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A STUDY ON CONCEPTUAL UNDERSTANDING OF NEWTON'S LAWS OF MOTION IN ADVANCED LEVEL PHYSICS: A CASE STUDY IN THE MATALE EDUCATIONAL ZONE SRI LANKA

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This study investigated the conceptual understanding of Newton's Laws of Motion among General Certificate of Education (G.C.E) Advanced Level Physics students in the Matale Zone of Education, Sri Lanka. A mixed-methods explanatory sequential design was employed, incorporating diagnostic tests, focus group interviews with students, and structured interviews with teachers. A total of 334 students and five physics teachers from five selected schools were chosen using simple random sampling. Quantitative data were analysed descriptively using statistical package for social sciences (SPSS), and qualitative data were analysed thematically. According to the findings, 24.9% believed a continuous force is needed to maintain motion, 76.2% were confused about action-reaction pairs of Newton's Third Law, on the other hand 56.5% misunderstood inertia, and 48.0% struggled with reference frames. Qualitative data supported these findings and revealed six key themes: limited use of student-centered teaching methods, infrequent practical demonstrations, challenges in applying Newton's Second Law, poor recognition of action-reaction pairs, vague understanding of inertia, and weak diagram interpretation skills. Teacher interviews confirmed that instruction remains largely teacher-centered, with limited focus on building conceptual understanding. Results revealed that while many students could recall basic concepts, a large number held persistent misconceptions. The study concludes that although students possess surface-level knowledge of Newton's Laws, deeper comprehension is lacking. It is recommended that more interactive, inquiry-based teaching methods, real-world applications, and hands-on experiments be incorporated. Furthermore, continuous professional development for teachers is essential to improve instructional strategies and foster meaningful student engagement. Enhancing these areas would strengthen students' understanding on Newtonian mechanics and lead to improved outcomes in Physics education.

Keywords: G.C.E. Advanced Level, Instructional strategies, Misconceptions, Newtonian mechanics