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The study probed the effects of the Multiple-Representation Lesson Study (MRLS) on pre-service Physics teachers' technological-pedagogical-content knowledge, critical thinking, and student achievement in Physics. The study also identified the challenges and the coping mechanisms in conducting the MRLS.

The two-phase study employed a pretest-posttest quasi-experimental design with the participation of 18 pre-service Physics teachers and 12 intact Grade 8 classes of a public high school. The comparison group was exposed to Traditional Instructional Planning Approach (TIPA) while the experimental group was exposed to MRLS.

Phase 1 of the study was conducted in Summer 2016 while Phase 2 was conducted during the practice teaching stage in the first semester of SY 2016-2017. Data from multiple sources were analyzed using the Mann-Whitney U test, ANOVA, t-test, and constant comparative qualitative method. Results revealed significantly higher media scores of the MRLS group than the TIPA in the overall TPCK and critical thinking, as well as in the various components of the two constructs both in Phase 1 and Phase 2 of the study. Moreover, results suggest encouraging effects of the MRLS on student achievement.

Meanwhile, seven dominant challenges and six coping mechanisms were revealed in the conduct of MRLS. Finding indicate a positive influence of the MRLS on pre-service teachers' TPCK, critical thinking, and on the academic achievement of students; hence, the integration of the MRLS in the pre-service teacher education curriculum is recommended. Likewise, the extensive use of technology-generated and conventional multiple representations in Physics instruction is proposed to reinforce higher order thinking and student motivation.