



Validity of Ethnoscience Based Chemistry Learning Media Emphasizing Character Values and Conservation Behavior

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Abstract: This study aims to obtain a valid chemistry learning device based on ethnoscience emphasizing character values and conservation behaviors. This study refers to the 4D model from Tiahgrajan, S. Semmel & Semmel which was modified into three stages, namely define, design, and develop. The chemistry learning kit that has been validated by three experts consisted of ethnics-based chemistry modules, lesson plans, student worksheets, and questionnaire sheets. The validity of chemistry learning devices was analyzed using the Aiken's V formula which was consulted to the criteria in the validity table. The results showed that the developed devices were appropriate for use in learning with an individual score of each component as follows: the implementation plan of learning got a score of 0.91 (very valid), the Chemistry module got a score of 0.91 (very valid), the student worksheet got a score of 0.89 (very valid), and the poll got a score of 0.72 (valid).

Keywords: Learning tools; validity; ethnics

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Introduction

The combination of scientific knowledge in schools with genuine science knowledge in the community (Gondwe & Longnecker, 2015), can make students pay more attention to environmental issues. The application of learning like this (scientific knowledge in school with genuine knowledge) can increase students' understanding of science concepts and make learning more meaningful (Okebukola, 1986), especially at a present circumstance where there are still many scientific concepts that have not been formalized in the school. The level of understanding of scientific concepts by teachers has a close relation to their professionalism in their attempts to introduce ethnics-based science material especially chemistry courses (Andayani, 2018). In an ideal situation, a teacher is required to recognize and preserve culture in

daily life that can be used as a source of learning with ethnographic approaches (Wardani *et al.*, 2013).

This ethnoscience-based learning will introduce the students with a phenomenon that is trusted by the community that can be integrated with existing scientific science material (Atmojo, 2012). This combinative learning is very important, especially at the current state where values and norms are increasingly declining. Small things that we can observe in the school environment such as littering and energy-wasting are due to the lack of awareness and sensitivity of the younger generation to protect the environment and preserve good culture previously imprinted in the society. In the culture that develops in the community, there are wise values that can be used as guidance in daily life (Wikantiyoso & Tutuko, 2009). So that such culture needs to be integrated into learning. It was supported by Stanley & Brickhouse (2001) who suggested that teachers should balance

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science learning in schools with traditional science knowledge in cross-cultural form as a source of learning. The thing to note is that the culture implemented must be relevant to the concept of the material to be taught.

The integration of culture is rarely considered in learning activities, so students are less familiar with their own culture. This integration is useful for instilling the character values and conservation behaviors among students. One way to present a variety of scientific content of genuine culture is by combining the referred culture or value with scientific concepts being taught. The information obtained can change the mindset of students. This change in mindset will instill character and shape good habits among students. This will have a positive impact on the environment and can build a sense of love for its culture. Therefore, students need to be provided with ethnics-based learning tools that support the formation of these attitudes (Subali et al., 2015). Teaching materials developed systematic means arranged in order making it easier for student to study (Ramdoniati et al., 2019).

This research is a preliminary study that aims to produce a valid learning tool through a series of stages of testing and validity analysis. This learning tool is based on science, that is, science that develops in societies that unconsciously has scientific value especially in chemistry. A valid ethnographic-based learning tool is expected to be used in chemical science learning which at the same time can instill the character values and environmental conservation behaviors of students (Suastra et al., 2011).

Methods

This study is a research and development (Research and Development) study. This development research procedure refers to the 4D model which is modified into 3 stages namely define, design, and develop. Formative evaluation is carried out at the development stage, including the validity test. Validation was carried out by 3 experts who judge the ethnoscience involved, subject matter, and media. Data analysis techniques used Aiken's V formula, namely:

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

The V value obtained is consulted with the validity criteria in Table 1 (Azwar, 2012).

Table 1. Scoring Criteria

No	Scoring Results	Feasibility Level
1	0.00 - 0.10	Invalid
2	0.11 - 0.30	Less valid
3	0.31 - 0.50	Fairly valid
4	0.51 - 0.80	Valid
5	0.81 - 1.00	Very Valid

The developed learning tool can be used in learning if it has met the valid minimum criteria, namely a scoring result of 0.51-0.80.

