, namely the define, design, and develop stages.

Define

- a. *Front-End Analysis*

Front-End Analysis is carried out to determine the problems faced by teachers and students. Researchers made observations on 32 students and interviewed one of the biology teachers of SMAN 3 Padang. Based on the results of an interview with Mrs. Dra. Azhira, M. Pd., it is known that SMAN 3 Padang has implemented the Kurikulum Merdeka since 2021. However, in the implementation of the learning process, teachers are still constrained to carry out varied learning. According to Pesona (2021), the components of teaching variations in learning that can be done by teachers are variations in teaching styles, variations in the use of media and teaching materials and variations in interaction patterns and student activities. Based on this, teachers have tried to carry out varied learning, one of which is by using various media and teaching materials in the form of videos, teaching modules, PPT and LKPD. However, from the observations of students, it is known that the teaching materials used are printed books and LKPD, but not all students have printed books and the use of learning modules is still small. One variety of teaching materials in addition to printed books and LKPD can also use learning modules. Biology learning is inseparable from the visualization process contained in the material so that teaching materials are needed that can help visualize biological material in the form of learning modules.

b. *Learner Analysis*

Learner Analysis aims to see the characteristics of learners. The analysis was conducted by providing observation questionnaires as many as 32 students of grade XI F.1 SMAN 3 Padang. Based on the results of the observation questionnaire analysis, 32 students wanted pictures and videos to motivate biology learning, 32 students better understood the material if there were interesting pictures and videos and 32 students agreed if the biology learning module used an attractive design. Based on the results of observational analysis, it can be concluded that not all students understand visual literacy such as in understanding the form of images and inferring information from images.

c. *Concept Analysis*

Concept analysis aims to identify the main concepts in the material to be discussed. Based on the results of the interview, it is known that photosynthesis material is abstract material, so visualization is needed for the material. Based on the results of observations during PLK, students have difficulty in understanding photosynthetic material, especially those that contain images such as calvin cycle images, cyclic and non-cyclic photophosphorylation. The difficulty experienced by students is seen in understanding arrow grooves, chemical name symbols (H_2O is water, CO_2 is carbon dioxide and others) and connecting an image with other images (such as bright reaction images containing cyclic and non-cyclic photophosphorylation processes).

d. *Task Analysis*

Task analysis was carried out to detail the learning material to be written in the visual literacy-based biology learning module in class XI Phase F. Analysis was carried out by identifying and analyzing learning objectives (TP) based on learning outcomes (CP) in the Kurikulum Merdeka.

e. *Specifying Instructional Objective*

Specifying Instructional Objective Aims to analyze the learning objectives achieved by students in the Visual Literacy-Based Biology Learning Module.

2. Design

The design phase aims to design a module designing a visual literacy-based photosynthesis material biology learning module for students of Class XI Phase F SMAN 3. This stage is carried out using 3 stages:

a. *Media Selection*

The media developed is a photosynthetic material biology learning module based on visual literacy for grade XI Phase F students. The module consists of 3 visual literacy indicators, each description of the material in learning activities includes meaning construction, visual thinking, and visual associations.

b. *Format Selection*

The material in the module is prepared and adjusted to the Kurikulum Merdeka. In addition, visual literacy in the module is also

adjusted to visual literacy indicators/competencies. The development of this module is made based on teaching material development guidelines prepared by Depdiknas (2008) which includes aspects of content feasibility, language, presentation and graphics. The font used is Garamond except for the font on the cover which is Asap. The modules developed are dominated by green and yellow colors.

c. *Initial Design*

The initial design aims to design an initial *prototype* of the module. The application used to create the module is *Microsoft Word 2021*, in addition to other applications used, namely *Canva* for making *Covers* and *Adobe Photosop CS6* and *Remini* applications for editing quality and text on images. The font type used in the module is *Garamond* with size variations of 13, 16, 18, and

26 pt. The dominant colors used are green and yellow. The paper used is the HVS type with an A4 size (21 cm x 29.7 cm). The components in the module refer to the Depdiknas (2008), namely learning instructions, competencies to be achieved, content or content of material, supporting information, exercises, work instructions in the form of worksheets, evaluation and return to evaluation.

