
Applying clickers as an interactive teaching and assessment tool in the chemistry class

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Brief survey

What's of your major?

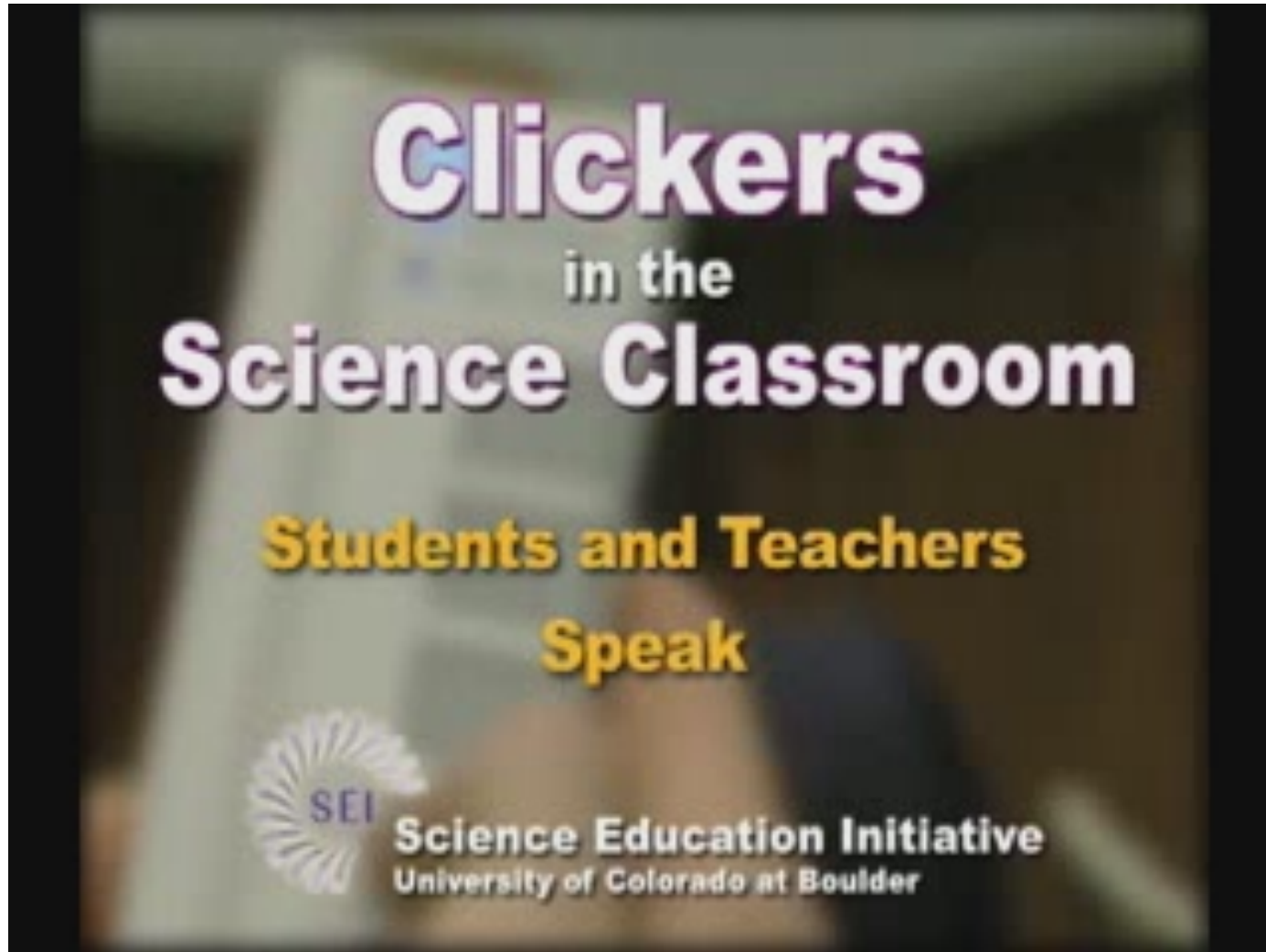
- A. Science or engineering area related to chemistry
 - B. Other science area except chemistry
 - C. Engineering without relation with chemistry
 - D. Social science area(Economics, literature, etc)
 - E. Professional schools(law, medical, business, etc)
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Introduction

Have ever used iclickers before?

