Biology FEST:
Faculty Explorations in Scientific Teaching

Biology FEST Luncheon Workshop #3
Tuesday, April 16th
12:30-2 pm

Crash Course on How to Use Clickers in Your Classroom
Biology FEST:
Faculty Explorations in Scientific Teaching

Goals for today…

• Continue building a community in our biology department focused on exploring scientific teaching

• Give everyone practical experience using the SFSU adopted clicker – the iClicker

• Explore different goals instructors have in using clickers and how your goals influence the questions you ask, when students talk about the questions, and how you might grade them.
Introductions and Considering our Data on the First Day

Share at your table:

1. Your name...
2. What, if anything, surprises you about the registration data on how our community is thinking about clickers?
Scientific Teaching Framework

Collecting Classroom Evidence

Active Learning

Assessment

Equity and Diversity
Using the i>clicker2

Biol 355 has ~70 students per section

Clicker Workshop 4/16/2013 12:30pm – 2pm
Meet i>clicker2: the Student Remote

ON/OFF Orange button
Meet i>clicker2: the Student Remote

- Battery level
- ON/OFF Orange button
- 2 batteries

i>clicker2: READY

橘色按钮：电池电平

i>clicker2 遥控器：电池电平

电池电量显示：B°

2节电池：123ABC78
Meet i>clicker2: the Student Remote😊

- Your response
- Battery level
- ON/OFF Orange button
- Response buttons
- 2 batteries
- Remote ID
CQ1: Have you used any “clicker technology”* in your teaching?

A = yes
B = no
C = don’t know

*personal response system, i-clicker, turning technologies, CPS eInstruction
CQ2: Have you used the i>clicker?

A = yes
B = no
C = don’t know

“old i>clicker remote”
“new i>clicker2 remote”
CQ3: Which of these teaching approaches/strategies have you used in your classroom?

A. Case studies
B. Think - pair - share
C. Jigsaw
D. At least two
E. None
CQ3: Which of these teaching approaches/strategies have you used in your classroom?

A. Case studies
B. Think - pair - share
C. Jigsaw
D. At least two
E. None

National Center for Case Study Teaching in Science
http://sciencecases.lib.buffalo.edu/cs/
case studies across the science disciplines
has CLICKER CASE STUDY MODULES ready for use
Meet i>clicker2: the Instructor Remote

- Instructor remote
- Student remote
Clicker *Big Ideas*:  

Your goals for using clickers in your teaching will determine…  

…what types of questions you ask.  

…whether students talk before clicking in or after clicking in, or both.  

...whether students are graded on correct answers or participation, or both.
Crash Course in Clickers:
Stories from Colleagues on Using Clickers...

Andy Zink
Sally Pasion
Kimberly Tanner
Using Clickers in Biology 240

• Have been using clickers now for five years (all but one year that I have taught Biol 240)

• Transitioned to the iClicker two years ago

• Opportunity to engage students. More democratic (~200 students).

• Opportunity to identify misunderstandings in real time
How we go about it...

• Warn students on the slide before (using a red dot in corner of slide)

• Read over question before starting timer (usually 60 seconds)

• Allow students to discuss with their neighbor. Open notes.

• Three points for correct answer. One point for incorrect answer.

• Usually 1-3 questions per lecture (at unpredictable times)
Clicker Question:

In the logistic growth equation, for a fixed positive intrinsic rate of population growth, \( \frac{dN}{dt} \) always remains positive when

\[
\frac{dN}{dt} = r \ N \ \frac{(K - N)}{K}
\]

A) The carrying capacity is greater than \( N \)
B) \( N \) is greater than the carrying capacity
C) The carrying capacity and \( N \) are exactly equal

93% correct answer
Clicker Question: Lotka-Volterra Competition Equations

A small modification of the logistic growth curves:

Species 1: \( \frac{dN_1}{dt} = r_1 N_1 \left( \frac{K_1 - N_1 + \alpha N_2}{K_1} \right) \)

Species 2: \( \frac{dN_2}{dt} = r_2 N_2 \left( \frac{K_2 - N_2 - \beta N_1}{K_2} \right) \)

Which species is the predator?

A) Species 1

B) Species 2

C) Neither

79% correct
Consider Two competing species:

Species 1: \[ \frac{dN_1}{dt} = r_1 N_1 \left( \frac{(K_1 - N_1 - \alpha N_2)}{K_1} \right) \]

Species 2: \[ \frac{dN_2}{dt} = r_2 N_2 \left( \frac{(K_2 - N_2 - \beta N_1)}{K_2} \right) \]

What is the condition under which competition between species is greater than competition within species?

A) \( \alpha > 1 \)
B) \( \beta > 1 \)
C) Both are correct
D) Neither are correct

65% correct
Crash Course in Clickers:
Stories from Colleagues on Using Clickers...

