Students learn better and retain knowledge longer when they are engaged and actively processing the concepts in class. Peer instruction using a classroom response system, commonly referred to as clickers, is an excellent option for creating a student-centered learning environment.

In an ideal episode of peer instruction,

1. the instructor poses a conceptually-challenging multiple-choice question,
2. students vote individually on the question,
3. the instructor, seeing a split between the correct answer and one or more common misconceptions, asks students to advocate for various choices and/or turn to their neighbors to discuss the concept,
4. after a discussion, the students vote again, this time with a vast majority of students choosing the correct answer.

With the right peer instruction choreography and some anticipation of how students will vote, you have an opportunity to make every clicker question a "golden moment" where students learn, right before your eyes. This pamphlet demonstrates and deconstructs an approach for running an effective peer instruction episode using the i>clicker system, giving options for reacting to students' clicker votes. This approach can easily be adapted to other technologies, even ABCDE flashcards, which allow the instructor to see the outcome of the votes before the students do.

"Ready, Set, React!" by Peter Newbury and Cynthia Heiner (June, 2012)
What if...?

Everyone knows the answer

Show the histogram: it’s positive feedback

It’s critical to confirm the correct answer in case there’s any doubt.

Give a brief explanation so students know their reasoning is correct.

Yes, A is correct: the square of the hypotenuse is equal to the sum of the square of the sides.

first slide of next mini-lecture

Good work, everyone. We continue with...

After class, make a note in slides: omit this next year? Not making them think deeply.

Votes split between 2 or 3 choices

Interesting! Turn to your neighbors, convince them you’re right.

Wander around room, listen in. Identify students with good arguments.

Coach them how to discuss with “convince them you’re right”

Please vote again.

90 5 2 0 3

Strong peak? They learned! Great work!

When their attention is drifting. vote again.

Show histogram: show them they learned. Confirm, explain, move on.

Well done! You were split on A and C but now you got it! A is correct because...

65 3 30 1 0

first slide of next mini-lecture

Circle back through material or leave it for another day.

After class, make a note in slides: fix this for next year!

Still split? They’re not getting it.

Are they guessing?

24 20 22 25 9

Show histogram. Something wrong with question?

That’s not what I was expecting. Is there something wrong?

[Yes] If it’s an easy fix, do it, and ask revised question.

[No] They aren’t prepared to answer this question. Review or leave it for another day.

It looks like I’ve asked a question you can’t answer. We’ll come back it later.

first slide of next mini-lecture

For now, let’s keep going with...

After class, make a note in slides: fix this for next year!

More possibilities

As you get more practice at anticipating the votes and reacting, start trying other options:

- on a split vote, instead of telling the students to turn to their neighbors, ask for volunteers to advocate for different choices. After moderating the discussion, get them to vote again.
- ask a question with more than one correct answer. Be sure the students don’t feel you’re tricking them, though.
- ask a question about attitudes or opinions. A question with no correct answer can stimulate class-wide discussion.

Peer instruction depends critically on using good questions. Think carefully about when and why you ask a question. For example,

- ask a question before introducing the new concept, to assess their prior knowledge, reveal a common misconception or capture their interest.
- ask a question during instruction to see if they’re following along or to practice a new skill.
- ask a question after lesson to assess their grasp of the concept, if they can apply the knowledge to an unfamiliar situation.

Peer instruction allows you to create an effective, student-centered learning environment. Using your teaching agility and then witnessing students learn can be very rewarding.

Resources

Teaching support in Physics and Astronomy at the University of British Columbia: www.phas.ubc.ca/teaching-support

Carl Wieman Science Education Initiative clicker resources: www cwsei ubc ca resources clickers htm

Videos by the Science Education Initiative at the University of Colorado (Boulder) provide excellent background for using clickers: www cwsei ubc ca resources SEI video htm


Peer Instruction network: blog peerinstruction net

Derek Bruff’s blog and clicker bibliography: look under Clickers at derekbruff org