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Fauziah Utami Tanjung, Festiyed

Department of Physics, Universitas Negeri Padang, Indonesia

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Validity of Authentic Assessment Instruments on Discovery Learning Model of Static Fluid Materials for Senior High School Grade XI

Fauziah Utami Tanjung[1*], Festiyed[2]
Department of Physics, Universitas Negeri Padang, Indonesia[1,2]

Corresponding Author's Email: utamifauziah000@gmail.com

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ABSTRACT

Addressing the challenges of the 21st century requires a strong emphasis on education. The core competencies referred to as the 4Cs—Communication, Collaboration, Critical Thinking, and Creativity—are central goals of the 2013 Curriculum, its revision, and the current prototype curriculum aimed at modernizing the learning process. To foster these competencies, effective assessment methods are essential. Assessments provide valuable insights to enhance both teaching and learning quality. The 2013 Curriculum particularly highlights the role of authentic assessment in evaluating student outcomes holistically. Motivated by this, the researchers developed an authentic assessment activity sheet integrated within a discovery learning model on static fluid topics for Grade XI high school students. The research adopts the ADDIE instructional design model, focusing on the development phase, specifically the validation process. The validation outcome, measured using Aiken's V index, indicates a strong level of validity, with an average score of 0.88.

Keywords: *Authentic Assessment; Discovery Learning; Static Fluids; Validity*

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INTRODUCTION

21st century. According to the National Education Standards Agency (BSNP), the learning framework for the 21st century requires students to master essential competencies categorized as learning and innovation skills—popularly known as the 4Cs: Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation. These skills are the core focus of the 2013 Curriculum, its revisions, and the prototype curriculum, all of which aim to rejuvenate and modernize current learning practices.

To effectively cultivate these competencies, an appropriate and comprehensive assessment method is necessary. In physics education, which often deals with real-world phenomena, assessments must also reflect real-life applications. Chang , in a study published in the *International Journal of Science and Mathematics*, emphasized that standardized tests such as multiple-choice questions are often insufficient in capturing students' real-world problem-solving abilities and attitudes. Therefore, the 2013 Curriculum advocates for authentic assessment as a more holistic approach to evaluating student learning.

John Mueller, as cited by Muri, describes authentic assessment as a process in which learners engage in real-world tasks that demonstrate meaningful application of their knowledge and skills. Numerous prior studies have explored the integration of authentic assessment within various learning models to enhance student performance. For example, Sari reported a significant improvement in science process skills through the application of Discovery Learning combined with authentic assessment, increasing from 82.05% to 97.43%. Similarly, Suhardi found that such assessments elevated students' physics achievement from 71% to 80%.

However, classroom realities often fall short of these expectations. Based on observations conducted during Educational Field Practice (PLK) at SMAN 1 Tigo Nagari (December 21–25, 2021), it was evident that students' mastery of 4C skills remained low. The assessments employed lacked contextual relevance to real-world scenarios, which hindered students' ability to analyze, interpret, and generate innovative ideas. This issue likely stems from the continued reliance on traditional methods such as lectures and discussions.

Additionally, interviews with physics teachers revealed that assessment practices were still centered primarily on cognitive aspects, with minimal attention given to skills and attitudes. Time constraints in designing assessment tools were also identified as a barrier.

To address this gap, the present study focuses on developing an authentic assessment instrument aligned with the Discovery Learning model on the topic of static fluids for 11th-grade students. While prior studies, such as that by Jelita , explored authentic assessment within Problem-Based Learning models, there remains a lack of valid instruments designed for Discovery Learning in the context of static fluid instruction. This research seeks to contribute a validated assessment product that supports the comprehensive goals of national education—beyond measuring knowledge, to fostering attitudes and practical competencies.

METHODS OF RESEARCH

This Research adopts a development research approach with the primary goal of creating a product in the form of an authentic assessment activity sheet. The design and development of this product follow established guidelines for constructing authentic assessments, as outlined in various educational manuals.

