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Performance Profile of Students in High School Physics Practicum on Temperature and Heat Material

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ABSTRAK

Profil kinerja mewakili serangkaian strategi penerapan pengetahuan, keterampilan, dan kebiasaan kerja melalui kinerja tugas yang bermakna dan menarik bagi siswa. Penelitian ini bertujuan untuk mengetahui profil kinerja siswa pada praktikum fisika SMA pada materi suhu dan kalor. Profil kinerja ini memberikan informasi kepada guru sejauh mana kemampuan kinerja siswa dalam melaksanakan praktikum fisika dengan mengembangkan instrumen penilaian kinerja yang telah teruji validitas, reliabilitas, dan praktikalitasnya. Penelitian ini dilakukan di SMA dengan subjek penelitian guru dan siswa peminatan Fisika XI. Hasil uji validitas instrumen sebesar 0,75 dengan kategori valid. Hasil rata-rata reliabilitas dengan metode Alpha Cronbach pada pengujian awal memperoleh nilai sebesar 0,761 dan pada pengujian kedua sebesar 0,75. Instrumen dinyatakan praktis berdasarkan penilaian respon guru fisika terhadap uji coba instrumen menunjukkan nilai 93% termasuk dalam kategori sangat baik. Sehingga dapat disimpulkan melalui beberapa tahap pengujian bahwa instrumen penilaian kinerja dapat digunakan dengan baik oleh siswa dan guru.

Keyword: Perkembangan; Penilaian kinerja; Suhu dan Panas

ABSTRACT

Performance profiling represents a set of strategies for the application of knowledge, skills, and work habits through the performance of meaningful and interesting tasks for students. This study aims to profile the performance of students in a high school physics practicum on temperature and heat. This performance profile provides teachers with information on the extent of students' performance abilities in conducting a physics practicum by developing performance assessment instruments that have been tested for validity, reliability, and practicality. The research was conducted in high school with the research subjects of teachers and students of the XI Physics Specialization. The results of the instrument validity test are 0.75, with a valid category. The average result of reliability with the Alpha Cronbach method in the initial test obtained a value of 0.761, and in the second test, it amounted to 0.75. The instrument is declared practical according to the assessment of the physics teacher's response to the instrument trial, which shows a value of 93%, which is in the very good category. So it can be concluded through several stages of testing that the performance assessment instrument can be used properly by students and teachers.

Keyword: Development; Performance Assessment; Temperature and Heat

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1. INTRODUCTION

The influence of education is substantial on human development and improvement. Education has the goal of maximizing human potential as a standard of national progress. Efforts must be made to improve the quality of education, namely by designing a learning curriculum that is in accordance with the demands of the times. The government designed the latest curriculum as a form of improvement from the previous curriculum, which was named the independent curriculum designed according to the needs of society 5.0. The independent curriculum implements a learning system that focuses on student needs. One way to determine the achievement

of student learning outcomes is by using assessment. Assessment is the collection of information that focuses on understanding, knowledge, mastery, and skills to determine student success in learning (Shadri et al., 2023). Assessment has several tasks that match the teaching model to measure students' skills using performance assessment. The independent curriculum emphasizes that students must be able to react actively and creatively, so one of the assessment methods guided by the independent curriculum is performance assessment.

Performance assessment is an assessment used to collect information about students' ability to complete learning tasks (Sukmawa, 2019). Another definition states that performance assessment is an assessment technique that requires students to demonstrate performance by applying their skills and knowledge (Bundu, 2018). Some types of performance assessment are assessments of making observations, assessments of formulating questions, formulating hypotheses, and so on. The advantage of performance assessment is that it is able to increase students' level of thinking by utilizing their creativity and skills (Wren, 2009).

A study on performance assessment conducted by Marmara University in 2008 and published in the Journal of Turkish Science Education showed that performance assessment helps students acquire and improve their knowledge, with teaching and evaluation being two processes that give each other importance. Therefore, performance assessment is seen as important as an intermediary capable of providing feedback to students during the learning process (Serevina & Muliyati, 2018).

Performance assessment can be done through practical activities. During the practicum, students are asked to carry out performance tasks that utilize students' knowledge and abilities in order to understand the performances performed. Practical activities can profile student performance in assembling practical experiments as outlined in the performance assessment instrument. Student performance profiles provide an overall picture of how students perform in a learning environment, such as a practicum. These profiles address a range of topics, including practical skills, conceptual understanding, motivation, engagement and student improvement over time. Student performance profiles in practicum can vary widely based on a variety of factors, including the purpose of the practicum, the subject or discipline studied, the skill level of the students, and the quality of the teaching delivered.

