

STRENGTHENING CAMPUS IMPACT THROUGH PHYSICS LABORATORY INTERNSHIP PROGRAM IN SCHOOLS IN OPTIMIZING STUDENTS' SCIENTIFIC ATTITUDES

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ABSTRACT

Students' scientific attitudes remain a problem in science learning, including physics. Frequently encountered problems include low curiosity, lack of thoroughness in conducting experiments, weak critical thinking skills regarding data, and a lack of objectivity in drawing conclusions. The results of this study aim to describe and evaluate the scientific attitudes of students in the laboratory internship program at the school to strengthen the impact of the campus. The research was conducted using a descriptive quantitative approach, as the data were presented as percentages and then described. The sample was taken using a purposive sampling technique, with 29 students participating in the laboratory internship. Data collection techniques used questionnaires and observation methods. Data analysis was conducted using descriptive statistics. The results showed that attitudes of honesty, thoroughness, discipline, responsibility, curiosity, cooperation, and communication were in the range of 51%–75%, in the good category. The results of this study provide a real contribution to the role of higher education in strengthening the role of impactful campuses through a physics laboratory internship program at a school, which emphasizes meaningful, relevant, and socially contributing learning. This program also provides real-life experience in optimizing students' scientific attitudes.

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1. INTRODUCTION

The current transformation of higher education in Indonesia is directed at strengthening the role of universities as agents of social change through the Impact Campus policy launched by the Ministry of Education, Science, and Technology of the Republic of Indonesia. This policy emphasizes the importance of direct involvement of universities in addressing real community needs through experiential learning, cross-institutional collaboration, and contextual strengthening of student competencies (Kemendikristek, 2025). One implementation of the Impact Campus is thematic internship programs that enable students to study off-campus while maintaining a focus on learning outcomes. The physics laboratory internship program in schools provides a concrete

manifestation of the connection between the academic world and the practice of science education at the school level. The physics laboratory internship program in schools provides students with a space for direct involvement in the management and implementation of science practicum activities. Students play a role in preparing experimental equipment and materials, providing practicum assistance, and developing laboratory-based learning tools. This activity not only benefits schools by improving the quality of physics instruction but also enriches students' learning experiences by applying theoretical knowledge in real-world contexts (Kolb, 2015; Maharani et al., 2025; Sutrio et al., 2023). Therefore, the physics laboratory internship program aligns with the Impact Campus spirit, which emphasizes meaningful, relevant, and socially-contributing learning.

However, various studies indicate that students' scientific attitudes remain problematic in science learning, including physics. Common problems include low curiosity, lack of thoroughness in conducting experiments, weak critical thinking skills regarding data, and a lack of objectivity in drawing conclusions (Harlen, 2014; Muhamad, 2017; Rustaman, 2017). Unoptimally developed scientific attitudes impact the quality of learning processes and outcomes, particularly in courses requiring science process skills and laboratory work. This suggests that strengthening students' scientific attitudes requires an authentic and contextual learning approach. Scientific attitudes are an important foundation in developing students as future educators and professional scientists. Scientific attitudes encompass curiosity, honesty, objectivity, openness to criticism, thoroughness, and responsibility in the process and results of scientific work (Dimiyati & Mudjiono, 2013; Jumini et al., 2023). Students with strong scientific attitudes will be better able to face the challenges of scientific and technological developments and make decisions based on data and evidence. The physics laboratory internship program in schools is one effort to optimize students' scientific attitudes while strengthening the implementation of impactful campuses in higher education.

A laboratory is an academic support unit in an educational institution, consisting of a closed or open space, permanent or mobile, systematically managed for testing, calibration, or limited-scale production activities, using equipment and materials based on specific scientific methods, for the purpose of implementing education, research, or community service (Agustina, 2022; Susanti et al., 2021). There are many types of laboratories, one of which is the school laboratory in the world of education. The main function of a physics laboratory in schools is as a source of learning physics at school, or as a supporting facility for the physics learning process at school (Annisa et al., 2023; Aprilia et al., 2024). The laboratory is a key facility in developing students' scientific attitudes. Through laboratory practicals, students can develop creativity, precision, perseverance, honesty, and cooperation.

Student internship programs in school laboratories play a crucial role in preparing students for the workforce in education, particularly as prospective physics educators. Through internships, students gain hands-on experience in laboratory management, the use of laboratory equipment and materials, and the application of safety procedures. These programs also serve as a vehicle for students to apply the theoretical knowledge they acquire in college to practical learning at school (Maharani et al., 2025; Riskiyah & Suwadi, 2025). The presence of students in school laboratories assists teachers and laboratory assistants in ensuring the smooth running of practical activities, ensuring an effective physics learning process. Internship programs in school laboratories are an important way to develop students' professional competencies and work attitudes.

