

D1.5-04 | Consistency of Students' Mathematical Difficulties May Allow Reliable Performance Predictability

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Our investigation of introductory physics students' difficulties with pre-college mathematics has extended to five campuses at four universities, employing a 14-item diagnostic administered near the beginning of the semester. More than 6000 students have taken the diagnostic over the past four years. We find (1) consistently high error rates (30-70%) on trigonometry, algebra, geometry, and graphing problems, (2) significant degradation of algebra performance when symbolic coefficients are substituted for numerical coefficients, and when Greek letters are substituted for Latin letters, and (3) high performance consistency among diverse question types, such that performance on a single test item can reliably predict overall diagnostic performance. A new online version of the diagnostic has been tested with small samples and seems to produce results that are largely consistent with the written version. Performance on non-mathematical conceptual physics questions, added to the online diagnostic, is significantly correlated with performance on the mathematics questions.

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