EFFECTIVENESS OF USING MOMENTUM VECTOR DIAGRAMS TO TEACH COLLISIONS

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This study aims to enhance students' understanding and problem-solving skills of collisions. A teaching tool called 'Momentum Vector Diagrams (MVD)' was developed to help students understand that momentum is a vector quantity and to help them correctly solve collision problems. The MVD was applied to 9 physics classes at 4 schools (294 students) during 3 academic years, who were studying momentum and collisions. The problem-solving test on collisions was developed and given as pre- and post-tests. It consists of 4 open-ended questions asking students to find the final velocity of objects after colliding in 1 and 2 dimensions.

The post-test results indicated that the students who studied with the MVD had a higher average score and standard deviation than the students who studied with traditional methods (2.4 ± 0.6 and 1.6 ± 0.5, full score being 4.0). In addition, the class averaged normalized gains were at the low level for the traditional method ($<g> = 0.26$) and at the high level for the MVD ($<g> = 0.74$). It can be concluded that the MVD is an effective tool to enhance students' understanding and problem-solving skills in the topic of collisions.