A scientific attitude is a crucial factor in supporting the success of student internship programs in school laboratories. Attitudes such as discipline, responsibility, thoroughness, honesty, curiosity, and the ability to collaborate encourage students to carry out internship tasks regularly and in accordance with procedures. During laboratory internships, a scientific attitude helps maintain the orderly use of equipment, occupational safety, and the smooth running of practicums. Students who demonstrate a positive scientific attitude tend to be more proactive, responsible, and adaptable to the laboratory work environment, enabling internship programs to run smoothly and benefit both students and schools (Aisyah & Rahayu, 2026; Rati et al., 2024).

In addition to core scientific attitudes, internship success is also influenced by supporting attitudes such as communication skills, adaptability to the school environment, and neatness and appearance in the laboratory (Syecha, 2024). Good communication skills facilitate students' interactions with teachers, laboratory technicians, and students, while adaptability helps students adjust to the school's work culture. Furthermore, neatness and appearance reflect students' professionalism as prospective educators or educational staff. The implementation of the Physics Laboratory Internship Program in schools is the result of collaboration between schools and universities to support practical-based physics learning. During the internship, students participate directly in various laboratory activities, including setting up and maintaining laboratory equipment, mentoring students during practical activities, and assisting with laboratory administration. The physics laboratory environment at school provides students with the opportunity to observe and understand real-world laboratory management, enabling them to apply the knowledge and skills they have acquired in college.

2. METHOD

This study used a descriptive quantitative method with the aim of obtaining a picture of students' scientific attitudes during the Physics Laboratory internship program at school (Creswell & Poth, 2018; Zulfikar et al., 2024). This method was chosen because the focus of the research was not on hypothesis testing, but rather on descriptive statistical analysis of students' scientific attitudes based on questionnaire data. With this approach, the researcher sought to accurately describe how students demonstrate scientific attitudes in carrying out their duties and responsibilities during the internship. Therefore, the data collected is expected to provide a comprehensive picture of the role of students' scientific attitudes in supporting the success of the school laboratory internship program. In addition, the descriptive quantitative method is considered appropriate for the research objectives, which focus on analyzing students' scientific attitudes in a natural and situational context in an educational laboratory environment based on numerical data (Jumini, Madnasri, et al., 2024). This method provides the researcher with the opportunity to observe students' behavior, habits, and reactions throughout the internship process without any intervention or additional treatment. Therefore, the information obtained can reflect the actual state of the internship implementation and offer a deeper understanding of students' scientific attitudes related to the demands of physics laboratory activities at school.

The questionnaire was used to obtain scientific attitude data directly from students. Observation was used to validate the scientific attitude data obtained through direct observation of students' scientific attitudes during the physics laboratory internship. The focus of the observation was on several indicators of scientific attitudes, such as discipline in following the activity

schedule, accuracy in using laboratory equipment, honesty in making observations, curiosity about practical activities, and the ability to collaborate with teachers, laboratory assistants, and fellow students. In addition to observation, documentation in the form of activity photos was used as supporting data to strengthen the observation results. This documentation serves as visual evidence of the implementation of the internship program and helps provide a concrete picture of student activities.

The research instruments consisted of questionnaires, observation sheets, and interview guidelines. The questionnaire used a four-point Likert scale: 4 = strongly agree, 3 = agree, 2 = somewhat disagree, and 1 = disagree. The questionnaire was developed by developing scientific attitudes into indicators and questions, as shown in Table 1.

Table 1. Indicators of Students' Scientific Attitudes (Jumini, 2016)

No	Attitude aspect	Category	Behavioral Indicators
1	Honesty	Core scientific attitude	Objective in observation, do not manipulate data, and be honest.
2	Accuracy	Core scientific attitude	Be careful in using tools, carrying out practical procedures, and be careful in reading scales.
3	Discipline	Core scientific attitude	Attend as scheduled, comply with the rules, regularly fill in the daily journal and attendance list, and adhere to working hours.
4	Responsibility	Core scientific attitude	Complete internship assignments thoroughly, accurately, and according to the specified deadline.
5	Curiosity	Core scientific attitude	Actively ask questions, seek information, and try to understand the activities taking place during the internship.
6	Cooperation	Core scientific attitude	Able to work collaboratively with teachers, laboratory assistants and fellow students.
7	Communication	Supportive attitude	Polite, courteous, friendly, apply 3S (smile, greet, say hello), and interact effectively in a laboratory environment.

