From Classroom Reasoning to Field Applications: Highlights of Lontar Physics Today Vol. 5 No. 1

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Abstract:
This issue highlights research that bridges classroom physics learning with applied solutions in the field. In Physics Education, the papers emphasize the development of students' critical thinking and scientific reasoning through case-based pedagogy, systematic review of evidence, and interactive learning technologies across core topics such as static fluids, temperature and heat, work and energy, and energy transformations, including support for conceptually demanding content like special relativity. In Physics**,** the articles contribute applied investigations on biomass-derived carbon materials, microcontroller-based monitoring and control for water quality, and the performance assessment of solar water pumping systems under high-head field conditions. Taken together, the issue presents complementary perspectives—strengthening reasoning-centered instruction while advancing practical innovations relevant to sustainability and local needs.

Keywords: physics education; critical thinking; scientific reasoning; interactive learning media; applied physics; renewable energy

Introduction

Lontar Physics Today (LPT), Volume 5, Number 1 (February 2026) has been completed and published, and all articles are finalized and fully citable. The issue DOI is https://doi.org/10.26877/axdkvk43. This issue is divided into two sections: Physics Education (7 articles) and Physics (3 articles).

The Physics Education section foregrounds two connected priorities: (1) strengthening learners' higher-order thinking (critical thinking and scientific reasoning) through structured pedagogy and assessment, and (2) leveraging interactive learning technologies (Lumio, Pear Deck, Wizer.me) and STEM-oriented media development to improve conceptual understanding and student engagement. Across topics—static fluids, temperature and heat, work and energy, and energy transformations—these studies collectively emphasize instructional designs that make reasoning processes visible and measurable (Anjiana et al., 2026; Nurjannah et al., 2026; S. J. Putri et al., 2026; Ramadhona et al., 2026; Simanullang et al., 2026; Zahara et al., 2026). A systematic literature review on technology-based parabolic motion complements this section by mapping technology–pedagogy alignments and reported learning outcomes (Kuntari et al., 2026).

The Physics section highlights applied and experimental contributions spanning biomass-derived carbon materials, instrumentation and control systems, and renewable-energy-based water pumping under real field constraints. Together, these works reflect physics research with practical relevance: linking material structure to processing parameters, integrating sensors and microcontrollers for water-quality control, and evaluating system performance for water access in high-head environments (D. A. Putri et al., 2026; W. M. Putri et al., 2026; Setyowati et al., 2026).

Articles Highlight

Case-based learning for critical thinking in static fluids (Simanullang et al., 2026). This article frames Case-Based Learning (CBL) as an instructional route for helping high school students reason more deeply about static fluids through contextual problem situations. Instead of treating hydrostatic pressure and buoyancy as purely formula-driven, the learning design encourages students to interpret a case, identify relevant physical principles, and justify their decisions with evidence and concepts. The work emphasizes how authentic or semi-authentic cases can stimulate higher-order thinking through analysis, argumentation, and evaluation of alternatives. In this sense, CBL is positioned not only as a classroom strategy but also as a structure for aligning physics content with reasoning-centered learning outcomes.

Scientific reasoning profile on temperature and heat using a two-tier test (Anjiana et al., 2026). This study provides a baseline profile of students' scientific reasoning in the domain of temperature and heat, an area where misconceptions and everyday intuitions often interfere with formal physics understanding. By using a two-tier test, the authors not only assess whether an answer is correct but also probe the reasoning that underpins students' choices, enabling them to diagnose patterns of thinking. The analysis is organized around Lawson-style reasoning indicators (e.g., control of variables, proportional or correlational reasoning), allowing the results to be discussed as a reasoning competence map rather than a simple score report. The findings can inform teachers about which reasoning components deserve explicit instructional attention and which concepts may require stronger representational support during learning.

Lumio interactive media for conceptual understanding of energy and its transformations (Zahara et al., 2026). This article explores the use of Lumio as an interactive medium to support students' conceptual understanding of energy and its transformations—topics that are often taught procedurally but require coherent conceptual linking across representations. The work highlights how structured interactive activities can help students actively process relationships among forms of energy, transfer, and transformation rather than passively receive explanations. By focusing on conceptual understanding, the study implicitly emphasizes learning evidence, such as students' ability to explain, connect, and apply ideas, rather than merely computing numerical answers. In practical terms, Lumio is positioned as a platform that can facilitate formative interactions (checks for understanding, embedded tasks) that are aligned with conceptual learning goals in physics.

Systematic literature review: technology-based parabolic motion learning (Kuntari et al., 2026). As a systematic literature review, this study maps how technology has been used to teach parabolic (projectile) motion, a classic topic that requires coordinating multiple representations (graphs, equations, motion diagrams). The review's contribution lies in showing that learning improvements typically depend not merely on the presence of technology, but on how it is embedded within pedagogy—such as inquiry tasks, modeling activities, or problem-based designs. The synthesized evidence helps readers compare instructional purposes: visualization for conceptual clarity, simulation for experimentation with variables, and digital tools for modeling and prediction. For researchers, the review provides a structured picture of current directions and potential gaps; for educators, it offers a rationale for choosing technology based on learning outcomes rather than novelty.

