Testing as a Learning Experience

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Portions courtesy Fred Brooks
Testing: It is not just for measurement

• An opportunity for active learning in class (solve problem X)
• An opportunity for feedback
  – Note that feedback is not just the grade, but how students feel they did
  – And feedback for the instructor
Bloom’s Taxonomy, revisited

Bloom’s Taxonomy
(Revised by Anderson and Krathwohl 2001)

Bloom’s Taxonomy
(levels of educational objectives)

- Remember
- Understand - interpret, infer
- Apply
- Analyze - how different components relate to each other
- Evaluate - make judgements based on criteria
- Create

My test questions:
- Some simple definition questions
- Some simple word problems
- Some challenging problems
- Some performance analysis
- Some “what if?” questions

Ideally, assess at all levels
Advice on Designing a Test

• Revisit learning objectives: What questions most directly measure these objectives?

• Sample reasonably across the material covered
Advice 1: Be Mindful of Clarity

• Questions are always clearer to you than your students
  – Write your own solutions in advance / rework the problems
  – Get someone else (your TA, your grad students) to read/take your exam first
  – Be available during exam to address ambiguity
• Write out all rules, expectations on test
  – Be equally clear what should NOT be done
• Constrain the answer space
• Ask specific questions, versus open-ended ones
• Group questions by topic, list topic area at top of each question
• Avoid making one question depend on another
Advice 2: Mitigate Anxiety

• Tests are a big deal for many students, in case you have forgotten...
  – Especially when there is only 1—2
  – Your job is not to measure test-taking ability, but learning outcomes

• The more junior the class, the more frequent the exams:
  – Sr. undergrad class – 3 exams
  – Sophomore level class – 3+ exams && weekly quizzes

• Remind students of good test-taking strategies
  – Answer the ones you know first
  – Recommend a time budget, and/or list points explicitly

• Consider role of time pressure
• Consider partial credit
Partial Credit

• Good to mitigate anxiety
• Also, a learning opportunity: Submit corrections
  – More work for the instructor
  – But deflates pressure on student, reinforces correct answer
  – E.g., Gary Bishop offers half credit on corrected problems
Other Advice and Opinions

• Open-book testing:
  – Pros: Avoids memorization, tests for understanding
  – Cons: More work for teacher, questions must be google-proof

• Common trade-off:
  – Easy-to-grade (true/false, multiple choice) vs. instructive (essay qs)
  – Can be creative in boiling complex problems down to something auto-grade-able
    • E.g., Gradescope can auto-grade numbers and short text responses
  – A few multiple choice qs can be good at the lower end of Bloom’s taxonomy
After the exam

• Look at how your students did
  – Make notes of widespread confusion

• In-class post-mortem:
  – Re-teach anything that a significant percentage of the class missed
Cheating

• An ounce of prevention is worth a ton of cures

• IMO, typically an act of desperation, not malice
  – So don’t let students get desperate!
  – Reduce pressure on any one assessment, provide sufficient study materials
  – Active proctoring
  – Alternate seating
  – Assigned seating

• What if you catch cheating?
  – Follow university procedures
Other Common Situations

• What if a student misses a test?
  – I typically average other grades

• What if a student is mad?
  – Listen empathetically, try to redirect toward a constructive solution