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Identifying the Conceptual Understanding of Undergraduate Physics Students in Solving Basic Physics Problems: A Descriptive Quantitative Study

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Abstract

Understanding concepts is a crucial component of successful physics learning, especially when solving fundamental physics problems. This study aims to identify students' level of conceptual understanding in an introductory physics course and the difficulties they encounter when solving related problems. The research method is a quantitative descriptive survey, involving students from the first to the seventh semesters of the Physics Education program as respondents. Data were collected through a Google Forms questionnaire distributed via WhatsApp. The results showed that 50.33% of students showed their conceptual understanding in the moderate category, because many responses were uncertain or agreed. About 45.58% of students were not confident when applying basic physics concepts to solve problems. About 50.63% of students have not mastered the logical steps and proper methods in solving fundamental physics problems. They also do not fully understand when and how to use the correct physics equations. About 60.77% of students tend to ignore evaluating their understanding of physics concepts after solving problems or exams, and they still rely on others to solve physics problems. These findings highlight the need for better teaching strategies to improve students' conceptual understanding. It will also identify factors that hinder conceptual understanding and propose solutions to improve students' ability to understand physics concepts and solve fundamental physics problems.

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INTRODUCTION

Education can be interpreted from several different perspectives. According to experts, the definition of education can vary greatly, with its content differing from one interpretation to another. These differences are influenced by orientation, the basic concepts used, the aspects emphasized, or the underlying philosophy. Despite these differences, all definitions of education ultimately converge on a common understanding. One view suggests that education is a developmental process with a purpose (Halpern, 2013; Kline, 2022). Education is also broadly defined as life (Kyllonen, 2018; Makruf et al., 2022). Various experts have clearly explained that education is a process that helps shape individuals and society to survive and lead fulfilling lives (Kleinberger, 2016; Tambak et al., 2022). According to the National Education System Law No. 20 of 2003, Article 1, paragraph (1), education is defined as a conscious and planned effort to create a learning environment and process that enable students to develop their potential actively. This aims to equip them with spiritual and religious strength, self-control, personality, intelligence, noble character, and the skills necessary for themselves, society, the nation, and the state (Battey, 2012; Chanifah et al., 2021; Dalimunthe, 2023). Based on the Indonesian Dictionary, the word "education" comes from the word "did," with the prefix "pe" and the suffix "an," meaning the process or method of teaching. Therefore, the definition of education in linguistic terms refers to changes in the behavior and attitudes of individuals or groups as they mature through training and teaching (Baten et al., 2021; Milligan, 2020; Noxaïc & Fadel, 2022).

Students are individuals acquiring knowledge or studying and enrolled in higher education. Students are unique and complex individuals who can develop dynamically. Each student possesses different potentials, such as thinking ability, social skills, communication, art, and technical skills. Students also have varying physical, social, emotional, and value characteristics (Gandecka, 2013; Nasra & Heilbrunn, 2016; Rachmad et al., 2023). These potentials can shape a unique personality, distinct from others. Humans continuously develop, and their development is dynamic due to constant interactions with their environment, making their uniqueness increasingly complex (Aldrup et al., 2022; Hill & Chin, 2018; Sutiah et al., 2020). Humans have an inherent curiosity about the world around them, especially nature. Initially, humans attempted to explain nature through myths. However, with the advent of rational inquiry in the form of philosophy, particularly in ancient Greece, myths were gradually replaced (Putranta, 2023; Suprapto, 2020). This shift marked the beginning of scientific methods, which combined reasoning and experimentation. Physics is one such scientific method. Physics studies everything from tiny particles, measuring a fraction of a meter, to the vast universe, spanning millions of kilometers (Hasanah, 2020; Mason & Just, 2016; Putranta & Supahar, 2019).

