Integrated Teaching Module of *Wasaka* Character with SETS Approach to Improve Students' Science Literacy: Content Validity Review

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Abstract. Content validation by expert assessment is an important component in the development of a teaching module. Therefore, a study was conducted to analyze the content validity of the teaching module integrating *Wasaka* characters with the SETS approach to improve students' scientific literacy. Data were collected from five experts (four lecturers and one practitioner). The instrument used in this study was a validation sheet assessed by the experts. The results of the content validation were analyzed using Lawshe's Content Validity Ratio (CVR). The results showed that the CVR value of the module's validity is 0.99, meeting the minimum CVR criteria. Based on these results, the developed teaching module is considered valid so that it is feasible to use in learning.

Keywords: Teaching module; *wasaka* character; SETS approach; science literacy; content validity

1 Introduction

The world is at a critical point in the field of energy in the third decade of the 21st century [1]. The energy crisis has become a global issue, with increasing challenges related to climate change, the need for energy security, and economic stability. This has triggered a shift towards renewable energy, which has become an essential element in reshaping the relationship between humans, the environment, the economy, and broader societal values [2–5]. Various forms of renewable energy, such as solar, wind, water, geothermal, and biomass, are crucial in directing the course of this global energy transition [6–9].

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The study of renewable energy has become a topic in the Programme for International Student Assessment (PISA) to measure the science literacy of students aged 15 [10]. Science literacy in the latest assessment by the Organization for Economic Cooperation and Development (OECD) in 2022 is measured through three science dimensions: (1) science competencies dimension; (2) science knowledge or core science dimension; and (3) science context dimension [10].

The PISA results show that the science literacy of students in Indonesia, from 2000 to 2022, has consistently ranked among the lowest 10 out of more than 70 countries participating in the PISA science literacy assessment [11]. Several studies have indicated that a lack of focus on expanding science literacy in learning sequences is the main cause of this low performance [12–20]. This statement is supported by the fact that variations in science literacy scores are influenced by the school's learning environment and climate, teacher-centered learning processes, students' lack of positive attitudes toward science learning, the presence of disliked competencies regarding content, processes, and context, students' unfamiliarity with completing science literacy assessments, and the low frequency of students' reading habits [21–28].

Several studies have shown that science literacy education can be effectively carried out through the implementation of the Science, Environment, Technology, and Society (SETS) approach [29,30]. Learning with the SETS approach focuses on how a topic is connected to the components of science, technology, environment, and society [31–33]. Other research has also shown that the implementation of teaching materials using the SETS approach can improve students' science literacy [34].

Based on the above background, research was conducted on students' science literacy through the development of integrating the teaching module with SETS approach. One important part of developing teaching materials is content validation by experts. Therefore, a study was conducted to analyze the content validity of the teaching module integrating *Wasaka* characters with the SETS approach to improve students' scientific literacy. This research is expected to contribute to science literacy education.

2 Methods

This research focuses on determining the validation of the teaching modules developed. Validation of the teaching module was carried out by five validators. In analyzing the validity of the teaching module, the Content Validity Ratio (CVR) by Lawshe was used. The equation is as follows (1).

$$\mathrm{CVR} = \frac{ne - \frac{N}{2}}{\frac{N}{2}} = 2\frac{ne}{N} - 1 \tag{1}$$

Where CVR is content validity ratio, *ne* is the number of panel members indicating certain items and *N* is the number of panel members. The validity criteria of learning material are shown in the table 1 [35]. The minimum value of CVR with the number of panelists 5 is 0.99 (Lawshe) [35]. This research instrument used a validation sheet using a Likert scale.

Table 1. Validity Criteria

Interval	Category
-1	Perfect disagreement
+1	Perfect agreement

3 Results and Discussion

Validation of the teaching module was carried out by five people. Four experts from academics and one practitioner used the validity instrument sheet. Validation of the teaching module includes format, language, general component, core component, attachment, presentation of teaching module, and benefit of teaching module. The teaching module was developed as a teacher's reference material to support teaching and learning activities in the classroom. The learning objectives in this teaching module are derived based on the analysis of learning outcomes for phase E of physics of the Merdeka Curriculum. The approach used is Science, Environment, Technology, and Society (SETS). The lesson topic focuses on renewable energy. The time allocation in learning is 10×40 minutes for 5 meetings. The selected Pancasila student profile is an independent, mutual cooperation, and critical reasoning profile. These three profiles are described in elements and sub-elements related to the values in the *Wasaka* character, namely the values of hard work, resilience, and responsibility. The components of science literacy used refer to the PISA science literacy components: explaining scientific phenomena, interpreting data and evidence scientifically, and evaluating and designing scientific investigations.

The validation results are shown in Table 2. Validation data shows that the teaching module has been assessed as very good in almost all aspects, with an average CVR of 0.99. Aspects such as format, language, general components, appendices, presentation, and benefits of the teaching module all received a CVR of 1.00, indicating full agreement among raters. Although the core component received a CVR of 0.71, which still indicates good agreement, there is room for improvement or further discussion. The average validity value is 3.62, with a very good category. Overall, the teaching module is considered very relevant and effective according to the expected standards.

