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Evaluation of Physics Practicum for High School and MA Students in South Kalimantan at the Epic Olympiad at the Integrated Laboratory of UIN Antasari Banjarmasin

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Physics Practicum, Performance Evaluation, Practicum Report, EPIC Olympiad, Integrated Laboratory.

ABSTRACT
This study examines the evaluation of physics practicum activities conducted by senior high school and Madrasah Aliyah (MA) students from South Kalimantan during the EPIC Olympiad at the Integrated Laboratory of UIN Antasari Banjarmasin. The background of this research is based on the importance of laboratory-based learning in improving students' scientific literacy, experimental skills, and understanding of physics concepts in the era of 21st-century education. However, differences in students' abilities in operating laboratory equipment, following procedures, analyzing data, and preparing practicum reports indicate the need for a comprehensive evaluation of practicum implementation. This study aims to evaluate students' practicum performance and practicum report quality during the EPIC Olympiad. The research employed a descriptive qualitative approach involving senior high school and Madrasah Aliyah students participating in the Olympiad. Data were collected through observation sheets used for assessing practicum performance and questionnaires used for evaluating practicum reports. The collected data were analyzed using percentage-based descriptive analysis. The results showed that students' practicum performance achieved an average score of 78%, categorized as good, particularly in teamwork and practicum participation. Meanwhile, the practicum report evaluation obtained an average score of 67.6%, categorized as fairly good, with weaknesses identified in data analysis, discussion, and conclusion writing. In conclusion, the EPIC Olympiad contributes positively to strengthening students' scientific competence, although further improvement is still needed in technical laboratory skills and scientific reporting abilities.

INTRODUCTION

Phenomena showing increasing interest in experiment-based learning among secondary school students have become an important concern in improving the quality of physics education in Indonesia (Diana et al., 2025; Kamilah et al., 2025; Sanjaya et al., 2022). One form of its implementation is the EPIC Olympiad (Event of Physics), which is regularly held by the Integrated Laboratory of UIN Antasari Banjarmasin. This Olympiad serves as a platform that integrates theory and practice directly through competitive, applicable, and contextual physics practicum activities (Pinar et al., 2026; Tschisgale, 2024). The active participation of senior high school and Madrasah Aliyah (MA) students from various regions in South Kalimantan demonstrates strong enthusiasm for laboratory-based learning approaches, while also reinforcing the importance of mastering practical skills as part of 21st-century scientific literacy.

During the implementation of the EPIC Olympiad, students were engaged in various physics experiments such as measuring buoyant force based on Archimedes' law, verifying

Ohm's law using a simple electrical circuit, and measuring the heat capacity of objects through calorimetry methods (Falentino et al., 2024; Prastia et al., 2022). To carry out these activities, laboratory instruments such as digital balances, metal containers, ammeters, galvanometers, alcohol thermometers, as well as optical instruments such as convex lenses and plane mirrors were used (Taufik & Hikmawati, 2024; Ain et al., 2025). However, initial observations indicated disparities in students' abilities to operate instruments, understand procedures, and analyze experimental results scientifically (Geschwind et al., 2024; Panuluh, 2022). This indicates the need for a comprehensive evaluation of the effectiveness and quality of physics practicum activities conducted during the Olympiad (Hamidy et al., 2023).

Previous studies emphasize that practicum activities play a strategic role in developing scientific thinking skills, conceptual mastery, and scientific attitudes among students (Rahmawati & Nur, 2018; Nurfadillah et al., 2020). A study by Sari et al. (2021) stated that the success of practicum activities is highly dependent on equipment readiness, clarity of instructions, and students' prior laboratory experience. In addition, Taufik and Dewi (2019) noted that students tend to experience difficulties in formulating hypotheses and interpreting data when they are not accustomed to systematic laboratory activities. However, most of these studies focus on routine school practicums and not on competitive contexts such as olympiads, which have distinct characteristics such as time constraints, competitive pressure, and limited teacher intervention.

In the Indonesian context, the gap between conceptual physics learning and practical laboratory competence remains evident, especially among senior high school and Madrasah Aliyah students. The study context shows that the EPIC Olympiad at the Integrated Laboratory of UIN Antasari Banjarmasin involved students from South Kalimantan in physics experiments such as Archimedes' law, Ohm's law, and calorimetry. However, initial observations revealed unequal student abilities in operating instruments, following procedures, and analyzing experimental results. This situation highlights the need for systematic evaluation of students' practicum performance.

