

A two-stage review activity for the first day of class

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Two-stage review: Context

- CHEM 311: Instrumental Analysis
- Demographics:
 - Chemistry majors and honours (~90 students)
 - Bachelor of Medical Lab Sciences (~25 students)
- **Challenge:** Significant variation in students' background knowledge
 - Differing levels of achievement and differing emphases in the common prerequisite course
 - Students' background in Electricity & Magnetism is generally weak
- First day of class would typically include only a brief introduction to new material

Why use a two-stage review?

We agreed to use the two-stage review activity to address the following goals:

1. Capture a snapshot of students' understanding of key concepts
2. Provide students with immediate feedback & clarification on their background knowledge
3. Give students a low-stakes opportunity to experience the dynamic a group test (in prep for two-stage midterm)
4. Mix the two student cohorts
5. Have a productive first day of class!

Developing the two-stage review activity

1. Identify the topics and key concepts
 - Brainstorming with instructor, lecture TA, and STLF
 - Topics and concepts from 2nd-year prerequisite and 1st-year physics (E&M)
2. Develop a set of multiple-choice questions (18 Qs)
 - targeted at a "quiz" level rather than "final exam" level

Example:

Which of the following changes will increase the intensity of the light beam reaching the detector of a standard absorbance spectrophotometer?

- a. Decreasing the intensity of the light source
- b. Diluting the analyte solution
- c. Using a sample cuvette with a longer path length
- d. Reducing the slit widths of the monochromator
- e. More than one of the above

The first day of class: Organization

- Students assigned to groups of 5
 - rearranged into groups during a 5-minute break
- We explained the activity and repeatedly emphasized it was not for marks, but to help them assess their background understanding

- **Individual review:**
Scantron sheets, 15 min

- **Group review:** same questions, “Immediate Feedback Assessment Technology” (IF AT) cards, 15 min

IMMEDIATE FEEDBACK ASSESSMENT TECHNOLOGY
Name _____
Subject _____
SCRATCH OFF COVERING TO EXPOSE

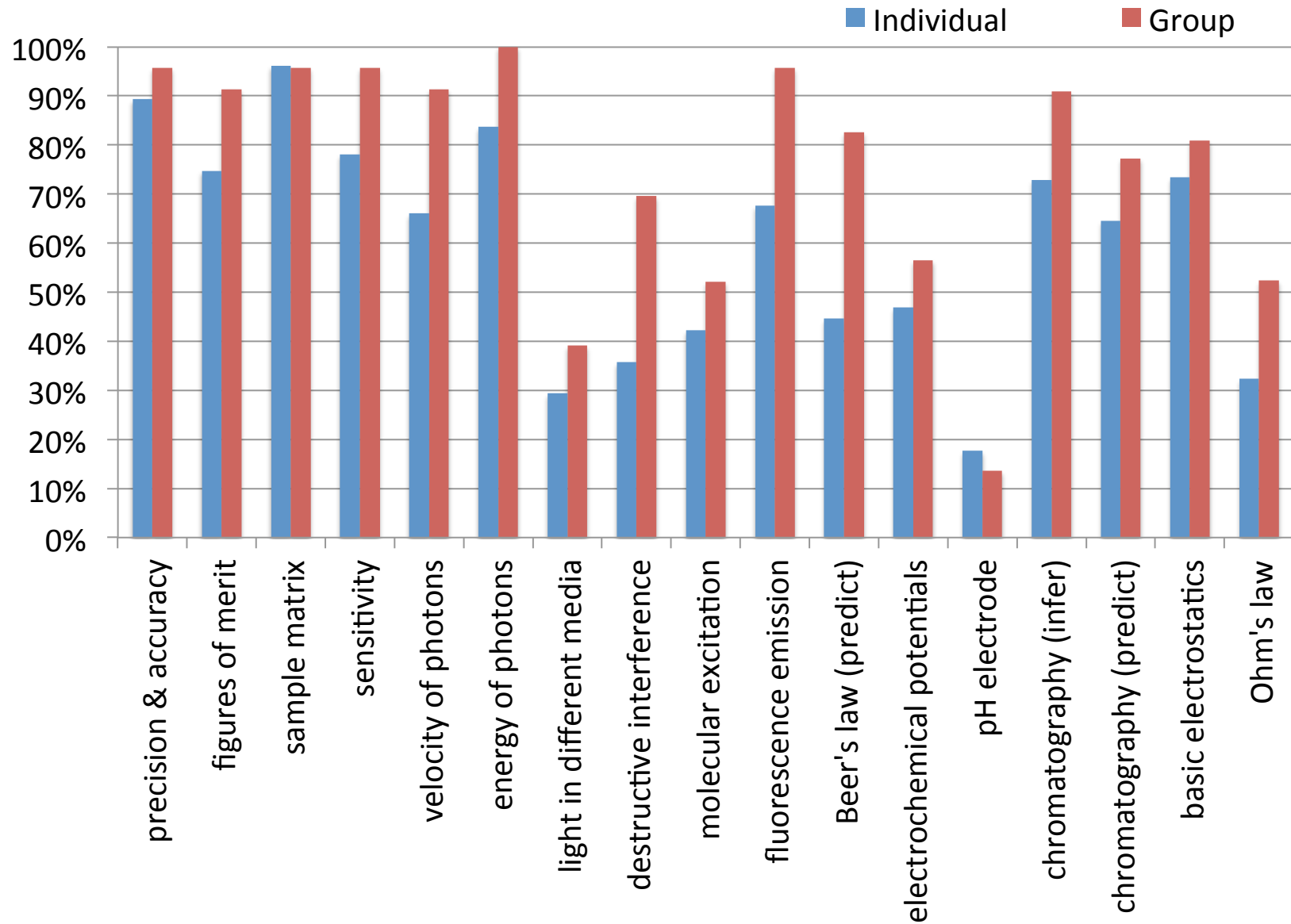
	A	B	C	D	E
1.					
2.					
3.					
4.					
5.					
6.					

