

Quantitative Insights: Unveiling the Interplay Between Mathematics and Physics in College Education

Judelyn L. Patero

Faculty, College of Teacher Education,
North Eastern Mindanao State University - Cantilan Campus, Cantilan, Surigao del Sur, Philippines

Abstract: *This study investigates the intricate interplay between mathematics and physics in college education. Through a mixed-methods approach involving surveys, interviews, and classroom observations, the research delves into students' perceptions, instructional challenges, and effective pedagogical strategies. The findings reveal that while many students recognize the relationship between the disciplines, challenges persist in bridging mathematical concepts with physics principles. Instructors employ interactive simulations and inquiry-based methods to address these challenges. The study's insights hold implications for curriculum development and teaching practices, aiming to enhance the integration of mathematics and physics education and provide a more enriched learning experience for students.*

Keywords: Quantitative Insights, Mathematics and Physics, College Education

REFERENCES

- [1]. Smith, S. L., Heiner, C. E., Figueiredo, A. D., & Britton, S. M. (2017). Investigating student performance on mathematical tasks in introductory physics. *Physical Review Physics Education Research*, 13(1), 010130. doi:10.1103/physrevphyseduces.13.010130
- [2]. Martin, T. (2019). Enhancing quantitative skills in undergraduate biology through interdisciplinary connections. *CBE—Life Sciences Education*, 18(4), es4. doi:10.1187/cbe.18-03-0039
- [3]. Ramirez, M. C., & Diaz, L. M. (2020). Mathematics and physics: Bridging the gap in the physics classroom. *AIP Conference Proceedings*, 2242(1), 020030. doi:10.1063/5.0014510
- [4]. Einstein, A. (1905). On the electrodynamics of moving bodies. *Annalen der Physik*, 17(10), 891-921.
- [5]. Penrose, R. (2004). *The Road to Reality: A Complete Guide to the Laws of the Universe*. Vintage.
- [6]. Loverude, M. E., Kautz, C. H., & Heron, P. R. (2015). Interpreting mathematical expressions in physics. *Physical Review Special Topics-Physics Education Research*, 11(1), 010110.
- [7]. Dori, Y. J., & Herscovitz, O. (1999). Question-posing capability as an alternative evaluation method: Analysis of an environmental case study. *Journal of Research in Science Teaching*, 36(4), 411-430.
- [8]. Redish, E. F. (2003). *Teaching physics: with the physics suite*. John Wiley & Sons.
- [9]. Creswell, J. W. (2013). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*. Sage Publications.
- [10]. Piantanida, M., & Garman, N. B. (2018). *The Qualitative Dissertation: A Guide for Students and Faculty*. Corwin Press.
- [11]. Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107-115
- [12]. Branchetti, L., Cattabriga, A., & Levrini, O. (2019). Interplay between mathematics and physics to catch the nature of a scientific breakthrough: The case of the blackbody. *Physical Review Physics Education Research*, 15(2), 020130.
- [13]. Duval, R. (1999). *Representation, Vision and Visualization: Cognitive Functions in Mathematical Thinking. Basic Issues for Learning*.

- [14]. Mujumdar, A. G., & Singh, T. (2016). Cognitive science and the connection between physics and mathematics. Trick or truth? The mysterious connection between physics and mathematics, 201-217.
- [15]. Pepper, R. E., Chasteen, S. V., Pollock, S. J., & Perkins, K. K. (2012). Observations on student difficulties with mathematics in upper-division electricity and magnetism. Physical Review Special Topics-Physics Education Research, 8(1), 010111.