STEM-based interactive media for critical thinking in renewable energy (Ramadhona et al., 2026). This development-focused article presents interactive learning media grounded in a STEM orientation, using solar power plants as the central context to connect physics concepts with engineering design and real-world energy issues. The study deliberately aligns content and thinking outcomes: the media is designed not only to deliver information but also to foster critical thinking through tasks that require reasoning, evaluation, and decision-making. By situating learning in renewable energy, the work strengthens relevance and contextual authenticity, which can increase motivation while also supporting the application of concepts. The development and evaluation components indicate the authors' focus on practical adoption—making the product potentially usable as an instructional resource rather than a purely theoretical proposal.

Pear Deck for improving critical thinking in work and energy (S. J. Putri et al., 2026). This study discusses the implementation of Pear Deck for teaching work and energy, a topic that often benefits from interactive probing of students' assumptions about forces, displacement, and energy changes. The use of Pear Deck is highlighted as a way to orchestrate real-time participation: students respond to prompts, and the teacher can address misconceptions or partial reasoning immediately. The critical thinking emphasis suggests that tasks are not limited to selecting answers but also extend to explaining choices, comparing alternatives, and evaluating the quality of reasoning during instruction. Importantly, the study positions interactive media as a support for both engagement and cognition, where participation becomes a vehicle for making thinking visible, discussable, and improvable in class.

Wizer.me digital worksheet for teaching special relativity (Nurjannah et al., 2026). Focusing on a conceptually challenging domain, this article develops a Wizer.me worksheet intended to support learning of special relativity, where abstraction and counterintuitive implications can be barriers. The digital worksheet format enables structured scaffolding—stepwise prompts, guided reasoning, and interactive elements—so that students can gradually move from intuitive interpretations to formal conceptual understanding. The work also emphasizes feasibility through user responses, indicating attention to practicality: whether learners and teachers find the tool understandable, helpful, and engaging. In this sense, the product is positioned as a pedagogical scaffold that can complement classroom explanation, supporting conceptual reconstruction and reasoning about relativistic ideas through guided activity.

Water hyacinth biochar: microstructure and carbon phase under particle-size variation (D. A. Putri et al., 2026). This article investigates biomass-derived carbon materials, specifically biochar from water hyacinth, by examining how particle-size variation relates to microstructural properties and carbon-phase characteristics. A key value of this work is its emphasis on linking a controllable physical parameter to observable material outcomes, thereby supporting a more systematic understanding of processing–structure relationships. Such characterization studies are important because they provide evidence that can guide optimization when biochar is intended for practical applications (e.g., adsorption, soil amendment, or carbon-based materials), where performance often depends on microstructure and carbon ordering. Overall, the study contributes to applied physics/materials research by demonstrating how experimental variation and characterization can be used to interpret material behavior and potential utility.

Arduino-based automatic water salinity control using a Gravity TDS sensor (W. M. Putri et al., 2026). This article presents an applied instrumentation solution: an Arduino-based automatic system for monitoring and controlling water salinity using a Gravity TDS sensor. The study integrates sensing, data acquisition, and control logic into a single working system, demonstrating how physics-based measurement concepts can be operationalized for real-world water-quality needs. Beyond the prototype itself, the paper underscores the replicability of microcontroller-based systems: such designs can be adapted to various contexts where affordable monitoring is essential. In educational and applied settings, this work exemplifies how low-cost electronics and sensors can enable practical measurement and control systems that align with community-relevant problems, thereby advancing physics instrumentation.

Solar water pumping performance at high head in Sumba, Indonesia (Setyowati et al., 2026). This study assesses the performance of a solar water pumping system under high-head conditions in Sumba, Indonesia. In this important context, terrain and infrastructure constraints can powerfully shape system effectiveness. The study focuses on performance evidence under realistic constraints, which enhances the research's practical relevance for water access and renewable energy deployment. By analyzing system behavior in a high-head scenario, the work contributes to a better understanding of how design assumptions, field conditions, and operational demands interact in renewable-energy-based water supply solutions. In broader terms, the article positions performance assessment not as an abstract metric exercise, but as a knowledge base for improving the reliability and sustainability of solar pumping in remote or challenging environments.

Concluding Remarks

Overall, the contributions in this issue demonstrate how physics research can move coherently from reasoning-centered learning designs to evidence-based applied solutions. The Physics Education papers emphasize critical thinking and scientific reasoning supported by interactive learning environments and structured instructional approaches, while the Physics papers present applied investigations in materials, instrumentation, and renewable-energy systems under field-relevant constraints. By bringing these perspectives together, Lontar Physics Today Vol. 5 No. 1 (February 2026) offers a balanced snapshot of current directions in physics education and applied physics. We invite readers to engage with the studies, adapt the reported approaches to their contexts, and build further research that strengthens both learning and real-world impact.

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