

The Validity of the Guided Inquiry-Based Teaching Module on Additives to Improve Students' Scientific Attitudes

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Article Info

Article History :
September 2023
Accepted
December 2023
Published
April 2024

Keywords:
Additives; Guided Inquiry; Students' Scientific Attitudes; Teaching Module

Abstract

The Ministry of Education, Culture, Research, and Technology fostered the Merdeka Curriculum program as a significant endeavor to recuperate from the academic situation after the COVID-19 outbreak. The Merdeka Curriculum has shown better results two years after the pandemic than in the previous academic years. It indicates that learning will be more significant if students independently find ideas through the logical cycle since this can create and bring about scientific attitudes. This research aims to analyze the validity of the guided inquiry-based teaching module on additives to improve students' scientific attitudes. This is an R&D study adopting the 4D model and restricted to the development stage. Questionnaires were used as the instrument for the data collection. The validation included media and content validity, carried out by respectively 1 lecturer as a media specialist and 1 lecturer as a content specialist. The validation results revealed that the developed teaching module obtained 0.95 with very valid criteria from the media specialist and 0.96 with very valid criteria from the content specialist. In sum, the developed teaching module is valid for use in the learning process.

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INTRODUCTION

Education is a socially organized and regulated process of transferring significant experience from generation to generation (Naziev, 2017). Law no. 20 (2003) concerning the National Education System expresses that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious, spiritual strength, intelligence, personality, self-control, noble character and skills needed by himself, society, and nation. Realizing that a society or nation progresses parallels with the quality of its education is crucial (Efendi et al., 2023).

Learning will be more significant if students discover the ideas independently through a scientific process because it can develop and create students' scientific attitudes (Suryantari et al., 2019). By its characteristics, science learning emphasizes the concept of discovery to form scientific attitudes that help students achieve better grades (Widani et al., 2019). Scientific attitudes emerge within students to convey behavior toward object-oriented science and scientific methods (Suwintara et al., 2022). Generally, the main factor causing students' low scientific attitudes is the lack of learning optimization that involves the role of students, where learning only emphasizes mastery of concepts and does not explore scientific understanding. Hence, to overcome this issue, a particular learning model that can boost student enthusiasm during the learning process is needed, in addition to stimulating students' scientific attitudes (Kushrawati et al., 2020; Hanifa et al., 2023). According to Parwati et al. (2020), guided inquiry is a learning model to grow students' scientific attitudes.

The Guided Inquiry, according to Fitri and Fatima (2019), is an inquiry learning model where teachers provide scaffolding to guide the students through their inquiries. Komalasari et al. (2019) stated that guided inquiry is a student-centered learning model where students are required to be more active, and teachers guide the learning process. Meanwhile, Lovisia (2018) explained that guided inquiry is a learning model that escorts students in conveying scientific attitudes and thinking skills. From these definitions, guided inquiry is defined as a student-centered learning model with guidance

and direction from the teacher upon achieving scientific attitudes, thinking abilities, and active students.

In the guided inquiry model, the teacher's task is to provoke students to do something while bringing up problems to be solved and then guide students to find the best solution to the issues (Anam, 2015). This model lets students be involved, have opportunities for independent learning, and practice through experimentation and data collection (Wahyudi et al., 2018). Therefore, classroom activities allow students to build skills, creativity, and abilities (Orosz et al., 2022). Students also get to focus on investigations based on existing problems (Jundu et al., 2020). In other words, the guided inquiry fits the requirements of the Merdeka Curriculum (Azizah et al., 2023).

The curriculum is a tool for achieving educational goals and a guideline for implementing the teaching and learning process at every level of formal education (Almuzani, 2021). Moreover, the Merdeka Curriculum has diverse intra-curricular learning and focuses on essential content so that students have sufficient time to explore concepts and strengthen competencies (Nurani et al., 2022). The Ministry of Education, Culture, Research, and Technology developed the Merdeka Curriculum as an essential effort to restore learning from the educational crisis, primarily the negative impacts of the COVID-19 pandemic. Numerous studies unveiled that Indonesian kids need help grasping straightforward perusing or fundamentally applying numerical ideas. These findings also show a picture of steep education among regions and social groups in Indonesia, and this situation is getting worse due to the spread of COVID-19 (Kemendikbudristek, 2022). The Merdeka Curriculum is characterized by its more superficial and deeper, independent, relevant, and interactive (Puskurjar Exposure, Ministry of Education, Culture, Research, and Technology, 2022 in Nurani et al., 2022; Rambung et al., 2023). Thus, it is a potential educational innovation that can provide positive changes in the education system of Indonesia (Syahbana et al., 2024). One of the differences between the Merdeka Curriculum and the previous one is the teaching modules previously known as RPP (*Rencana Pelaksanaan Pembelajaran*/lesson plan) (Maulida, 2022).

