

**EFFECTIVENESS OF INQUIRY-BASED LEARNING STRATEGIES IN
TEACHING SCIENCE CONCEPTS TO SECONDARY SCHOOL SCIENCE
STUDENTS IN SRI LANKA**

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This study investigated the effectiveness of inquiry-based learning (IBL) strategies in teaching science concepts to secondary school students in Sri Lanka. The outcomes were compared with the traditional lecture-based instruction method (TLBL). The mixed-method approach was used to evaluate the impact of IBL on student understanding, retention, engagement, and motivation in science classrooms. The study sample included 300 secondary school students from three different Districts in Sri Lanka (Matale, Kandy, and Nuwara-Eliya). The schools were selected through stratified random sampling to ensure representation. Pre- and post-tests were used to measure learning outcomes. Surveys and questionnaires were used to assess student engagement and attitudes. In-depth interviews with teachers and students, along with classroom observations using a standardized protocol, were also conducted. Ethical considerations, including informed consent, confidentiality, and adherence to educational research guidelines, were followed throughout the study. Quantitative data were analysed using t-tests and ANOVA, while qualitative data were subjected to thematic analysis to identify recurring themes. Students in the IBL group showed a significantly greater improvement ($t = 6.34, p < 0.001$) in test scores with a mean increase of 12.5 ± 3.8 , compared to the students of the TLBL group (mean increase of 4.2 ± 2.1 marks). Moreover, 85% of students in the IBL group reported higher engagement compared to 60% in the TLBL group ($p = 0.002$). Inquiry-based learning showed relatively higher levels of student engagement and motivation. Preliminary findings suggest that IBL strategies significantly enhance student understanding and retention of science concepts compared to traditional lecture-based methods.

Keywords: Inquiry-based learning, Lecture-based teaching, Science education, Secondary students