



# Validity and Practicality of the Ethnoscience-Based Design Thinking E-book

Diah Kartika Sari<sup>1\*</sup>, Yenny Anwar<sup>2</sup>, Eka Ad'hiya<sup>1</sup>, Sofia<sup>1</sup>, Rodi Edi<sup>1</sup>

<sup>1</sup>Chemistry Education, Universitas Sriwijaya, Palembang, Indonesia.

<sup>2</sup> Biology Education, Universitas Sriwijaya, Palembang, Indonesia.

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Corresponding Author:

Diah Kartika Sari

[diah\\_kartika\\_sari@fkip.unsri.ac.id](mailto:diah_kartika_sari@fkip.unsri.ac.id)

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**Abstract:** Design thinking is an innovation methodology that combines skills, processes and mindset. Design thinking is becoming increasingly popular in education as a way to encourage students to think critically, collaborate effectively, and develop innovative solutions to complex problems. Teachers and students can solve wicked problems creatively using design thinking. This research aims to determine the validity and practicality of an ethnoscience-based design thinking e-book. This research was conducted using walkthroughs and questionnaires. Validation data was analyzed using Cohen's Kappa while practicality data was analyzed using percentages. The results show that the ethnoscience-based design thinking textbook that was developed was said to be valid in aspects of design, systematics, substance and writing style. The textbooks being developed are also said to be very practical in terms of design, language, material and interest aspects.

**Keywords:** Design Thinking; Ethnoscience

## Introduction

The increasingly rapid development of the world and global changes in various aspects of life that are coming so quickly are a challenge for the nation in preparing future generations, including students. Therefore, in this modern era, education plays an important role in creating generations of people who are able to keep up with the pace of development of science and technology. Education is one of the determinants of the progress and decline of a nation's civilization (Rachmantika & Wardono, 2019). The world of education in the era of revolution 4.0 or better known as 21st century learning must make many changes, these changes include 21st century learning centered on students (student center), interactive learning where learning Currently there must be sufficient interaction between teachers and students in various forms of communication, active learning investigates where currently learning is recommended so that students must be more active by providing various questions that

they want to know the answers to and learning with real examples, where currently the examples are given appropriate to the context of everyday life and relevant to the material being taught (Amir, 2015; Suciono et al., 2020). Education as an effort to educate the nation places the ability to think as an important competency. The goal of the education system is educated people who are independent and can think effectively (Rahardhian, 2022).

Quality human resources have critical, systematic, logical, creative thinking and a willingness to work together effectively. Human resources, who have thoughts as mentioned, are produced from school educational institutions (Kurniati et al., 2016). Students' thinking abilities are very important to be developed and mastered because they are related to solving problems rationally, logically and systematically (Syifa et al., 2022). Thus, thinking abilities are important to have and start to be applied in design thinking.

Design thinking is considered to bring positive things to students, because students are invited to

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approach problems directly on the subject. They work in teams, think from multiple perspectives to answer challenges with great solutions. No matter how big the problem, and no matter how limited the circumstances faced, there is always optimism to make a change. This condition is supported by a learning atmosphere that allows students to make mistakes and learn from these experiences (Carroll, 2015; Baskoro & Haq, 2020). Design Thinking is a way to solve a problem practically and creatively and has a main focus on the target audience. In carrying out design thinking, there are 5 stages that must be carried out, namely empathize, define, ideate, prototype, and test. Design thinking itself is carried out to understand and produce the most effective solutions to obtain the desired results, thereby producing a product that is liked by many users. Design thinking is important to do because the decisions and ideas made are in the form of observations from the brand and target audience, not just from assumptions and data (Wiguna & Kurniawan, 2022).

What is special about design thinking is that the work process can help extract, teach, learn and apply human-centered techniques systematically in solving problems in a creative and innovative way in business, state, school and in everyday life. Design thinking is a series of processes that can trigger the latest innovations that can be used in research and development to find out problems, create new models and complete solutions using prototypes or prototypes. Design thinking abilities will be more based on new patterns of creation because the process focuses more on perception, possibility and practice activities (Gibbons, 2019; Kasri et al., 2021).

