

ARTICLE

Validity of LKPD (Student Worksheet) Based on Ethnoscience Integrated STEAM on Macromolecule Material for Senior High School Class XII

Vivi Alqhorina^a, Effendi^b

^aDepartment of Chemistry, Faculty of Mathematic and Science, Universitas Negeri Padang, Padang, Indonesia

^bDepartment of Chemistry, Faculty of Mathematic and Science, Universitas Negeri Padang, Padang, Indonesia

email: vivialqhorina@gmail.com

ABSTRACT

This research aims to determine the validity of LKPD (Student Worksheet) based on ethnoscience integrated STEAM on macromolecule material for senior highschool class XII. The type of this research is research and development or R&D with 4-D development models. The 4-D development model has four stages, namely define, design, develop, and disseminate. However, in this research, dissemination was not carried out. The instruments used in this study were content and construct validation questionnaires. This LKPD was validated by five validators including chemistry lecturers, FMIPA UNP, and chemistry teachers. The data obtained from the validation result were analyzed using Aiken's v scale. Based on the validity test questionnaire, the development LKPD has a validity level of 0.896 so it is included in the very valid category.

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1. Introduction

Education is a conscious effort to realize a cultural inheritance from one generation to the next (Rahman et al., 2022). The times have influenced and challenged education, so a learning approach that can develop skills in the 21st-century era is needed (Pujiati, 2020). Referring to the philosophical foundation of curriculum 2013, education is rooted in the nation's culture (Kemendikbud, 2013). Indonesian people have interesting local wisdom to be studied scientifically and applied in learning (Irawan & Muhartati, 2019). Ethnoscience is knowledge gained with the language and culture of a region and can be innovated in science learning (Abonyi et al., 2014). The application of ethnoscience in learning depends on the environment in which students live. Learning materials will be more understandable because they are related to the knowledge around them (Arfianawati et al., 2016). Ethnoscience-based learning can be combined with integrated approaches such as the STEAM (Science, Technology, Engineering,

Arts, and Mathematics) approach. Learning carried out with the STEAM approach makes students more creative to identify their abilities through science, technology, engineering, art, and mathematics. Then the learning process will be more fun and trigger 4C skills (Communication, Collaboration, Critical thinking & Problem Solving, and Creativity) (Catteral, 2017). The combination of Ethnoscience with the STEAM approach can be implemented in the form of teaching materials in the form of LKPD (Aqilla & Effendi, 2022). The advantage of using LKPD as teaching material is that it makes it easier for students to learn independently based on the tasks contained in the LKPD. The function of the LKPD is as a tool to optimize teaching with a limited time, helping students to be more active in the learning process, increasing learning motivation, and facilitating task completion both individually and in groups (Widjayanti, 2008:1).

Indonesia has a variety of cultures and local wisdom from various ethnic groups including natural wealth, dances, to the culinary specialties of an area. One of Indonesia's natural wealth is lokan, which is a type of shellfish that lives in the mangrove ecosystem (Antara & Yogantari, 2018). According to Cappenberg (2008) lokan are freshwater clams living on the riverbed, their bodies are soft, covered by shells, and not segmented. Lokan is widely used by the community to become a variety of culinary, one of which is Samba lokan.

Samba Lokan is a culinary preparation with the basic ingredients of lokan meat which is often found at the bottom of major rivers, including in Mukomuko Regency to the southern coast of West Sumatra. Lokan meat is a source of important macromolecules for the body such as protein, carbohydrates, and fat (Nadra, et al., 2020). The content of macromolecules found in lokan meat can be related to the material for SMA class XII, namely macromolecules. This is in line with KD. 3.7 Analyzing the structure, nomenclature, properties, and classification of macromolecules. Thus, students can learn topics in macromolecular material that are linked to the location as one of the natural resources owned by the area. In addition, referring to KD. 4.7 Analyzing the results of searching for information regarding the manufacture and impact of a macromolecular product, students will test the content of food ingredients to prove that the lokan meat contains macromolecules of carbohydrates and proteins.