The first day of class: How did it go?



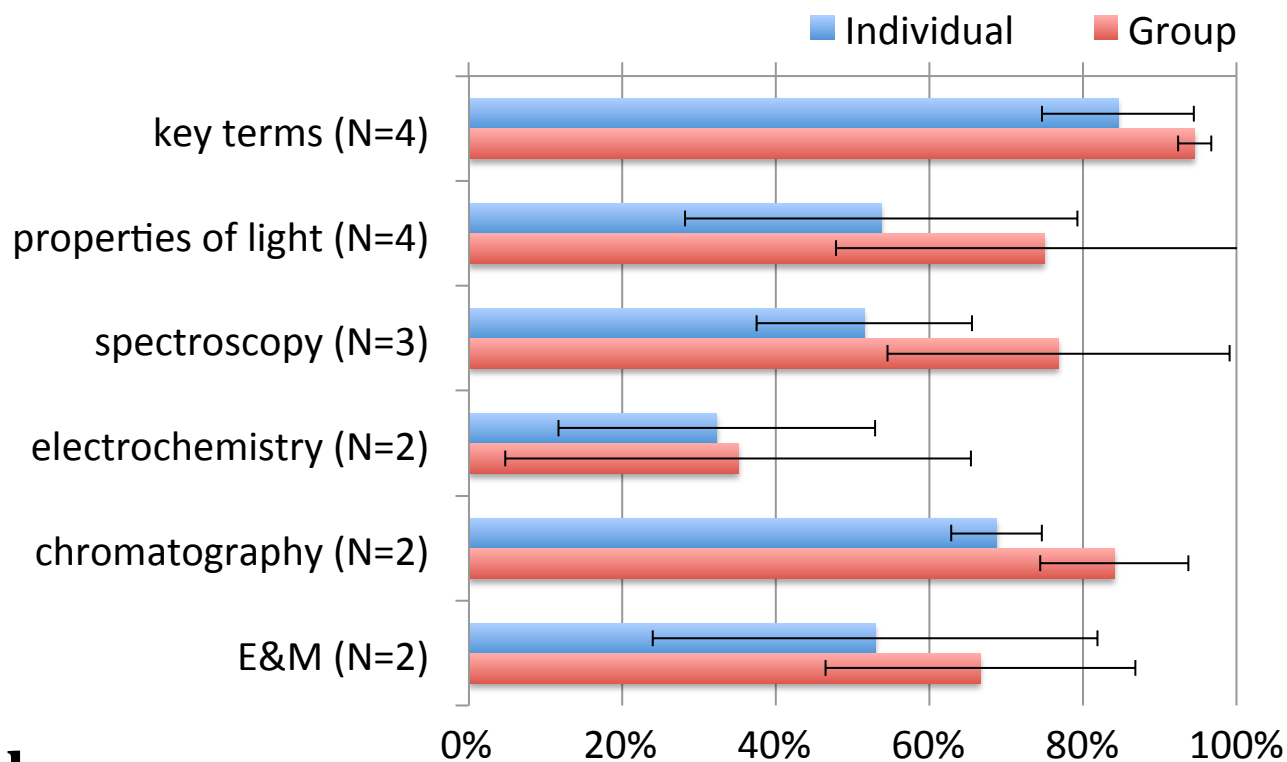
- Groups appeared engaged in good discussions about concepts
- Despite being slightly rushed, nearly all groups finished
- Attitudes during and afterwards were generally positive ("That was fun!")

