EOSC 210

Introduction to Earth Science for Engineers

Background

- EOSC 210 is a required 2nd year course for engineers in Civil (~60%), Mining (~20%), and Geological (~20) specializations
- Approximately 220 students each Fall
- Students participate in two 80 minute lectures and one 3-hour lab each week

Features

- Clickers to drive discussion in lectures (not for attendance!)
- Other activities and discussions in lectures
- Learner focused lab activities
- Course level learning goals
- Lecture level learning goals for all lectures (Used to guide lectures, develop activities, and to create clicker and exam questions)
- Emphasis on relevance to society and engineering

Major Changes for 2009

- Labs rewritten with learning goals and new activities
- Use of PeerWise - Students required to create, review, and answer Multiple Choice Questions
- More examples related to student lives and engineering practice in lectures and labs

Assessing learning with clickers and exams

- One applied multiple choice question was delivered to the students in several successive assessments throughout the term.
- This question (next slide) is difficult because
  - It relies on several different but interrelated concepts (Groundwater, permeability, properties of sediment, depositional environment, the nature of tunneling, etc.)
  - There are several “red herrings” in the diagram and text that can easily distract students
- Question difficulty is mitigated slightly as there are multiple ways to arrive at the correct answer

Assessing Learning with Clickers

There are plans to excavate a 20-m deep NW-SE tunnel across the area shown in the map to the right. The same materials found on surface extend to a depth of 50 m. Which of the following factors may be problematic?

(a) Large water inflows.

(b) Buried erratics/boulders.

(c) Tunnel collapse in weak sands.

(d) Sub-horizontal faults.

(e) a) and c).

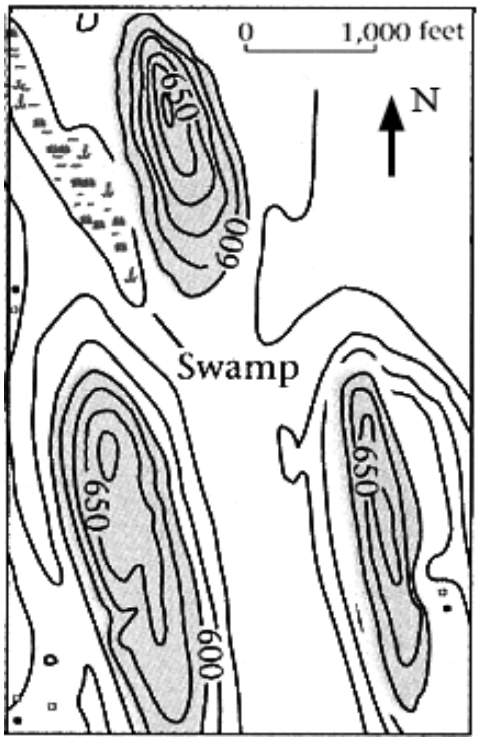


Chart 1
Midterm 2 (Early November)