The purpose of this research is to evaluate the validity of an authentic assessment activity sheet specifically designed for the Discovery Learning model on static fluid topics for 11th-grade high school students. Validation is carried out by a panel of subject matter experts to identify the product's strengths and areas for improvement.

To guide the research process, the ADDIE instructional design model is employed, which includes five stages: Analysis, Design, Development, Implementation, and Evaluation. However, due to time constraints, this study is limited to the Development stage, particularly focusing on expert validation.

The first stage is analysis. This phase consists of two main components: a needs analysis and a curriculum analysis. The needs analysis involves interviews and questionnaires administered to physics teachers and students to determine the current state of assessment practices and instructional strategies. The curriculum analysis ensures that the assessment product aligns with national education standards. The second stage is the design stage, In this phase, problems identified during the analysis are addressed through conceptual planning and the drafting of an authentic assessment design. The design includes identifying intended learning outcomes, selecting authentic tasks, establishing assessment criteria, and constructing scoring rubrics. The third stage is development. The planned design is translated into a tangible product—an authentic assessment activity sheet. This draft product is submitted to four validation experts for review. Feedback and suggestions from the experts are used to refine and revise the product.

The validation instrument consists of components of content feasibility, language use, presentation feasibility, and graphics. Validation of the validity instrument is carried out by involving the validator 1. After the validity instrument is declared valid, product validation can be carried out by involving the four validators. The validator assigns a score as stated in the instrument using a Likert scale. Validity analysis for each criterion is sought using the equation from Aiken's V. Aiken's V calculates the content-validity coefficient based on the results of the assessment of the expert panel of n people on an item from terms of the extent to which the item represents the measured construct [9]. The equation of Aiken's V follows:

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

$$S = r - l_o$$

With information:
l_0 =lowest validity assessment score (eg 1)
c =highest validity assessment score (eg 5)
$\sum S$ =sum S of all validators
r =the score given by the validator
n =number of returners/validators

Table1. Aiken's V index Category

Score	Category
V≥0.88	Valid
V≤0.88	Invalid

(Aiken, 1985)

RESULT AND DISCUSSION

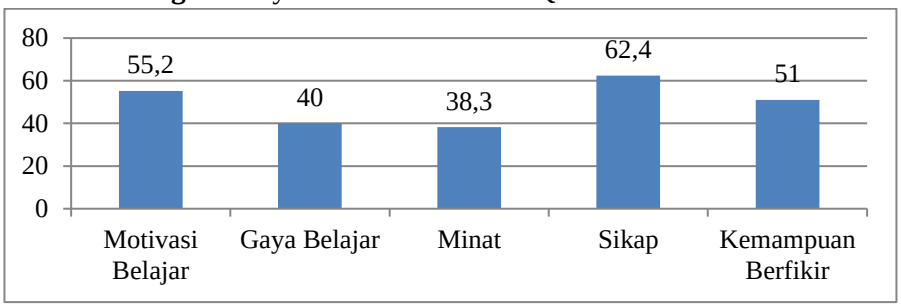
Research on Making this Authentic Assessment Activity Sheet conducted in accordance with the ADDIE learning system design model.

1. Analysis

At the analysis stage, there are two things, namely needs analysis and curriculum analysis. In the needs analysis, interviews and questionnaires were filled out by teachers and students of class XI MIPA 1 at SMAN 1 Tigo Nagari. Interviews with teachers were conducted regarding the use of learning models, learning media and how the assessment in the learning process was carried out. During the interview it was found that in the learning process there were deficiencies. Weaknesses can be seen from the absence of the use of learning models. The teacher only uses the lecture method and writes on the blackboard. And the teacher does not do a complete assessment in learning.

The students only learn through borrowed books from the library in insufficient numbers because there are still students who have not received books. In addition, the questions given by the teacher have not been linked to the real world so that students' thinking skills are low and the learning process at school has not implemented the assessment as a whole. Following are the results of the questionnaire analysis of student needs related to learning physics.

