If At First You Do Not Succeed: The Student Benefits of Multiple Trials on Summative Assessments

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If At First You Do Not Succeed: The Student Benefits of Multiple Trials on Summative Assessments

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Background

Learning management systems offer flexibility in assessments. In Canvas, questions can be pulled from pools, customizing each quiz. Canvas also allows unique feedback options. Unique feedback can be programmed for students whether they got the question correct or incorrect. Feedback can even be customized based on when a question was selected. Canvas also allows multiple attempts on assessments, with various options for awarding credit (final attempt, best score, average score, etc.). Combining immediate feedback with multiple attempts is a power – yet underexplored – tool.

Previous research on multiple attempts reveals that multiple attempts alone do not result in stronger performance on assessments as students are not likely to self-diagnose errors.

- Question pools reduce rate bank is compromised
- Timely feedback is a best practice
- Allowing opportunity for application of feedback is a best practice

Methods

- CHEM 139/141
  - Module Quizzes (2 attempts)
  - Pre-Lab Quizzes (3 attempts)
  - October / November 2017
- Feedback
  - Actionable
  - Available once immediately after attempt
- Assessment Programming in LMS
  - No penalty for stopping on first attempt
  - Closed questions from pools
  - Questions one-at-a-time
  - Save and resume options
  - Timed - 1 hour
  - Keep highest score
  - Multiple attempts communicated multiple ways
  - Auto-graded by LMS

Exploring the Data

Do students who take advantage of the second attempt do so? (H1a)
- Chi Square with a = 0.05
- Reject null, accept alternative hypothesis
- Students who used multiple attempts spent more time on the assessment (nearly double on average)

Do those who used multiple attempts outperform those who did not? (H1b)
- Quizzes
  - T-test with a = 0.05
  - P value on one tailed test = 0.604
  - Fail to reject the null hypothesis
  - No difference in final scores between 1 and 2 attempts
- Pre-Labs
  - ANOVA
  - P value = 0.8667
  - Post-hoc: Tukey HSD test
  - Fail to reject the null hypothesis
  - No difference in final scores between those who took 1, 2, or 3 attempts

Does time spent on task correlate to the grade earned on the first attempt? (H1c)
- Pearson’s r correlation coefficient = 0.1866 and coefficient of determination = 0.0348
- Time on task is NOT a predictor of score on first attempt
  - Model only explains 4% of variation

Does the total time on task correlate to a better final grade? (H1d)
- Regression analysis
  - Pearson’s r correlation coefficient = 0.106 and coefficient of determination = 0.0112
- Time on task is NOT a predictor of score on multiple attempts
  - Model only explains 2% of variation

Hypotheses

H1a. Students who do not earn an A on their initial attempt take advantage of the multiple attempts
H1b. Students who take advantage of multiple attempts outperform students who do not take advantage of multiple attempts
H1c. Students’ second attempt on the assessment outperforms their first attempt
H1d. Students who used multiple attempts spent more time on the assessment than those who used one attempt
H1e. Student utilization of the second attempt varied across the term
H1f. Time spent on task correlates to the grade earned on the first attempt
H1g. Time spent on task correlates to the final grade earned

Pedagogical Implications

- Students self-select to take advantage of multiple attempts
- Score higher on 2nd attempt
- Spend more time on the assignment
- Used multiple attempts throughout the term

Exploring the Data (cont’d)

Do students do better on a future attempts after receiving feedback? (H1f)
- P value = 0.0001
- Reject null, accept alternative hypothesis
- Students took the quiz twice scored significantly higher on the second attempt

Do students spend more time on task when using multiple attempts? (H1g)
- Two sample t-test with a = 0.05
- P value = 0.0001
- Reject null, accept alternative hypothesis
- Students who used multiple attempts spent much longer on the assessment (nearly double on average)

Does student use of multiple attempts vary during the term? (H1h)
- Regression analysis
- Pearson’s r correlation coefficient = 0.015 and coefficient of determination = 0.0002
- Week of term is not a good predictor of utilization of multiple attempts

Does time on task correlate to the grade earned on the first attempt? (H1i)
- Regression analysis
- Pearson’s r correlation coefficient = -0.1866 and coefficient of determination = 0.0348
- Time on task is NOT a predictor of score on first attempt
  - Model only explains 4% of variation

References