



Research Article

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A curriculum-based laboratory kit for flexible teaching and learning of practical chemistry

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Abstract: Laboratory practical is an essential component for effective learning of science. To provide laboratory experience can be a challenge to some rural schools with limited laboratory facilities. The situation was exacerbated when schools were close due to the COVID pandemic. This paper reports a laboratory kit designed based on the Standard Curriculum for Secondary Schools in Malaysia (KSSM). The kit was evaluated by students and experienced teachers from town and rural schools. Pre- and post-test was conducted with the students before and after using the kit. A questionnaire was disseminated to appraise the students' perceptions on practical learning. There was a significant improvement ($p < 0.05$) in the overall score of the post-test comparing to the pre-test. Both rural and town schools demonstrated a marked increase in the overall mean scores in the post-test. There was also improvement in affection for chemistry among students after using the kit. The practical kit can be deployed in schools with laboratory constraints and to be used outside the school settings. It was designed to be affordable, safe and environmental-friendly, providing individualized hands-on exposure.

Keywords: chemistry; COVID; inquiry-based learning; laboratory kit; standard based curriculum for secondary school.

Introduction

Laboratory practical plays an important role for effective learning of science. Woolnough and Allsop (1985) infers that laboratory activities are exercises aid to develop practical skills in students giving them the 'feel' for phenomena, and to be actively and immensely involved as a 'problem-solving scientist'.

Malaysia adapted British educational framework after its independence in 1957 (Suminotono, 2015). The curriculum has evolved incorporating culture and religion of multiracial society in Malaysia leading to formation of the Integrated National Curriculum for Primary School (KBSR) and Secondary School (KBSM). This curriculum was introduced in 1980s, emphasizing on reading, writing and arithmetic skills in balance with spiritual, emotion and physical development, inculcating life-long learning (Lee, 1992). The curricular structure was later revised and replaced with KSSR (Standard Based Curriculum for Primary School) and KSSM (Standard Based Curriculum for Secondary School), shifting towards student-centered learning with focus on the 21st century skills such as communication, critical thinking, problem solving, innovation etc. (Malaysia Education Blueprint).

One of the changes upon reformation of curriculum from KBSM to KSSM is the re-introduction of practical assessment in Malaysian Certificate of Education (SPM). The practical assessment was fully implemented in 2021 replacing the written test; students are expected to conduct experiments individually. This is to

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