- A. I've never heard of them
 - B. I've heard of them but I've never used them
 - C. I've used them as a teacher
 - D. I've used them as a student
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Teacher's comment about clickers



Science Education Initiative
University of Colorado at Boulder

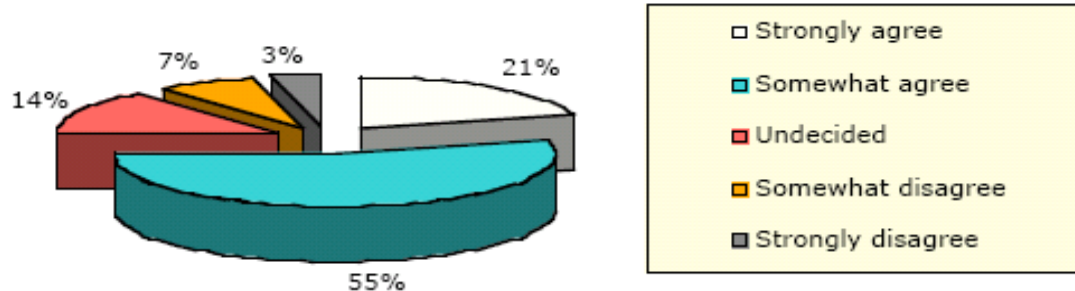
Student's comments



Clickers

What do students think?

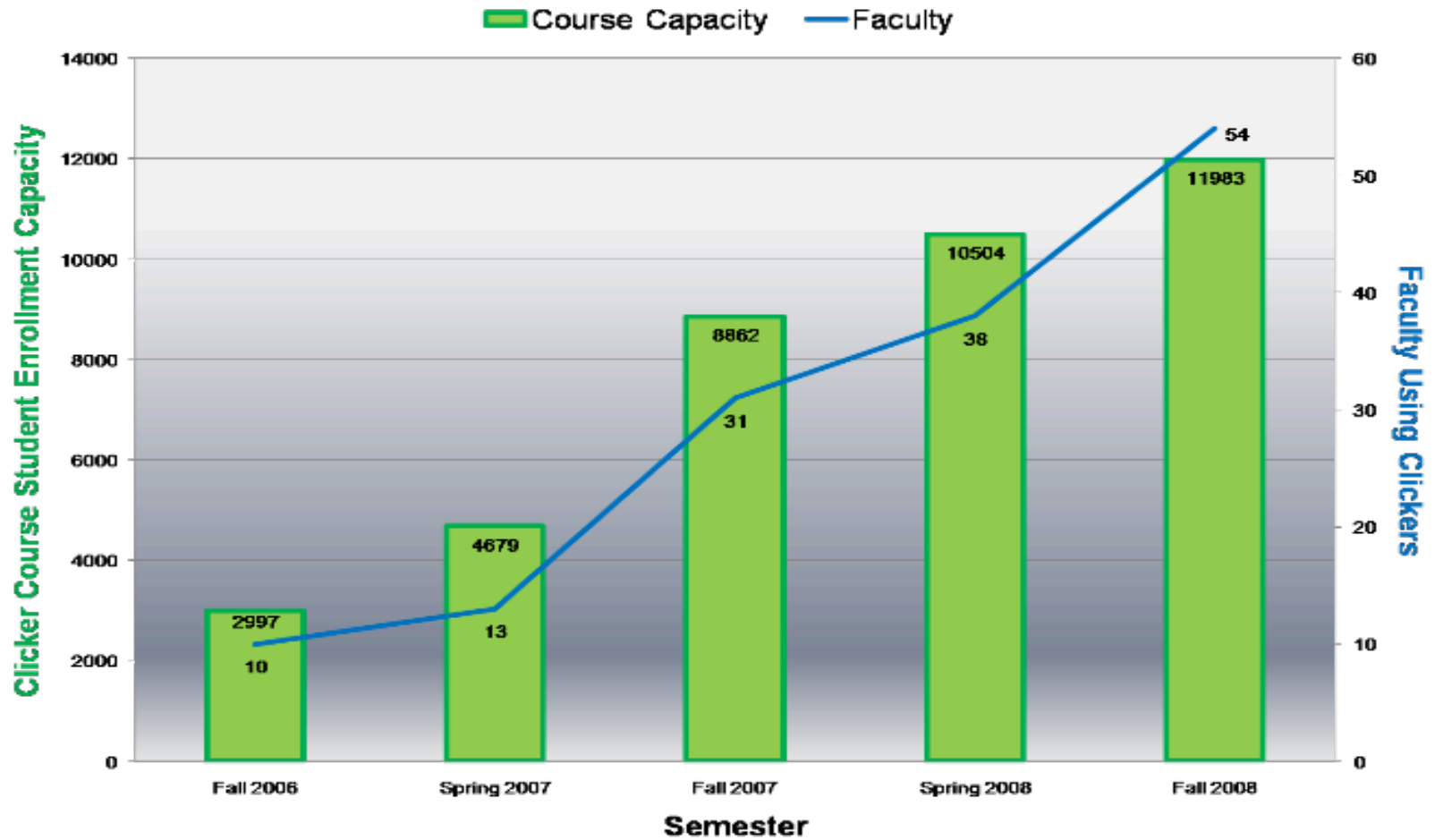
I have increased my understanding of organic chemistry by participating in the clicker questions during lecture



