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Revealing Teachers' Approaches in Analyzing Meaningful and Contextual Physics Materials in Phase E of the Indonesian National Curriculum

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Abstract: This study aims to reveal how teachers analyze the breadth and depth of Grade X Physics materials in Phase E within the context of implementing the Indonesian National Curriculum. Using a descriptive qualitative approach, data were collected through interviews and documentation involving Grade X Physics teachers in Garut Regency. The findings show that teachers rely on various sources such as textbooks, government-issued modules based on learning outcomes (*Capaian Pembelajaran*/CP), and supplementary references to select key topics including measurement, environmental pollution, and alternative energy. Learning strategies primarily focus on developing deep conceptual understanding, while the curriculum's flexibility allows teachers to adapt lessons according to students' characteristics and needs. Although the integration of school vision and mission into material selection remains limited, teachers strive to instill essential character values like responsibility and collaboration. Overall, teachers' analysis of Physics materials considers curriculum flexibility, learner conditions, and real-life relevance, emphasizing their crucial role in making learning more meaningful and contextual in alignment with the Indonesian National Curriculum.

Keywords: Character values, Curriculum flexibility, Meaningful learning, Physics education, Teacher analysis

Introduction

In the *Kurikulum Merdeka* (Independent Curriculum), learning outcomes (*Capaian Pembelajaran* or CP) are no longer confined to a single academic year but are instead aligned with students' developmental phases. For Grade X students, this corresponds to Phase E (Irvani et al., 2023, 2025; Safitri et al., 2023). At this stage, students are expected to respond to global issues and actively participate in finding solutions to various existing problems (Baig & Yadegaridehkordi, 2023; Sirait et al., 2024; Weng et al., 2022). According to the Teacher's Guide for Natural Science for Grade X in senior high schools, several topics covered include natural phenomena, measurement, climate change, global warming, environment, and alternative energy and its utilization (Puspaningsih et al., 2021).

Physics, as a branch of science, aims to train students to think logically, critically, objectively, and with discipline in solving various problems, whether in the context of physics, other disciplines, or everyday life (Firmansyah & Suhandi, 2021; Fitriani et al., 2021; Nursabila et al., 2025). Within the

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framework of the Merdeka Curriculum, physics learning for Phase E is designed not only to develop academic competence but also to shape students' character through project-based learning and contextual approaches that relate to real-life situations. The goal is to equip students with critical thinking, creativity, and collaboration skills that are essential in the 21st century (Thornhill-Miller et al., 2023; Virijai et al., 2024).

Curriculum development at the senior high school level plays a crucial role in creating an education system that adapts to the changing times, encompassing the renewal of teaching materials, innovation in teaching methods, and more targeted evaluations. The main focus is to foster students' critical thinking, creativity, and adaptability so that they are well-prepared to face future challenges (Maolani et al., 2025; Virijai et al., 2024). However, the implementation of the Kurikulum Merdeka in physics subjects faces several challenges, including uneven teacher readiness, limited facilities and laboratory equipment, and students' difficulties in understanding the material being taught (Guntani et al., 2025; Virijai et al., 2024). These conditions highlight the importance of a comprehensive analysis of physics content to be taught in Phase E, ensuring alignment with learning outcomes and students' needs. Therefore, careful planning is key to effective physics learning, where teachers must design appropriate strategies, select relevant materials, and create a conducive learning environment (Irvani et al., 2025; Wahidin, 2024). Furthermore, analyzing teaching materials also plays a vital role, as concept analysis helps ensure alignment between learning resources and students' needs. One approach that can be employed is the use of teaching modules designed according to students' characteristics and the learning context (Ulfa et al., 2024).

Another study emphasizes the importance of integrating the Education for Sustainable Development (ESD) and STEAM (Science, Technology, Engineering, Arts, and Mathematics) approaches into physics teaching materials for Grade X (Wahyuni et al., 2023). This approach is expected to enhance students' scientific literacy while fostering awareness of sustainability issues, in line with the spirit of the National Curriculum.

The purpose of this study is to explore how teachers analyze the breadth and depth of Grade X Phase E physics materials within the context of implementing the National Curriculum at a senior high school in Garut Regency. The research focuses on several indicators, including material sources, topic breadth, time estimation, school or curriculum policies, student characteristics, and the school's vision and mission. The findings of this analysis are expected to contribute positively to improving the quality of physics learning at the senior high school level.

