

PS.A-SA-9.09: Instructional Implications of Findings on Students' Mathematics Difficulties*

Contributed – David Meltzer, Arizona State University

Dakota H King, National Heart, Lung, and Blood Institute, National Institutes of Health

We have administered diagnostic tests covering pre-college mathematics to over 6700 introductory physics students at four state universities, with largely consistent results. Key findings include: (1) Use of symbols to replace numbers in otherwise identical algebraic equations significantly lowered correct-response rates, implying that instructors may want to be more cautious when employing symbolic manipulations; (2) Few physics students solved algebraic equations by “isolating the unknown variable,” implying that instructors’ standard and habitual approach to algebraic manipulation may appear confusing, and should be modified or better scaffolded; (3) Class-average scores on even a single diagnostic test item were highly predictive of average scores on other items covering varied topics, suggesting it may be possible to diagnose the level of students’ difficulties with very few pretest items; (4) During interviews, students tended to self-correct approximately 60% of their initial errors, suggesting that instruction on self-checking strategies may offer disproportionately high returns.

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