Andy Zink
Sally Pasion
Kimberly Tanner
**Clicker Question**

- In a cross between a true-breeding black mohawk, yellow eared furby with a true-breeding white mohawk, black eared furby, you recover F1 furbies that are black mohawk, yellow eared.

- In the F1 testcross, you recover 400 progeny:
  - Black mohawk, yellow eared 145
  - Black mohawk, black eared 45
  - White mohawk, black eared 155
  - White mohawk, yellow eared 55

- What is the recombination frequency (or map distance) between the loci controlling mohawk and ear colors?
Clicker Question

• In a cross between a true-breeding black mohawk, yellow eared furby with a true-breeding white mohawk, black eared furby, you recover F1 furbies that are black mohawk, yellow eared.

• In the F1 testcross, you recover 400 progeny:
  Black mohawk, yellow eared 145
  Black mohawk, black eared 45
  White mohawk, black eared 155
  White mohawk, yellow eared 55

• What is the recombination frequency (or map distance) between the loci controlling mohawk and ear colors?
  A. 50% or 50 cM
  B. 33% or 33 cM
  C. 25% or 25 cM
  D. 12% or 12 cM
Recombination vs Complementation

- rIIA1 mutant and rIIA2 mutant – mutations in SAME gene
- Simultaneous infection of single E. coli B cell
- Recover phage progeny
  - Infect E. coli B?
  - Infect E. coli K12?

Recombination between mutations in same gene is less likely than between mutations in two different genes.

Figure 6.20 and Figure 6.21
If I take a SINGLE PHAGE PARTICLE from each of 500 plaques...

...and infect E. coli B

Will it infect and lyse??

A YES

B NO

C DUNNO KNOW
If I take a SINGLE PHAGE PARTICLE from each of 500 plaques...
...and infect E. coli K12

Could it infect and lyse??
A YES
B NO
C DUNNO KNOW
Some considerations

• High stakes or low stakes?
  – Encourage participation
  – Reward comprehension of content
  – Class quiz or midterm exam
  – 10% or 75% of final grade?
Some considerations

• High stakes or low stakes?
  – Encourage participation
  – Reward comprehension of content
  – Class quiz or midterm exam
  – 10% or 75% of final grade?

• Clickers take time out of lecture
  – Read the question (you can read them or have different students read them) and the possible answers
  – Allow enough time for the students to process the question and develop an answer
  – Discuss the solution, if necessary; or review the content
Some considerations

• High stakes or low stakes?
  – Encourage participation
  – Reward comprehension of content
  – Class quiz or midterm exam
  – 10% or 75% of final grade?

• Clickers take time out of lecture
  – Read the question (you can read them or have different students read them) and the possible answers
  – Allow enough time for the students to process the question and develop an answer
  – Discuss the solution, if necessary; or review the content

• Technology issues...(have policies set up ahead of time)
  – What if the clicker fails?
  – What if the student misses class?
  – What if one student brings 5 clickers?
Crash Course in Clickers:

Stories from Colleagues on Using Clickers...

Andy Zink

Sally Pasion

Kimberly Tanner
Clicker Question

What of the following is ordered from LARGEST to SMALLEST?

A. mitochondrion, hemoglobin, virus, glucose, water molecule
B. virus, mitochondrion, hemoglobin, glucose, water molecule
C. mitochondrion, virus, hemoglobin, glucose, water molecule
D. virus, mitochondrion, glucose, hemoglobin, water molecule
E. I really have no idea...

We record your PARTICIPATION. We do NOT grade you on your answer.

Be brave! Stand your ground! A big part of THINKING LIKE A BIOLOGIST is being willing to have different ideas than others.
Looking Forward & Next Steps

Biology FEST Luncheon Workshops
Tuesdays, 12:30-2 pm, Spring 2013

May 7th Strategies for Promoting Student Engagement
then...

June 10th - 14th Summer Institute
~25-30 of us will gather!!

We’re currently sorting out Fall Program Assignments, namely who’s in a Teaching Square or Classroom Partnership...

Thanks for all your timely responses to emails and surveys!

SFSU Biology Faculty Rock!!!!!
Reflection and Assessment

What are the three most important things you learned during your time with the HHMI Biology FEST Community today?

This is anonymous!
Biology FEST:
Faculty Explorations in Scientific Teaching

Strategies to address our goals…

2. Provide multiple ways to participate…

- Scientific Teaching: Monthly Workshop Series (drop-in, introductory)
- Scientific Teaching: Weeklong Summer Institute (intensive, advanced)
- Teaching Squares
- Classroom Partnerships
- Luncheon Workshops

Spring Term → Summer Term → Fall Term