

TEACHING MOMENTUM AND COLLISION WITH HIGH-SPEED VIDEOS

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The research we will be presenting on, aims to construct physics instructional materials in video format to be used in an active learning approach for teaching momentum and collisions. Eighteen high-speed videos of five different collisions were recorded and tutorial sheets for analyzing these five collisions were developed. The instructional materials were deployed with 206 Grade-10 students from Chiang Mai University Demonstration School. A conceptual survey on momentum concepts was developed based on previous physics education research, including 6 problems translated from Singh and Rosengrant (2003). The conceptual survey consisted of 25 multiple-choice questions. The survey was administered as pre-test and post-test. Students learned concepts of momentum and collisions in a 50-minute lecture. Students learned how to use the relevant Tracker program to analyze videos for 50 minutes. Then, in the two following periods they used the Tracker program to analyze all five different collisions. From the statistical results of both pre- and post-test, the paired sample t-test, the mean scores differed statistically at 0.01 levels, indicating that the mean scores after instruction or the post-test (mean = 7.44, SD = 3.63) was significantly higher than the pre-test mean scores (mean = 5.78, SD = 2.53). The effect size was equal to 0.53, which was a value indicating that the post-test scores were quite different from the pre-test scores. However, the average learning gain was 0.07, which was considered quite small. It was concluded that learning from using high-speed video media increased at a moderate level.

REFERENCE

Sing, C. & Rosengrant, D. (2003). Multiple-choice test of energy and momentum concepts. *American Journal of Physics*, 71(6), 607-617. <https://doi.org/10.1119/1.1571832>

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