Large Lecture Classes: Problems and Solutions

James A. Knopp
Associate Professor and
Undergraduate Coordinator
Department of Molecular and Structural Biochemistry
North Carolina State University
Raleigh NC
Teaching Experience

• 2 years as undergraduate TA
• 1 year as graduate TA
• 35 years at NCSU/Biochemistry
• 16 years: BCH 451 - first lecture course
200 - 300 per semester
Problem: cheating on exams

“This never happens in MY class.”
“This is just a minor problem.”
“Honor/graduate students do not cheat.”
“There is no cheating because everyone signs an honor pledge/code.”
“I give up. Everyone is doing it. The curve takes care of the problem.”
Solution - Environment

• “Watch like a hawk”
  – Seats are too close
  – Impossible to prove
  – Need many proctors
  – Cannot rely upon moral codes
Solution - Multiple Exams (?)

- Multiple exams
  - Disguised
  - Open – color coded exams
  - Hard to pass out
  - Have to make multiple copies [3 the limit?]
Solution - Multiple Questions(!)

- Make only one test with multiple questions
- Helps to have very similar but not identical questions
- Can change just the data sets for one question
- A high number of different tests from a small number of different questions
Example from one Exam
Solution - Multiple Questions continued

• With just two similar questions in each section, I have 10 unique exams after 4 questions. \[2^4 \text{ is 16 and } 2^7 \text{ is 128}\]

• Random selection of the specific digit leads to uncertainty. Students do not know which test is near by.

• Use this for low level questions; have same questions for high level [my point ratio = 1/3:2/3]

• Easier to spot the cheaters. Cheating hurts, not helps

• Small number [1-2 per exam] of incorrect questions being answered. Deliberate? [Lose 1/2 points]
Problem - Essay questions

• How to ask challenging high level [Bloom] questions in large classes?
• Essay questions - problems
  – changing grading rubric
  – grading time!!! [2 minutes/question >3 hrs]
  – not reading answers carefully [key word search]
  – lot of re-grading
Agriculture is
(1) the study of plants
(2) the study of animals
(3) running a farm
(4) in steady decline
(5) the one positive aspect of our balance of trade
Agriculture is
(1) the study of plants [0.3]
(2) the study of animals [0.3]
(3) running a farm [1.0]
(4) in steady decline [0.4]
(5) the one positive aspect of our balance of trade [0.6]
Teaching

is what you do if you cannot get a real job

is the same as instruction

also occurs outside of the classroom

involves more inspiration in large classes

is highly valued in my institution
Check the answers

Teaching

is what you do if you cannot get a real job [-1]
is the same as instruction [0.5]
also occurs outside of the classroom [0.5]
involves more inspiration in large classes [+1]
is highly valued in my institution [???]
Solution - Multiple choice/grades (!)

- Can get a better evaluation of the extent of students’ knowledge with fewer questions
- Incorporating the grading rubric in the beginning
- Using negative point values removes guessing
- Fewer arguments about almost correct answers
- Develops critical reading skills
- Tests higher levels on Blooms Taxonomy
- More time to prepare good questions
- Many answers are from student quizzes
Problem: Personal attention

- Large class [\(>100\)]
  - Impersonal
  - Hard to learn all names
  - Students inhibited from asking “dumb” questions
  - Cannot determine student learning difficulties until too late
  - Only one style of presentation or interpretation of concepts
Solutions:

- Recitation sections
- Undergraduate Teaching Assistants
- Workbook
Recitation Sections

- started as pre-exam help sessions
- formalized 10 years ago
- once a week
- small number = 25-45
- quizzes [at end - no attendance problem]
- encourage/require student questions
- not another lecture section! [SI model]
- active student participation - call names
Undergraduate Teaching Assistants

• experienced the course
• can relate to other students
• more believable
• better trained than graduate students
• can spot cheating easier
• instructor still needs to be there!
Workbook

• reviews the details missing from text
• provides a focus for information
• provides testing through old quizzes
• provides a summary of information
• study guide
• exercises can be assigned