



Analysis of Performance Assessment in Liquid Viscosity Practicum of Physics Students at Universitas Negeri Makassar

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Abstract – This study analyzes the assessment of student performance in the liquid viscosity practicum at the State University of Makassar. The viscosity practicum is designed to provide hands-on experience to physics students in understanding the basic concepts of fluids, measurement methods, and analysis of experimental results. The performance assessment includes aspects of practicum preparation, implementation, observation, cooperation skills, and discipline, using a rubric based on the Likert scale 1-4. The results showed that the discipline and cooperation skills aspects reached the highest percentage in the "Very Suitable" category (86.67%), while the practicum preparation aspect had the lowest score. The main factor that affects the assessment results is the lack of understanding of the practicum steps and student initiatives in preparing tools and material. This study recommends intensive mentoring programs and the development of more comprehensive assessment rubrics to improve learning outcomes. This finding is expected to be a reference in optimizing the assessment method of physics practicum in the academic environment.

Keywords: performance assessment, viscosity practicum, Assessment Rubric

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Introduction

The measurement of liquid viscosity is one of the important aspects in the field of physics, particularly in the study of fluids. Viscosity reflects a liquid's resistance to flow (Delvert et al., 2022), which has broad applications in various fields such as industry, technology, and scientific research. The magnitude of liquid viscosity (η) can be estimated using Stokes' law (Asih et al., 2022). Therefore, a deep understanding of viscosity is essential for physics students. Liquid viscosity practicum in the academic environment aims to provide students with hands-on experience in understanding basic concepts, measurement methods, and analysis of experimental results. This practicum also involves students' ability to use laboratory instruments, such as viscometers, as well as to understand factors that influence measurement results, such as temperature, liquid density, and external forces.

Universitas Negeri Makassar as a higher education institution, has a commitment to producing graduates who are competent in their fields. In the physics learning process, laboratory

practicum is an integral component that supports the achievement of these competencies. The implementation of experiments in a positive and consistent manner influences students' attitudes and confidence (Smith et al., 2020). However, the implementation of laboratory practicum often faces various challenges, one of which is the assessment of students' performance. This assessment includes cognitive, psychomotor, and affective aspects, which must be conducted objectively and comprehensively. The advantages of performance assessment include enabling students to: (1) directly demonstrate a process; (2) provide a more complete and authentic evaluation of certain reasoning abilities, oral skills, and physical skills; and (3) increase students' motivation. (Tiara et al., 2022)

Performance assessment in viscosity practicum is important to ensure that students not only understand the theory but are also able to apply it in practice. Initial observations indicate that there are variations in the quality of practicum implementation and students' performance assessment. This is influenced by several factors, such as the lack of clear assessment guidelines, limited laboratory facilities, and students' levels of understanding of experimental procedures, as well as their initial abilities stemming from different educational backgrounds. (Yani et al., 2024). A performance assessment system using performance rubrics is commonly used to evaluate students' skill aspects. (Erawati et al., 2023) Performance assessment has long been recognized as an evaluation method capable of measuring students' skills in real-world contexts. This method is considered more relevant than written test-based assessments because it allows teachers to evaluate students based on actual activities, behaviours, and interactions that occur during the learning process (Nugroho et al., 2021) In the context of physics learning, performance assessment provides opportunities to evaluate students' science process skills, such as observation, experimentation, data analysis, and data interpretation, which are central to physics education. Nevertheless, the successful implementation of performance assessment requires evaluation instruments that are clear, measurable, and capable of encompassing all aspects of students' skills, such as systematically designed assessment rubrics (Tawil & Tampa, 2024).

Therefore, this study aims to analyze students' performance assessment in the liquid viscosity practicum at Makassar State University. This research is expected to provide a comprehensive overview of the effectiveness of the assessment conducted and to offer recommendations for improving the quality of physics learning and laboratory practicum at the university.

