

1. Title: Using a Mathematical Diagnostic Test to Predict Success in General Chemistry

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6. Abstract:

The current national failure rate for students taking general chemistry in the United States is 40%. The goal of this work is to identify students who need help in multi-step, non-algorithmic type problems crucial for learning in an introductory chemistry course.

Survey of General and Organic Chemistry (CHEM 202) is one of the largest chemistry classes taught in the Chemistry and Biochemistry Department at California State University Long Beach (CSULB), with an average enrollment of 250 students per year.

The course is designed primarily as a prerequisite course for the Nursing program. It is the first semester of a two-semester sequence covering general and organic chemistry.

Learning goals for this course involve preparing students in the allied health sciences in which an understanding of biological chemistry is valuable. A mathematical diagnostic test (developed by Pomona College in Claremont, California) is given during the first class meeting to assess student needs at the beginning of the course. This diagnostic test is under continual development through a Course, Curriculum, and Laboratory

Improvement (CCLI) Grant to Pomona College by the National Science Foundation (NSF). The average score of the first group of students to take this math test ( $n = 118$ )

was 9.8%, revealing several weaknesses in their math skills. In addition, a database was used to track student progress in the course, as well as to track performance on the entrance exam to CHEM 302 taken at the beginning of that course. Even with students scoring very low on this diagnostic test, their math score correlated well with their final course grade. An on-line questionnaire was administered to students at the completion of the course to evaluate its effectiveness. Questions dealt with how they could have been better prepared for the course if given extra help in math or basic chemistry, and what topics they would like covered more in preparation for CHEM 302. The survey revealed that students forgot most of the math skills they learned in high school. The survey also

revealed that the majority of students (56%) studied less than 4 hours per week for a 3 credit hour class. Their course grade expectation was also out of line with their actual grade. Evaluation of these data will provide feedback as to the effectiveness of current teaching strategies and learning goals. It is hoped that this study will improve the teaching and curriculum in the introductory chemistry course for nursing majors. Given the projected drastic shortage of nurses facing California and the nation, success in beginning chemistry may keep those in the field who might otherwise shy away from the daunting course of chemistry.