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# THE VALIDITY OF AUTHENTIC ASSESSMENT INSTRUMENTS IN THE POE OF DYNAMIC FLUID MATERIALS FOR HIGH SCHOOL

Dinda Yanuar[1,*], Festiyed[1]

[1] Universitas Negeri Padang, Padang, Indonesia
Corresponding author email: dindayanuar8@gmail.com

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**Abstract :**
The era of revolution 4.0 will be marked by the development of science and technology that is increasingly rapid and advanced. The rapid development of science and technology is a challenge for the world of education. Ongoing learning must facilitate the acquisition of student skills such as collaboration, creativity, literacy, communication, and critical thinking. To answer these challenges, the government has taken various initiatives to improve the quality of education in Indonesia, including improving the curriculum, providing school facilities and infrastructure, and improving teacher professionalism. Advances in educational theory by educational professionals have also led to developing different learning models that school teachers can apply. However, one thing that has not received much attention is the assessment or assessment system. This study aimed to determine the validity of an authentic assessment of the POE model of fluid dynamics for class XI high school. The model used in this research is the ADDIE development model design. The assessment of the validity of an authentic assessment of the POE model of fluid dynamics for class XI high school, according to three experts, uses Aiken's V formula, which is 0.87 with a valid category. So that the authentic assessment of the class XI high school fluid dynamics POE model created is in the valid category.

Keywords: Authentic Assessment, Dinamic Fluid, POE Model



## INTRODUCTION

The Revolutionary Era 4.0 will be marked by increasingly rapid and advanced developments in science and technology. The rapid development of science and technology is a challenge for the world of education. Ongoing learning should facilitate the acquisition of student skills such as collaboration, creativity, literacy, communication, and critical thinking (Asrizal et al., 2018; Astalini et al, 2022; Nwune et al, 2023; Yusnidar et al, 2023; Aningrum et al, 2024; Alvisari et al, 2024). To answer these challenges, the government has taken various initiatives to improve the quality of education in Indonesia, including improving the curriculum, providing school facilities and infrastructure, and increasing teacher professionalism. Advances in educational theory by educational professionals have also led to the development of different learning models that can be applied by school teachers (Buti & Ansyah,

2024; Arjad & Farid, 2024; Nugroho et al, 2024). However, one thing that has not received much attention is the assessment or assessment system. Assessment is a systematic process that involves gathering information (numeric, descriptive, verbal), analyzing and interpreting information, and making decisions (Festiyed, 2017).

In the 2013 curriculum, the revised 2013 curriculum and the prototype of the change pressure were carried out on a complete assessment for three aspects, namely aspects of attitudes, knowledge, and skills. Because if only using standardized assessment makes it difficult to assess the achievement of learning objectives.

Previously there have been other researchers who have made several attempts to make authentic assessments including the Sania research (2019) (Aprisilia et al., 2019) on the research on Making Authentic Assessments Learning Cycle 5E Learning Model Material Momentum, Impulse and Simple Harmonic Motion for SMA which focuses on making assessments authentic measurable valid. Selvia's research (2020) (Silvia et al, 2020) on the Validity study of the Authentic Assessment of the Learning Cycle 5E Learning Model Containing Learners' Critical Thinking Skills in the Business and Energy Materials, Momentum and Impulse Materials states that a validation value of 87% means that the authentic assessment can be used in physics learning.

However, the reality on the ground has not described the expected conditions. The results of interviews obtained when carrying out Education Field (PLK) at SMA Painan, Pesisir Selatan Regency, West Sumatra Province to one of the physics teachers on July 21 - December 18, 2021, it was found that the implementation of assessment instrument has not been applied optimally and according to the learning model used. Students use worksheets and books available in the library. After the teacher explains the learning material, the students do the exercises given by the teacher. And so on until the semester exam is carried out. Assessment is measured through assignments in the form of exercises, daily tests, mid-semester exams and semester exams. For the skills aspect, practical activities are carried out but do not take place regularly for each material. Because the tools to do the practicum are inadequate so that the practicum cannot be carried out on every material. As for the attitude aspect, an assessment is given at the end of the semester by determining students who are good and students who have problems. So that the assessment only focuses on aspects of knowledge, while aspects of attitudes and skills are still not well implemented. So, the assessment only focuses on the knowledge aspect, while the attitude and skills aspects are still not implemented well. Therefore, in this research, an assessment design was created that includes three aspects, namely attitudes, knowledge and skills. Understanding of dynamic fluid concepts among high school students is 22.86%, so the material used by researchers is dynamic fluid. This is because there are too many formulas, too many computational problems, and students do not understand dynamic fluid material (Aprita et al., 2015).