Research Methods

This study employed a quantitative descriptive approach to evaluate the effectiveness of the performance assessment rubric applied in the liquid viscosity practicum. The research was conducted at Makassar State University, involving 30 students as research subjects. The assessment rubric used consisted of five main aspects: practicum preparation, practicum implementation, observation, collaboration skills, and discipline. The assessment was carried out based on direct observation of students' practicum activities. Each aspect had previously formulated indicators, and each indicator was assessed using a 1–4 Likert scale.

The research process began with providing students with instructions regarding the liquid viscosity practicum procedures. The students then carried out the practicum in accordance with the prepared guidelines. During the practicum, observers recorded students' performance based on the established rubric. The collected data were analyzed to calculate the average score for each aspect and the percentage contribution of each aspect to the total assessment. The analysis was conducted using Microsoft Excel to calculate the percentage scores of each indicator and to construct result diagrams. The analysis results were used to evaluate the strengths and weaknesses of the assessment rubric and to provide recommendations for further development.

Result and Discussion

A. Results

The results of the study yielded data on performance assessment in the liquid viscosity practicum using five aspects: practicum preparation, practicum implementation, observation, discipline, and collaboration skills. These results are presented and analyzed in relation to the application of the performance assessment rubric in the liquid viscosity practicum. Each aspect consists of two indicators; therefore, the research results include the percentage of students' performance scores for each assessed indicator, as well as the percentage contribution of each aspect to the total assessment. The percentage scores and the percentage contribution of each indicator to the overall score are presented in Table 1.

Table 1. Percentage Scores for Each Performance Assessment Indicator.

Assessment Aspects	Indicator	Score (%)			
		1	2	3	4
Practicum Preparation	1. Understanding the practicum procedures	0,00	6,67	40,00	53,33
	2. Preparing practicum tools and materials	0,00	10,00	43,33	46,67
Practicum Implementation	3. Following procedures	0,00	0,00	48,33	51,67

	correctly				
	4. Proper use of tools and materials	0,00	0,00	30,00	70,00
Observation	5. Recording observation results accurately	0,00	10,00	30,00	60,00
	6. Performing repetitions for accuracy	0,00	0,00	13,33	86,67
Collaboration Skills	7. Working collaboratively in a team	0,00	3,33	20,00	76,67
	8. Sharing tasks effectively	0,00	3,33	10,00	86,67
Discipline	9. Managing time well	0,00	3,33	10,00	86,67
	10. Complying with laboratory rules	0,00	0,00	13,33	86,67

This study found that Indicators 6, 8, 9, and 10 stood out with the highest percentages in the “Very Appropriate” category (86.67%). This indicates that these indicators were the most suitable or performed the best according to the researchers’ assessment. In contrast, the lowest scores were observed for Indicators 1 and 2. Indicators 1 and 2 recorded percentages in the “Not Appropriate” category (Score 2) of 6.67% and 10%, respectively. There were no scores in the “Very Not Appropriate” category (Score 1); however, the presence of these low percentages indicates areas that require improvement. The overall distribution of indicator percentages can be seen in Figure 1.