Organic Chemistry Spring 2006

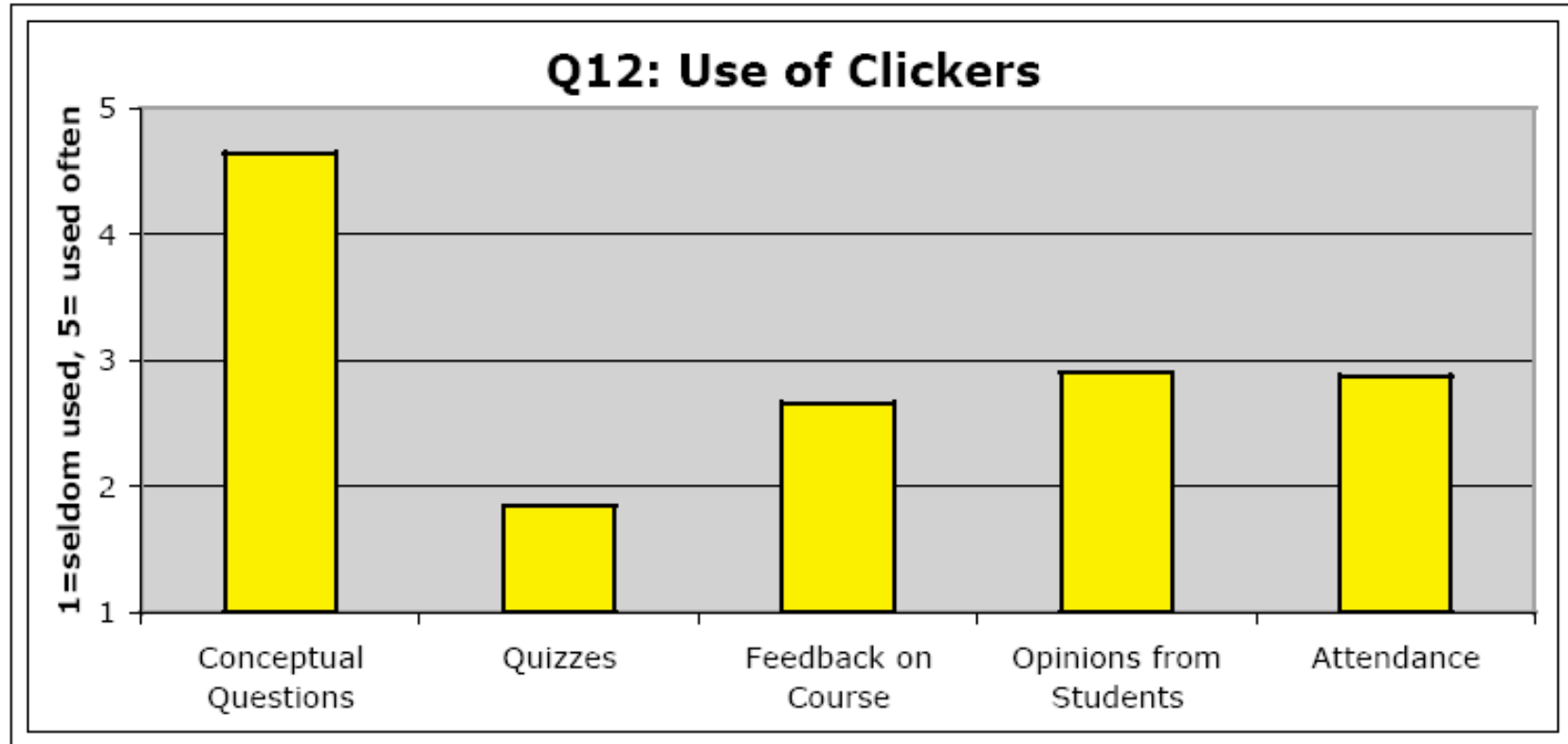
Clickers

SDSU Faculty and Student Clicker Participation



Boehmler, Deb; Smith, Ann C.; Teaching with technology, 2006

Different types of clicker questions



Faculty self-reported average frequency of use of different types of clicker questions.

Purposes of using Clickers

- 1. Engagement
 - 2. Informal assessment
 - 3. Peer Instruction
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Engagement

- Goal: To get students' attention and interest.



Engagement

Example Question 1

Which phenomena is regarded as a chemical change?

- A. Tearing paper
 - B. Evaporating Alcohol
 - C. Burning a Candle
 - D. Melting Snow
 - E: Cutting Glass
-

Engagement

Example Question 2

Which chemical item is NOT included during the metabolism of plants ?

- A. Carbon dioxide (CO_2)
 - B. Oxygen (O_2)
 - C. Water (H_2O)
 - D. Silicon dioxide (SiO_2)
-

Engagement

- Discussion

What are the features of Engagement Questions?