Previous studies support the importance of practical work in science education. Oliveira et al. (2023), in a systematic review of practical work in science education, found that laboratory activities have strong potential to improve conceptual understanding, motivation, and scientific skills, although their effectiveness depends on design, guidance, and assessment quality. Similarly, studies on science process skills in Indonesia indicate that students generally perform better in basic skills such as observing and classifying than in higher-order skills such as interpreting data and communicating scientific conclusions.

Recent research also confirms that practicum-based approaches can improve students' science process skills when supported by structured learning models. For example, inquiry-based laboratory learning has been shown to enhance science process skills and critical thinking abilities among secondary school students. Project-based learning in physics has also been proven to support science process skills and learning outcomes, particularly when students are actively involved in solving experimental problems. These findings strengthen the assumption that practicum activities should be assessed not only based on participation but also on technical, analytical, and reporting competencies.

However, most previous studies focus on regular classroom or school laboratory settings, while only a limited number of studies examine physics practicums in competitive

environments such as science olympiads. The EPIC Olympiad has unique characteristics, as students must work under time pressure, utilize laboratory facilities outside their usual school environment, collaborate in teams, and produce practicum reports within a competitive setting. This makes the evaluation different from conventional practicum assessments, as it integrates laboratory competence, scientific reasoning, teamwork, and performance under pressure.

The research gap therefore lies in the limited empirical evaluation of physics practicum performance and practicum report quality among senior high school and Madrasah Aliyah students in an olympiad-based laboratory setting. The study context indicates that student performance is categorized as good in practicum execution, but only fairly good in report quality, particularly in data analysis, discussion, and conclusion writing. This gap suggests that students may be able to conduct experiments procedurally but still struggle to transform experimental data into scientific reasoning.

The urgency of this research is strengthened by the need to improve scientific literacy and laboratory readiness among Indonesian students. If students are weak in interpreting data and drawing conclusions, physics learning will remain procedural rather than scientific. Evaluating practicum activities in events such as the EPIC Olympiad can provide valuable feedback for schools, teachers, laboratories, and policymakers in identifying aspects of physics practicum that require improvement, particularly instrument operation, data processing, scientific discussion, and evidence-based conclusion formulation.

The novelty of this research lies in its focus on evaluating physics practicum in a competition-based laboratory environment involving senior high school and Madrasah Aliyah students from South Kalimantan. Unlike previous studies that examine routine classroom practicums, this research positions the EPIC Olympiad as both a learning platform and an assessment space. Thus, this study contributes a contextual evaluation model for assessing students' practicum performance and report quality in a collaborative-competitive laboratory setting supported by higher education institutions.

The purpose of this research is to evaluate the quality of physics practicum implementation among senior high school and Madrasah Aliyah students in South Kalimantan during the EPIC Olympiad at the Integrated Laboratory of UIN Antasari Banjarmasin. Specifically, this research aims to assess students' practical performance and practicum report quality, identify strengths and weaknesses in laboratory competencies, and provide recommendations for improving physics practicum learning. The expected benefits of this research include providing feedback for Olympiad organizers, supporting teachers in designing better practicum preparation, strengthening collaboration between schools and universities, and contributing to the development of more effective physics learning models based on scientific process skills.

METHOD

Study This is study qualitative with approach descriptive. According to Arikunto (2021) research descriptive qualitative No intended for test hypothesis certain, but only describe about something variables, symptoms or condition. Subject study This is South Kalimantan high school students. Data, data sources, techniques data collection (TPD) and instruments in research This depicted in the table following.

Table 1. Data Table of TPD Data Sources and Instruments

No	Data	Data source	TPD	Instrument
1	Show Work	Observer	Observation	Observation Sheet Evaluation Show Work
2	Report My practice	Student	Questionnaire	Questionnaire Report Evaluation Practicum

Source: Research Data Processed by the Authors (2026)

Analysis observation evaluation show work and evaluation report practical work physics own objective for know in a way overall evaluation practical work physics High school and Islamic high school students in South Kalimantan which was carried out in the Laboratory Integrated UIN Antasari Banjarmasin. Observation sheet used for measure in evaluation show work on practicum physics. Questionnaire used for measure evaluation report practical work Physics The results of observations and questionnaires obtained will counted use formula following:

Percentage = Amount scores obtained Amount score maximum x 100%

After obtained percentage evaluation show work on practicum physics and reports practical work physics Then categorized based on the following criteria:

Table 2. Interpretation Table Percentage Implementation Learning

Percentage	Category
85.01% - 100%	Very good
75.01% - 85.00%	Good
65.01% - 75.00%	Pretty good
50.01% - 65.00%	Not good
< 50.00%	Not good

Source: Adapted from Learning Implementation Assessment Criteria, Processed by the Authors (2026).