3. Develop

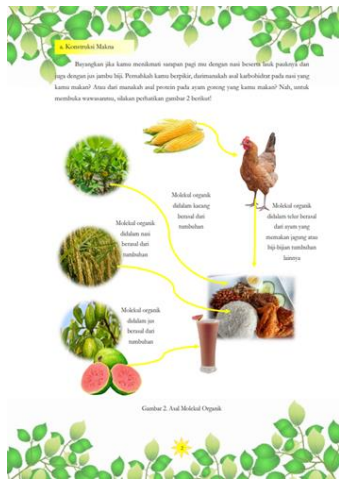
The development stage is carried out validity tests on modules. The validity test was carried out by two lecturers of the Department of Biology FMIPA UNP and one biology teacher of SMAN 3 Padang. The analysis of module validity results can be seen in Table 4.

Table 4. Average Module Validity Value

No	Assessment Aspect	Value	Validity (%)	Criteria
1	Content Eligibility	94,64		Highly Valid
2	Language	95,83		Highly Valid
3	Serving	93,75		Highly Valid
4	Graphics	92,70		Highly Valid
	Average	94,23		Highly Valid

The validation results in Table 4 show a value of 94.23% with very valid criteria. This shows that the visual literacy-based photosynthesis material biology learning module for class XI phase F is very valid from the

feasibility aspects of content, language, presentation and graphics so that it is suitable for use as teaching material. The display of the developed module is presented in the following Figure.

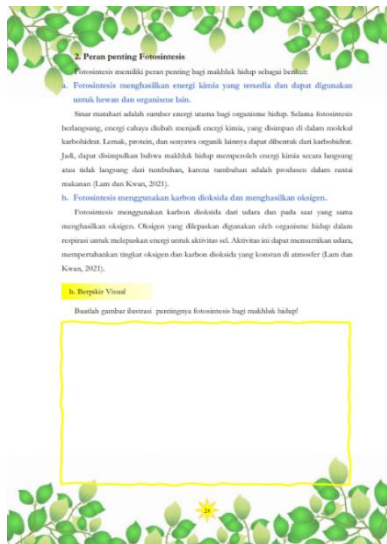


(a)

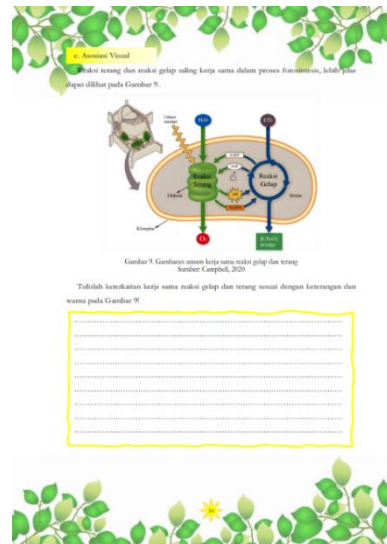


(b)

Figure 2. Visual literacy indicator display snippet of meaning construction (a) image that directs learner understanding (b) answer column



(a)



(b)

Figure 3. Visual literacy indicator display snapshots (a) Visual thinking and (b) Visual associations

Discussion

The results of the validity analysis showed that the module developed had very valid criteria with a value of 94.23%. Validity data was obtained using a modified validity test questionnaire from Depdiknas (2008) which refers to four aspects of assessment, namely the feasibility of content, language, presentation, and graphics as follows.

1) Content Eligibility Aspect

Based on the content eligibility aspect, the content of the module is categorized as very valid with an average value of 94.64%, meaning that the modules developed are in accordance with the achievements and learning objectives that refer to the Kurikulum Merdeka and in accordance with the needs of teaching materials and students. According to (Depdiknas, 2008) there are 3 reasons teachers need to develop teaching materials, namely the availability of materials according to curriculum demands, target

characteristics, and learning problem solving demands. The modules developed also contain the correct description of the material, material clearly and in detail, increase the knowledge and insight of students and have conformity with norms, morals and social values that apply in society. So, based on this, researchers concluded that the modules developed already met the criteria for the need to develop teaching materials.