Table 2. Results of Teaching Module Validation

Aspect Validation	CVR	Category	Value of validity	Category
Format	1.00	Agreement	3.75	Very good
Language	1.00	Agreement	3.67	Very good
General Component	1.00	Agreement	3.67	Very good
Core Component	0.71	Agreement	3.55	Very good
Attachments	1.00	Agreement	3.50	Very good
Presentation of the Teaching Module	1.00	Agreement	3.67	Very good
Benefits of the Teaching Module	1.00	Agreement	3.50	Very good
Mean	0.99	Agreement	3.62	Very good

The format aspect has four components that are validated by the validator. The module format assessment is a part of the module related to the use of fonts (type and size), layout, illustrations or images, and module display design [36]. The CVR value for this aspect is 1. The validator agreed to give a good value for one font component and a very good value for the other three components. The average validity value is 3.75, with a very good category. The validator's suggestion is to make the writing format in the module not too dense.

The language aspect has six validated components. Language assessment in the module is about the suitability of the content to the development of the reader, communicative, informative, and the suitability of good and correct Indonesian language rules [37]. The CVR value for this aspect is 1. The validator agreed to give a good value for the component of the suitability of the content to the reader and a very good value for the other components. The average validity value is 3.67, with a very good category. The validator's suggestion is to re-check the components in the language assessment aspect used.

The general component aspect has six validated components. For the general information framework, the ones validated are module identity, prerequisite competencies, Pancasila student profiles taught, student modes and targets, facilities and infrastructure, and learning models, methods, and media. The CVR value is 1. The validators agree to give a good value for the Pancasila student profile taught and the student modes and targets and a very good value for other components. The average validity value is 3.67, with a very good category. The validator's suggestion is that information from learning objectives must be included for each detail of the learning activity flow. Include information from learning achievements. Learning objectives should be described again, containing only one operational verb. Distinguish between meaningful understanding and learning objectives.

The core component aspect has six validated components. The CVR value is 0.77. The average validity value is 3.57, with a very good category. For validation on this component, the validator's assessment concluded that the teaching module was less operational. This indicates that the teaching module needs to be improved so that the teaching module can be used by teachers to assist learning activities. Based on this assessment, the author needs to pay attention to the validator's recommendations for improvement regarding the contents of the module framework so that it can be used. In addition, the validator also suggested bringing out independent and mutual cooperation characters because these are two very different things.

The attachment aspect contains teaching materials and student worksheets. The CVR value is 1. The average validity value is 3.50, with a very good category. The validator's suggestion is for teaching materials to adjust students' abilities to the depth of the material. The solution could be to attach several new QR codes so that the learning materials created are clear. In the section on deriving equations, it should be more detailed because grade X students still have poor mathematical abilities. The validator's suggestion for student worksheets is that the format of the student worksheets is less operational, so it needs improvement.

The presentation aspect of the teaching module is related to the clarity of the objectives to be achieved, the order of presentation of the material, the provision of motivation, interaction, and completeness of information [36]. This aspect has a CVR value of 1 and an average validity value of 3.67. The suggestion from the validator is that the module cover design should emphasize green and blue energy.

The benefit aspect is reviewed from the level of ease for teachers to understand the contents of the module, and the module can be used as a guideline in learning activities. This aspect has a CVR value of 1 and an average validity value of 3.50. The benefit of developing a teaching module is to lighten the teacher's responsibility in presenting content so that teachers monitor student learning activities [37].

The measure used to show the validity of an instrument is validity [38. Validation is carried out in order to assess the suitability of the product developed with the instrument criteria contained in the validation sheet [39]. Validation of teaching materials can be carried out using the validation sheet [40]. Validation of teaching modules is carried out to determine the suitability of the module, whether it is suitable or not to be used in learning [41].

From the results of the study above, the developed teaching module is valid for use. A science literacy-based teaching module in its preparation can be said to be valid if it meets the eligibility criteria, which include the content of science teaching materials, the purpose of preparing science teaching materials, clarity and truth of concepts, in accordance with the applicable curriculum, motivating and stimulating activities, as well as student abilities, illustrations and examples, and the use of communicative, logical, and systematic language [42]. A product is said to be good if it meets the valid criteria with the validity aspect, namely the module developed based on strong theoretical rationale and there is internal consistency in the developed module [43]. A product that is developed is valid if it is in accordance with its purpose [44]. This means that the product is good and can support the content of learning.

In addition, a teaching module is valid if it is in accordance with the required teaching materials, the material is clear and accurate, and it is able to motivate students [44]. Validity shows the suitability, meaningfulness, and usefulness of the conclusions made [45],[46]. Thus, the higher the validity of the teaching materials developed, the better the conclusions, level of meaningfulness, and usefulness.

4 Conclusion

The results showed that the CVR value of the module’s validity is 0.99, meeting the minimum CVR criteria. Aspects such as format, language, general components, appendices, presentation, and benefits of the teaching module all received a CVR of 1.00, indicating full agreement among raters. Although the core component received a CVR of 0.71, which still indicates good agreement, there is room for improvement or further discussion. Based on these results, the developed teaching module is considered valid so that it is feasible to use in learning.

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