RESULTS AND DISCUSSION

1. Research Results

A. Evaluation Show Work Practicum Physics

Show Work is one of the evaluation assessed in practicum physics High school and Islamic high school students in South Kalimantan which was carried out in the Laboratory Integrated UIN Antasari Banjarmasin which was assessed by 5 observers. In the evaluation show Work There are five aspects assessed use scale Likert 1-4 based rubric assessment. Aspects assessed consists of from (1) ability assemble and use tools, (2) abilities do practical work in accordance procedures, (3) abilities take the result data practical work, (4) ability in finish practical work and (5) skills participate in group. Evaluation show Work practical work physics South Kalimantan high school and Islamic high school students are shown in the table following.

Table 3. Evaluation Table Show Work Practicum Physics

No	Observer Assessment	Aspect					
		1	2	3	4	5	∑
1	Team A	3	4	4	4	4	19
2	Team B	3	3	3	4	4	17

No	Observer Assessment	Aspect					∑
		1	2	3	4	5	
3	Team C	2	2	3	2	3	12
4	Team D	2	2	2	2	4	12
5	Team E	2	4	4	4	4	18
	∑ Total	12	15	16	16	19	78
	Percentage	60%	75%	80%	80%	90%	78%

Source: Observation Results of Physics Practicum Performance during the EPIC Olympiad, Processed by the Authors (2026).

Based on table 3, evaluation criteria every aspects, namely (1) ability assemble and use tool obtained 60% so that categorized not enough good; aspect (2) ability do practical work in accordance procedure obtained 75% so that categorized Enough good; (3) ability assemble and use tool as well as aspect.

(4) ability in finish practical work obtained 80% so that categorized good and aspect (5) ability participate in group obtained 90% so that categorized as very good

So based on results evaluation show Work practical work Physics based on overall aspect obtained namely 78%, this This show that evaluation show Work practical work physics based on overall aspect is in the range 75.01% - 85.00% so categorized Good.

B. Evaluation of Practical Report Physics

Report is one of the evaluation assessed in practicum physics High school and Islamic high school students in South Kalimantan which was carried out in the Laboratory Integrated UIN Antasari Banjarmasin which was carried out by 5 teams from different schools. Evaluation report assessed based on rubric evaluation report consisting of from 6 aspects and has weight maximum different in each aspects. Aspects assessed the consists of from (1) purpose practical work, (2) tools and materials, (3) pictures series and procedures practical work, (4) result data observation, (5) discussion and (6) conclusion. Evaluation report practical work physics South Kalimantan high school/Islamic high school students are shown in the table following.

Table 4: Practical Report Evaluation Table Physics

No	Student	Aspect						∑
		1	2	3	4	5	6	
1	Team A	10	20	15	20	20	10	95
2	Team B	10	15	20	10	10	0	65
3	Team C	10	10	10	5	10	4	49
4	Team D	1	10	15	1	1	1	29
5	Team E	10	20	20	20	20	10	100
∑ Total		41	75	80	56	61	25	338
Percentage		82	75	80	56	61	50	67.6

Source: Evaluation Results of Students' Physics Practicum Reports during the EPIC Olympiad, Processed by the Authors (2026).

Based on Table 4, the evaluation criteria for each aspect are as follows: (1) practicum objectives obtained a score of 82%, categorized as good; (2) tools and materials obtained 75%, categorized as fairly good; (3) sequence of images and practicum procedures obtained 80%, categorized as good; (4) ability to complete practicum activities obtained 56%, categorized as not good; (5) discussion obtained 61%, categorized as not good; and (6) conclusion obtained 50%, categorized as not good.

Based on the overall results of the physics practicum report evaluation across all aspects, an average score of 67.6% was obtained. This indicates that the evaluation of physics practicum reports falls within the range of 65.01%–75.00%, and is therefore categorized as fairly good.