The solution to the problem above is to make an authentic assessment that can measure all aspects of students during the learning process. Authentic assessment is an assessment that takes place through the presentation or appearance of students in the form of work on certain tasks or activities that have direct educational meaning (Irsyad & Sukaesih, 2015; Ridwan et al, 2024; Sugini et al, 2024). Authentic assessment research has been carried out for a long time, such as research by Rahma (2015) (Rahma Jelita et al., 2015) Application of Problem Based Learning Model with Authentic Assessment on Vibration, Waves, Sound, and Light Materials on the Science Competence of Class VIII Students of SMP Kubung. This research focuses on competence students use the PBL model, while there is no research on making authentic assessments using the POE model. The POE learning model is a model that invites students to predict or propose hypotheses and consider the results (prediction), students conduct experiments and observe and record the results of their experiments (observation), students draw conclusions from problems by analyzing experimental results, comparing experimental results with hypotheses previously described the agreement and discrepancy between the hypothesis and the experimental results (explanation) (Liew & Treagust, 1998). Based on the description above, researchers are interested in creating an authentic assessment instrument on POE model fluid dynamic material for class XI SMA that is valid.

## RESEARCH METHOD

This research is focused on making authentic assessment products in the form of authenticity activity sheets. To make an authentic assessment, the steps used are the design of the ADDIE

development model. The ADDIE development model design is a learning design model based on an effective and efficient systems approach and an interactive process. In other words, the results of the evaluation of each phase can advance the development of learning to the next phase (Ibrahim, 2011; Utaya et al, 2024; Rachmawati et al, 2024). The design of the ADDIE learning model consists of 5 main steps, namely analysis, design,development, implementation, and evaluation.

The analysis stage is the first step that must be done in making a product. In this phase, there are three things that are analyzed, namely analysis of student needs, curriculum analysis, and analysis of student characteristics. The design stage is to design an authentic assessment that will be made by choosing an authentic task, determining criteria, creating a rubric, and the initial design of the product. At the development stage, an assessment is produced in the form of an authentic assessment instrument product that can measure the competence of attitudes, knowledge, and skills of students during the learning process. At this stage, the researcher will do the validation test and product revision. Due to the limited time the researcher had, this research was limited to stage three.

Assessment product validation is carried out by three experts who are experts in their fields. carried out data analysis. The instrument used to assess the validity of the product is an expert validation sheet. There are 4 components that are validated in an authentic assessment product, namely content feasibility, language use, presentation feasibility, and graphics. This research instrument uses a Likert scale with a score range of 1-5. The data analysis technique used in this study uses the Aiken's V formula as follows.

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

$$\mathbf{s} = r - l_o$$

Description:
V = Validity index
s = score
n = Number of validators
$l_o$ = The lowest validity rating score (in this case = 1)
c = The highest validation assessment score (in this case = 5)
r = Score given by the validator

Validation value obtained later matched with Aiken's V index criteria in Table 1.

Table 1. Aiken's V Index Category

| Final Score (%) | Category |
|---|---|
| V ≤0,4 | Less |
| 0,4 <V≤0,8 | Medium |
| 0,8 <V | Valid |

(Retnawati, 2016)

## RESULTS AND DISCUSSION

Based on the research conducted, the research results were obtained in the form of an authentic assessment activity sheet on the POE model of dynamic fluid materials. The results of the study followed the stages of the ADDIE learning model design as follows.

### *Analysis*

This stage of analysis includes needs analysis, curriculum analysis and student analysis. Needs analysis, this analysis stage is collected from interviews obtained when carrying out Education Field (PLK) at SMA Painan, Pesisir Selatan Regency, West Sumatra Province to one of the physics teachers on July 21 - December 18 2021, it was found that the implementation of learning physics at school has not run optimally. The assessment system only focuses on aspects of knowledge, while aspects of attitudes and skills are still not well implemented. Curriculum analysis, at this stage the researcher observes the characteristics of the curriculum used in the studied schools. This is done to ensure that the manufacture of authentic assessment products can meet the requirements of the applicable curriculum.

In addition, examine the KI and KD in the curriculum to determine the material and objectives for each indicator. In creating an authentic assessment product, the material chosen is KD 3.4. This KD material was chosen because it is in accordance with the purpose of authentic assessment, its application itself is close to the real life of students. Analysis of student characteristics, at this stage an analysis is carried out to identify interests, attitudes, learning motivation, and student learning styles related to learning physics. This is done with the aim that the manufacture of products in accordance with the character of students. Figure 1 shows the results of the student personality analysis.