The module developed already contains three clear visual literacy indicators and visualizations that are presented representative of the material concept. This shows that the visual literacy indicator in the module, namely meaning construction, visual thinking and visual association, is clear so that it can be understood. In addition, the form of visualization in modules such as images is representative of the concept of the material. According to Nurbaeti (2015), the selection of appropriate and clear images is expected to be able to provide convenience for students so that misconceptions or misunderstandings do not occur. So, it can be concluded that the photosynthetic material biology learning module based on visual literacy already contains clear visual indicator content and visualization in the module representative of the concept of matter.

2) Language Aspects

Based on linguistic aspects, the module is categorized as very valid with a value of 95.83%. This means that the developed module already has clear readability, uses communicative language, uses Indonesian rules that are in accordance with the EYD, and sentence structure that does not cause confusion. Supardi (2020) stated that there are several things that underlie the development of teaching materials from the linguistic side, including being made in the form of a standard language, paying attention to the correctness of language use, and avoiding the use of grammar that confuses students. So, it can be concluded that the biology learning module of photosynthetic material based on visual literacy is in accordance with the linguistic principles of teaching material development.

3) Serving Aspect

Based on the presentation aspect, the module is categorized as very valid with a value of 93.75%, meaning that learning outcomes, learning objectives and instructions have been clearly presented. In addition, the material on the module is arranged systematically, the order of presentation is systematic. According to Bahtiar (2015), good teaching materials must contain adequate substance and be presented systematically to achieve learning objectives.

The modules developed also contain material that can provide learning motivation, make students seek information and independent learning as well as encourage activities and provide interactive responses to students. The presentation of the module is also arranged based on three indicators of visual literacy, namely meaning construction, visual thinking, and visual association so that through these three visual literacy indicators students are actively involved in training visual literacy skills. According to Lundry & Stephens (2015) states that visual literacy is essential for 21st century learners to develop the skills of creating and utilizing visual grammar to communicate and contribute to global dialogue. So, it can be concluded that the modules developed have encouraged student activities to train visual literacy skills.

4) Graphic Aspect

Based on the graphic aspect, the module is categorized as very valid with a value of 92.70%, meaning that the developed module already has clear letters, background color gradient that does not interfere with vision, attractive cover color, systematic and appropriate layout, clear illustrations / images/photos and good quality and easy to understand, placement of appropriate illustration / image/photo sizes, and the display of attractive visual literacy indicators. According to Ramadhani, et al (2015) in order for learning modules to be fun for students so that they can cause high interest and motivation to learn, one element that must be considered in developing learning modules is the graphics of the learning modules. So, it can be concluded that the module developed has paid attention to the graphical aspect and is declared very valid from the results of the average assessment of validators.

Based on the four aspects of the assessment above, researchers also conducted content analysis to describe the validity

characteristics of biology learning modules based on visual literacy on photosynthesis material, more clearly can be seen in Table 5.

Table 5. Content Analysis Of Validity Characteristics Of Biology Learning Modules Based On Visual Literacy On Photosynthesis Material

No	Aspects of the content being analyzed	Results of Researcher Analysis	Validator Response		
			V1	V2	V3
1	Visual literacy indicators of meaning construction	Visual literacy indicators of meaning construction train students' critical thinking and communication skills by constructing their own meanings or conclusions based on visual objects or images given.	Agree	Agree	Agree
2	Visual literacy indicators of visual thinking	Visual literacy indicators of visual thinking train students' creative thinking by recreating in the form of images or other visual objects from the visual information provided	Very Agree	Very Agree	Very Agree
3	Visual literacy indicators of visual association	Visual literacy indicators of visual associations train students' critical thinking skills by connecting visual objects or given images.	Very Agree	Very Agree	Very Agree

