An Application of the Engineering Online Gateway System for Predicting Success in ENGR 101

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Research Question

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

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.

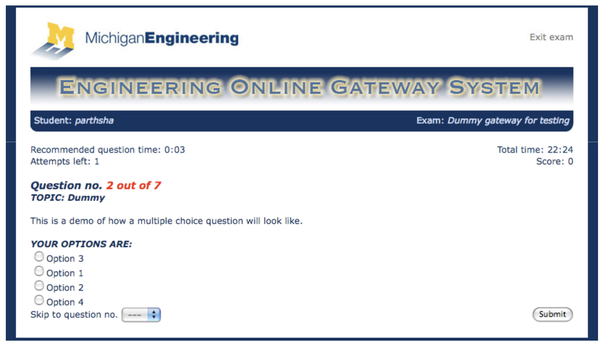
   True or False: Larry is innocent.

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.

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