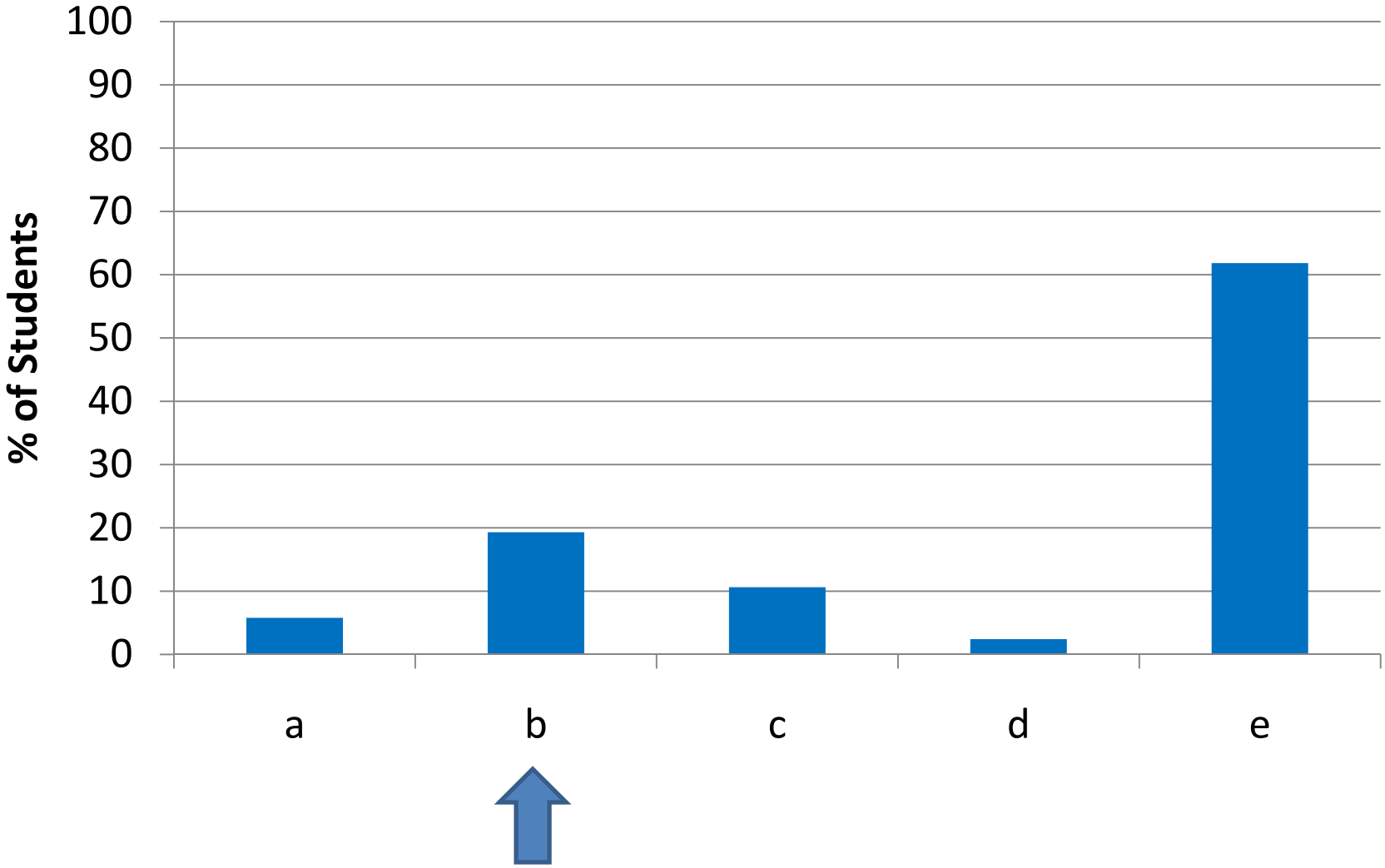


Chart 2
Clicker Review (Late November)