The research data analysis was conducted by calculating the total score of the students and the total score of their scientific attitudes. To calculate the percentage of students' scientific attitudes, the following formula can be used.

$$Np = \frac{R}{SM} \times 100\% \quad (\text{Hidayat et al., 2017})$$

Np is the percentage value sought, R is the raw score obtained by the student, and SM is the ideal maximum score.

After giving a score by looking at the achievement of students' scientific attitudes, then convert the score into percentage form and categorize the students' scientific attitudes as in Table 2.

Table 2. Interpretation of Students' Scientific Attitudes (Sudaryono et al., 2013)

Presentation of Achievement Aspects	Category
76% - 100%	Very Good
51% - 75%	Good
26% - 50%	Fair
0% - 25%	Poor

Next, the results of the interviews and observations are presented in the form of pictures and described according to the conditions observed.

3. RESULTS AND DISCUSSION

The Physics Laboratory Internship Program in Schools is one of the implementations of the Impactful Campus program that allows students to study off-campus while still focusing on learning outcomes. The physics laboratory internship program in schools is a concrete manifestation of the connection between the academic world and the practice of science education at the school level. This program has been implemented since 2018. Initial implementation of the program was carried out in collaboration with the Physics and Science MGMP. This year, internships were carried out in five schools in Wonosobo: SMA N 1 Wonosobo, MAN 1 Wonosobo, MAN 2 Wonosobo, SMP Negeri 1 Mojotengah, and SMP Negeri 2 Selomerto.

3.1. Implementation of the Internship Program

Laboratory internships are a way for students to implement the theories they learn in class, honing skills and expertise that can be directly applied in the workplace. Students experience the current working world and assess the extent of their existing skills and expertise during the internship. During the Physics Laboratory Internship program at school, students engage in various activities that support laboratory operations and the physics learning process.

Interns play a crucial role in supporting the management and implementation of internships at school. During the internship, students act as laboratory operational support staff, assisting physics teachers and laboratory assistants in preparing and managing practicum activities. These duties include organizing laboratory equipment and materials, checking for equipment problems, and maintaining the cleanliness and tidiness of the laboratory space. Students also assist with laboratory administration, such as attaching barcodes to simplify equipment identification, improve laboratory management efficiency, and support the learning system.



Figure 1. Students Arrange and Check the Condition of Equipment

Figure 1 shows the activity of arranging and checking the condition of physics laboratory equipment, then tidying it up in the designated area. This activity aims not only to tidy up, clean, and check the quantity and condition, but also to help students recognize the names of the equipment in the physics laboratory at school. Accuracy, perseverance, and responsibility are cultivated in this activity (Natalia et al., 2025). Students must also ensure that all equipment is ready for use before the practical activities or practical exams are carried out.

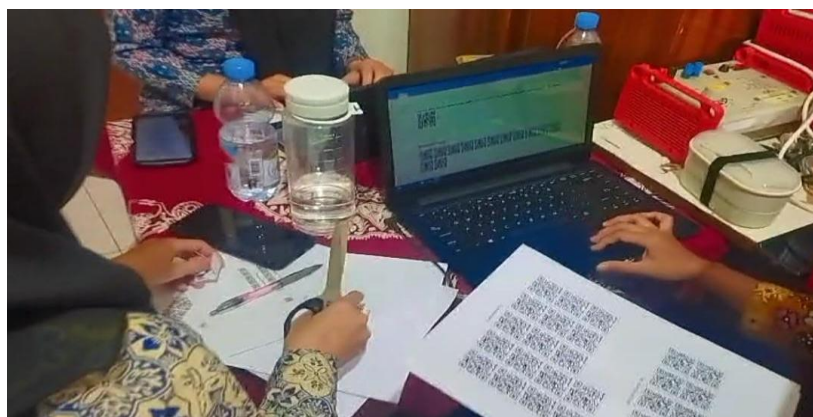


Figure 2. Students Attaching Barcodes to Laboratory Equipment

Figure 2 shows the activity of attaching barcodes to physics laboratory equipment. The activity aims to make physics laboratory equipment easily recognizable by students. Furthermore, students do not only recognize the equipment. By scanning the barcode attached to each tool, students easily learn the name, description, and function of the tool. Students must be careful and thorough, so that the name of the tool and the equipment must be correct. With the large number of tools in the laboratory, students must work together to digitally inventory the equipment, so that it can be completed within the targeted time. This is where cooperation between students is essential. This activity reflects the students' scientific attitude, particularly full responsibility in the attachment process and cooperation between students and existing laboratory assistants (Fiska, 2024).