Results and Discussion

Validation of the learning tool was carried out by experts on ethno science-based learning tools which included modules, lesson plans, student worksheets, and values and character conservation questionnaires. In this case, the devices are overall in the category of valid and suitable for use in learning. This is in accordance with Rochmad (2012) who states that learning devices can be categorized as feasible if they meet the criteria of content and construct validity. The following is a summary of the results of the learning device validation by expert validators.

Table 2. Validation Data of Module

Assessment Aspects	Content Validity	Criteria
Suitability core competencies, basic competencies	0.91	Very valid
Conformity to needs	0.89	Very valid
Material accuracy	0.91	Very valid
Material expertise	0.83	Very valid
Benefits in adding insight	0.91	Very valid
Supporting the presentation	0.97	Very valid
Presentation of learning	0.86	Very valid
Ethnoscience principle	0.97	Very valid
Ethnoscience component	1.00	Very valid
Average	0.91	Very valid

Table 3. Validation Data of Lesson Plans

Assessment Aspects	Content Validity	Criteria
Formulation of learning objectives	0.93	Very valid
The contents presented	0.93	Very valid
Time Allocation	0.89	Very valid
Average	0.91	Very valid

Table 4. Validation Data of Student Worksheets

Assessment Aspects	Content Validity	Criteria
The contents presented	0.90	Very valid
Use of language	0.89	Very valid
Average	0.89	Very valid

Table 5. Validation Data of Questionnaire on the Value and Character of the Conservation

Assessment Aspects	Content Validity	Criteria
Theory	0.89	Very valid
Constructive	0.66	Valid
Use of Language	0.61	Valid
Average	0.72	Valid

Table 2, 3, 4, and 5 shows that the developed learning tools namely modules, lesson plan, student worksheet, and questionnaires are suitable for use in learning because they have met valid criteria that reach above the average value of at least 0.51-0.80. The learning kit was first revised according to the suggestions of the validators. Validation of the module gets a score of 0.91 which meets a very valid category. Of special note is that the ethnosience principle and ethnosience component scored 0.97 and 1.00 respectively that highly account for the overall validity of the module. Moreover, the module is packaged as attractive as possible so that it can help students to understand the lessons independently and can instill conservation character and behavior. The attractiveness of the module is reflected by the validator's score of 0.97 for presentation support (Table 1). The consequence of this finding is that, if teacher pays attention to local culture in learning, it will be easier for students to understand science material (Baker & Taylor, 1995; Jegede & Aikenhead, 1999; Michie, 2002; Erinosh, 2013). In order to obtain valid teaching materials, it is also necessary to pay attention to appearance to make it attractive to student (Nerita et al., 2018).

Second, the results of lesson plans validation were 0.91, which falls to a very valid category. The contents of the lesson plan that have been prepared have been adjusted to the provisions of Permen No. 22 of 2016 related to the development of indicators and requirements in determining learning objectives that must meet the ABCD component (audience, behavior, condition, and degree). The syntax in the lesson plan is also adjusted to the model suggested in the 2013 curriculum, namely the PBL (Problem Based Learning) model, which is integrated with the ethnosience concept.

Third, the result of student sheets validation was 0.89 which falls to a very valid category. The obtained score reflects that the student's sheets were arranged clearly, interestingly, and was complemented by ethnosience activities that helped students to translate public science into scientific science. Additionally, the student sheets used good and correct language according to EYD (Bahasa Indonesia newest guideline), so that during the learning process, the use of the

student sheets is easily understood by students (Dewi et al., 2019; Afza, 2016). Preparation of student worksheet is influenced by teachers understanding of the competency basic knowledge and skill as well the accuracy of the learning model used (Setiadi et al., 2019).

Fourth, the results of the questionnaire validation were of 0.72 which is classified as valid. This reflects that this questionnaire can be used to see the character values and conservation behaviors that are embedded after the ethnographic-based learning process. The character values that will be instilled are discipline, responsibility, curiosity, and politeness, whereas the conservation behavior that is instilled in the culture of disposing of waste in its place, saving water, and energy. When viewed from the aspect of the questionnaire assessment, several statements have been corrected and clarified according to the validator's advice. In addition, the questionnaire indicator has been modified to suit the values and character of conservation to be instilled in the students (Sumarni, 2018).

Conclusion

Based on the results of this study, it can be concluded that the developed ethnosience-based learning device meets the eligibility requirements both in terms of content and construct. These learning tools can be used in science learning, especially in chemistry learning.

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