Fig1. Analysis of Student Needs Questionnaire



Based on Figure 1 on the analysis of student needs, almost all categories get low scores. The low category is the students' interest in learning with a figure of 38.3% and learning styles with a value of 40%. This proves that the interest and learning styles of students are low. For this reason, efforts are needed to increase student interest and change student learning styles. For the sufficient category, namely the indicators of learning motivation and students' thinking skills with a value of 55.2% and 51%, respectively. This proves that students' learning motivation and students' thinking abilities are sufficient, but efforts are still needed to improve them

2. Design

The writing of teaching material products in the teaching material guide from the Ministry of National Education was adapted into writing an authentic assessment based on the steps for making an authentic assessment proposed by Festiyed quoted from O'Malley . The step of making an authentic assessment consists of four stages:

a. Determining the Achievement of Final Ability
b. Choose an Authentics Assessment
c. Determine criteria
d. Create a rubric

3. Development
   a. Determining the Title of the Authentic Assessment Activity Sheet

   The title of the authentic assessment activity sheet is determined from the existing KD, main materials, or learning experiences contained in the curriculum. In this study, the KD used is KD 3.3, namely the material for Static Fluids. The material is used as the title of the assessment activity sheet because it describes what material will be presented in the assessment activity sheet that is made. Therefore, the product made is entitled "Authentic Assessment Activity Sheet on the Discovery Learning model of Static Fluid material for Class XI High School Students"

   b. Writing Authentic Assessment Activity Sheet

   Product An authentic assessment activity sheet is made using the steps for writing LKPD teaching materials from the Ministry of National Education.[12]

   1) Cover

   The front cover contains the title of the material, the name of the assessment product, a description of the level of education, a description of the class, a description of the semester and illustrations

Fig2. Front Cover

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2) Foreword

Fig3. Foreword

3) Table of contents

Fig4. Table of contents

4) General instructions

Fig5. General Instructions

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5) Basic Competencies and Indicators