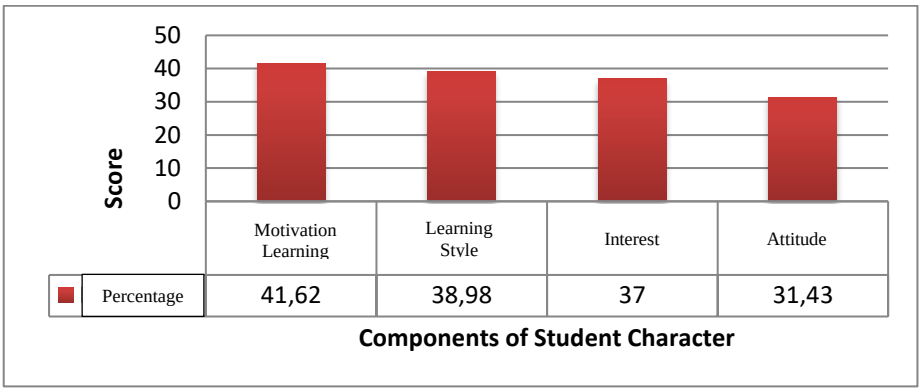


Figure 1. Components of Student Character

Figure 1 shows that the components of learning motivation are included in the sufficient category. While the components of learning styles, interests, and attitudes are included in the weak category. In order to improve the character of students, evaluation should be focused not only on the knowledge aspect, but also on the attitude and skill aspects. An assessment that can assess these three aspects is an authentic assessment. According to Irsyad (2015), authentic assessment is an assessment carried out through the presentation or performance of students in the form of carrying out certain tasks or various activities that have direct educational meaning.

***Design***

a. Selecting authentic assignments, authentic assignments are selected based on the results of curriculum analysis and final performance determination at the authentic assessment design stage. Authentic assessment tasks relate to cases in students' daily lives in the form of student assessment worksheets.
b. Determination of criteria, the determined criteria are outlined in the form of an authentic assessment rubric for each POE syntax.
c. Making a rubik, in the form of a rubric that is made containing instructions and a brief description of student activities, as well as the metrics needed for the scale method.

3. Development

Authentic assessment sheets are written with a writing structure including cover, table of contents, study instructions, competencies (KI, KD, indicators, and learning objectives), authentic assignments, evaluation questions, and bibliography.assessment sheet authentic made, there are steps for the POE learning model consisting of prediction (prediction), observation (observation), and explanation (explaining). The parts of the authentic assessment activity sheet that have been made can be described as follows.

a. Cover

On the cover is written the title of the Physics subject, the material taken is dynamic fluid, product description of the authentic assessment activity sheet on the POE model which is intended for SMA/MA class XI education. On the cover page there are also several illustrations that represent the application of the concept of dynamic fluid materials including flower sprinklers, water reservoirs, and airplanes.

Figure 2. Shown cover

b. Table of contents

Table of contents is intended to make it easier for authentic assessment users to view the contents and find learning activities for each authentic assessment sub-material carried out


Figure 3. Table of Contents

c. Learning instructions

Learning instructions are made with the aim of facilitating the process of using authentic assessment sheets in the learning process.


Figure 4. Display of Learning Instructions

d. Competencies achieved

Core competencies and basic learning on authentic assessment worksheets to provide an overview of the learning to be implemented.

Figure 5. Display of Competence and Indicators

e. Title The
Title has illustration images related to sub-materials and group identity.

Figure 6. Display The Title of The Sub Material

f. Material description The
Instructions in this material include the material described in the authentic assessment activity sheet. The material is introduced briefly to support learning and contains key concepts for students' initial reference.

Figure 7. Display of Material Description

g. Assessment
1) Task
The tasks performed by students in the authentic assessment activity sheet are in accordance with the syntax sequence in the POE model which consists of prediction, observation, and explanation syntax.

Figure 8. Task

2) Evaluation

Questions The display of evaluation questions in this assessment is in the form of questions that describe the cognitive domain of students.

Figure 9. Evaluation Questions

3) Assessment

Rubric based on the syntax of the learning model. In making this product, the model used is POE with prediction, observation, and explanation syntax.