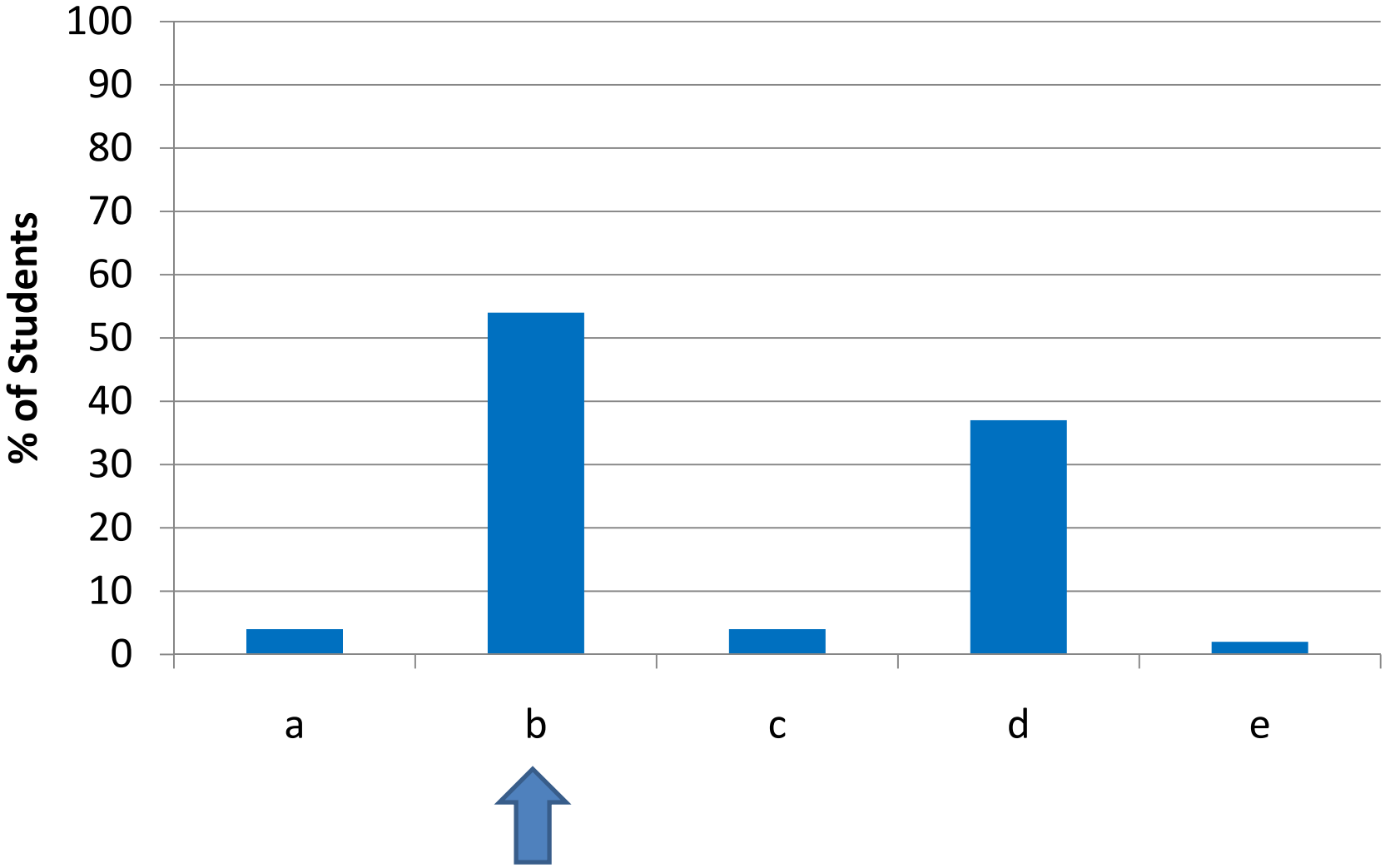
