

Vrishtee Rane, Cameron MacKenzie

### Do students learn better using online testing with multiple attempts?

#### 1. Introduction

- A new method to assess student learning was implemented for IE 305 Engineering Economic Analysis
- Students were evaluated with online testing modules which they could take repeatedly until they passed
- Questions were randomized; very unlikely that a student ever received the exact same question

**Goal:** Evaluate students' performance when they are allowed multiple attempts of online tests and compare student performance to traditional assessment methods

#### 2. Method

##### Fall 2017

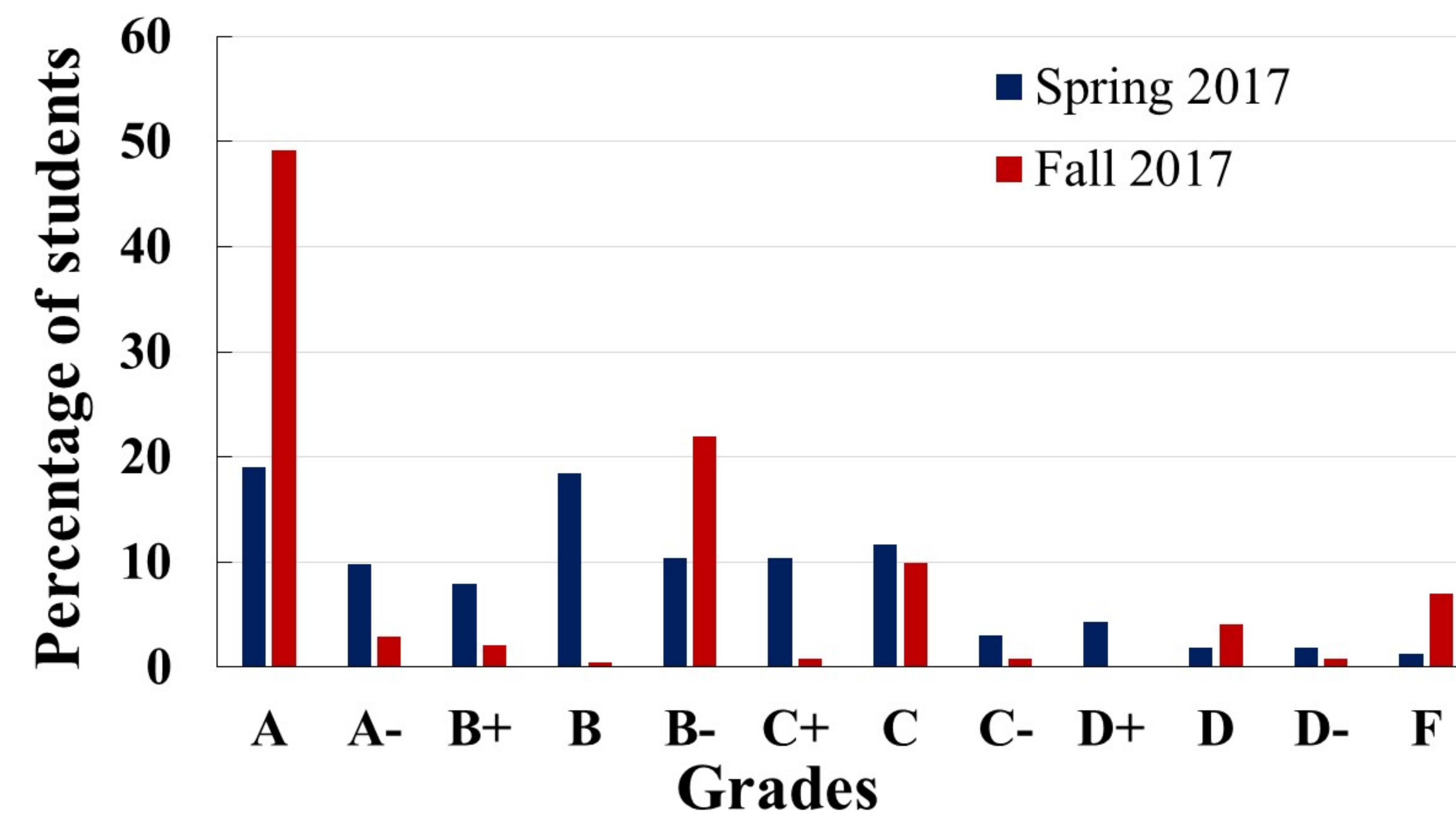
- Engineering Economics course with 242 students
- Students had to take 7 online testing modules (TMs), which accounted for their semester grades
- Each TM had 7 or 8 calculation questions
- Questions were randomly selected from a large pool for each attempt
- The solution allowed  $\pm 1\%$  of rounding error
- Passing an TM required answering all but one question correctly (no partial credit)
- Two additional TMs required for students to earn an A
- Students could use class notes, book, calculators, Microsoft Excel, and Internet to solve the questions