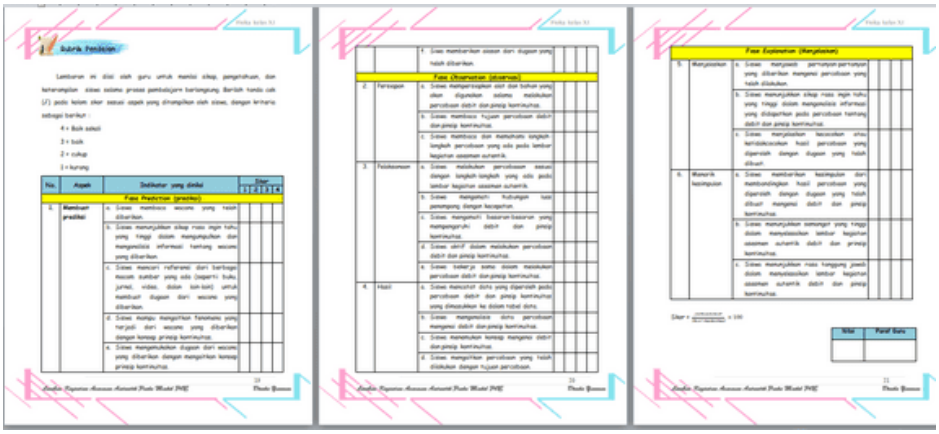

Figure 10. Appearance of The Scoring Rubric

h. Bibliography

This bibliography contains references used as sources in writing authentic assessment activity sheets.

Figure 11. Bibliography

Validation of authentic assessment products on the POE model of dynamic fluid materials for class XI High school designed by three experts in their fields. Based on the validation instrument there are four components that are analyzed by experts to get a valid product. Each component consists of several indicators. The assessment components used are content feasibility components (A), language use (B), presentation feasibility (C), and graphics (D).

The first component of the validation instrument is about the feasibility of the content which is broken down into several indicators. The content feasibility assessment component consists of seven indicators. These indicators include: the suitability of the material with learning outcomes (A1), the assessment content refers to the dynamic fluid material indicators (A2), the learning objectives are described in the content of the dynamic fluid material assessment (A3), the integration of dynamic fluid material presented in the assessment is appropriate (A4 ), the assessment of dynamic fluid material provides information in the form of new insights to students (A5), the assessment contains instructions that can make students able to solve problems on dynamic fluid materials using scientific methods according to student development (A6), the assessment contains instructions that can make students improve the student's mindset is in accordance with student development (A7), activities in the assessment of dynamic fluid materials instill social values (A8), the assessment is bound only to dynamic fluid materials and POE syntax only (A9). The results of the validation of this content feasibility indicator can be seen in Figure 12.

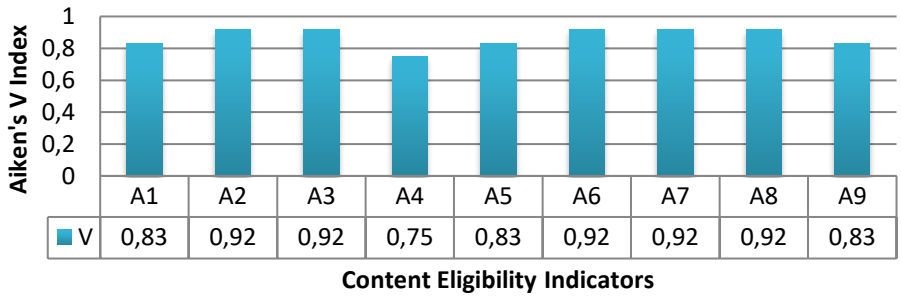


Figure 12. The Results of The Validation of The Content Feasibility Indicator

Based on Figure 12, it was found that the Aiken's V index of the content feasibility component of the nine indicators was between 0.75-0.92. Of the nine indicators, there is one indicator with a moderate category, namely 0.75 and the remaining indicators are categorized as valid. The average value of the data obtained on the component feasibility of authentic assessment content in the POE model of fluid dynamics is 0.87 with a valid category.

The second component of the validation instrument on the use of language is broken down into seven indicators. These indicators include: the sentences used in the fluid dynamics material assessment are correct (B1), the sentences used in the fluid dynamics material assessment are easy to understand (B2), the information in the assessment, both instructions and instructions for the dynamic fluid material assessment, is clear (B3). used in the dynamic fluid material assessment in accordance with the Indonesian language rules (B4), the use of punctuation in writing on the dynamic fluid material assessment is correct (B5), the writing of terms in the dynamic fluid material assessment is correct (B6), the use of language in the dynamic fluid material assessment is correct (B6). fluid dynamic material assessment has been effective (B7). The results of the validation of this language use indicator can be seen in Figure 13.