Based on Table 5, it is known that there are three aspects of the validity characteristics of biology learning modules based on visual literacy on photosynthesis material. These three aspects received affirmative and strongly agreed responses from validators. Three aspects of the characteristics of validators of visual literacy-based biology learning modules are indicators or competencies of visual literacy in the module:

1. Construction of meaning

The construction of meaning in the visual literacy-based biology learning module on photosynthesis material is the ability that directs students to identify information on given visual objects. In the developed module, this aspect can be seen in the example of Figure 2. In the aspect of visual literacy indicators of meaning construction, learners are given a picture and learners are asked to rewrite the information obtained from the image. The validity characteristics of the meaning construction visual literacy indicators in the module are assessed in agreement by the three validators, meaning that the meaning construction visual literacy indicators in the module have been clearly and appropriately

displayed. The purpose of the visual literacy indicator of meaning construction in the module is to train visual reading skills to encourage students to build their own meanings so as to train students' critical thinking and communication skills. According to Nurannisa, (2017) visual literacy encourages appreciation and understanding in visual communication, lack of awareness of visual reading skills may have an impact on the development of the communication process. So, it can be concluded that the visual literacy indicators of meaning construction in the module are appropriate and correct based on the validator's assessment.

2. Visual thinking

Visual thinking in biology-based learning modules visual literacy on photosynthesis material in question is the ability that directs students to convert all types of information provided into images, graphs, or other forms that help communicate the information. In the module developed, this aspect can be seen in the example of Figure 3a. In the aspect of visual literacy indicators of visual thinking, students are asked to make pictures, diagrams, or tables based on the

information provided. According to Faizah (2019), the development of visual literacy through drawing activities is very important, because it involves concepts, contexts, skills, and cross-learning. The validity characteristics of visual literacy indicators of visual thinking are considered very agreeable by the three validators, meaning that these indicators have been displayed clearly and accordingly. The purpose of visual indicators of visual thinking in the module is to encourage creative thinking of learners. According to Marantika (2019), visual literacy has an important war in the development of students' creative thinking, especially in writing skills. So, it can be concluded that the visual thinking indicator on the module is correct and correct based on the validator's assessment.

3. Visual associations

Visual associations in biology-based learning modules on visual literacy on photosynthesis material are abilities that lead students to connect visual forms that display the unity of themes. In the module developed, aspects of visual literacy indicators of visual thinking can be seen in Figure 3b. In the aspect of visual literacy indicators of visual association, students are asked to connect images and conclude the relationship or relationship of these images. The validity characteristics of visual literacy indicators of visual thinking are considered very agreeable by the three validators, meaning that these indicators have been displayed clearly and accordingly. The purpose of visual literacy indicators of visual associations in the module is to encourage learners' critical thinking skills. According to Tindani (2021), visual literacy and critical thinking are interrelated because visual teaching and learning play a role in developing critical thinking. So, it can be concluded that the visual association indicator on the module is correct and correct based on the validator's assessment.

CONCLUSIONS AND RECOMMENDATION

The biology learning module based on visual literacy on photosynthesis material has been validated based on the assessment of three validators. The characteristics of the validity of the visual literacy-based biology learning module

consist of three aspects based on visual literacy indicators or competencies, namely *first*, training students' critical thinking and communication skills by building their own meanings or conclusions based on visual objects or images given. *Second*, train students' creative thinking by recreating in the form of images or other visual objects from the visual information provided. *Third*, train students' critical thinking skills by connecting visual objects or images given. The biology learning module based on visual literacy on photosynthesis material was declared very valid with an average validity value of 94.23%. This shows that the developed module is declared suitable for use in the learning process on photosynthesis material.

Based on the conclusions above, the advice given by the researcher is that the results of the development of this module are one of the variations of teaching materials used in class. However, it needs adjustment to the conditions and characteristics of each learner. The development of visual literacy-based modules can also be developed in other subjects. In addition, the effectiveness of biology learning modules based on visual literacy on photosynthesis material can also be carried out.

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