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Implementation of Math Pre-testing and Tutorials for Improving Student Success in Algebra-based Introductory Physics Course

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The student success rate in the algebra-based Introductory General Physics I course at the University of Houston (UH) and across the United States is low in comparison to success rates in other service courses. In order to improve student success rates, we have implemented, in addition to interactive teaching techniques, pre-testing as an early intervention process to identify and remediate at-risk students. The pre-testing includes a math and problem-solving skills diagnostic exam and pre-tests administered prior to all regular exams. Students identified as at risk based on their scores on these pre-tests are given incentives to utilize a tutoring intervention consisting of on-line math tutoring to address math deficiencies and tutoring by graduate Physics Teaching Assistants to address student understanding of the physics concepts. Results from 503 students enrolled in three sections of the course showed that 78% of the students identified as at-risk students by the diagnostic exam who completed the math tutorial successfully completed the course, as compared to 45% of at-risk students who did not complete the math tutorial. Results of the pre-testing before each regular exam showed that all students who were identified as at risk based on pre-test scores had positive gains ranging from 9 – 32% for the three regular exams. However, the large standard deviations of these gains indicate that they are not statistically significant; therefore, pretesting before exams will not be offer in the course. However, utilization of the math tutorials as remediation will continue to be offered to all sections of the algebra-based course at UH with the goal of significantly improving the overall success rates for the introductory physics courses.