FGSR Teaching Development Week

Session 2: Teaching in the Large Classroom
Alex Brown

About Me
Have been at the University of Alberta since 2003
Professor in the Department of Chemistry

Have Taught
First year chemistry (CHEM 102/105): 250-350 students
2nd year Quantum Chemistry (CHEM 282): 40-60 students
3rd year Physical Chemistry (CHEM 371): 100-140 students
Graduate Quantum Chemistry (CHEM 681): 5-10 students

Proposed Overview
How do you foster engagement with your students when you have a large classroom? Dr. Alex Brown will share some things that have worked well in his classes that you may want to consider adapting for your purposes.

Future Sessions on Engaging Students
Friday January 9, 2015 3:00 - 4:00 pm
Session 10: Engaging Students - The Devil is in the Details
Room: South Academic Building (SAB) 321
Overview: Active learning is a clear winner in terms of impact on student learning, but many instructors find the prospect of opening the floor to discussion among 100 or more students terrifying. In this session, details which make all the difference are revealed!
Presenter: Dr. Suzanne Kresta

Monday January 12, 2015 2:00 - 3:00 pm
Session 11: Engaging Large Classrooms in Active Learning
Room: South Academic Building (SAB) 321
Overview: There is a belief that you cannot engage large classrooms in activities, and this may be the experience of many students. However, if you are armed with some tools and a willingness to try something different, your students will have a much more engaged learning experience.
Presenter: Lisa Guirguis, Assistant Professor in the Faculty of Pharmacy has presented on a various teaching related topics for the University of Alberta.
New Overview
Practical advice in dealing with large classes and, if time permits, a little about engagement.

Have you attended GTL sessions previously?
Have you TAed (lab/tutorial/seminar)?
Have you given a class lecture?
Have you taught an entire course?

What makes teaching large classes “hard”? What makes teaching large classes “different” from teaching small classes?

What is a “large class”?
What makes teaching large classes “hard”?
What makes teaching large classes “different” from teaching small classes?

What makes teaching large classes “different” from teaching small classes?

Numbers of students (>100 up to 450 or more)
Physical space for instruction
Diversity of backgrounds (often introductory courses)
Format for delivery (electronic, e.g., powerpoint, doc camera)
Communication with students (email overload?!)
Feedback (harder for students to ask questions, harder for you to assess student comprehension)
Personal connection to the students
Physical Space for Instruction

Lecture Venue: Auditorium-style
CCIS 1 430/40
Photo by Bill Burris from Faculty of Science website

Lecture Venue: Table-style
CCIS 1-140/60
Photo by Bill Burris from Faculty of Science website

Lecture Venue

• Be comfortable with your lecture room
  Rehearse using the equipment and setting up computer/slides.
  Carry spare mic batteries
  Carry a cell phone and classroom support number
  How will it guide/constrain any planned activities?
Diversity of Backgrounds/Interests

I am in:
A) 1st year = 62%
B) 2nd year = 33%
C) 3rd year = 3%
D) 4th year = 0%
E) Greater than 4th year = 3%

Introductory Course: Winter term

I am from
A) Alberta = 71%
B) Another Canadian province = 4%
C) Asia = 15%
D) Europe = 6%
E) Somewhere else = 4%

When I grow up I would like to be
A) A health care professional (doctor, dentist, nurse, pharmacist…) = 61%
B) A teacher/professor = 3%
C) A research scientist = 18%
D) A salesperson/business-person = 0%
E) Other (professional athlete, unemployed, actor/actress, musician,…) = 18%
You **cannot** control diversity of backgrounds

Be aware of it.

Control what you can directly influence

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**COURSE STRUCTURE**

- **Lectures**
  - Summarize what is important
  - Motivate students to learn it

- **Homework**
  - Practice and learn
  - Assessment

- **Student-Driven Learning**
  - Discovery Based

- **Projects, Writing, Research**

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**EXAMS**

- Assessment

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**GRADES**

- What level has the student mastered the outcomes?

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**Student Expectations (USRI’s)**

- The goals and objectives of the course were clear.
- In-class time was used effectively.
- I am motivated to learn more about these subject areas.
- I increased my knowledge of the subject areas in this course.
- Overall, the quality of the course content was excellent.
- The instructor spoke clearly.
- The instructor was well prepared.
- The instructor treated the students with respect.
- The instructor provided constructive feedback throughout this course.
- Overall, this instructor was excellent.