Method

This study employs a qualitative research method aimed at comprehensively explaining and describing how teachers analyze the breadth and depth of Grade X Phase E physics materials. The qualitative method was chosen because it allows for the exploration of qualitative data obtained from interviews and document analysis (Creswell & Creswell, 2017). The subject of this research is a Grade X physics teacher at a senior high school in Garut Regency.

The information obtained in this study consists of primary data collected directly from the source through interviews and documentation conducted with the research subject. Secondary information was gathered from various literature sources, such as modules and journal articles. After conducting the interviews, the researcher analyzed the collected data to obtain clear and structured information. The data analysis began with data reduction to simplify and visualize the findings in a narrative format, focusing on the interview and documentation results relevant to the research topic. The next stage involved data presentation, where the reduced information was organized for easier reading and understanding. After these two stages, interpretation was carried out to identify meanings related to the research topic, which were then formulated into conclusions.

Result and Discussion

The results of the structured interview with the respondent, as described in the methodology section, are presented in Table 1 below.

Table 1. Results of Interview Analysis with the Physics Teacher

Indicator	Question	Answer
Sources and Breadth of Material	What sources or references are used to determine the breadth of Grade X Physics materials (e.g., textbooks, government guidelines, or other literature)?	The teacher uses textbooks and government-issued modules based on Learning Outcomes (CP) to develop Learning Objectives (TP) and Learning Activity Plans (ATP). In addition, various relevant references are explored to help determine the breadth of materials, serving as a reference to deliver content according to learning outcomes. The materials taught at the school include measurement, environmental pollution, and alternative energy.
Time Estimation	How do you estimate the time required for each Physics topic in Phase E?	The time required for each topic depends on its complexity and the students' level of understanding. Typically, one topic is planned to be completed within one week. However, if students experience difficulties, more time is allocated. For Grade X Physics, there are two class hours per week (one meeting).
	What strategies do you use to complete all materials within the available time?	There is no specific strategy for completing the material; all topics are delivered according to the students' learning conditions. The teacher believes that the quality of understanding is more important than completing all topics as planned. Delivering all topics without ensuring understanding is considered ineffective; therefore, the teacher prefers to slow down the pace to ensure deeper comprehension. The teacher also believes that not all students will continue studying Physics after graduation, so forcing completion without comprehension would hinder the learning process.
School/ Curriculum Policy	Are there any school or educational authority policies that influence the selection of Physics materials?	The school adjusts its Physics materials according to the guidelines provided by the government and the lesson plans developed by the teacher. There are no specific school policies regarding additional materials.
	To what extent does the Kurikulum Merdeka provide flexibility in selecting or developing materials?	The Kurikulum Merdeka allows teachers the freedom to select and develop learning materials. Teachers have the autonomy to adjust the breadth and depth of materials according to students' needs, with a focus on comprehensive understanding rather than merely completing sections. This approach provides room for innovation and adaptation to real classroom conditions.
Student Characteristics	Do student characteristics (interests, prior knowledge, background) affect material selection or simplification? Are there different approaches for classes with diverse characteristics? If some students are already proficient, are they given additional materials?	Only a few students are genuinely interested in Physics—around two or three students per class. Physics is considered complex because it combines mathematical and conceptual elements. Many students struggle with the mathematical aspects, so the teacher emphasizes that Physics is not only about calculation but also about understanding real-life phenomena. Regarding diversity, no significantly differentiated instruction is applied. Students who learn faster are not given special treatment but are encouraged to help peers who struggle, fostering collaborative learning. Those with higher interest can join extracurricular study groups such as the Physics GCA Club, where they receive additional materials and practice, especially for preparing competitions like the Physics Olympiad.
	How do you make Physics materials relevant and easy for students to understand?	The teacher strives to make Physics materials relatable and easy to understand by connecting them to daily life phenomena. For example, in the topic of waves, the teacher uses simple activities such as shouting or listening to sounds to help students link the concept to real-life experiences.
School Vision and Mission	How do the school's vision and mission influence the	Currently, the school's vision and mission do not directly influence the selection of Physics materials. The teacher