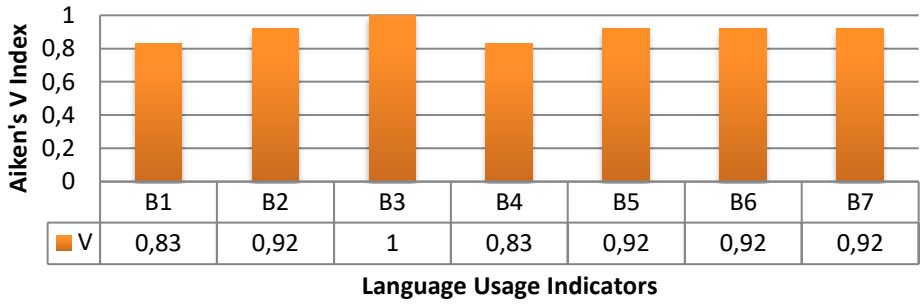


Figure 13. Results of Validation of Language Use Indicators

Based on Figure 13, it was found that the Aiken's V index of the language use components of the seven indicators was between 0.83-1. Of the seven indicators, all of them are categorized as valid. The average value of the data obtained on the component feasibility of authentic assessment content in the POE model of fluid dynamics is 0.90 with a valid category.

The third component of the validation instrument regarding the feasibility of presentation is broken down into fourteen indicators. These indicators include: the order of the dynamic fluid material assessment structure is in accordance with the Ministry of National Education (C1), the dynamic fluid material assessment command in the prediction syntax is in accordance with the indicator (C2), the dynamic fluid material assessment order in the observation syntax is interconnected with the explanation (C3), the command Assessment of dynamic fluid material in explanation syntax is related to the previous syntax (C4), Assessment of dynamic fluid material can encourage students to work in contextual practice (C5), assessment of fluid dynamics material allows interaction between fellow students (C6), assessment of fluid material dynamics allows interaction between teachers and students (C7), there is a syntax of steps from the POE learning model in fluid dynamic material assessment (C8), POE steps in dynamic

fluid material assessment are coherent/structured (C9), fluid material assessment dynamics makes students learn independently (C10), fluid material assessment dynamically develop students' communication skills (C11), assessments make students more creative (C12), assessments can make students solve problems by understanding dynamic fluid material (C13), dynamic fluid material assessments provide information and commands that students need during the learning process (C14) . The results of the validation of this presentation feasibility indicator can be seen in Figure 14.

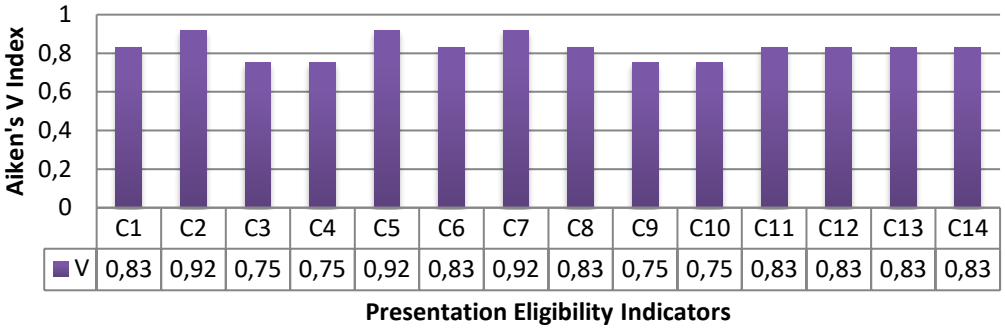


Figure14. The Results of The Validation of The Presentation Feasibility Indicator

Based on Figure 14, it was found that the Aiken's V index of the presentation feasibility component of the seven indicators was between 0.75-0.92. Of the 14 indicators, there are 4 indicators with a moderate category, namely 0.75 and the remaining indicators are classified as valid categories ranging from 0.83-0.92. The average value of the data obtained on the components of authenticity assessment content feasibility in the POE model of fluid dynamics material is 0.83 with a valid category.