Physics education is crucial in developing students' critical and analytical thinking skills (Bile et al., 2024; Kaur et al., 2024; Maknun, 2020). Fundamental physics is a mandatory course in the Physics Education Program. A strong understanding of fundamental physics concepts provides a foundation for understanding natural phenomena and helps students solve various problems effectively (Wahyuni et al., 2021; Zavala et al., 2017). Understanding basic physics concepts is fundamental in physics education, especially at the university level (Cai et al., 2021; Kösem & Özdemir, 2014). Conceptual understanding is absorbing the meaning of a concept or theory learned indirectly (Puschkasch-Möck, 2024; Zhang et al., 2024). However, many students struggle to understand and apply basic physics concepts. This is often reflected in their inability to solve problems that require the application of these concepts.

These difficulties can arise from several factors, such as ineffective teaching methods, limited use of student-centered approaches, and differences in individual students' cognitive abilities. Generation Z (the "strawberry generation"), which currently dominates the student population, has unique characteristics, such as strong responsiveness to technology and a preference for visual-based learning (Chan et al., 2025; Chanifah et al., 2021; Rautela et al., 2024). A generation is a social construct that refers to a group of people with similar ages and historical experiences (Dirga & Wijayati, 2018; Holubova, 2024). Generation Z follows millennials, including those born between 2001 and 2010 (Mandíková & Pschotnerová, 2024; Vikhrev & Baronova, 2006). However, traditional teaching methods often fail to align with students' learning needs and preferences.

Based on previous research, conceptual understanding is often a significant challenge in physics education. Students tend to memorize formulas without fully understanding their origins or underlying principles (Nyirahabimana et al., 2024; Zhang et al., 2024). This leads to poor problem-solving abilities in various physics problems that require understanding the concepts learned. Identifying students' level of conceptual understanding is an essential first step in designing more effective learning strategies that meet their needs (Gasana et al., 2024; Santoso et al., 2024). This phenomenon must be addressed because a poor understanding of fundamental physics concepts can hinder students' ability to apply physics knowledge in more complex everyday contexts and in their future professional careers. Therefore, it is necessary to identify how well students understand basic physics concepts and the factors that influence their ability to solve fundamental physics problems.

Through this research, the author aims to identify the level of students' understanding of fundamental physics concepts and how this understanding affects their ability to solve various physics problems. The findings of this study are expected to provide a clearer picture of how well students understand basic physics concepts and apply them in problem-solving. Additionally, this study will serve as a reference for helping instructors develop more innovative teaching methods and effective learning strategies that align with Generation Z's characteristics and help improve the curriculum to meet students' learning needs better (Băltescu & Untaru, 2025; Lisana et al., 2025; Patten, 2025). Thus, this research aims to analyze students' conceptual understanding of fundamental physics and to identify weaknesses and potential areas for optimization in the learning process.

METHODS

This study is survey research using a quantitative descriptive approach to identify and analyze students' understanding of physics concepts in solving fundamental physics problems. Survey research involves collecting information from a sample, typically via questionnaires or interviews, to describe various aspects of a population (Brundage et al., 2023; Brundage & Singh, 2023). A survey design was chosen because this study aims to obtain a natural, unaltered description of the population. The survey used rational reasoning procedures (de Mortier et al., 2025; Saidi & Siew, 2019). Quantitative descriptive research involves describing, investigating, and explaining the subject matter and drawing conclusions from observable phenomena using numerical data (Jejaw et al., 2025; Terzi & Petrarca, 2025).

Descriptive quantitative research only describes the contents of a variable in the study and does not aim to test specific hypotheses. Thus, descriptive quantitative research is designed to define, examine, and explain a phenomenon using available (numerical) data without testing a particular hypothesis (Keskin, 2025; Rushami Zien et al., 2024). This approach was chosen to explore students' understanding patterns, including the possibility of misconceptions. This study can be described through the steps taken in the research process, from planning to data analysis. The following flowchart provides a clear visual representation of the research process, facilitating a better understanding of the procedures conducted. Meanwhile, the research implementation procedure scheme can be shown in Figure 1.