Fig6. Basic Competencies and Indicators

6) Cover of learning material

Fig7. Cover Learning Materials

7) Learning materials

Fig8. Theory

8) Tasks and learning activities

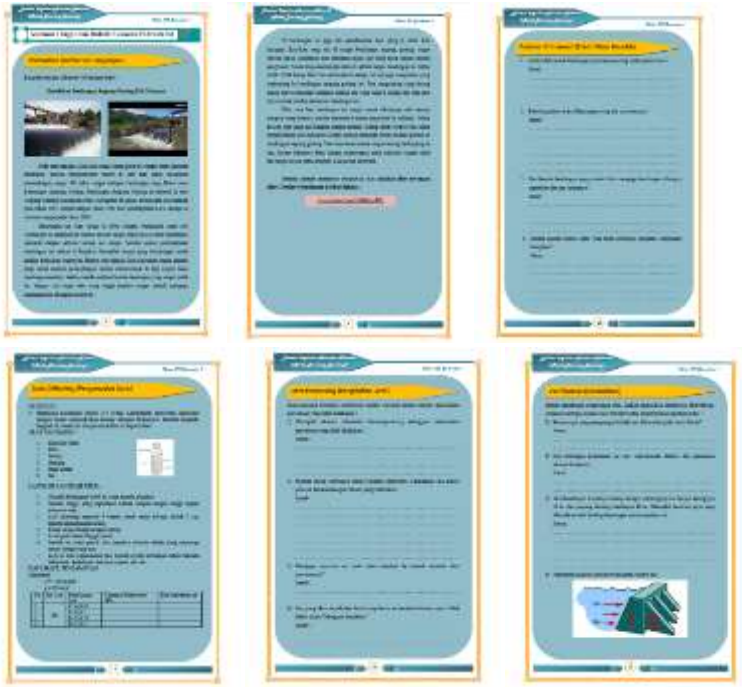

Fig9. Tasks and Learning Activities

9) Assessment rubric

Fig10. Assessment rubric

10) Evaluation Questions

Fig11. Evaluation Questions

11) References

Fig12. Bibliography

c. Authentic Assessment Validation

Authentic Assessment Activity Sheet on the Discovery Learning model of Static Fluids for Class XI SMA students designed to be validated by 4 experts. Based on the average value of each assessment component on the validation sheet, according to the experts, the average value for all components of the validation assessment can be determined. The components of the assessment include: 1) Content feasibility component, 2) Language use component, 3) Construction/presentation feasibility component, and 4) Assessment graphic feasibility component. The description of the results of the validation assessment of the content feasibility component which is broken down into several indicators is shown in the following figure 13.

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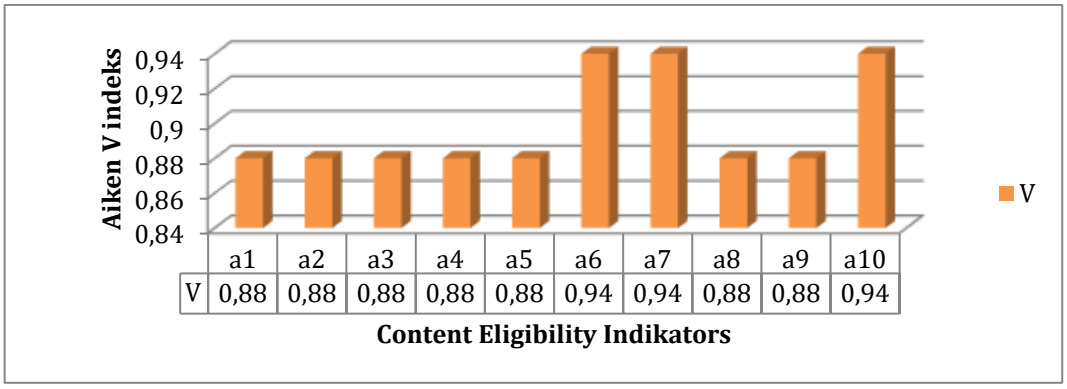

Fig13. Description of Content Feasibility Component Validation Assessment Results

Based on Figure 13, it can be seen that the validation value of the Aiken V index of the content feasibility component consists of 10 indicators ranging between 0.88 and 0.94. The lowest validation value of 0.88 is found in several indicators. From the data, the average value of validation on the feasibility component of the contents of the Authentic Assessment Activity Sheet on the Discovery Learning Model for Static Fluid Materials for Class XI High School Students is 0.893. Which means that the content feasibility component is in the valid category.

The description of the results of the validation assessment of the language use component which is broken down into several indicators is shown in the following figure:

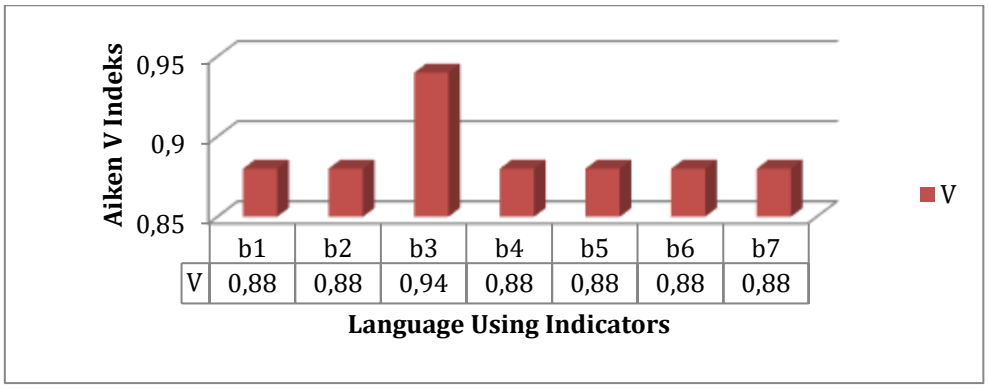

Fig14. Description of the Results of the Assessment of the Validity of the Language Use Components

Based on Figure 14, it can be seen that the validation value of the content feasibility component consists of 7 indicatorswhich ranged from 0.88 to 0.94. The highest indicator value is in accordance with the Indonesian language rules. From the data, the average value of validation on the language use component on the Authentic Assessment Activity Sheet on the Discovery Learning Model for Static Fluid Materials for Class XI High School Students is 0.88. According to the Aiken V' category, this value is categorized as valid and according to experts it is valid.The description of the results of the validation assessment of the presentation

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feasibility component which is described into several indicators is shown in the following figure 15.