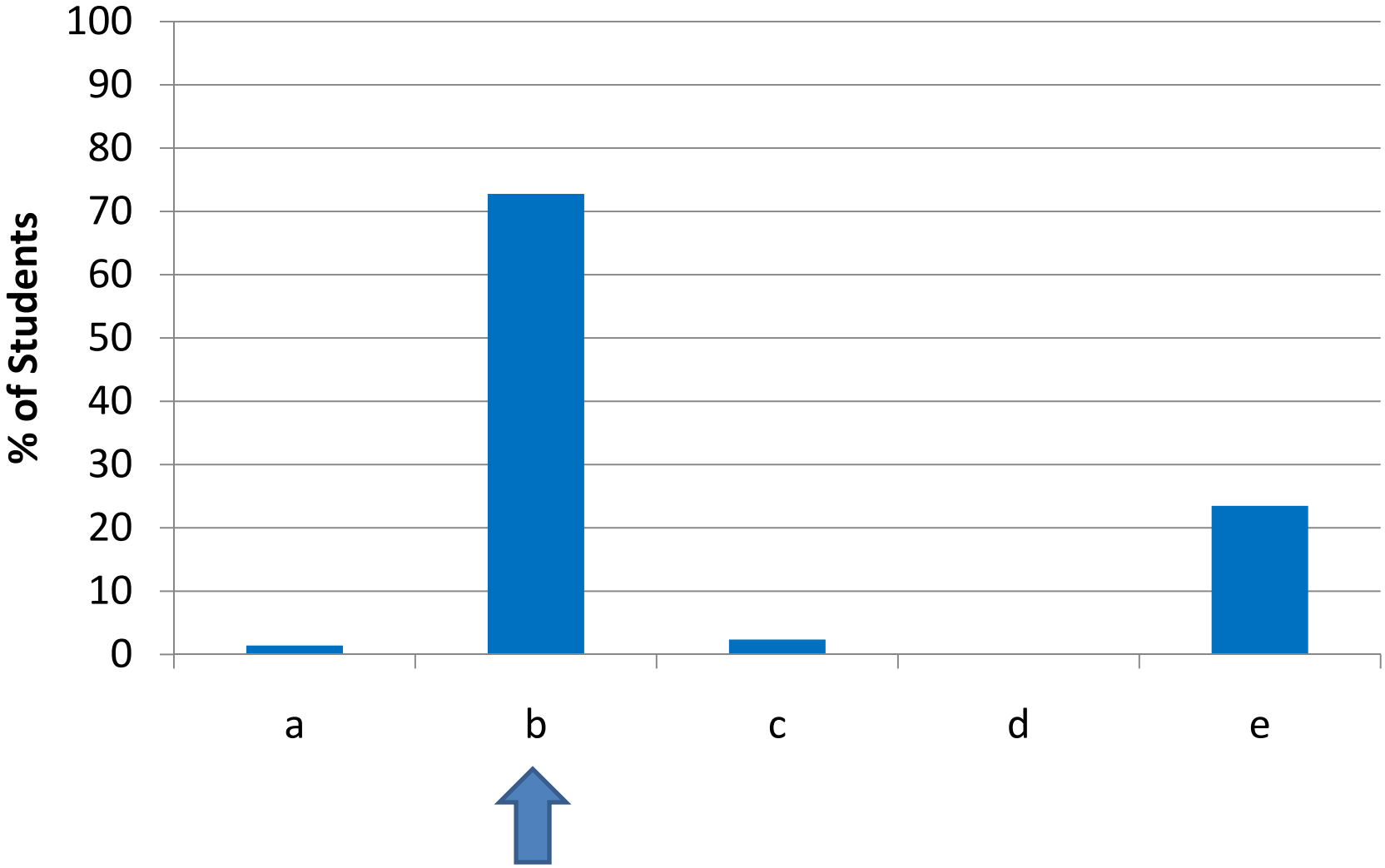