The flowchart outlines the steps of this study, starting with identifying the problems faced in the introductory physics course. The next step is to formulate the research objectives that describe students' challenges. Afterward, the research method is selected. A Likert-scale questionnaire in Google Forms is then developed, consisting of 15 statements for students to answer. The sample was taken using the simple random sampling technique, and students from the physics education program at the State Islamic University of Sunan Kalijaga, Yogyakarta, from the 2021 to 2024 cohorts were selected as respondents. Data is collected by distributing the questionnaire to the respondents and giving them 10 minutes to complete it. Data processing and analysis are conducted after all responses are collected using the analysis features in Google Forms. The percentage of responses for each statement is calculated based on specific categories. The final step is preparing the report, which includes identifying problems and conclusions. The results are then communicated to the lecturer and readers.

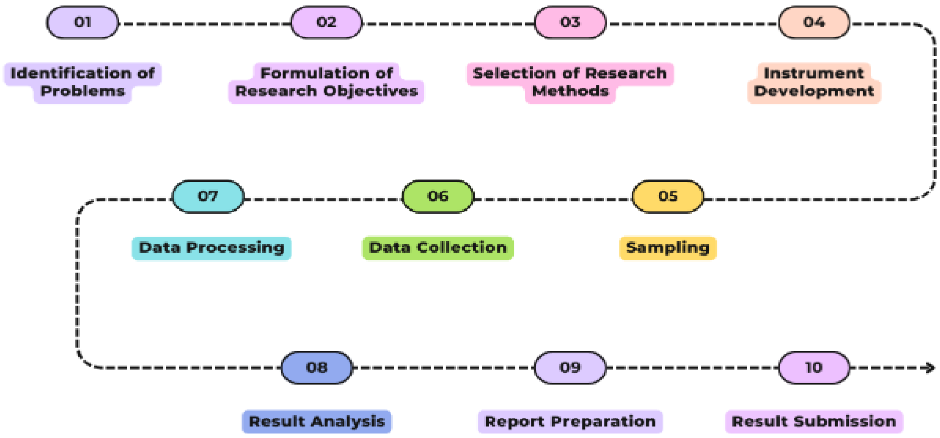

Figure 1 Research implementation procedures

The participants in this study are students from the Physics Education Program at the State Islamic University of Sunan Kalijaga, Yogyakarta, from the 2021-2024 cohorts, who are currently enrolled in or have completed the Basic Physics course. A total of 51 students were selected as respondents. The research was conducted on October 26, 2024. Participants were selected using simple random sampling, with the following criteria: active students in the Physics Education program who are either currently enrolled in or have completed the Basic Physics course and are willing to complete the provided questionnaire. Simple random sampling is a technique in which samples are selected at random, without regard to strata or subgroups within the population. All population members are eligible to be part of the sample frame. This technique is typically used when the population is homogeneous (Kent et al., 2010; Paradiso et al., 2024). Simple random sampling (SRS) was used in this study because of its several advantages, including being representative of each population member, providing each member an equal chance of selection, and ensuring that the sample represents the population as a whole.

It also minimizes bias, as there is no intervention in the selection process, and it is easy to apply, especially in small populations (Husaeni et al., 2023; Rego et al., 2024). A sample is a subset of the population chosen for data collection in a study. Samples are used to describe the characteristics or behaviors of the population without observing every individual in the population. Furthermore, the sample is a subset of the population's total number and characteristics (Almeida et al., 2025; Melillo et al., 2025). A sample should be representative, meaning it must accurately reflect the characteristics of the population to allow for valid generalizations (Lines & Jardine, 2025; Taber, 2018). In this study, samples were obtained by distributing questionnaires to students in the physics education program from the 2021 to 2024 cohorts via WhatsApp using a Google Forms link. The questionnaire aimed to gather data on students' understanding of the Basic Physics course and their challenges in solving related problems. Therefore, this research focuses on the number of respondents and the data they provide.