This study aims to produce valid student worksheets. Based on a preliminary study conducted by interviewing chemistry teachers and students at SMAN 3 Mukomuko and SMAN 5 Mukomuko, the teacher revealed that he did not know about ethnoscience-based learning. Thus, there is no ethnoscience-based teaching material. Thus, ethnoscience learning has not been applied. There are several previous studies have developed Ethnoscience-based worksheets in Chemistry learning. Ethnoscience-based LKPD development on the concept of electrolyte and nonelectrolyte solutions by Pertiwi, et al (2021). Then, Aqilla and Effendi (2022) developed LKPD based on STEAM integrated ethnoscience which is applied to the material nature of chemistry. In addition, Siagian, et al., (2022) have also developed an Ethnoscience integrated electrolyte worksheet to train students' scientific literacy skills on food substances. Based on this description, the authors are interested in conducting research under the title Development of Macromolecule LKPD Based on Integrated STEAM Ethnoscience for Class XII SMA. It is hoped that the LKPD developed into appropriate teaching materials, to support learning in schools, and trigger critical thinking skills, creativity, and innovation in students. So that students can explore the chemical values that exist around the local wisdom where they live. It is hope that the LKPD that is developed will become a proper teaching material, in order to support learning in schools, triggering critical thinking skills, creativity and innovation in students. So that students can explore the chemical values that exist around the local wisdom where they live.

2. Method

The type of research used in the development of this LKPD is research and development (R&D) using a 4-D development model. According to Thiagarajan, et al (1974) in the 4-D development model, there are four stages Define, Design, Develop, and Disseminate. First, the define stage is carried out to analyze the obstacles faced in learning through Front-End Analysis, Learner Analysis, Task Analysis, Concept Analysis, and Specifying Instructional Objectives. Second, the design phase aims to design the product to be developed, namely LKPD by compiling a reference test, media selection, format selection, and initial design. Third, the development stage, namely the development of the product as a whole by conducting a validity test which aims to test the level of validity of the developed LKPD. However, due to time constraints, the dissemination stage was not carried out. The subjects in this study were three lecturers of the Department of Chemistry, Faculty of Mathematics and Sciences Universitas Negeri Padang, and two chemistry teachers from SMAN 3 Mukomuko.

The instrument used in collecting data in this study was content and construct validation questionnaire. The validity test was carried out by three chemistry lecturers from FMIPA UNP and two chemistry teachers from SMAN 3 Mukomuko. Aspects assessed in the validity test include the appropriateness of the content, presentation components, linguistic component, graphic component, and ethnoscience content. The validity test data obtained were analyzed using the following Aiken's V equation bellow.

$$V = \frac{\sum s}{n(c-1)} \text{ where } s = r - l_0$$

Description:

s = The score set by the validator minus the lowest score.

r = Validator choice category score

l_0 = The lowest score in the scoring category (1)

n = The number of validators

c = The number of categories selected by the validator

Furthermore, the value of each component was analyzed using a qualitative method to determine the level of validity of the developed LKPD. The criteria for the validity level can be seen in table 1 below.

Table 1. Validity category base on Aiken's V

No. of Items (m) or Raters (n)	Number of Rating Categories (c)											
	2		3		4		5		6		7	
	V	p	V	p	V	p	V	p	V	p	V	p
2							1.00	.040	1.00	.028	1.00	.020
3							1.00	.008	1.00	.005	1.00	.003
3			1.00	.037	1.00	.016	.92	.032	.87	.046	.89	.029
4					1.00	.004	.94	.008	.95	.004	.92	.006
4			1.00	.012	.92	.020	.88	.024	.85	.027	.83	.029

Source: Aiken's 1985.

3. Results and discussion

The validity rated involved experts consisting of three lecturers from the Department of Chemistry, FMIPA UNP and two chemistry teachers from SMAN 3 Mukomuko. The validity test data above is in accordance with the aspects assessed against the level of validity of the developed LKPD. The results of the validity test conducted by five validators on the macromolecular LKPD based on STEAM integrated ethnoscience for class XII SMA obtained the data in table 2 below.

Tabel 2. The Validity test of Student Worksheets

No	Rated aspect	V	Category
A. Component of Content			
1	Competency Achievement Indicators (IPK) in LKPD are formulated following Basic Competencies (KD).	0,900	Valid
2	The topics discussed in the LKPD are following the KD.	0,900	Valid
3	The pictures/tables/readings presented are following the basic competencies discussed in the LKPD.	0,950	Valid
4	The supporting information provided is relevant to the KD discussed in the LKPD.	0,900	Valid
5	The questions asked can guide students to find the concept of macromolecular material (polymers, carbohydrates, proteins).	0,900	Valid
6	The questions posed can lead students to conclude the concept of macromolecular material (polymers, carbohydrates, proteins).	0,850	Valid
7	The questions gave help students in strengthening macromolecular material (polymers, carbohydrates, proteins).	0,850	Valid
8	LKPD is useful for increasing students' insight into macromolecular material (polymers, carbohydrates, proteins).	0,950	Valid
Average		0,900	Valid
B. Presentation Component			
1	LKPD is presented systematically and contains topics on macromolecular material (polymers, carbohydrates, proteins).	0,900	Valid
2	The orientation video presented is related to the topics discussed in the LKPD.	0,850	Valid
3	The orientation video presented can build students' motivation regarding the topic of macromolecule material (polymers, carbohydrates, proteins)	0,850	Valid
4	LKPD provides complete information.	0,850	Valid
5	The STEAM approach is seen in the resulting LKPD.	0,950	Valid
Average		0,880	Valid
C. Language Component			
1	The language used in the orientation video and LKPD is communicative.	0,950	Valid
2	The language used in giving instructions is understandable and unambiguous.	0,850	Valid