Chart 3
Final (December)



Assessing Learning with Clickers

- Students had great difficulty with this question on midterm II (Chart 1 ~20% correct) – students possibly missing some content (permeability?)
- It was highlighted after the midterm, but by the final review students still had trouble (Chart 2 ~50% correct)
- Intervention in lecture: Discussion on how to approach questions with multiple overlapping concepts
- By the final exam the majority of students got the answer correct (Chart 3 ~70%)

PeerWise

- This year we used PeerWise software that helps students create, review, and answer Multiple choice questions
- Students were required to create 1 question, and answer and review 5 in the week before each exam
  - Students - who contributed questions) **213**
  - Students - who answered questions) **223** (more than completed the class)
  - Total number of questions submitted **773** (more than required by assignment (should be ~600)
  - Total number of answers **43645** (far more than required average of ~200 Qs per student, requirement was 15)

Chart 4
How much did using PeerWise help your learning?

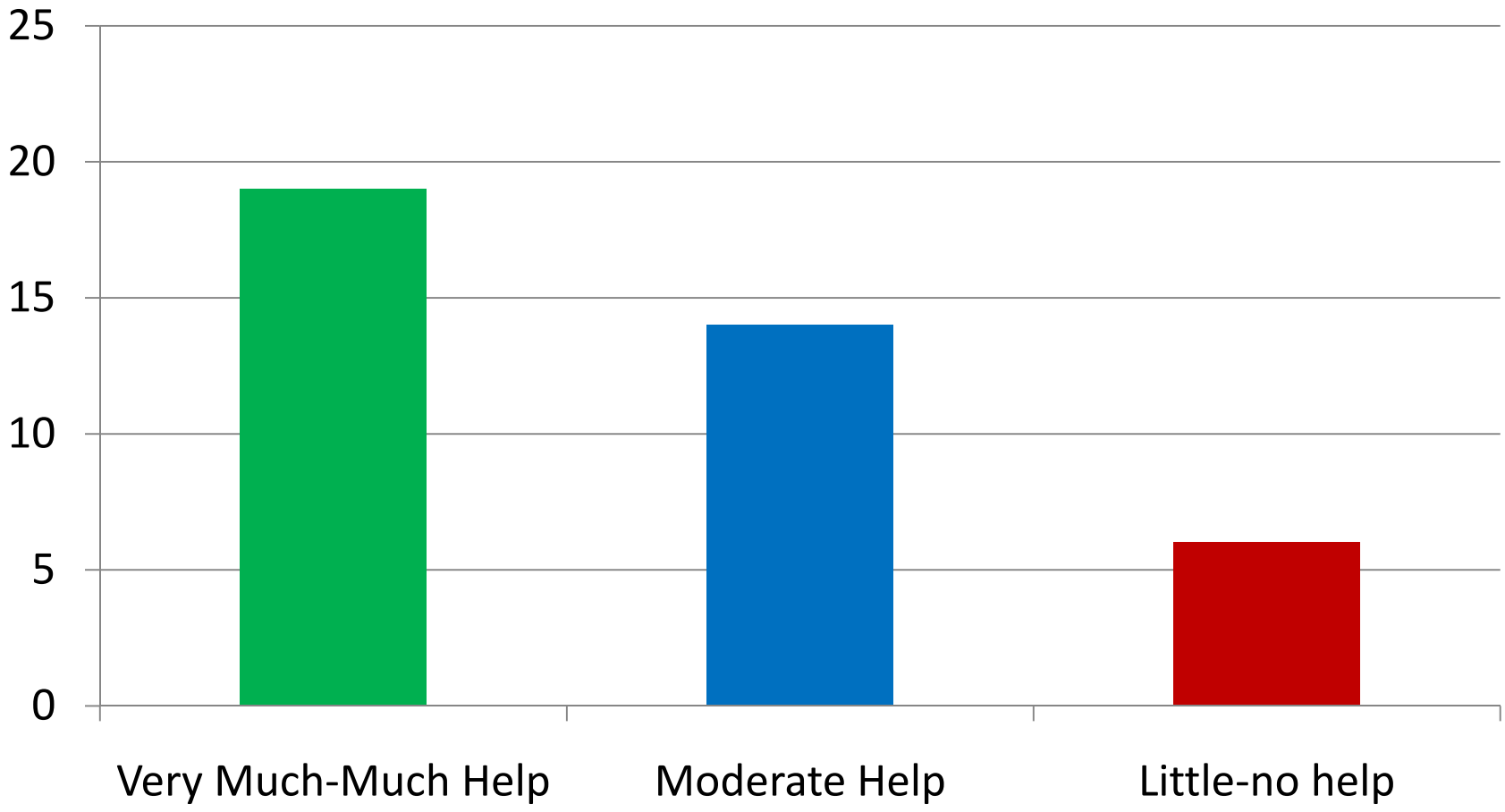
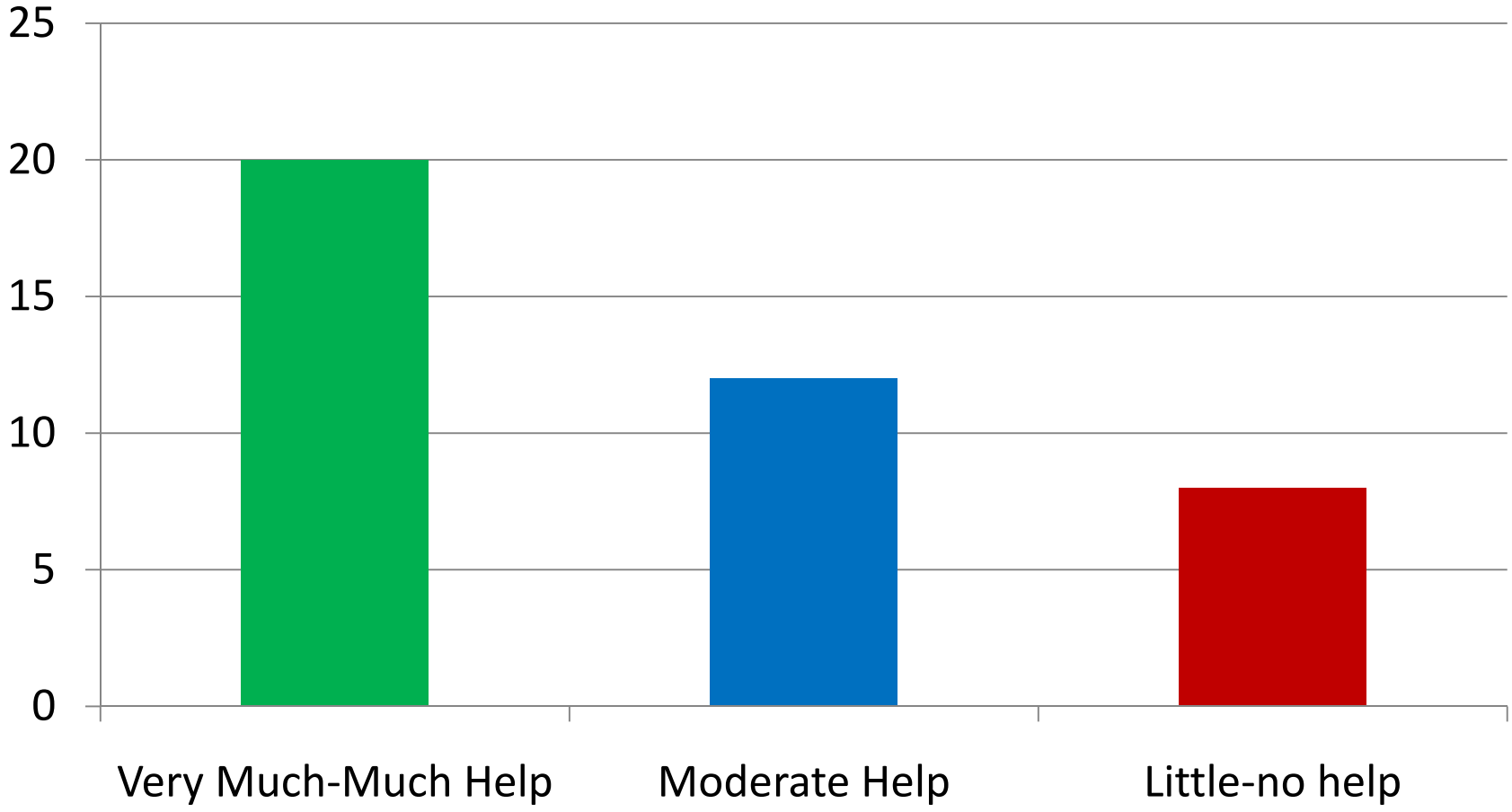