The data for this study were collected using a Google Form containing a Likert scale questionnaire. The questionnaire comprised 15 statements to identify students' understanding of physics concepts in solving fundamental physics problems. The questionnaire is a closed-form survey, meaning respondents are asked to choose from predetermined answers. The Likert scale provides five answer choices: strongly disagree

(SD) with a score of 1, disagree (D) with a score of 2, neutral (N) with a score of 3, agree (A) with a score of 4, and strongly agree (SA) with a score of 5 (Jacobsson et al., 2024; Vizer-Karni & Reiter, 2014). Meanwhile, two expert validators of physics instruments and content validated the questionnaire containing fifteen statements and analyzed it using Aiken's validity test. The results of Aiken's validity test for the questionnaire in this study were 0.96, which was included in the valid category. The reliability test of the instrument was analyzed using the Cronbach's Alpha equation, and the result was 0.89, which is included in the reliable category.

This questionnaire takes about 10 minutes to fill out. This time is enough for respondents to consider each statement carefully and provide answers based on their experiences. The instructions for filling out the questionnaire are as follows: Read each statement carefully and choose the answer that best reflects your opinion. The research procedure follows: (1) The preparation stage includes making questionnaire statements, compiling research instruments, and determining research subjects. (2) Implementation Stage: The questionnaire was distributed to participants from the Physics Education Study Program of Sunan Kalijaga State Islamic University using WhatsApp and Google Forms links to collect their responses. (3) Data Analysis Stage: Student responses were analyzed using descriptive analysis techniques, namely grouping data into categories. The score for each statement was calculated to obtain the average and frequency distribution of responses (Kyllonen, 2018; Wharne et al., 2025). Meanwhile, the categorization criteria for conceptual understanding in undergraduate physics education are low (0-40%), medium (41-70%), and high (71-100%). Furthermore, data analysis aims to identify the problems students face when solving basic physics problems.

The data analysis technique used is descriptive analysis, which aims to describe the results of measuring students' understanding of physics concepts based on collected data, such as questionnaire results (Noureddine et al., 2025). The steps taken are data collection, grouping, scoring, calculating descriptive statistics, data visualization, and interpreting results. The next step is to calculate scores to analyze questionnaire responses (Lines & Jardine, 2025; Saretta et al., 2025). Data collected from the questionnaire can be integrated and analyzed automatically using the Google Forms data analysis feature. This feature allows researchers to quickly and efficiently obtain summary statistics, including the percentage of respondents for each statement. Data analysis is carried out descriptively by examining the percentages of responses from each respondent in the questionnaire. Automatic percentage analysis provides an overview of the proportion of students who strongly agree, agree, neutral, disagree, or strongly disagree with each statement. This allows researchers to quickly identify students' understanding of physics concepts in solving basic physics problems. However, to ensure accuracy and validity, manual calculations are also required.

RESULTS AND DISCUSSION

Understanding and Interest in Basic Physics Concepts

This section aims to assess students' understanding and interest in basic physics concepts, as well as their level of engagement in teaching them. Table 1 presents the data on students' understanding and interest in fundamental physics concepts. The data were collected through the research, and Table 1 provides a comprehensive overview of the relationship between students' understanding and interest in these concepts. The analysis of this research is expected to offer appropriate solutions for improving students' knowledge and interest in fundamental physics concepts.

Table 1 Statements on understanding and interest in fundamental physics concepts

No.	Statement	SD	D	N	A	SA
1.	I understand the basic physics concepts taught in the lectures.	5.9%	0%	25.5%	66.7%	2%
2.	I am interested in understanding basic physics concepts in depth.	0%	0%	23.5%	49%	27.5%
3.	I feel confident when applying basic physics concepts to solve problems.	0%	5.9%	49%	35.3%	9.8%

Based on the responses in Table 1, most respondents chose 'strongly agree' or 'neutral' in the questionnaire. The results indicate that most students have begun to understand and are interested in basic physics concepts. Additionally, students feel confident in applying these concepts to solve problems. The 'strongly agree' responses received a relatively high score for the statement regarding interest in understanding basic physics concepts more deeply.