Indicator	Question	Answer
	selection of Physics materials?	mentioned that the school does not yet have specific goals such as becoming an international-standard institution or adding extra materials to achieve such a vision. Although the school has an A accreditation, there are no policies integrating the school's vision and mission into Physics curriculum development. The teacher noted that integrating the school's vision and mission into the learning process could strengthen educational quality—for example, if the school's vision emphasizes global competitiveness, Physics lessons could focus on critical thinking, problem-solving, and technology exploration.
	Are there specific values intended to be instilled through the selected Physics materials?	Certain values are indeed emphasized through the Physics learning process, even if not directly related to material selection. These values include discipline, responsibility in completing tasks, compliance with rules, and active participation in both individual and group learning activities.

Based on the interview results presented in the table regarding the breadth of physics material taught in high schools, teachers use textbooks, government-issued CP-based modules, and various other sources. This indicates that teachers do not rely on a single source but instead explore multiple references and information sources to align the material with learning outcomes. The topics taught include measurement, environmental pollution, and alternative energy, all of which are highly relevant to students' daily lives. Students' understanding of learning content and its practical benefits is crucial, as it helps them realize that the material they study is not only relevant to everyday life but also has a significant impact on their future (Amelia et al., 2024).

The topic limitation applied by the respondents serves as a strategy to help students achieve a deeper understanding of the material, rather than covering a wide range of topics superficially. Furthermore, regarding the indicators of time estimation and learning strategies, this approach, according to the author's interpretation, reflects an educational principle that emphasizes the quality of understanding rather than the quantity of content. This flexibility also aligns with the Merdeka Curriculum, which grants teachers the autonomy to adapt learning processes to the needs and abilities of their students (Nurroniah et al., 2025; Safira et al., 2023).

In terms of policy, schools do not have specific regulations that directly influence the scope of physics material. The selection of content is guided by government standards, while teachers develop their own methods and techniques to support the learning process. This approach ensures that learning remains structured and goal-oriented, enabling students to follow and comprehend the material effectively. Adapting learning materials to students' characteristics facilitates their understanding (Antika, 2023).

Regarding the indicator of student characteristics, although classroom approaches tend to be general, students' participation in group-based learning and extracurricular activities represents an indirect strategy that supports differentiated instruction. The key characteristics of the Merdeka Curriculum include project-based learning, a focus on essential content, and flexibility for teachers to implement differentiated learning approaches (Irvani et al., 2025; Warliani et al., 2023).

Character education is a process of instilling values in students that encompasses various aspects of knowledge, awareness, willingness, and actions to implement those values (Purnawanto, 2023). Teachers stated that there are no specific directives from the school regarding the integration of the institution's vision and mission into the development of physics learning content. Nevertheless, teachers continue to strive to instill character values throughout the learning process, such as responsibility, obedience, and cooperation. Although the implementation of character values in learning has not been fully realized, teachers consistently make efforts to enhance the learning process so that students not only gain conceptual understanding but also develop positive attitudes that are highly beneficial for their lives.

The effort to integrate character values into the learning process serves as an initial step in supporting the development of the Pancasila Student Profile, as emphasized in the national curriculum.

In the future, it would be more effective if these values were embedded systematically through structured learning activities.

Conclusion

The findings of this study reveal that teachers play a central role in analyzing and selecting physics learning materials that are both meaningful and contextual within the framework of the Indonesian National Curriculum. Teachers demonstrate autonomy in adapting content according to students' needs by utilizing diverse references, textbooks, government modules, and supplementary sources, to ensure alignment with learning outcomes. The prioritization of depth over breadth in material coverage reflects a pedagogical commitment to fostering conceptual understanding rather than superficial completion of topics.

In practice, teachers also strive to integrate character education values, such as responsibility, discipline, and collaboration, into the learning process, even in the absence of direct institutional directives. This approach supports the realization of the Pancasila Student Profile and reinforces the holistic goals of the Merdeka Curriculum.

The implications of these findings highlight the importance of continuous professional development for teachers, particularly in designing flexible, student-centered learning strategies that balance conceptual mastery with value formation. Future research should expand the sample scope and explore the effectiveness of structured integration of character education and contextual learning models in physics instruction across different regions and school contexts.

Conflicts of Interest

The authors declare no conflict of interest.

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