Chart 5
How much did using PeerWise help your studying for the exam?



PeerWise

- On average students in EOSC 210 answered far more questions than their counterparts at other institutions – we are investigating this with Paul Denny (creator of PeerWise)
- Student comments on PeerWise are shown in Charts 4 and 5. In general, students appreciate this tool.
- We believe it can be better utilized and will improve the implementation for next year

Interest

- Part of the changes in this course were an effort to create linkages between students and the course material
- Case studies, lecture examples, and labs were redesigned to be more relevant both to students but also to engineering in general
- Stated student interest in the course has increased

Chart 6
Relative to other courses you have taken at UBC, how does your interest in this course compare? Fall 2008

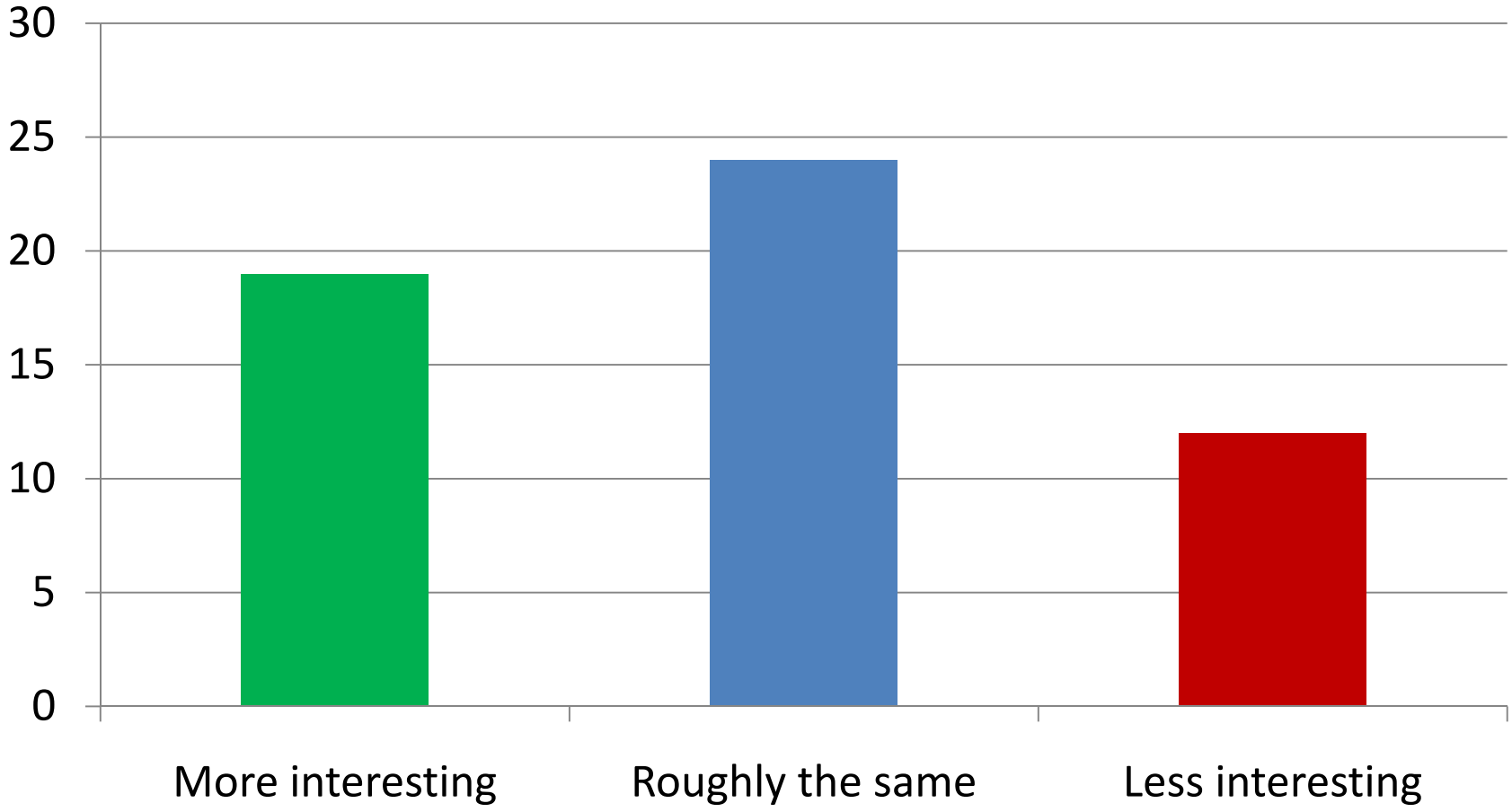
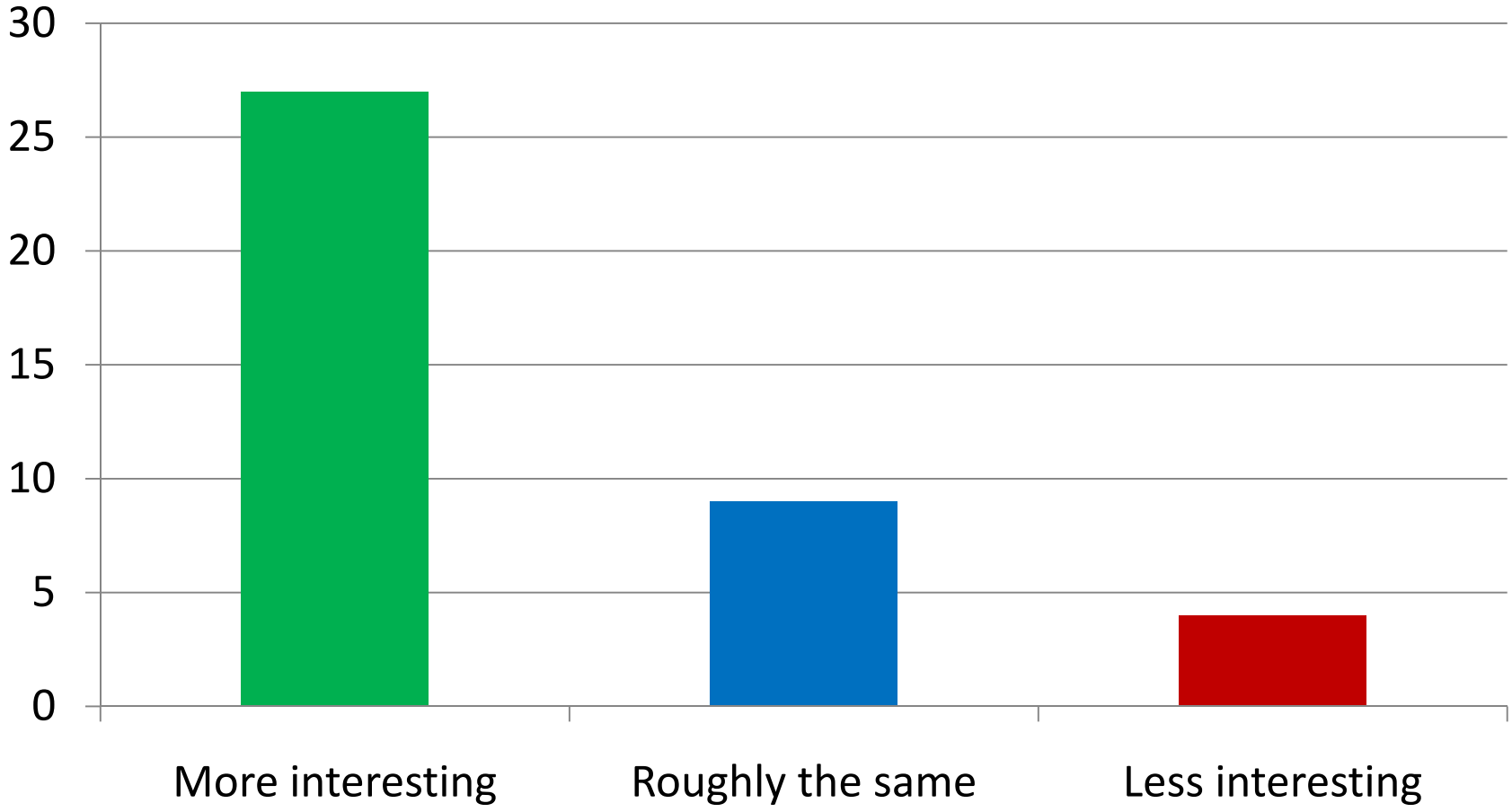


Chart 7

Relative to other courses you have taken at UBC, how does your interest in this course compare? Fall 2009



Persistent Challenges

- 8:00 am Lecture Slot – Student attendance
- Lecture and lab linkages
- Convincing Civil Engineering students of relevance (~60% of students)
- Textbook – many students do not find it useful (most did not read)
- Students still perceive much material to be memorization based (this is perhaps a fair assessment)