

**IMPLEMENTING INQUIRY-BASED LEARNING APPROACH TO IMPROVE  
SYNTHESIS SKILLS AMONG SCIENCE UNDERGRADUATES**

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Analysis, evaluation, and synthesis are higher-order cognitive processes which require the active participation of students and inquiry-based learning (IBL) activities are an efficient means to improve them. IBL involves exposing the students to an issue or a concept, and the students are encouraged to ask questions and generate hypotheses or predictions. This process is followed by experimentation to collect data and analysis of data to draw conclusions. The learning process involves analysis, critiquing, designs, and reflections. An IBL activity was implemented on a group of 19 fourth-year undergraduates enrolled in the Membrane Biology course and were following the BSc Honours degree in Biochemistry and Molecular Biology at the University of Colombo. For the IBL activity, students were provided with several research articles relevant to the taught material. They were requested to conduct a poster presentation on an experiment in the research article, assuming they were one of the authors in the article, providing context to what is already known, gap-in-the-knowledge, hypotheses, experimental method, results, conclusion/s and future direction/s for the study encouraging them to synthesise their own hypotheses and experimental designs. To ensure that students are not developing misconceptions during their inquiry, they were requested to submit a short manuscript on what they are proposing. Following the feedback from the instructor, students conducted their poster presentations, which were evaluated based on predetermined evaluation criteria. A cross-sectional survey involving the students who participated in the IBL activity recorded their positive learning experience, with all agreeing that the assignment helped them to learn how to analyse data presented in a journal article critically. In the study sample, 19% of students strongly agreed, and 76.2% of students agreed that they were able to synthesise their own hypotheses and experimental designs. All students agreed that the assignment led to an increase in their scientific creativity. In conclusion, the implemented IBL activity was highly constructive in developing students' higher-order cognitive skills. Considering the intellectual effort that needs to be invested in an IBL activity, the entire course can be benchmarked by incorporating another IBL-based assignment, such as developing a research proposal forgoing the necessity of an end-semester examination.

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