3	Have used good and correct language following Indonesian Spelling (EBI).	0,800	Valid
4	The questions contained in the LKPD are asked clearly.	0,900	Valid
Average		0,875	Valid
D. Ethnoscience Content			Valid
1	Ethnoscience content themes are following the topics discussed in the LKPD.	0,900	Valid
2	LKPD can connect the subject matter with everyday life.	0,950	Valid
Average		0,925	Valid
E. Graphics Component			Valid
1	The type and size (font) of the letters used in the LKPD are precise and legible.	0,900	Valid
2	The pictures/photos presented on the LKPD can be seen clearly.	0,950	Valid
3	Proportional LKPD layout and layout.	0,900	Valid
4	The color combination in the LKPD is interesting.	0,900	Valid
5	The overall LKPD display design is attractive.	0,900	Valid
Average		0,910	Valid

Beside of that the validity test average of the LKPD (Student Worksheet) based on ethnoscience integrated STEAM on macromolecule material for senior highschool class XII all categories obtained on the graphic bellow.

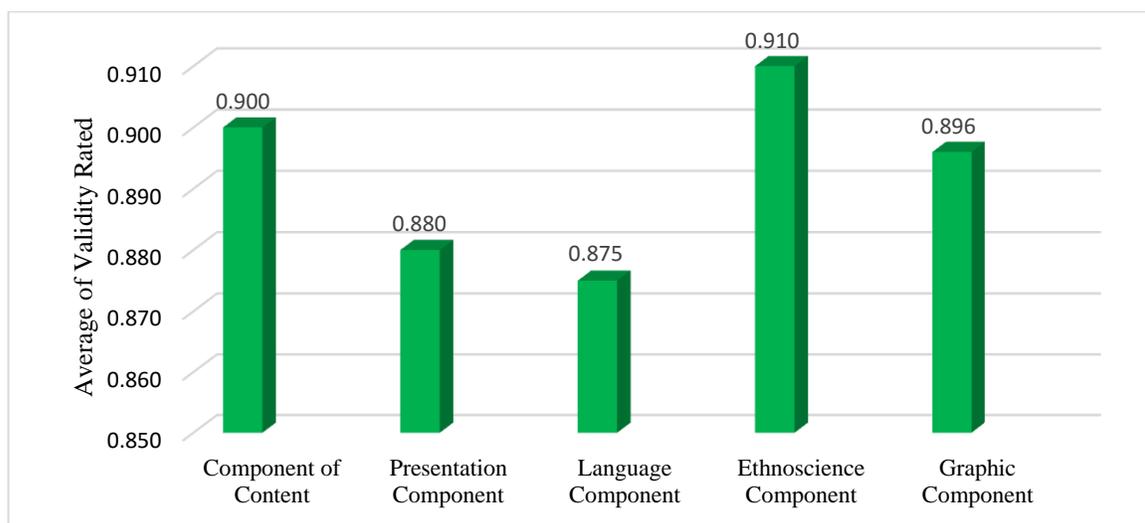


Figure 1. Graphic analyse of Validity

Based on the graphic, result analysis of the validity test showed that the average Aiken's V of each category are component of content 0,900, presentation component 0,880, language component 0,875, ethnoscience component 0,910 and graphic component 0,896. Results analysis of the validity test showed that the developed LKPD was valid with an average V value of 0.896. This value is included in the valid category.

4. Conclusion

Based on the results of the study, it can be concluded that the LKPD (Student Worksheet) based on ethnoscience integrated STEAM on macromolecule material for senior highschool class XII is declared valid with an average V value of 0.896 which is included in the very valid category. So that the LKPD (Student Worksheet) based on ethnoscience integrated STEAM on macromolecule material for senior highschool class XII that was developed can be tested at the next stage, namely practicality to test its feasibility to be applied in learning.

Acknowledgements

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