



Testing as a Learning Experience

Don Porter

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