The teaching module is an improvement of the prior RPP, which is furnished with a more definite direction, including students' action sheets and evaluations to gauge the accomplishment of learning goals (Anggraena et al., 2022a). Its purpose is to act as a benchmark for the learning process that will be carried out in class; thus, educators are required to use creative thinking to make a fun and exciting class. However, many educators still need to understand how to arrange teaching modules in the Merdeka Curriculum (Salsabilla et al., 2023). Teaching modules at least contain objectives, steps, learning media, assessments, and additional information and references to help teachers carry out learning (Anggraena, Ginanto, et al., 2022b). Educators have the opportunity to modify and select examples of available teaching modules or develop modules according to the needs, characteristics, and context of students (Anggraena, Ginanto, et al., 2022b).

The ideas conveyed in the discussion are the underlying reason the researchers want to develop a guided inquiry-based teaching module on additive. This research aims to analyze the validity of the developed module in improving students' scientific attitudes. In addition, this study serves as a follow-up to developing teaching modules in the context of developing educational science and as a reference for science teachers in training students' scientific attitudes.

METHODS

This is an R&D study with the 4D developmental model and is restricted to the development stage. Questionnaires were used for the data collection method, consisting of media expert validation sheets and content expert validation sheets.

Teaching module assessments were done by the media and content specialist. Expert validity aims to determine the validity level of the guided inquiry-based teaching module on additives to improve students' scientific attitudes. The assessment results served as the authors' reference for the refinement of the instruments used in this research. The validity assessment is calculated using Aiken's formula, which is as follows:

$$V = \frac{\sum s}{[n(c-1)]} \quad (1)$$

(Azwar, 2017)

Description:

s: r – lo

lo: The lowest score of the validity assessment (in this case = 1)

c: The highest score of the validity assessment (in this case = 4)

r: A score given by a specialists

n: Number of specialists

Ratings are given on a numerical scale between 1 (very irrelevant) and 4 (very relevant). The results of the validity index are converted as in Table 1.

Table 1. Validity Criteria

Intervals	Criteria
$0.80 < V \leq 1.00$	Very valid
$0.40 < V \leq 0.80$	Valid
$0.00 \leq V \leq 0.40$	Less valid

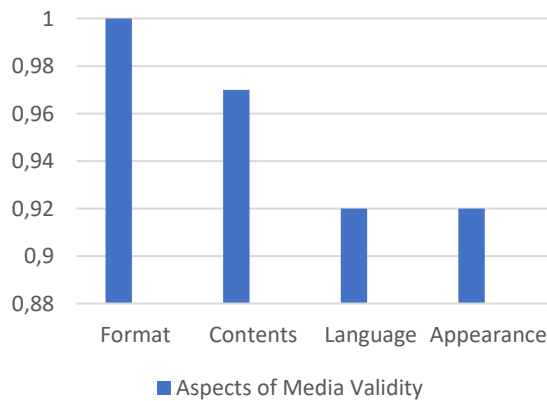
(Retnawati, 2016)

RESULTS AND DISCUSSION

The developed product is the guided inquiry-based teaching module on additives topic. After finishing the module, the media and content experts validated it to assess whether or not the teaching module was appropriate for use in the learning process. The following Table 2 and Figure 1 present the media validity results for the guided inquiry-based teaching module on additives, while Table 3 and Figure 2 show the content validity results.

Table 2. The Results of Media Validity (Validator 1 and Validator 2)

No.	Aspect	Validity Value	Criteria
1.	Format	1.00	Very valid
2.	Contents	0.97	Very valid
3.	Language	0.92	Very valid
4.	Appearance	0.92	Very valid
	Average	0.95	Very valid

**Figure 1.** The Graphic Result of Media Validity (Validator 1 and Validator 2)**Table 3.** The Results of Content Validity (Validator 1 and Validator 2)

No.	Aspect	Validity Value	Criteria
1.	Contents	0.96	Very valid
2.	Language	0.96	Very valid
	Average	0.96	Very valid

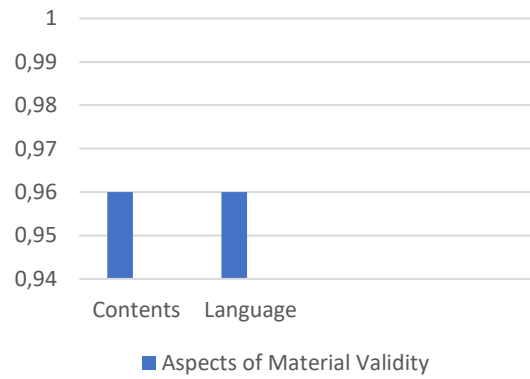
**Figure 2.** The Graphic Result of Content Validity (Validator 1 and Validator 2)

Table 2 shows the media validity results, which obtained an average score of 0.95 and were categorized as very valid. These results indicate that the presentation of the teaching module has been well prepared and is appropriate for use in the learning process. Moreover, Table 3 shows the content validity results, which obtained an average score of 0.96 in the very valid criteria. These results also suggest that the materials in the teaching module have been presented favorably and are appropriate for use in the learning process. The final score of the developed teaching module is derived from these outcomes, as shown in Table 4.

