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Assessment Strategies to Support Teaching from the Test

J Dana Eckart
Columbus State University, eckart_jon@columbusstate.edu

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Who Likes Testing (for Assessment)?

Students Dread Taking Tests
  • How much study time?
  • What should I study?
  • What kind of questions?
  • How many questions?
  • Will I get a high enough grade?
  • Will grade reflect what I know?
Who Likes Testing (for Assessment)?

Faculty Dread Creating/Giving Tests

- Do questions target knowledge level?
- Do questions check understanding?
- Adequate material coverage (random sampling)?
- Deciphering student handwriting and grammar
- Will student grades reflect their knowledge and understanding?
Some Causes of Testing Angst...

• Tests are usually “secret”
  • to reduce/avoid student just memorizing answers
  • faculty often customize each test (to avoid repeats)

• Test coverage is incomplete and randomized
  • too little time to ask every question
  • based on random sampling methods
  • students want to maximize their time investment (avoid “over studying”)

• Procrastination
  • faculty delay test creation – sometimes until just days before the test
  • students delay studying – often cramming 2-4 days before the test
The Best Course I Ever Took

• Gated Course
• No real lecture
• Gates were pass-fail (>= 80% to pass)
• Recitation sections that were gate specific, like a flipped classroom individualized to each gate
• Unfortunately, few people excelled in the course, about 4 of 50 students passed all the gates
• It was widely known as “Self-shaft Physics”
How the FAA Test Pilots...

**Knowledge Test**
- Public databank of questions
- 900+ possible questions
- Multiple choice questions
- Many third party test study aids
- Required before Flight test
- Pass/Fail

**Flight Test**
- Need instructor’s recommendation
- Oral test
- Practical test – the checkride.
- Public rubric – Practical Test Standards
- FAA (Designated Pilot) Examiner – not part of student’s training
- Pass/Fail
Two Courses, Two Approaches...

**Computer Science I (Freshman)**
- List of 10 programming problems (1 chosen for test)
- Given out 10-14 days before test
- Specified language features that must be used (for full credit)
- Encouraged to work together to solve *before* test
- Points for answers during test

**Operating Systems (Junior)**
- All questions available from start of course (but no answers)
- ~50 questions per week
- Mostly multiple selection
- Includes some programming and diagram labeling, etc.
- Unannounced quizzes (best 10 scores) – to promote currency
Computer Science I (Freshman)

• Requires computer for each student during test
• Must limit access (to other files, internet, etc)
• Students must effectively use computing environment
  • create code and test data files
  • edit – compile – test – debug
• Addresses complaint of many students (and faculty)
  • tests and assignments are dissimilar
  • students passing CS I not always prepared for CS II
• Students must demonstrate ability in realistic setting to pass
Computer Science I – Sample Question

• Read in a list of fruit names, case sensitive, given 1 per line
• Print out each unique fruit name + # times seen + % of total fruits
• Solution must use a
  • record type and variable
  • array type and variable
  • function that takes at least one parameter
  • procedure that takes at least one parameter

• Sample output:
  apple     3     30%
  grape     5     50%
  pear      2     20%
Operating Systems (Junior)

• Question bank *per topic* to help students self-assess understanding
• Large question bank discourages memorization
• Students warned that tests may include new/reworded questions
• Students must indicate all correct answers
  • Many questions require information “assembly”
  • Must do more than eliminate or recognize
  • “None of the above” is frequent option

• Grading
  • 2 pts all (and only) correct
  • 1 pt if >= 50% correct (*red* marks don’t outnumber circled correct responses)
Operating Systems – Sample Questions

Which scheduling algorithms favor CPU over I/O bound processes?

a) First Come, First Served
b) Shortest Job First
c) Shortest Remaining Time
d) Guaranteed Scheduling
e) None of the above

The P (DOWN) semaphore operation is best described by

a) count--; if (count <= 0) { sleep(); }
b) sleep(); if (count <= 0) { count--; }
c) if (count <= 0) { count--; } sleep();
d) if (count <= 0) { sleep(); } count--;
e) None of the above
Quizzes vs Test Scores (OS – Juniors)

UNannounced Quizzes vs Test Scores (R = 0.4833)
Student Feedback

• Greatly appreciated seeing questions beforehand
• Nearly all students actively used questions as study aids
• CS I – liked using the computer (no paper coding)
• OS – said unannounced quizzes helped them stay current

Complaints
• Answers are not included
• Too many questions
What’s the Core Difference?

Teaching TO the Test
• What everyone is expected/responsible to know
• Least common denominator (Intersection of interests)
• Static material and coverage
• Hyper focused and specialized
• Results in repeated “drills” that kills curiosity and individuality

Teaching FROM the Test
• What everyone could know based on the material
• Expansive (Union of interests)
• Continually add questions about
  • Relationships between info
  • New application domains
• Broad based scope with deep dive areas
• Promotes exploration & curiosity
Traditional Course Development Approach

• Objectives are created 1\textsuperscript{st}
• Content is organized based on the objectives
• But assessments are often a compromise – perhaps only a proxy for the true objectives
Align Assessment, Content, and Objectives

• Create assessments 1st
• Iteratively develop objectives and refine assessments
• Objectives are just a summary of assessments
• Develop content (and delivery) that supports assessments
Thank you ...

Questions?