Engagement

Characteristics of an effective engagement question:

- ❑ Brief and simple
 - ❑ Interesting
 - ❑ Related to prior/basic knowledge
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Engagement

- Design

Design a simple engagement question about effective teaching methods

Hint: we have already used several different effective teaching methods in our workshop.

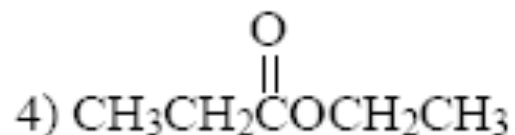
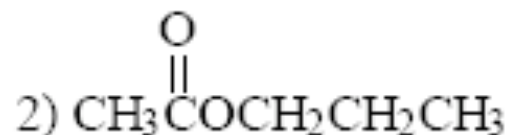
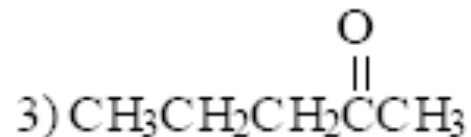
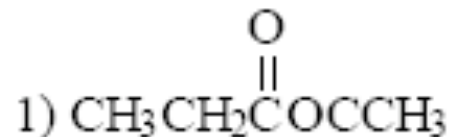
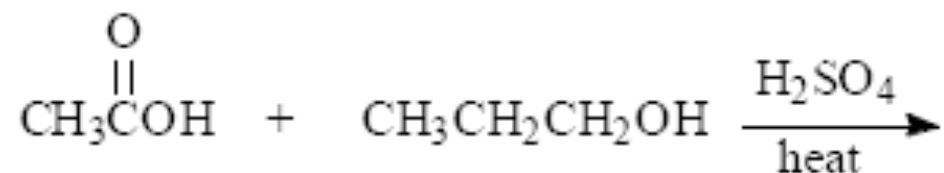
Informal Assessment

- Goal: Instructor gets an idea of who does and doesn't understand. Based on the feedback, the instructors are able to lead an audience-paced lecture.
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Informal Assessment

Example Questions 1

what is the product of the reaction below?



Informal Assessment

Example Questions 2

Which of the following contains the largest number of molecules?

A: 1g of NH_3

B: 1g of HF

C: 1g of H_2O

D: 1g of CH_4

E: All of them are Same

Informal Assessment

- Strategies if students make mistakes
 - 1. (10% wrong) Go over correct answer , emphasize
 - 2. (>50% wrong) Clarify the problem through scaffolding question process.
 - 3. (25~30% wrong) Have students discuss with peers
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Peer Instruction

- What is Peer Instruction?
Step 1: “Think” phase
Step 2: “Pair/Share” phase



Peer Instruction

- Goal: Help students learn more actively and form better solutions during the discussion



Peer Instruction

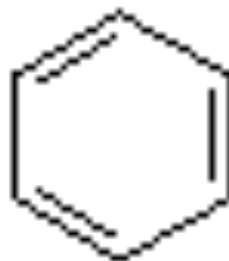
Example Question:

- Consider the Br_2 molecule. If there are two common isotopes, 79-Br and 81-Br, how many physically distinguishable combinations of Br atoms are there in Br_2 ?
 - A. 1
 - B. 2
 - C. 3
 - D. 4
 - E. None of all

Peer Instruction

Example Question:

How many degrees of unsaturation are there in benzene?



- A. 2
- B. 3
- C. 4
- D. more than 4

Peer Instruction

Discussion

How can peer instruction positively impact learning?

Peer Instruction

Benefits of Peer Instruction

- Students will be more likely to discuss freely with peers than professors
 - Students will reach higher levels of understanding (1. Just listen 2. Listen and see 3. Do/discuss 4. Teach others)
-

Conclusion

Applying Clickers

- 1. Better class interaction and engagement
 - 2. Quick feedback
 - 3. Improve teaching & learning effectiveness
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Resources

- [1] Thomas A. Angelo K. Patricia Cross, Classroom assessment techniques, 2nd edition,
 - [2] Ashley Deal, Classroom response systems, A teaching with technology white paper, 2007
 - [3] David E. Smith, Teaching academy innovation award application,
 - [4] Joseph Lauher, <http://www.youtube.com/watch?v=AHfV3AqTBEM> and http://www.youtube.com/watch?v=z_Clyp4Jlfo&feature=related
 - [5] Sandra Jones, “Clickers” in the classroom, Teaching and Learning in Nursing (2009) 4, 2–5
 - [6] Richard E. Mayer, Clickers in college classrooms: Fostering learning with questioning methods in large lecture classes, Contemporary Educational Psychology 34 (2009) 51–57
 - [7] Gregory A. DeBourgh, Use of classroom “clickers” to promote acquisition of advanced reasoning skills, Nurse Education in Practice (2008) 8, 76–87
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Questions