Design thinking is an innovation methodology that combines skills, processes and mindset. Design thinking is becoming increasingly popular in education as a way to encourage students to think critically, collaborate effectively, and develop innovative solutions to complex problems. Teachers and students can solve wicked problems creatively using design thinking. So, design thinking can help teachers and students solve every learning activity dilemma by thinking creatively (Luthfi & Septiyanti, 2023). By implementing Design Thinking, the learning process is able to collaborate with current needs by paying attention to various aspects of education and developing scientific abilities. Design Thinking also accommodates developing left brain abilities related to writing, language, science, mathematics, and logic skills while synergizing them with right brain abilities which explore creativity, spatial awareness, imagination, dimensions, music, art and others (Sofiana, 2014); Mintrom & Luetjens, 2016; Husein, 2018; Satria & Muntaha, 2021).

One source for design thinking is culture. culture is defined as; thoughts, customs, something that has

developed, something that has become a habit that is difficult to change (Sumarto, 2019). One of the cultural elements that can be integrated into science learning is the community knowledge system or what is known as ethnoscience (indigenous science). Science (Natural Science/IPA) and ethnoscience (original science) are two different things. Science is knowledge which is a collection of knowledge obtained systematically using scientific methods. Meanwhile, ethnoscience is community knowledge as a socio-cultural construction obtained in various ways, both scientific and non-scientific (Mukti et al., 2022). Indonesia is an archipelagic country stretching from Sabang to Merauke, which has various tribes, cultures, races, traditions, languages and beliefs. This diversity must be preserved, because it is a wealth that must be safeguarded, not used to separate one from another. Culture and traditions must always be implemented in life so that they are not lost or eroded by changing times. Culture is explained as all the results of the work, feelings, creations of society, which can be in the form of technology and material culture or physical objects (material culture) which must be carried out by humans to perpetuate the use of the natural surroundings, so that they are able to fulfill the needs of life (Nurmanita, 2021).

In the world of education, ethnoscience-based design thinking is needed. Thus, teaching materials are needed that explain ethnoscience-based design thinking that are valid and easy for students to use. Therefore, this research aims to determine the validity and practicality of an ethnoscience-based design thinking textbook.

## Method

In this research, a validity and practicality test of an ethnoscience-based design thinking textbook was carried out (Winarni, 2018).

### *Validity tests*

Validity tests are carried out by experts to assess content validity. The data collection technique used starts from a walkthrough. Walkthrough is one of the data collection techniques required in research. This walkthrough is carried out with experts, where determined experts will provide input and comments on the products that have been developed. This test was carried out by giving a questionnaire for responses and suggestions. The results of the questionnaire are used as a basis for improving the product so that it can be declared feasible or valid. The validation sheet that will be given to the validator is in the form of a Likert scale. The Likert scale contains five categories, namely very good (4), good (3), not good (2), very bad (1).

The instrument to be validated is given to the validator to get suggestions and get corrected directions for the product that has been developed by the researcher. The completed validation sheet is calculated using the Cohan's Kappa Index formula as follows:

$$K = \frac{fa - fc}{N - fc} \tag{1}$$

Information:

- K = Kappa consistency
- fa = Item agreed
- fc = 50% of items agree
- N = Total number of items

The results obtained from calculating the validation scores are then analyzed using validity score interpretation criteria which can be seen in the following Table 1.

**Table 1.** Validity Score Criteria

Kappa Value	The Power of Agreement
≤ 0.20	Bad
0.20 - 0.40	Less than moderate
0.41 - 0.60	Currently
0.61 - 0.80	Good
0.81 - 1.00	Very good

*Practicality test*

The practicality test was carried out using a survey technique using a questionnaire. The practicality questionnaire is calculated using the Guttman Scale as follows.

**Table 2.** Guttman Scale

Score	Information
Score 1	Yes
Score 0	No

Source: (Sugiyono, 2015)

Based on the Guttman Scale table listed, the data percentage is calculated using the following formula:

$$\text{Practicality} = \frac{\text{Total score of each statement}}{\text{Number of respondent} \times 100\%} \tag{2}$$

Source: (Irsalina & Dwiningsih, 2018)

The results of the questionnaire calculations are then analyzed using the practicality score interpretation criteria to determine the level of practicality which can be seen as follows.