Figure 3. Students Assist Teachers in Supervising the Practical Exam for Class XII

Figure 3 shows students assisting teachers in administering the 12th grade practical exam in the Physics Laboratory by demonstrating discipline, responsibility, and thoroughness in ensuring students follow the established practical procedures. Furthermore, students demonstrated communicative behavior and were able to cooperate with teachers, ensuring the exam ran smoothly and orderly in accordance with the rules.



Figure 4. Students Teaching in Class

Figure 4 shows students carrying out teaching activities in grades 10 and 11 of physics, adapting to the material to be practiced. Students carry out their teaching duties by demonstrating discipline in time management, responsibility in delivering learning materials, and good communication with students. During the learning process, students emphasize objectives, are open to student questions, and are able to create a conducive classroom atmosphere for effective teaching and learning.

Figure 5 shows students carrying out digital physics practicum learning activities using PhET and real-life laboratory experiments. In these activities, students are trained in discipline in time management, responsibility in guiding the practicum, and good communication in explaining concepts and the use of simulations to students. Throughout the learning process, students emphasize the objectives of the practicum, are open to student questions, and are able to create a conducive classroom atmosphere for effective digital simulation-based practicum activities.



Figure 5. Practical Experiment in Class

Figure 6 shows students preparing procedures for using a physics laboratory, which are outlined in the form of a poster and posted in the laboratory room. This activity trains students to be creative and innovative in creating posters, demonstrating a responsible attitude and thoroughness in formulating clear and systematic work steps, as well as good communication so that the information on the poster can be understood and applied by laboratory users.



Figure 6. Poster Installation in the Laboratory

Several activities undertaken by students in the physics laboratory internship program at school significantly assist in developing and strengthening their scientific attitudes. The program stimulated the development of existing scientific attitudes in some students. Those lacking these attitudes will develop over time, as the internship program progresses and the lectures are completed.

3.2. Student Scientific Attitude Data

Scientific attitude data, in addition to observations of the physics laboratory internship activities described above, was also collected using a questionnaire completed by the students themselves and validated by assessments from their respective school supervisors. The data were then analyzed using descriptive statistics. The questionnaire data from students and teachers are presented in Figure 7 below.

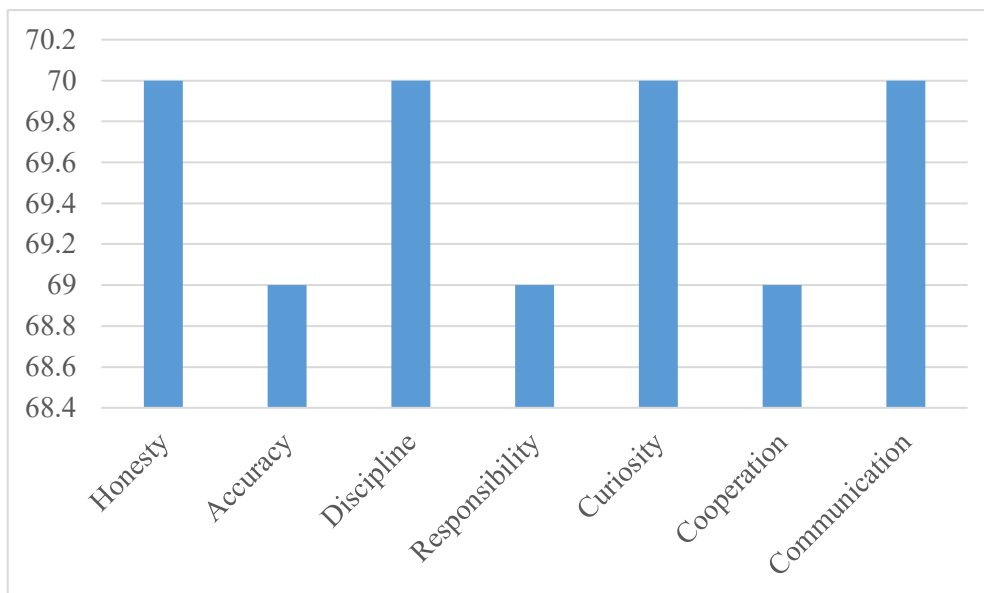


Figure 7. Student Scientific Attitude Data from the Questionnaire

Observations regarding scientific attitudes during the Physics Laboratory internship program at school presented in Figure 7 showed that all indicators of scientific attitudes analyzed were in the range of 51% - 75%, in the good category. This indicates that students successfully implemented discipline and responsibility in carrying out internship tasks, as well as demonstrating thoroughness and integrity in every activity in the laboratory. In addition, students also had a good sense of curiosity, were able to work together in teams, and demonstrated good communication skills and adaptation to the laboratory environment. Indicators of honesty, discipline, curiosity, and communication had the same score and were above the categories of thoroughness, responsibility, and cooperation. This is in line with what was conveyed by (Maharani et al., 2025; Marbun, 2025). in their book that practical activities in the laboratory can reveal students' scientific attitudes.

