
# PEDAGOGICAL PROBLEMS OF MODELING PHYSICAL PROCESSES IN PHYSICS EDUCATION

**Khudoyeva Hulkar Kandiyorovna**
**Physics teacher at Secondary**
**School No. 201, Chilonzor district,**
**Tashkent city**
**Email: Khulkar-83@mail.ru**
**https://doi.org/10.5281/zenodo.18059411**

**ARTICLE INFO**

Received: 23rd December 2025
Accepted: 24th December 2025
Online: 25th December 2025

**KEYWORDS**

*Computer-based modeling enables visualization and exploration of physical phenomena that are otherwise abstract or complex*

**ABSTRACT**

*Computer-based modeling enables visualization and exploration of physical phenomena that are otherwise abstract or complex. It supports active learning and scientific reasoning but poses pedagogical difficulties that must be addressed for successful implementation.*

**Introduction**

Computer-based modeling enables visualization and exploration of physical phenomena that are otherwise abstract or complex. It supports active learning and scientific reasoning but poses pedagogical difficulties that must be addressed for successful implementation.

**Pedagogical Challenges**

**Cognitive Load:** Complex models can overwhelm students lacking foundational knowledge.

**Technical Skills:** Insufficient experience with software tools restricts student engagement.

**Interpretation Issues:** Understanding simulation outcomes and validating models are challenging.

**Teacher Training:** Many educators lack adequate preparation to effectively use modeling tools.

**Curriculum Constraints:** Time and syllabus rigidity limit modeling integration.

**Strategies for Improvement**

Develop scaffolded instructional materials to gradually introduce modeling concepts.

Provide continuous professional development for teachers focused on modeling pedagogy and tools.

Employ user-friendly software adapted to students' language and skill levels.

Align modeling activities with curriculum standards to ensure sufficient class time.

Encourage collaborative learning to foster shared understanding.

**Conclusion**

Addressing pedagogical challenges in modeling physical processes is vital for enhancing physics education quality. With proper strategies, modeling can significantly improve students' conceptual understanding and motivation.

## References:

1.Gilbert, J. K. (2004). Models and Modelling: Routes to More Effective Science Education. International Journal of Science and Mathematics Education, 2(2), 115–130.
2.Hestenes, D. (1999). Modeling Theory for Science Education. In D. Gabel (Ed.), Handbook of Research on Science Teaching and Learning (pp. 935–948). Macmillan.
3.de Jong, T., Linn, M. C., & Zacharia, Z. C. (2013). Physical and Virtual Laboratories in Science and Engineering Education. Science, 340(6130), 305–308.
4.Gobert, J. D., & Buckley, B. C. (2000). Introduction to Model-Based Teaching and Learning in Science Education. International Journal of Science Education, 22(9), 891–894.
5.White, B. Y., & Frederiksen, J. R. (1998). Inquiry, Modeling, and Metacognition: Making Science Accessible to All Students. Cognition and Instruction, 16(1), 3–118.