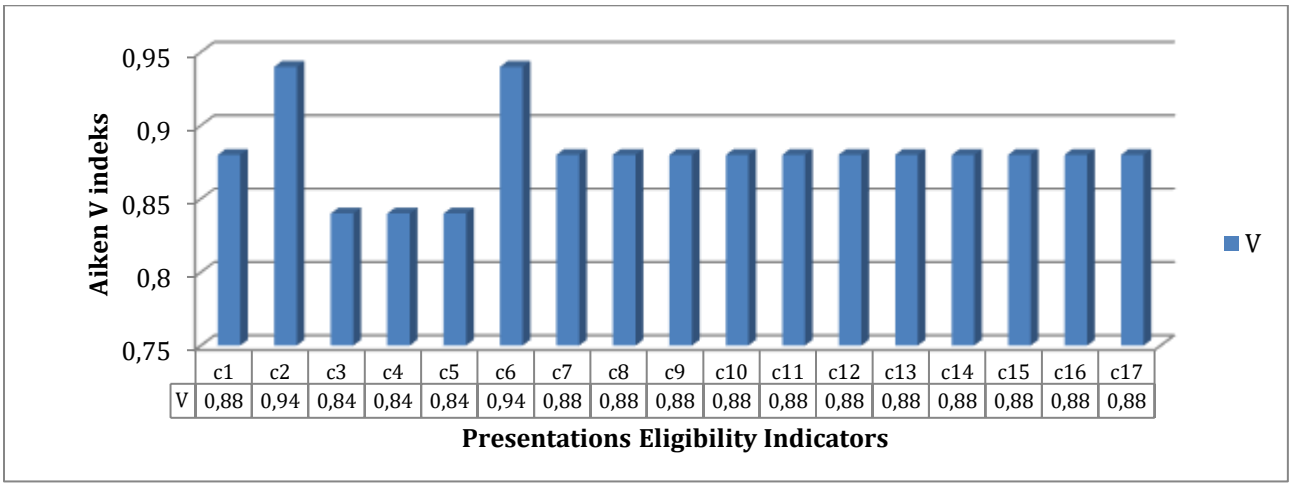

Fig15. Description of the results of the assessment of the Validity of the Components of Feasibility of Presentation

Based on Figure 15, it can be seen that the validation value of the presentation feasibility component consists of 17 indicatorswhich ranged from 0.88 to 0.94. For the highest indicator value 0.94, namelyThe assessment command in the Problem statement syntax is related to Stimulation and the assessment command in the Generalization syntax is related to the previous syntax.. From the data, the average value of validation on the presentation feasibility component on the Authentic Assessment Activity Sheet on the Discovery Learning Model for Static Fluid Materials for Class XI High School Students is 0.882. According to the Aiken V' category, this value is categorized as valid and according to experts it is valid.

The description of the results of the validation assessment of the graphic component which is broken down into several indicators is shown in the following figure 16.