To assess the performance of students in laboratory practicum, an assessment format is needed that includes aspects that are in accordance with the demands of the curriculum, such as preparing measuring instruments, installing or assembling tools, reading measurement results, writing down data, analyzing data, compiling reports, and so on (Susila, 2019).

Learners who perform laboratory work must understand how their work will be evaluated. This requires rubric-based evaluation, also known as rubric scoring. Experts use rubric scoring as one of their evaluation tools to ensure that the criteria are clear and rational (Arends, 2008). In this method, the exam more accurately represents the student's ability.

The reality of the field is that there are still many physics practicum implementations that are rarely applied to the learning process due to limited practicum tools and preparation time in conducting practicum, and the process of assessing student performance carried out by teachers is also limited to unstructured observations without assessment instruments, so that teachers emphasize more based on students' cognitive scores. Teachers sometimes only assess the results of the practicum, especially in the form of writing reports for each group or individual, not the student learning process. Therefore, it is necessary to develop a performance assessment instrument for the implementation of a physics practicum to improve students' skill competencies.

2. RESEARCH METHOD

The research was conducted at one of the high schools in Kisaran. The process of determining the subject of the research involves using a simple random sampling technique. The research subjects were physics teachers and students of class XI Physics Specialization, as many as 110 students. The initial test and the second test used 35 students each in the XI Physics Specialization. The data in this study were analyzed quantitatively by paying attention to research data on the results of validation, reliability, and practicality of instruments. Calculation of validity with Cohen's kappa formula as follows:

$$k = \frac{\Pr(a) - \Pr(e)}{1 - \Pr(e)} \quad (1)$$

(McHugh, 2012)

After the performance assessment instrument was changed in accordance with the validator's input and recommendations, a field trial was conducted to obtain data carried out by analyzing reliability using the Alpa (α) method, namely:

$$\alpha = \frac{K}{K-1}\left(1 - \frac{\sum S_i^2}{S_x^2}\right) \quad (2)$$

(Arikunto, 2015)

The practicality of the performance assessment instrument is carried out using a physics teacher response questionnaire to see the ease of use of the assessment instrument that has been developed. If 80% or more respondents give a positive response to the instrument, then the instrument is practical to use.

3. RESULTS AND DISCUSSION

A. Results of Feasibility Validity Analysis of Physics Practicum Performance Assessment Instruments by Validators Using Cohen's kappa.

The results of the study meet the predetermined validity criteria and can be used as an assessment tool for the suitability of construct, content, and linguistic elements that researchers have evaluated to determine the success of practical learning activities, in line with the perspective (Arikunto, 2015). A scale is used to test validity, and to obtain valid results, raw numerical data must first be converted into qualitative form (Sugiyono, 2006). If the findings of the analysis meet the predetermined requirements, i.e. the test results are accurate, then the performance appraisal instrument is considered valid. The performance appraisal instrument has 24 components that were tested for validity, and Cohen's Kappa testing using SPSS was used to conduct the test. Cohen's Kappa is a measure that states how consistent two raters or measurement techniques or instruments are measured, or how consistent two people make measurements between each other. The following are the results of processing the validation results using SPSS software:

Table 1. Validator Assessment

		VAR00002		
		0	1	Total
VAR00001	0	1	5	6
	1	1	8	9
Total		2	13	15

Based on the results of the validation that has been carried out with 2 validators to see the feasibility of the instrument, which is listed in the table. The table produced by SPSS Statistics is a cross tabulation of the categories of the two variables. The cross tabulation table is to understand the extent to which the two assessors agree and disagree in the assessment of the validation instrument to make decisions on the feasibility of the instrument. It can be seen in the table above that of the 24 aspects of the performance assessment instrument assessed by the validator, 5 items of the performance assessment instrument show disagreement according to the agreement of the two validators. The agreement between the two validators showed 16 items of the instrument showed agreement. Therefore, there are 3 instrument items that show a difference in agreement between the two validators in the assessment.