What we learned: Strengths and weaknesses

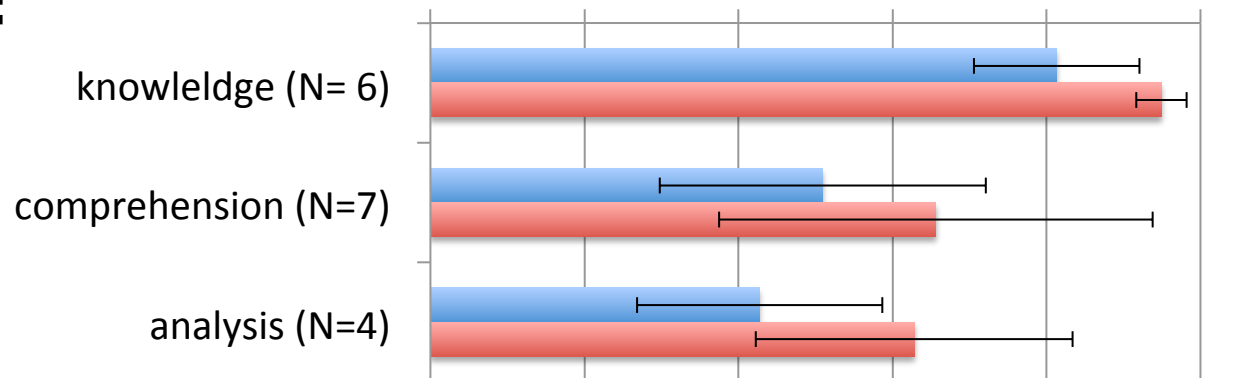


What we learned: Strengths and weaknesses

by Topic:



by Bloom's level:



What we learned: Strengths and weaknesses

3 major categories of questions:

1. Majority correct - students receive feedback from peers → 100%
2. Majority incorrect - target for clarification by instructor
3. Majority of groups incorrect - identify widely-held misconceptions

What we learned: Persistent misconceptions

Which of the following statements about glass pH electrodes is/are FALSE ?	Individuals		Group	
	N	%	N	%
a) The glass membrane acts as a salt bridge	17	18%	2	9%
b) Hydronium ions (H_3O^+) from solution are in equilibrium with hydronium ions bound to the glass surface	18		7	
c) The glass electrode must be filled with a solution of fixed pH	5		5	
d) The relationship between pH and voltage is linear	38	40%	19	83%
e) More than one of the above	18		13	

What we learned: Lessons to carry forward

- Consider your class composition when setting groups
 - Very important in our case to maximize heterogeneity
- Be persistent in prompting students to sit in a formation conducive to group discussion
- Follow-up with students:
 - We provided the questions and detailed explanations of correct AND incorrect answers on Connect
 - In the future: use Connect gradebook feature to tailor feedback for students
- Overall, the activity was **easy to prepare and implement**, and provided both us and our students with valuable information