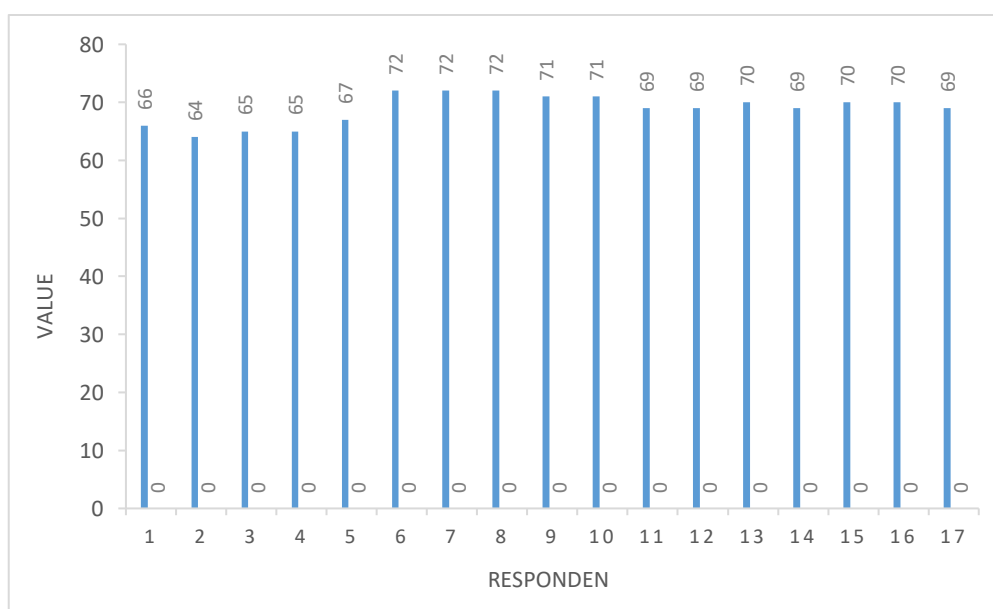


Figure 8. Student Scientific Attitudes as a Result of Teacher Observations

The teacher's observation data on students' scientific attitudes, presented in Figure 8, also categorized as good. This indicates that the scientific attitudes demonstrated by students during the laboratory and classroom internship programs significantly contributed to the smooth running of each activity. Indicators such as discipline, responsibility, thoroughness, honesty, curiosity, and cooperation were clearly visible in various activities, from laboratory preparation and practical implementation to the classroom teaching and learning process. The application of these scientific attitudes illustrates students' readiness to fulfill their role as future professional educators and demonstrates their ability to adapt to the school work environment. This is consistent with research conducted (Novalinda, 2022; Rayung Puspaningrum, 2026).

The findings of this examination are consistent with science education theory, which highlights the need for a scientific attitude in learning and experimental activities. Based on science-focused learning theory, scientific attitudes such as curiosity, thoroughness, objectivity, and collaboration are among the skills that educators and students must possess (Ristiani et al., 2025; Septaria et al., 2025). These attitudes support the realization of meaningful, interactive, and process-oriented learning. Therefore, the scientific attitudes demonstrated by students during the internship period are not only in line with scientific theory but also strengthen the internship's function as a tool to improve the professional, pedagogical, and social skills of students who will become teachers.

4. CONCLUSION

The study results indicate that the proportion of scientific attitudes demonstrated by students during the Physics Laboratory internship period at school is in the range of 51% - 75%, classified as good, and serves as a supporting element in maximizing the effectiveness of the internship program. Aspects of discipline, accountability, accuracy, integrity, curiosity, and collaboration and communication capacity are internalized in various activities, including laboratory management, conducting experiments, and the learning process in the classroom. The implementation of these scientific attitudes contributes to the smooth running of the internship series, the creation of an orderly work atmosphere, and increased efficiency in the process of socializing physics materials in educational units. The implications of these findings indicate that student internship programs have significant potential as an instrument in fostering scientific attitudes and professionalism in prospective educators, provided they are systematically designed and implemented. Thus, instilling scientific attitudes should be an essential component in student internship preparation at higher education institutions. Furthermore, schools that act as internship partners can utilize the presence of students to contribute to laboratory management and the implementation of practicum-based learning more effectively.

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