Table 2. Validation Results of Performance Assessment Instrument

Symmetric Measures

		Value	Asymptotic Standard Error[a]	Approximate T[b]	Approximate Significance
Measure of Agreement	Kappa	.062	.208	.310	.756
N of Valid Cases		15			

a. Not assuming the null hypothesis.
b. Using the asymptotic standard error assuming the null hypothesis.

Based on the results of validation that has been carried out with 2 validators to see the feasibility of the instrument, which is listed in table 4.1. The instrument used is said to be coefficient if the probability p value> alpha (0.05) then Ho is accepted and vice versa if the probability p value < alpha (0.05) then Ho is rejected. Kappa results are interpreted with values ≤ 0 meaning disagreement and 0.01-0.20 as not too little, 0.21-0.40 as reasonable, 0.41-0.60 as moderate, 0.61-0.80 as substantial, and 0.81-1.00 as almost perfect agreement. However, this interpretation allows very little agreement among raters to be described as "substantial". Thus a kappa value below 0.60 indicates insufficient agreement among raters and no confidence should be placed in the results of the study (McHugh, 2012). The results of instrument validation can be said to be valid if the percentage is ≥ 61 with valid and very valid criterio (Riduwan, 2012).

Researchers used the results of trials conducted by 2 validators, each of which was compared in the assessment. The examiner will give a value between 0 or 1, which if the answer value from the examiner is 0 on the nth trial it will be worth disagreeing while if the answer is 1 on the nth trial it will be worth agreeing. From the output above, the cohen's kappa coefficient value is 0.684. This means that there is an agreement at

a good level between validator 1 and validator 2 on the assessment of the performance assessment instrument, so that according to the Cohen's Kappa criteria the validation is declared good.

The significance value can be seen in the column Approx. Sig cohen's kappa, from the output obtained a significance value of (0.001>0.05), because the significance value is smaller than the significance level used 5%, the kappa coefficient is statistically significantly different from 0.

B. Reliability Analysis Results (Alpha-Cronbach) Performance Appraisal Instrument

Reliability is the consistency of an object with other objects. The Cronbach's Alpha technique was used to test the reliability of the performance evaluation instrument in this study. The reliability analysis used is empirical reliability, with the Cronbach's Alpha coefficient reliability test applied to the data obtained from the limited trial using SPSS software. The higher the correlation coefficient of each item obtained, the greater the level of dependence of the instrument (Setiawan, 2019).

Table 3. Reliability Analysis Results (Cronbach Alpha) Performance Appraisal Instrument (Initial Test)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.761	.970	25

Table 4. Reliability Analysis Results (Cronbach Alpha) Performance Appraisal Instrument (Second Test)

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.750	.924	25

Output results in table 4.5 and table 4.6 of both reliability tests on SPSS show numbers> 0.60 on 25 items of performance assessment instruments with each of the 5 groups of initial tests and the second test of physics practicum carried out so that it can be declared reliable with the Cronbach Alpha value of the initial test of performance assessment of 0.761 and in the second test of performance assessment of 0.750. The results of the reliability test of the two performance assessment instruments are consistent with the same range of values (0.60 - 0.80) so that the performance assessment instrument is in the reliable category.

C. Results of Analysis of Teacher Response Questionnaires on the Use of Performance Assessment Instruments

Based on the teacher response questionnaire to the performance assessment instrument, data on the practicality of the instrument is obtained from the answers of physics teachers. The level of ease of use of the resulting performance assessment instrument is a measure of practicality. A rating scale consisting of strongly agree, agree, disagree, and strongly disagree was used to test the data. Furthermore, numerical instructor response data was used with 4, 3, 2, and 1.

Table 5. Results of questionnaire analysis of teacher responses to the use of performance assessment instruments

Respondent	**Aspects**			**Assessment Score**	**Category**
	1	**2**	**3**		
Physics teacher 1	19	15	12	95.83%	Very good
Physics teacher 2	18	13	12	89.58%	Very good
Average				**92.71%**	**Very good**

The level of simplicity in using the designed assessment instrument serves as a measure of practicality. general application of evaluation instruments by at least two observers (Setiawan, 2019). Based on the findings of the questionnaire analysis of the teacher's reaction to the application of the performance assessment instrument in the field trial, a value of 95.83% (Physics Teacher 1) and 89.58% (Physics Teacher 2) was obtained. So as to obtain the average value of 2 questionnaires responding to the practical performance assessment tool used by 93%. However, there are differences in the results of the assessment questionnaire by the two physics teachers, namely at point 1, point 6 and point 7. At other points, the assessors have similarities to the performance assessment instruments that have been used in physics practicum learning activities at SMA Negeri 3 Kisaran. The results of the questionnaire analysis show that 93% which is in the very good category in accordance with the predetermined range of 81.25 - 100% so that the performance assessment tool products developed have met the criteria of practicality.