Sources and Learning Methods

This section examines the sources and learning methods employed by students from the 2021–2024 cohorts for the fundamental physics course. Table 2 presents data on the sources students use and the learning methods they adopt to understand basic physics concepts. Research data provides insights into students' preferences for learning resources and the methods they find most compelling for supporting learning. The analysis of this research is expected to offer practical solutions for optimizing students' choices of learning sources and methods.

Table 2 Sources and learning methods

No	Statement	SD	D	N	A	SA
1.	To understand basic physics concepts, I use learning resources other than the materials provided by the lecturer, such as books, the Internet, and videos.	0%	2%	3.9%	62.7%	31.4%
2.	Solving basic physics problems is more helpful when the lecturer explains the concepts before showing the solution method.	3.9%	0%	23.5%	41.2%	31.4%
3.	The lecturer's teaching method can influence the understanding of physics concepts in solving basic physics problems.	0%	0%	2%	35.3%	62.7%
4.	I find it easier to understand physics concepts when the lecturer uses real-life examples or applications.	3.9%	0%	5.9%	43.1%	47.1%

Based on the responses in Table 2, most respondents selected "agree" or "strongly agree" in the questionnaire. The results indicate that many students can understand basic physics concepts when lecturers explain them with real-life applications. Additionally, many students have utilized other learning resources besides the materials provided by their lecturers. However, many students also selected "uncertain," suggesting they feel more supported in solving fundamental physics problems when the lecturer thoroughly explains the concepts before demonstrating the problem-solving process.

Problem-Solving Approach

This section explores the sources and learning methods utilized by students from the 2021-2024 cohorts in introductory physics courses. Table 3 presents data on how students apply problem-solving approaches using physics concepts. The data was gathered through earlier research, and Table 3 illustrates students' strategies for addressing problems in fundamental physics. The analysis of this research is expected to provide effective solutions for improving students' problem-solving approaches to fundamental physics challenges.

Table 3 Problem-solving approaches

No	Statement	SD	D	N	A	SA
1.	I can use logical and appropriate steps to solve fundamental physics problems.	2%	0%	43.1%	47.1%	7.8%
2.	I can understand when and how to use the appropriate physics equations.	2%	4%	38%	46%	10%
3.	I often check my answers in problem-solving to ensure the correctness of the concepts used.	3.9%	2%	25.5%	58.8%	9.8%

Based on the responses presented in Table 3, most respondents chose "neutral" or "agree" as their answers to the questionnaire. The results indicate that some students frequently review their problem-solving answers to ensure the correctness of the concepts. However, many students still chose "neutral" or "agree" when responding to statements about their ability to use logical, appropriate steps to solve fundamental physics problems and to understand when and how to apply the correct physics equations.

Practice and Understanding Evaluation

This section focuses on the practice and evaluation of understanding among students from the 2021–2024 cohorts in the basic physics course. Table 4 presents data on students' practice habits and their evaluation of their understanding of basic physics concepts. This data was gathered through research to provide insights into students' habits of solving practice problems and evaluating their comprehension of physics concepts. The analysis of this research is expected to provide practical solutions to enhance students' practice routines and to improve evaluation methods in learning for better outcomes.

Table 4 Practice and Understanding Evaluation

No.	Statement	SD	D	N	A	SA
1.	I feel that the practice problems given help deepen my understanding of basic physics concepts.	2%	2%	5.9%	66.7%	23.5%
2.	I evaluate my understanding of physics concepts after solving problems or taking exams.	3.9%	5.9%	31.4%	52.9%	5.9%
3.	I review physics concepts when I encounter difficulties in solving problems.	2%	0%	19.6%	62.7%	15.7%

Based on the responses in Table 4, most respondents selected "strongly agree" for the questionnaire statements. The results indicate that most students feel the practice problems helped deepen their understanding of fundamental physics concepts. Additionally, students often evaluate their understanding of these concepts after completing exercises or exams and review them when they encounter difficulties solving problems. However, many students chose "neutral" in response to these statements, indicating some uncertainty.