The implementation of the EPIC (Event of Physics) Olympiad held at the Integrated Laboratory of UIN Antasari Banjarmasin serves as an important alternative learning space for strengthening experiment-based physics learning among senior high school and Madrasah Aliyah students in South Kalimantan. This Olympiad not only functions as a competition event but also as a means of implementing real practicum activities in a higher education laboratory environment, which is largely unavailable in schools. This activity is highly relevant because various studies confirm that student involvement in laboratory activities enhances scientific thinking skills, problem-solving abilities, and conceptual mastery in physics (Widiyatmoko, 2018; Harjono & Sahidu, 2019).

The phenomenon observed during the activity shows variations in student competence in practicum implementation, both in technical skills and scientific abilities. The practicum activities included basic experiments such as Archimedes' law, Ohm's law, and specific heat measurements using standard laboratory equipment such as digital balances, ammeters, voltmeters, thermometers, calorimeters, and simple electrical circuits. However, variations in students' ability to use instruments and write reports reflect gaps in laboratory experience across schools, which is also consistent with previous studies highlighting limitations in laboratory facilities and lack of practicum guidance at the secondary school level (Kusumastuti & Herlanti, 2020).

Based on observational results involving five assessment aspects evaluated by five observers, students achieved the highest score in teamwork participation (90%), categorized as very good. This indicates that teamwork skills in practicum activities are relatively well developed, even within a competitive environment. Meanwhile, the ability to assemble and use laboratory equipment reached only 60%, categorized as not good, indicating weaknesses in students' technical laboratory skills. The overall average achievement score was 78%, categorized as good. These findings are consistent with Suparman et al. (2020), who stated that continuous practicum training can improve science process skills, but initial technical training is required so that students are able to correctly operate laboratory procedures.

Meanwhile, the evaluation of practicum reports shows more varied results. The aspects of objectives, tools and materials, and procedure sequence obtained relatively high scores (75%–82%) and are categorized as fairly good to good. However, the aspects of results presentation, discussion, and conclusion showed low achievement, at 56%, 61%, and 50%, respectively, categorized as not good to poor. The total report score reached 67.6%, categorized as fairly good. This indicates that although students are able to compile the initial parts of the report well (descriptive sections), they still experience difficulties in data analysis

and drawing logical scientific conclusions. These findings are consistent with Sari and Susanti (2021), who reported that students' scientific literacy skills in writing reports are still weak, particularly in data interpretation and scientific conclusions.

The research gap identified in this study is the lack of comprehensive evaluation of students' physics practicum performance in competitive contexts such as olympiads. Previous studies generally focus on conventional school laboratory learning without considering collaborative-competitive dimensions, time pressure, and the use of unfamiliar laboratory facilities. In fact, olympiad-based experimental activities such as EPIC provide a more challenging context that closely resembles authentic scientific practice, making evaluation of both performance and reporting quality in this setting highly important (Wahyuni, 2020).

The implications of this study suggest that school-based practicum learning needs to be directed toward strengthening both technical skills and scientific thinking abilities simultaneously. Activities such as the EPIC Olympiad can serve as one solution to provide students with meaningful practicum experiences; however, they must be supported by initial training, teacher guidance, and appropriate assessment rubrics. This research also opens opportunities for the development of more comprehensive and standardized competition-based practicum evaluation models that can be applied to similar activities in the future.

CONCLUSION

Based on the results of the evaluation of physics practicum activities conducted by senior high school and Madrasah Aliyah students in South Kalimantan during the EPIC Olympiad at the Integrated Laboratory of UIN Antasari Banjarmasin, it can be concluded that the implementation of practicum activities contributes positively to strengthening students' scientific competence, particularly in the context of laboratory-based learning. The evaluation shows that students achieved a good overall performance with an average score of 78%, especially in the aspect of group participation. However, weaknesses were identified in technical skills, particularly in assembling and using laboratory equipment. Meanwhile, the evaluation of practicum reports shows a fairly good result with an average score of 67.6%, where the main weaknesses are found in data analysis, discussion, and conclusion writing. This indicates that although students are able to conduct practicum activities, their skills in describing and interpreting experimental results still need improvement. These findings provide important input for the formulation of science education policies at both regional and national levels, particularly in strengthening school laboratory capacity. Policy support is needed through collaboration between higher education institutions and schools in developing physics laboratories as centers for strengthening students' scientific skills. In addition, student involvement in olympiad-based experimental activities such as EPIC should be formalized as part of a strategy to improve the quality of practice-based learning, in line with the Merdeka Belajar (Independent Learning) agenda and the strengthening of national scientific literacy.

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