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Game-Based Learning Approach for Promoting Laboratory Safety to Students Who Studying Laboratory-Based Science Undergraduate Programmes: A Pilot Study

Prof. Ellie Chu , Dr. Ricky Wing Kei Wu , Dr. John Wai Man Yuen , Dr. Eva Yi Wah Cheung

Tung Wah College, Hong Kong

Abstract

Laboratory safety is a mandatory competence required for all Laboratory based Science programmes. For enhancing students' awareness on laboratory safety, a series of game-based learning modalities were embedded in a specific second year course offered in the Tung Wah College of Hong Kong. In this pilot study, effectiveness of this learning approach was evaluated by using an online self-administered questionnaire. Participants were randomly assigned into the intervention and control groups, whereas the game-based elements were provided before and after the post-measurement, respectively. Domain scores were of laboratory safety awareness, intrinsic motivation, and conceptual understanding were calculated for comparison, and their associations were also analyzed. Respondents were categorized into four subgroups according to their laboratory safety awareness scores: Low (0-2.39), moderate (2.4-2.79), moderately high (2.8-3.19), and high (?3.2). With the total of 69 respondents completed the questionnaires at both time points, no significant differences were observed between the two groups. At baseline, both groups expressed relatively high scores in all three domains: laboratory safety awareness (3.13?0.55 vs 3.03?0.58), intrinsic motivation (3.19?0.52 vs 3.04?.051), and conceptual understanding (3.03?0.58 vs 2.97?0.50). More than half of the respondents from the low and moderate subgroups demonstrated improvement in laboratory safety awareness when compared with the 40% and 26.7% from the moderately high and high subgroups, respectively. The laboratory awareness scores were strongly correlated with the intrinsic motivation (r=0.497; p=<0.01) and conceptual understanding (r=0.606; p=0.01). Our findings revealed that the game-based approach could effectively promote laboratory safety awareness in less confident students.

Keywords: Conceptual Understanding; Intrinsic Motivation; Laboratory Safety Awareness