##### Spring 2017

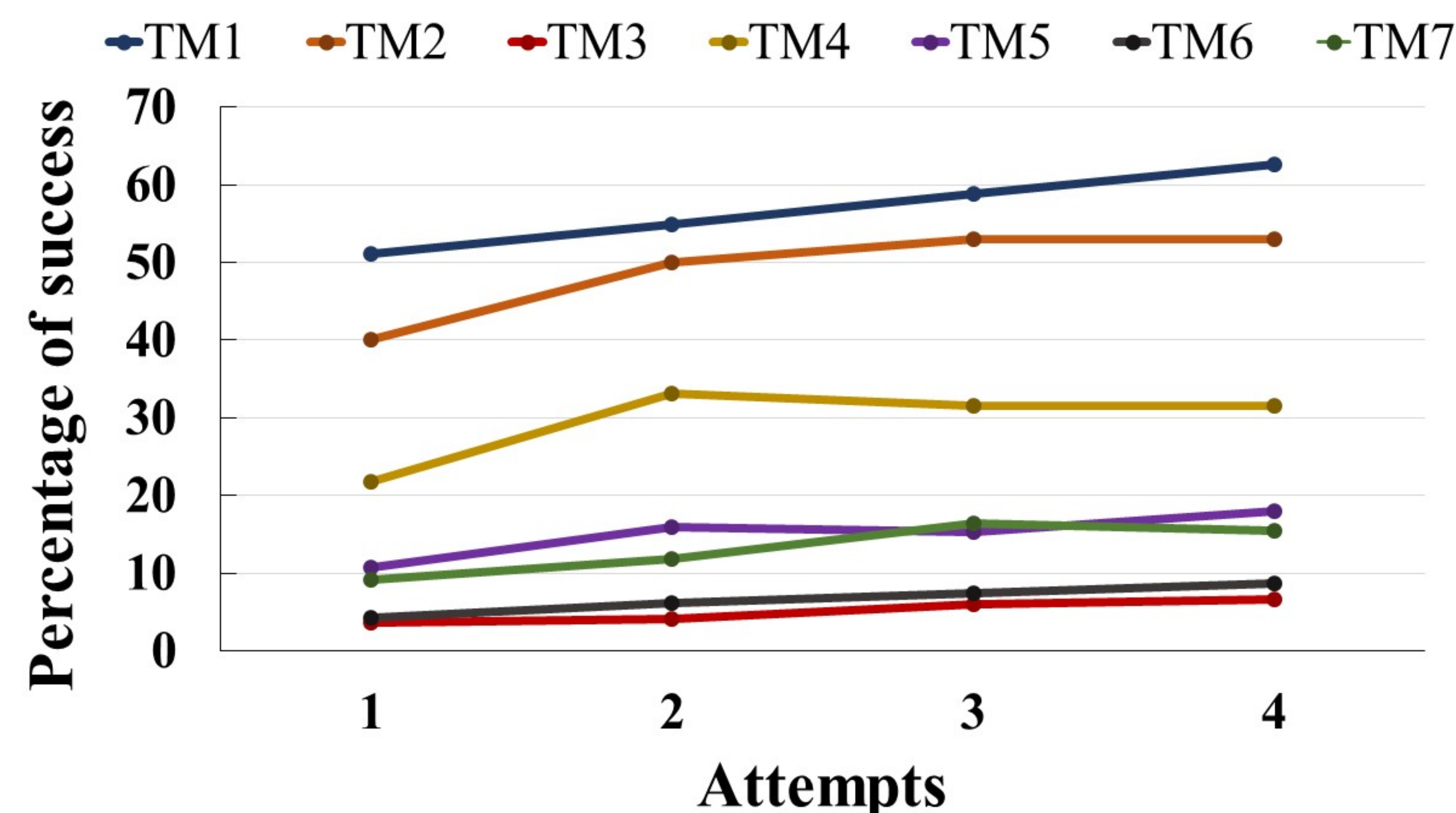
- Traditional assessment method was used for 163 in-class students
- Three 50 minutes tests, a final online exam, a group project, and eight homework with 5-7 problems each accounted for the semester grades

#### 3. Results

- B is average grade for fall and B- is average grade for spring
- 52% of fall students earned an A or an A-
- Higher percentage of D, D-, and F for fall compared with spring



Percentage of students who correctly answered a question by a given attempt



#### Students survey

- 80% of students feel anxious during in-class exams
- 73% of students are **not** anxious during online tests
- Students prefer online testing

|                            | Anxious during in-class exam | Anxious during online exam | Engagement in course with online test | Prefer online testing |
|----------------------------|------------------------------|----------------------------|---------------------------------------|-----------------------|
| Strongly Agree             | 37                           | 3                          | 16                                    | 37                    |
| Agree                      | 43                           | 8                          | 24                                    | 35                    |
| Neither agree not disagree | 11                           | 16                         | 31                                    | 15                    |
| Disagree                   | 7                            | 49                         | 19                                    | 7                     |
| Strongly disagree          | 1                            | 24                         | 10                                    | 5                     |

#### 4. Conclusion

- Students feel less anxious with online tests
- Students take advantage of opportunity for multiple attempts to pass the online test
- Greater percentage of students earn A with online tests
- Some students procrastinated too much and performed very badly with the online tests