Study Habits and Collaboration

This section explores students' study habits and collaborative efforts in introductory physics courses from the 2021–2024 cohorts. Table 5 presents data on students' study habits and collaborative activities with peers and instructors. The data were collected through research conducted for this study. Table 5 provides an overview of students' learning patterns and collaboration practices. The analysis of this data is expected to yield actionable solutions for fostering effective study habits and collaboration among students.

Table 5 Study habits and collaboration

No	Statement	SD	D	N	A	SA
1.	I will solve physics problems independently rather than relying on help from friends.	7.8%	19.6%	45.1%	19.6%	7.8%
2.	I often discuss with friends or lecturers to understand physics concepts in solving fundamental physics problems.	0%	2%	21.6%	49%	27.5%

Based on the statements in Table 5, most respondents selected "uncertain" and "agree" as their answers to the questionnaire. The results indicate that some students solve physics problems independently rather than relying on peers for assistance. Additionally, they often discuss physics concepts with friends or lecturers to understand them when solving fundamental physics problems. Many respondents also selected "strongly agree" to the statement about frequently discussing physics concepts with peers or lecturers to deepen their understanding.

This study involved a survey via a Google Forms questionnaire link distributed through WhatsApp. The purpose was to identify students' understanding of fundamental physics concepts in solving fundamental physics problems (Purwaningsih et al., 2024; Wan & Chen, 2024). The statements provided to students were categorized into five main areas: understanding and interest in fundamental physics concepts; learning resources and methods; problem-solving approaches; practice and evaluation of understanding; and study habits and collaboration (Ambaryani & Putranta, 2022; Fuadah et al., 2024).

Category 1: Understanding and Interest in Basic Physics Concepts. For the statement, *"I use learning resources beyond those provided by the lecturer, such as books, the internet, and videos, to understand basic physics concepts,"* 66.7% of students agreed, while 25.5% were uncertain. A small percentage chose either strongly disagree or strongly agree. Regarding the statement, *"I am interested in deeply understanding basic physics concepts,"* 49% agreed, while others chose uncertain or strongly agree. For the statement, *"I feel confident applying basic physics concepts to solve problems,"* 49% were uncertain, 35.3% agreed, and the rest chose either disagree or strongly agree. These results suggest that while some students have begun understanding physics concepts, many remain uncertain about their abilities (Gumisirizah et al., 2024; Shakhman & Barak, 2019).

Category 2: Learning Resources and Methods. In this category, 62.7% of students agreed that they use learning resources beyond those provided by lecturers. Additionally, 42.2% agreed that they could solve fundamental physics problems more effectively when lecturers explain concepts before demonstrating problem-solving steps (Kösem & Özdemir, 2014; Tong et al., 2024). A significant 62.7% strongly agreed that teaching methods impact their understanding of fundamental physics concepts, while 47.1% strongly agreed that relating physics lessons to real-life contexts aids their learning. However, some students remained uncertain or disagreed. Category 3: Problem-Solving Approaches. Regarding the statement, *"I can use logical and appropriate steps to solve basic physics problems,"* 47.1% agreed. Similarly, 46% agreed with *"I understand when and how to use appropriate physics equations,"* while 58.8% agreed that they often review their answers to ensure the correct concepts were applied (Šarlah & Planinšič, 2023; Tong et al., 2024). However, many students remained uncertain about their problem-solving approaches (Kaur et al., 2024; Wen et al., 2024).

