

Development of Inquiry-Based Online Laboratory Activities by Using Different Phases of Learning Cycles: An Action Research

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Abstract

Science education aims to help students to develop an understanding of the real world and gives students an opportunity to understand the nature of science. During the COVID-19 pandemic, online classes were mostly focused on teaching and learning the theoretical framework of the lessons. Unfortunately, science process skills that are intended to be acquired by students through laboratory activities have been suspended. Although virtual laboratories are thought to be effective in gaining science process skills, they cannot replace the ones where students formulate their own hypotheses and design their own experiments. Creating an online lab environment has some difficulties such as converting homes to labs, stimulating curiosity and inquiry for doing experiments. In this study, to overcome these difficulties, “lab-kits” were prepared and given to each student, open-ended inquiry-based laboratory activities were developed and implemented during live online biology lessons. Developing inquiry-based laboratory activities for online use was a challenge. The lab activity in the first action plan was designed by using 7E learning cycle. After its implementation, collected data was analyzed and the first cycle was linked to the next through the critical reflection on what was learned. Within the cyclical process of the action research, lab activity in the previous action plan was revised and planned again each time throughout the four research cycles. This research was conducted with 8 students of class 10 Cambridge IGCSE students in 2021-22 academic year and qualitative data was collected by semi-structured interviews with the students, teacher and student diaries, evaluation of lab sheets and lab tests.

Keywords: 7E learning cycle; online biology experiments; online laboratory environment; open-ended laboratory activities; science process skills.