Development of an automated grading tool for learning *R* programming

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The Role of Automation in Undergraduate Computer Science Education

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- Claim: The use of an automated grading tool improves performance in an introductory programming course
- Evidence: Attendance and grades both improve in semesters following when the tool is used (Spring 2013 vs. Fall 2013 and Spring 2014)

R programming and *swirl*

- *R* (http://www.r-project.org) is a free environment for statistical computing and graphics
- *R* is an interpreted language
- Many *packages* are available for specialized analyses (http://cran.r-project.org/web/packages/)
- Swirl (http://swirlstats.com) is a package where you can "learn R, in R."
  - Questions are hard-coded
  - This makes *swirl* appropriate for learning but not for practice and/or assessment

Proposed project

- Develop a swirl-based package that generates template-based problems to help students practice *R* programming and data analysis concepts

- Question templates that use random variable names and/or values:

  - Question: Create a vector named 'x' that stores the values 3 and 11.
  - Solution: x <- c(3,11)

- Improvement: values in red above are randomly generated each time.

Questions:

1. What is the best way to learn a new programming language?

2. What programming exercises will best help you learn the concepts?

3. What is the best way to assess someone's programming ability?

4. Does anyone have experience creating R packages (how do you do this)?