An Application of the Engineering Online Gateway System for Predicting Success in ENGR 101
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Presented at the Fourth Annual Research and Scholarship in Engineering Education Poster Session. 10/22/09.

Abstract
In order to ensure that students perform successfully during their first-year introductory programming courses, we present a methodology which we hope can predict student performance in courses such as ENGR 101 by using a short, logic-based exam.

Motivation
Students in ENGR 101 have very diverse backgrounds with respect to programming.
There are currently two paths (regular and accelerated) that a student can take in ENGR 101 depending upon his/her past experience.
Predicting how students will perform early in the semester will help to decide whether or not a student’s path is appropriate.

Methodology
At the beginning of the Fall 2009 semester, an online, logic-based survey was given to all students enrolled in both paths of ENGR 101.
Students could use notes and other resources, but had to answer the questions by themselves.
Time was limited to 30 minutes to complete a total of 15 questions.

Sample Questions
1) There was a robbery in which 500 iPods were stolen. The robber(s) quickly left in a Mini Cooper S. It is known that:
   • Nobody could have committed the crime other than Larry, Moe, and Curly.
   • Curly never commits a crime without Larry also committing the same crime.
   • Moe cannot drive.
True or False: Larry is innocent.
2) If X = 1 and Y = 3 and Z = 5, and then later X is set to Y’s value, and even later Y’s value is set to the value of Z, then what do X, Y, and Z finally equal?
   A) X = 1, Y = 3, Z = 5
   B) X = 3, Y = 3, Z = 5
   C) X = 4, Y = 8, Z = 5
   D) X = 3, Y = 5, Z = 5
3) There are three boxes labeled “APPLES”, “ORANGES”, and “APPLES AND ORANGES”. However, every box is labeled incorrectly. If I can only pick a fruit from one box, from which box should I pick in order to label all the boxes correctly?
   A) APPLES
   B) ORANGES
   C) APPLES AND ORANGES
   D) Either APPLES or ORANGES
4) If 0 < (s * t) < 1, then which of the following must be true?
   A) s < -1 and t > 0
   B) s < -1 and t < -1
   C) s > -1 and t < -1
   D) s > 1 and t < -1

Sample Exam Screen

Desired Results
Based on data gathered during the current semester, we hope to show that:
➢ Student performance on the predictive exam correlates to overall performance in ENGR 101.
➢ Specific questions show higher correlation than others so that future exams can be designed with higher accuracy.
➢ Student performance on the predictive exam can help to identify which path a student should take in ENGR 101.

Acknowledgements
We would like to thank our main EOGS developer, Parth Shah, for his many dedicated efforts. We would also like to thank Ella Atkins, Alex Bielajew, and Mike Wellman for their thoughtful feedback on the initial pool of survey questions.

Research Question
Is it possible to predict student performance in ENGR 101 without testing any specific programming knowledge?