Inquiry Based Learning Approach in Introductory Level Science Education

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In today's world, science education has been shifted from the traditional "Passive Learning" to the "Active Learning" approach. Although traditional teaching is effective in disseminating large body of content to a large number of students, it often fails to stimulate students' enthusiasm, confidence, and motivation, and thereby fails to enhance critical thinking and problem solving skills. The result is a mismatch in job market demand and supply as the graduates are lacking in appropriate skills and competencies needed in the job market, leading to increased unemployment among the graduates. In order to promote meaningful science education through concepts of Active Learning, number of different teaching pedagogies have been introduced, such as Problem Based Learning (PBL), Activity Based Learning (ABL) and Inquiry Based Learning (IBL). Current study focuses on the implementation of an Inquiry Based instructional design to enhance chemistry laboratory skills of undergraduates. Typically, chemistry laboratory classes utilize a "cook book" approach where students follow the directions in an experimental procedure. Although this approach is effective in teaching a new laboratory technique, it highly limits the level of learning as it doesn't provide a comprehensive understanding of the real world applications of the experiment. In the current IBL approach, each laboratory class was composed of four components, (i) Case Study session (ii) Pre-lab Assignment (iii) Laboratory session and (iv) a Post-lab activity. Case study session was an interactive group activity where a comprehensive real world problem/scenario related to each laboratory topic was discussed prior to the laboratory session. Students were asked to think critically on the scenario, and design an experiment to solve the problem. An inclusive learning environment was created in the classroom where each group had to present their solution and provide feedback to peers. Pre-lab assignment was designed to facilitate and assess students' subject knowledge and logical thinking, while the post-lab activity was designed to provide a deeper understanding by emphasizing the theoretical background. Assessment of this novel IBL approach consisted of student surveys, feedbacks, and comparison of students' grades. Significantly higher student satisfaction and performance was observed in the study signifying the positive impact of active learning towards the success of students' learning.

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