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**Course Organization**

- eClass is your friend
  - Post announcements using News Forum
  - Use a Discussion Board
  - Build online assessments
  - Post skeleton notes/full notes
  - Link websites/documents/videos of interest

Blended Learning!
Lectures

• Organization is critical and it takes a lot of time

Lecture Prep
  Takes anywhere from 3-10 hours/lecture

Lecture (50min/80min)
  Be efficient: arrive ten minutes prior, don’t let them out early.

Lecture Delivery Style
  Depends on your class size and your preferences

Lecture Delivery

• Break up the lecture midway through with an activity.
  Examples:
    Students pair up to solve a problem. Poll the students on their answers and ask how they got there.
    Incorporate polls (Polls Everywhere) or Quick Questions (Socrative)
    Demos and videos

Developing Large Class Activities
Takes Time and Experience

Experiment

My experiment: i>clicker

Clearly explain to students purpose of experiment!

Why i>clicker?

Promote active engagement with the material covered in lectures in order to:
(i) improve your learning
(ii) build understanding of concepts
(iii) identify misunderstandings & areas to study
(iv) demonstrate progress in learning the material

Therefore, bring to class: paper, pen, i>clicker, calculator, Equation/Data sheet
Year 1: CHEM 102 in 2010

Numbers of students: **220**

Physical space for instruction: **Auditorium-style classroom**

Format for delivery: **Animated Powerpoint**

Feedback: i>clicker

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Determine the maximum heat transferable to air at 25.0 °C from
1. 40.0 L of warm water at 40.0 °C
2. 1000.0 g of red-hot iron at 1000.0 °C
Which do you think will transfer more heat?

A) Water
B) Iron
C) Equal amounts of heat

**Response based on intuition**

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Emphasizes that we must consider the nature of the substance, the amount of substance, and temperature change when determining heat transferred

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Determine the maximum heat transferable to air at 25.0 °C from
1. 40.0 L of warm water at 40.0 °C
2. 1000.0 g of red-hot iron at 1000.0 °C

**NOTE:**

\[ d = 1.00 \text{ g/mL}, c_{H_2O} = 4.184 \text{ J/g °C} \]

1 calorie = 4.184 J

Without doing a calculation, which do you think will transfer more heat?

A) Water
B) Iron
C) Equal amounts of heat

**Response based on intuition**
Benefits
Instantaneous feedback: For both students and I
Can motivate topics by asking introductory question(s)
Can guide learning through formative questions
Can assess knowledge through summative questions
Students know what they know and what they do not know (also can compare their knowledge to their peers)

Student Response
Overall, the i>clickers worked effectively

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PROBLEMS
15-20% active participation rate (students already have an “expectation” of what lectures are and are not)

Needed to improve questions to promote higher-level vs. factual learning?

How to strike the right balance in number and type of questions?

How much time is enough time to work on questions?

How do I cover all the “required” content?

i>clicker Year 2: CHEM 102 in 2012
Numbers of students: 320
Physical space for instruction: Classroom with Tables
Format for delivery: Animated Powerpoint
Feedback: i>clicker (participation marks)
i>clicker participation grade
Assigned as follows:
(1) answer 80% or more of the questions during the term = 5/5
(2) answer less than 80%,
    (responses - 0.30) x 0.10 = mark out of 5
(3) Questions do not count on days:
    (i) at beginning of the course (first two lectures),
    (ii) when a substantial number of students cannot attend
    (iii) where there are technological problems.

You must register your i>clicker!

I have used an i>clicker before.
A) Yes
B) No

Problem: Bookstore sold out of i>clickers before all 320 of my students could buy one
Note: ~10% of students transferred out to non-clicker sections

The Good
80-85% participation rate
Student feedback generally positive
Questions improved to promote higher-level vs. factual learning.
Student Response

Overall, the i>clickers worked effectively

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PROBLEMS

(Still) Needed to improve questions to promote higher-level vs. factual learning?

How to strike the right balance in number and type of questions?

How much time is enough time to work on questions?
Solution: Provide 1st question to next class at end of class

How do I cover all the “required” content?
Solution: remove content! or move some content online

Take Home Messages

Teaching large classes can be just as fun as teaching small classes

Be willing to try new things!