Table 4. The Final Validity Score of the Developed Module

No.	Expert	Validity Value	Criteria
1.	Media	0.95	Very valid
2.	Content	0.96	Very valid
	Average	0.96	Very valid

The final validity scored 0.96 in the very valid criteria. Apart from obtaining quantitative data under Aiken's formula, qualitative data were also attained from the expert in the form of suggestions for attention and improvements to the developed teaching module. Table 5 and Table 6 present the suggestions given.

Table 5. Feedback from the Media Expert

No.	Suggestions
1.	Page 5, typo in the word "knowledge". Some of the objectives in the LKPD at the beginning of the sentence are capitalized, and some are not; please adjust them.
2.	It is best not to use "for" at the beginning of a sentence.
3.	The reading materials on the LKPD are full of text. Please make use of images, graphics, and the like.
4.	Page 13, typo in the word "school".
5.	The questions or forms of enrichment and remediation shall also be written down.
6.	Attachments, especially in the assessment, are not readable; some are even illegible as they are taken from the screenshots. Please make some adjustments.

Table 6. Feedback from the Content Expert

No.	Suggestions/Input
1.	Please consider enriching the materials for prohibited additives.
2.	Please elaborate on the materials on how to identify the prohibited additives.

The developed teaching module has undergone validity tests, suggesting that the module is very valid to apply. Nevertheless, several suggestions were put forward by the media and content experts, which were well-received and followed up by the researchers for the betterment of the product.

A teaching module shall contain general information, core components, and attachments (Salsabilla et al., 2023). As for the developed product, the validity test by the media expert covered 4 aspects, including format, content, language, and display. The format aspect gained 1.00 in the very valid criteria, similar to the content aspect, which scored 0.97 in the very valid criteria. The results have proven that the developed module agrees with the guidance provided by the Merdeka Curriculum. Other than that, the language and display aspect respectively scored 0.92 in the very valid criteria. These three aspects are pivotal in creating learning tools since a good design, communicative language, and attractive display affect students' perception in comprehending the content (Az Zafi & Partono, 2020; Martha, 2018 in (Apriyeni et al., 2021)). Design serves a crucial role to enhance learning and engagement in many ways, as it can make education more effective, engaging, and fun. Much of the creativity and power in teaching lies in the module design, the choice of

texts and ideas that become the focus of study, the planning of experiences for students, and the means by which achievement is assessed. All of these exemplary aspects are brought together and conveyed in a communicative, standardized language that clearly articulates to students the learning intention; also displayed attractively with the use of images, font, and colors to boost students' learning interest and motivation (Diantari & Gede Agung, 2021).

On the other hand, the assessment from the content specialist covered 2 aspects of content and language. The validity test by the content expert was intended to obtain information, views, criticism, and suggestions related to the materials presented in the developed teaching module (Sanjaya et al., 2023). The content aspect obtained 0.96 with the very valid criteria, showing that the materials on the additives have been well-packed and arranged accordingly to the Merdeka Curriculum. Moreover, the language aspect scored 0.96 with the very valid criteria, indicating that the sentences are communicative, practical, non-redundant, non-cliche, and agree with the standard rules for Indonesian Spelling. This is in line with Khasanah et al. (2020) and Fridayanti et al. (2022) in which both elucidated that delivering instructional language that students use and understand has the potential to significantly improve their reading outcomes and help them develop the literacy skills they need to be successful in school and life.

In the outline of this discussion, the guided inquiry-based teaching module on additives to improve students' scientific attitudes has been declared very valid, and it is appropriate for use in the learning process. The specialists and authors

have carefully examined both aspects of media (format, content, language, and appearance) and content (content and language). Creating a module is one of the skills, among numerous others, that a teacher should master (Salsabilla & Nurhalim, 2024). To the extent, it may be an alternative solution to increase teachers' knowledge and skills in creative teaching, through using integrated materials, methods, strategies, and resources. Besides that, the module could simultaneously enhance learners' scientific attitudes through creativity, which may boost their motivation for learning.

CONCLUSION

Based on the validity test, the guided inquiry-based teaching module on additives to improve students' scientific attitudes scored 0.95 with the very valid criteria by the media specialist and 0.96 with the very valid criteria by the content specialist. It concludes that the developed teaching module is applicable to the learning process in terms of format, content, language, and display.

ACKNOWLEDGMENTS

Thank you to the validators for their expertise and assistance throughout all aspects of our study, for their help in writing the manuscript, and for providing insightful feedback for the betterment of the developed teaching module.

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