Category 4: Practice and evaluation of understanding. In this category, 66.7% of students agreed that practicing physics problems helps deepen their understanding of basic physics concepts. Additionally, 52.9% agreed that they evaluate their understanding after completing exams or problem-solving exercises, while 62.7% agreed that they revisit concepts when struggling with problems. These results indicate that many students regularly practice and evaluate their understanding of physics concepts. However, some still express uncertainty about their abilities (de Souza et al., 2024; Hamdan et al., 2024). Category 5: Study habits and collaboration. For the statement, *"I prefer solving physics problems independently rather than relying on help from peers,"* 45.1% of students were uncertain. In comparison, 49% agreed, *"I often discuss physics concepts with peers or lecturers to solve basic physics problems."* This suggests that many students still rely on peers or lecturers for assistance in problem-solving (Kurniawan et al., 2024; Yoon, 2024).

The data analysis reveals that while some students grasp basic physics concepts, many remain uncertain about their ability to apply them effectively. This uncertainty can stem from a lack of confidence when solving problems. Suggested solutions include deepening their understanding of concepts, regular problem-solving practice, and collaborative learning with peers (da Rosa et al., 2024; Ramma et al., 2024). The Certainty of Response Index (CRI) method can be valuable for addressing uncertainty-related issues. CRI measures students' confidence levels in their answers and explains their choices (Cho, 2024; Maknun, 2020). This method could help students and lecturers evaluate learning progress and pinpoint improvement areas.

Developing problem-solving strategies can also improve logical and systematic thinking in physics problem-solving. This strategy provides structured approaches and diverse methods for tackling physics problems (Kurnianto et al., 2024; Nikolaus et al., 2024). Confidence-building is also critical, as self-confidence significantly affects a student's ability to solve physics problems (Asrizal et al., 2024; Lichtenberger et al., 2024). This study underscores the need to assess the extent of students' understanding of fundamental physics concepts and identify factors hindering comprehension (Bauman et al., 2024; Peşman et al., 2024). Furthermore, it emphasizes the importance of devising practical solutions to enhance students' abilities to grasp and apply physics concepts, ultimately improving the quality of learning outcomes (Nyirahabimana et al., 2024; Twahirwa & Ntivuguruzwa, 2024).

CONCLUSION

This study has identified students' understanding of physics concepts as they solve fundamental physics problems. Several challenges students face include a lack of confidence in applying basic physics concepts to solve problems, an inadequate understanding of logical and appropriate steps in solving basic physics questions, and difficulty determining when and how to use relevant physics equations. Students often fail to evaluate their understanding of physics concepts after completing questions or exams and rely on others to solve physics problems. These challenges can be addressed by developing a deeper understanding of physics concepts, for instance, through learning from relevant instructional videos. Regular practice is also essential, starting with simpler problems and gradually progressing to more complex ones. Students should practice systematic problem-solving steps, such as identifying the problem, illustrating the situation, determining the relevant physics principles, using the appropriate equations, and checking the results. Active learning strategies, such as peer and lecturer-led group discussions, can be highly beneficial. Self-reflection and evaluation are also critical for assessing the extent of their conceptual understanding. However, this study does not fully encompass the experiences of all students in the Physics Education program at Universitas Islam Negeri Sunan Kalijaga. It only involved a small number of students from cohorts 2021 to 2024. Despite the limited sample size, the study provides an initial insight into students' understanding of physics concepts in solving fundamental physics problems. The small number of respondents was chosen to ensure time efficiency. Moreover, the questions provided only closed-ended responses, which may not capture in-depth information.

Therefore, future studies should involve a broader range of respondents and offer opportunities for open-ended responses to allow participants to express their thoughts and experiences more fully. Future research should include qualitative methods, such as interviews, to gain deeper insight into physics education students' conceptual difficulties with physics material. In addition, interactive learning strategies, such as inquiry-based physics lectures, should be explored to enhance conceptual understanding.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS STATEMENT

Conceptualization, DRD and HP; methodology, DRD; formal analysis, DRD; writing and preparation of the original draft, HP.

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