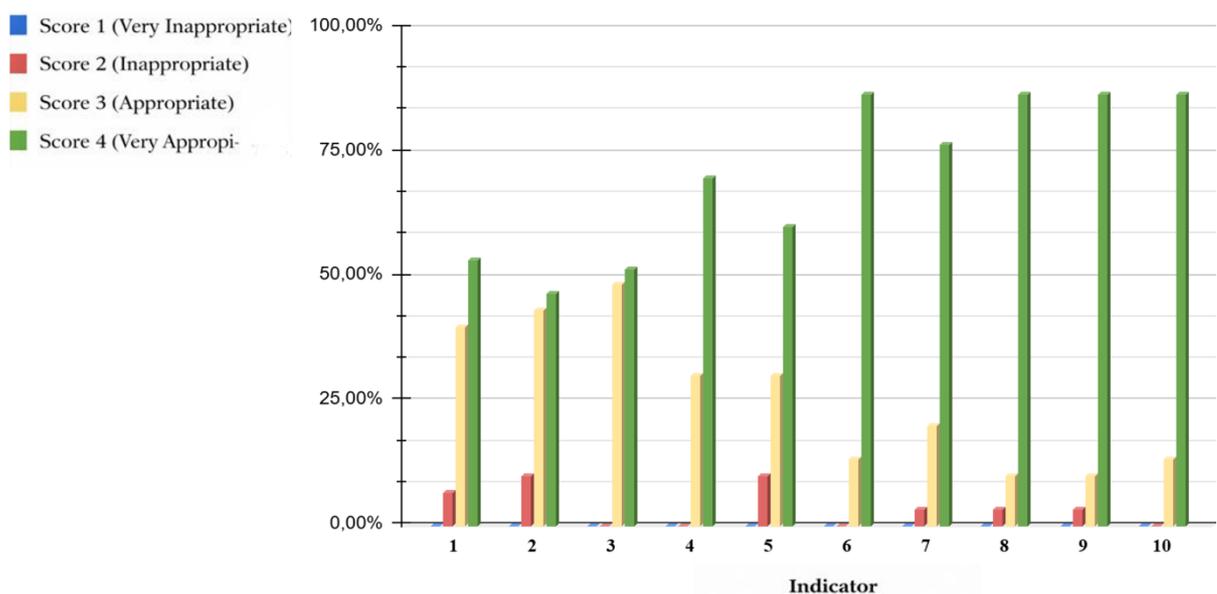


Figure 1. Percentage Scores for Each Performance Assessment Indicator

B. Discussion

Indicators 6, 8, 9, and 10 showed very good achievement, with most respondents assigning scores in the “Very Appropriate” category. Indicator 6, which relates to performing repetitions for accuracy, reflects students’ skills in repeating measurements. Students were accustomed to conducting repetitions three times in previous practicums, resulting in more accurate and reliable outcomes. Furthermore, Indicator 8, concerning effective task distribution, indicates that students were able to work efficiently in groups. For example, students divided tasks well during data collection, such as having some measure the mass and diameter of the ball, others record the time and data, and others alternately release the ball.

Then, Indicator 9, which focuses on time management, demonstrates students’ discipline in adhering to the practicum schedule, such as arriving on time according to their respective classes and submitting reports within the given deadline, namely one week after the practicum. Indicator 10, related to compliance with laboratory rules, also shows satisfactory results. Students were accustomed to following laboratory protocols, including checking required equipment such as laboratory coats, modules, and pulleys before entering, as well as maintaining laboratory cleanliness before and after the activities.

On the other hand, Indicator 1, which relates to understanding the practicum procedures, and Indicator 2, which concerns the preparation of tools and materials, received low scores. For Indicator 1, students appeared to have limited independent understanding of the practicum steps, thus requiring more guidance from laboratory assistants. This may be due to insufficient review of the practicum module prior to the activity. Meanwhile, for Indicator 2, students tended to be confused and lacked initiative in preparing the practicum tools and materials, which could hinder the efficiency of practicum implementation.

To improve these two indicators, steps that can be taken include providing more detailed briefings before the practicum, directing students to take greater initiative in watching videos or illustrations of the practicum procedures, and encouraging students to be more active in reading the module and discussing within their groups. With this approach, students’ understanding of the procedures and preparation for the practicum is expected to improve significantly.

Conclusion

This study concludes that performance assessment in the liquid viscosity practicum successfully identified students’ strengths and weaknesses across various skill aspects. The results indicate that the aspects of discipline and collaboration skills stood out with the highest scores, highlighting the importance of collaboration and disciplined attitudes in the success of

practicum activities. In contrast, the practicum preparation aspect received lower scores, indicating the need for more effective strategies to prepare students before the practicum begins.

As a next step, this study recommends the implementation of an intensive pre-practicum guidance program to improve students' preparation. In addition, the development of more detailed and varied rubrics can help support more comprehensive evaluation. With these strategies, learning outcomes are expected to continue to improve, reflecting better mastery of skills among students.

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