**Table 3.** Score Criteria

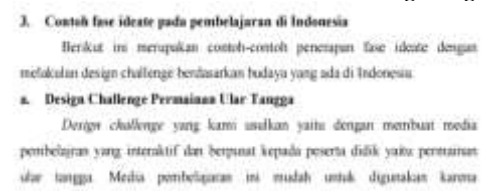
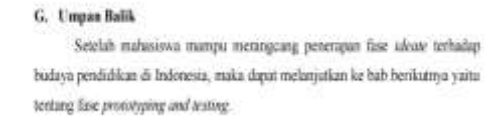
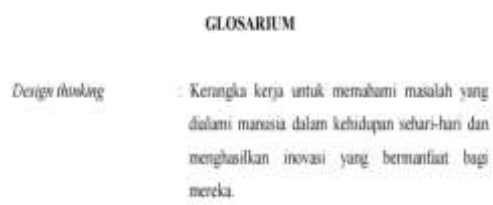
Percentage (%)	Category
0-20	Impractical
21-40	Less Practical
41-60	Quite Practical
61-80	Practical
81-100	Very Practical

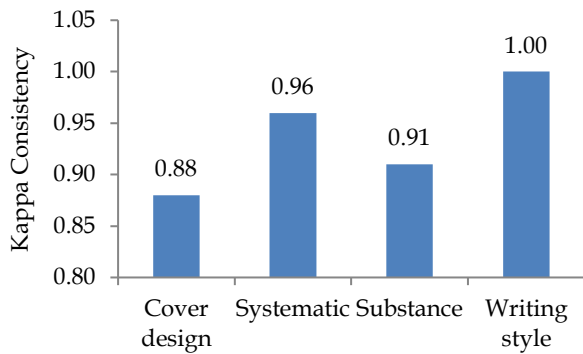
**Result and Discussion**

*Validation results*

Validation carried out by experts on ethnosience-based textbooks consists of several aspects, namely cover design and presentation of teaching materials, systematics of teaching materials, substance of teaching materials, and attachments. The validation results show that there are comments and suggestions provided by experts as shown in Table 4. Validity results for each aspect can be seen in Figure 1.

**Table 4.** Validation Comments

Comment	Repair
It is best to give examples in each chapter	Examples are given in each chapter, one of which is as shown in the following image:  
Each assignment is given feedback	There is feedback on each task, one of which is:  
There is no glossary yet	The product comes with a glossary:  

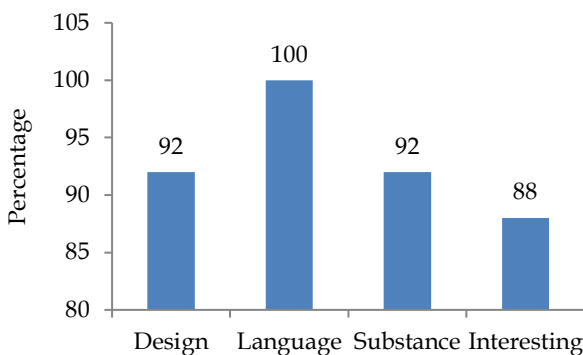


**Figure 1.** Result of Validity Test

Based on Figure 1, it can be seen that the kappa consistency value is more than 0.81, so it is included in the very good category. So it can be concluded that the ethnoscience-based design thinking textbook developed is valid for use. Validated products require improvement until the product developed is said to be suitable for use at the next stage. The validation results provide a significant influence in improving the product being developed. Furthermore, products that have excellent validity can be used as learning resources (Sastria et al., 2020).

*Practicality Test*

The practicality test was carried out on 4 aspects, namely design, language, material, and interest. The results of the practicality test can be seen in Figure 2.



**Figure 2.** Result of Practicality Test

Based on Figure 2, it can be seen that the percentage value for all aspects is above 81%, so it can be categorized as very practical. Thus, it can be concluded that the ethnoscience-based design thinking textbook is very practical. This shows that the ethnoscience-based design thinking textbook has used good and appropriate design, has used language according to enhanced spelling (EYD), the material and examples presented are in accordance with the topic and help students to

develop thinking skills, and can grow enthusiasm and curiosity in learning. Products that are tested on the aspects of validity and practicality are intended to see the extent of the feasibility of using the product. Excellent practical value means the book is easy to use and practical to carry everywhere. Good learning resources can be used easily and practically (Mustofa et al., 2016; Ponidi & Kristina, 2018; Agustiana, 2018; Yustitia et al., 2018; Setiawan et al., 2020; Nurhayati, 2020; Karma, 2021).

**Conclusion**

Based on the research results, it was concluded that the ethnoscience-based design thinking textbook that was developed was said to be valid in aspects of design, systematics, substance and writing style. The textbooks being developed are also said to be very practical in terms of design, language, material and interest aspects.

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**Author Contributions**

Diah Kartika Sari and Yenny Anwar conceptualized the research idea, designed of methodology, management and coordination responsibility; Eka Ad’hiya and Sofia analyzed data, conducted a research and investigation process; Rodi Edi conducted literature review and provided critical feedback on the manuscript.

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**Conflicts of interest**

The authors declared no conflict of interest.

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