

**ZMATH 2007e.00105**

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**The effects of students' reasoning abilities on conceptual understandings and problem-solving skills in introductory mechanics.**

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Summary: The purpose of this study was to determine if there are relationships among freshmen/first year students' reasoning abilities, conceptual understandings and problem-solving skills in introductory mechanics. The sample consisted of 165 freshmen science education prospective teachers (female = 86, male = 79; age range 17-21) who were enrolled in an introductory physics course. Data collection was done during the fall semesters in two successive years. At the beginning of each semester, the force concept inventory (FCI) and the classroom test of scientific reasoning (CTSR) were administered to assess students' initial understanding of basic concepts in mechanics and reasoning levels. After completing the course, the FCI and the mechanics baseline test (MBT) were administered. The results indicated that there was a significant difference in problem-solving skill test mean scores, as measured by the MBT, among concrete, formal and postformal reasoners. There were no significant differences in conceptual understanding levels of pre- and post-test mean scores, as measured by FCI, among the groups. The Benferroni post hoc comparison test revealed which set of reasoning levels showed significant difference for the MBT scores. No statistical difference between formal and postformal reasoners' mean scores was observed, while the mean scores between concrete and formal reasoners and concrete and postformal reasoners were statistically significantly different.

*Classification:* C35 M55 D55

*Keywords:* tests; mechanics; conceptual understanding; problem solving; reasoning; preservice teacher education

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