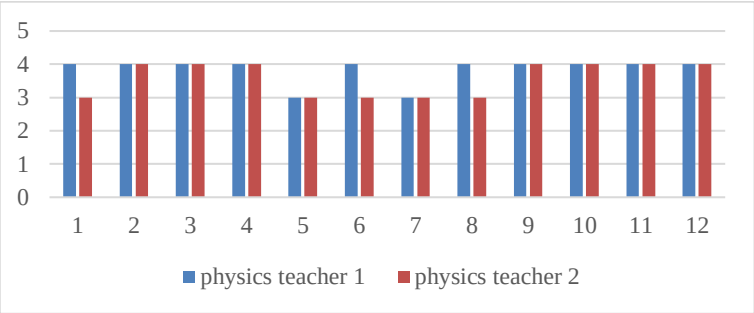

Figure 1. Graph of Teacher Questionnaire Assessment

4. CONCLUSION

Based on the results of the analysis and discussion that has been stated, it is concluded that the portrait of student performance, teachers can provide more effective guidance, identify learning needs, and support student development towards achieving the learning objectives set. The performance assessment instrument in physics practicum on temperature and heat material is feasible to use and apply to practicum learning in class XI. Based on the results of the validity of the instrument obtained an average value of 0.75. The performance assessment instrument was declared reliable and consistent after conducting a field trial stage to students. The average result of reliability with the Cronbach Alpha method in the initial test obtained a value of 0.761 and in the second test of 0.75. The instrument was declared practical according to the assessment of the physics teacher's response to the instrument trial which showed a value of 93% which was in the very good category.

REFERENCES

Arends, Richard I. (2008). Learning to Teach, terjemahan Helly Prajitno dan Sri Mulyantini. Yogyakarta: Pustaka Pelajar.

Arikunto, S. (2015). *Dasar-dasar evaluasi pendidikan* (Edisi ke-2). Jakarta: Bumi Aksara.

Bundu, P. (2018). *Asesmen autentik dalam pembelajaran*. Deepublish.

McHugh, M. L. (2012). Lessons in biostatistics: Interrater reliability: The kappa statistic. *Biochemica Medica*, *22*(3), 276–282. https://doi.org/10.11613/BM.2012.031

Riduwan, K. (2012). *Metode & teknik menyusun proposal penelitian*. Mandar Maju.

Serevina, V., & Muliyati, D. (2018). Development of student performance assessment based on scientific approach for a basic physics practicum in simple harmonic motion materials. *Journal of Physics: Conference Series*, *1013*(1). https://doi.org/10.1088/1742-6596/1013/1/012051

Setiawan, W. (2019). Pengembangan perangkat assessment berbasis keterampilan proses sains praktikum biologi. *Jurnal Al-Ahya*, *1*(1), 96–109.

Shadri, R., Hermita, N., Deswarni, D., Purnamasari, A., Lingga, L. J., & Wijoyo, H. (2023). Assessment in the Merdeka curriculum: How are the teachers' perspectives on it? *Jurnal PAJAR (Pendidikan Dan Pengajaran)*, *7*(1), 202–209.

Sugiyono. (2006). *Statistik untuk penelitian* (E. Mulyatiningsis, Ed.). CV ALFABETA.

Sukmawa, O. (2019). Pengembangan instrumen asesmen kinerja (*performance assessment*) praktikum pada mata pelajaran fisika di SMA. *Jurnal Pendidikan Fisika*, 7(1). http://dx.doi.org/10.24127/jpf.v7i1.1397

Susila, I. K. (2019). *Pengembangan instrumen penilaian unjuk kerja laboratorium pada mata pelajaran fisika sesuai kurikulum tingkat satuan pendidikan SMA kelas X di Kabupaten Gianyar* [Tesis, Universitas Pendidikan Ganesha].

Wren, D. G. (2009). Performance assessment: A key component of a balanced assessment system. *Research Brief. Report From The Department Of Research Evaluation, and Assessment*, *2*(2).