EFFICACY OF A BLENDED LEARNING MASTERY PROGRESSION CYCLE ON STUDENT ACHIEVEMENT AND ATTITUDE IN HIGH SCHOOL SCIENCE

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KEYWORDS: Blended learning, Mastery, Physics education

This study was conducted to examine the effect of a Blended Learning Mastery Progression Cycle (BLMPC) on student achievement and attitude in a High School Physics context, specifically through the use of the Minds on Physics (MOP) (Minds on Physics, 2022) application for the formative assessment and corrective activity components of the Mastery Learning cycle.

The sample (N = 199) consisted of mixed gender classes from Year 10 cohorts in a single Queensland high school. Classes were randomly assigned to the treatment or control condition. An experimental pretest–posttest approach was used to measure any changes in students' understanding of the Newtonian Force concept, measured using the Force Concept Inventory (FCI) (Hestenes et al.,1995), and Attitudes toward Science, measured using the Test of Science Related Attitudes (TOSRA) (Fraser, 1982). All students were exposed to the same initial learning activities; the control group then continued through the course content in a linear manner followed by working through non-personalized revision material, whilst the treatment group completed the relevant MOP module at the end of each subtopic.

Data were analyzed in terms of FCI and TOSRA mean pre- and post-unit scores, the distribution and standard deviation of scores, a t-test comparison of the pre- and post-unit scores, and the FCI normalized change and effect size. When comparing the control and treatment group FCI scores, the latter demonstrated significantly more improvement in the raw score, normalized gain and effect size, demonstrated a larger improvement in all dimensions of the Newtonian Force Concept, and showed greater stability in correct responses from the pre- to post-unit test. An analysis of TOSRA results showed there was no significant difference between the control and treatment groups.

It was concluded that the use of the MOP platform in a BLMPC led to improvements in understanding of the Newtonian force. These findings indicate that the use of Blended Learning activities as correctives is an effective way of improving students' understanding of the Newtonian Force Concept.

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Proceedings of the IUPAP International Conference on Physics Education, ICPE 2022 5-9 December 2022, page 141, ISBN: 978-1-74210-532-1.