The fourth component of the validation instrument is about graphics which is broken down into six indicators. These indicators include: the use of writing components (font, type, and size) in the assessment is appropriate (D1), the layout of titles and subtitles in the dynamic fluid material assessment is attractive (D2), placement of illustrations, pictures, and photos in the assessment. the dynamic fluid material assessment is correct (D3), the selected image/photo as an illustration in the dynamic fluid material assessment comes from a phenomenon close to real life (D4), the overall design of the dynamic fluid material assessment looks attractive (D5), the color combination on the cover and each sheet of dynamic fluid material assessment is proportional (D6). The results of this graphical indicator validation can be seen in Figure 15.

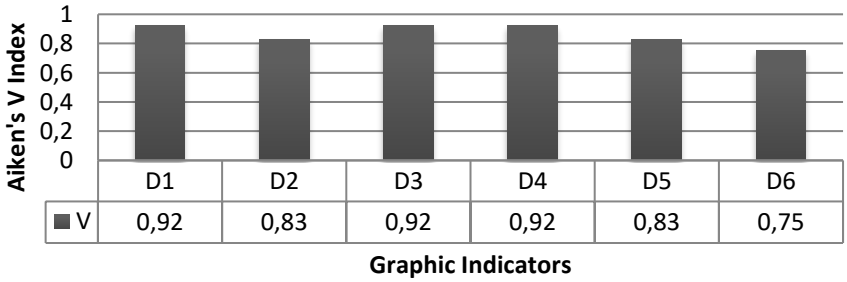


Figure 15. Graphical Indicator Validation Results Based

On figure 15, it was found that the Aiken's V index of the graphical components of the 6 indicators was between 0.75-0.92. Of the 6 indicators, there is 1 indicator with a moderate category, namely 0.75 and the remaining indicators are classified as valid categories ranging from 0.83-0.92. The average value of the data obtained on the graphical component of an authentic assessment of the POE model of fluid dynamics is 0.86 with a valid category.

Based on the average value of each assessment component on the validation sheet according to experts, it can be seen in Figure 16 below.

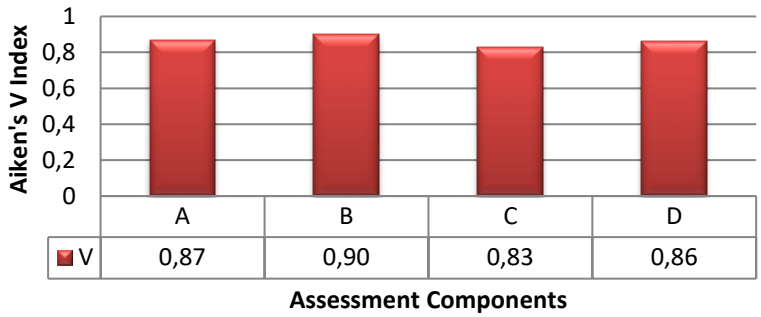


Figure 16. Validation Results of Authentic Assessment Validation Components

From Figure 16 above, it can be explained that each component of Aiken's V index varies between 0.85-0.93. The results of authentic assessment validation on the POE model of dynamic fluid material for class XI SMA according to experts were obtained at 0.87 with a valid category.

The validity of authentic assessments is obtained from the results of validation carried out by experts. Based on the criteria used to determine the quality of the results of making authentic assessments, it was found that the authentic assessments produced in this research met the valid category. The instrument used to determine the validity of a product is using a validation sheet. Based on the results of the validation analysis, the assessment components include four components, namely content appropriateness, language use, presentation and graphic components. The analysis results show the average value of the Aiken's V index is 0.87 for all assessment components. This means that the product produced meets the valid category. This means that the authentic assessment product of the POE model of dynamic fluid material for class XI SMA can be used in learning. The results obtained from the validation carried out by the validator show that the authentic assessment created can be used with appropriate revisions. The revision provided is in the form of improvements to the use of units. As stated by Borg & Gall (2002), in development research, the initial product being developed must be validated or revised based on expert input before use. The evaluation carried out at this stage revises the product according to the suggestions given by the validator.

## CONCLUSION

The inquiry learning model is a learning model that prepares students in situations to conduct their own experiments so that they can think critically to seek and find answers to a questionable problem. Inquiry allows students to have free space for students to learn, but provides clear boundaries of exploration. Learning science in the 21st century requires educators to better prepare dynamic learning outcomes. Students are required to be more independent in learning. Reliance on learning that does not support students discovering concepts should be reduced. It is important to apply inquiry learning because learning does not only focus on knowledge, but on students' process skills. Inquiry learning with a core activity in the form of investigation supports the creation of dynamic learning if it is done properly. Therefore, the various types and phases of inquiry are important for educators to understand, so that students are ready to face the dynamics of education in the 21st century.

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