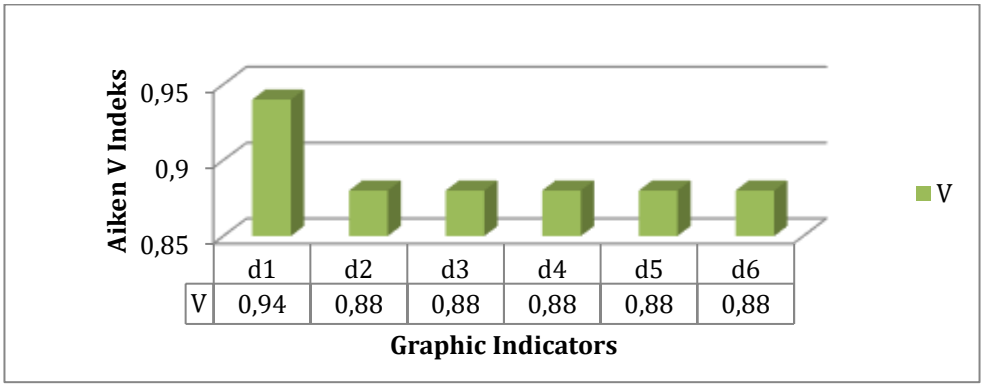

Fig16. Description of Graphical Component Validation Assessment Results

Based on Figure 16, it can be seen that the validation value of the Assessment Graphics component consists of 6 indicators ranging from 0.88 to 0.94. The highest indicator value is 0.94, namely the use of writing components (font, type and size) in the assessment is appropriate. From the data, the average value of validation on the Graphic component on the Authentic Assessment Activity Sheet on the Static Fluid Material Discovery Learning Model for Class XI High School Students is 0.885. According to Aiken's V category, this value has been categorized as valid and according to experts it is valid and suitable for use in learning physics.

Based on the average value of each assessment component on the validation sheet, according to the experts, the average value for all components of the validation assessment can be determined. The components of the assessment include: 1) Content feasibility component, 2) Language use component, 3) Construction/presentation feasibility component, and 4) Assessment graphic feasibility component. The results of the plot of the average value of each assessment component can also be made in the form of a bar graph which can be seen in the following figure.

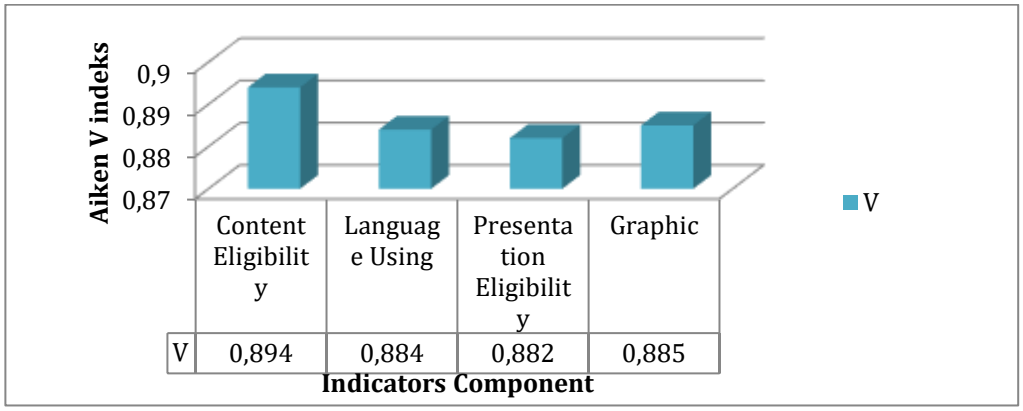

Fig17. Description of the Average Validation Assessment of each component

The data contained in the graph in Figure 17 can be explained that the value of each component is not too varied, ranging from 0.882 to 0.894. The value of the validation results according to the experts on the authentic assessment as a whole is in the valid category. The average obtained from the

CONCLUSION

Based on the development and results of the research conducted on the Authentic Assessment Activity Sheet for the Discovery Learning Model on Static Fluids for 11th-grade high school students, the following conclusions can be drawn:

1. The Authentic Assessment Activity Sheet for the Discovery Learning Model on Static Fluids has a validity rating of 0.886, with an average score of 0.886.

2. The Authentic Assessment Activity Sheet for the Discovery Learning Model on Static Fluids has a very practical rating, with a rating of 82% according to teachers and 82.3% according to students.

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