Agenda

- The Peer Instruction process
- Underlying educational theory
- Live demo
- The key features of the Peer Instruction tool
- Development process
- General experiences and feedback from tool users
- Methodology being used to evaluate the effectiveness of the tool
- Roadmap plans
How it works

**Step 1**
Choose an answer option & explain why it is correct

What is your answer to this question?
- Option A
- Option B
- Option C

Explain why:
Here is why I think this option is best.

**Step 2**
Read some other students’ answers and explanations

Student #1: Option B
"Reasons for option B"

Student #2: Option C
"Reasons for option C"

Student #3: Option A
"Reasons for option A"

**Step 3**
Reconsider your original answer & optionally revise it

What is your answer to this question?
- Option A
- Option B
- Option C

Explain why:
Here is why I think this option is better.

**Step 4**
See the correct answer/explanation & class breakdown

Correct Answer:
Option A
"Correct reasons for option B"

Initial Answers
- A
- B
- C

Final Answers
- A
- B
- C

Initial Answers
- A
- B
- C

Final Answers
- A
- B
- C
Underlying Theory and Practice

• Based on Eric Mazur’s Peer Instruction methodology
• Interactive engagement strategy to enhance classroom teaching
• Students asked questions designed to expose common difficulties in their understanding material
• Questions interspersed with small group discussion
• Well established efficacy of process
• Works because it engages higher-order cognitive skills: articulation, evaluation, synthesis etc.


http://mazur.harvard.edu/research/detailspage.php?rowid=8
brief presentation

ConcepTest

clicker poll 1

< 30% correct

revisit concept

30–70% correct

peer discussion

clicker poll 2

> 70% correct

explanation

repeat from start

Reproduced from Eric Mazur
(search "Confessions of a converted lecturer" on YouTube)
Why Peer Instruction?

UBC Context: Carl Wieman Science Education Initiative

The goal of the Carl Wieman Science Education Initiative is to achieve highly effective, evidence-based science education for all post-secondary students by applying the latest advances in pedagogical and organizational excellence.

→ 170 transformed courses

The MOOC challenge:

• Difficulty of supporting engagement at scale with limited instructor presence
• Difficulty of supporting synchronous interaction
Why Peer Instruction?

edX Global Forum 2014 - Instructional Design and Pedagogy Group

“Can we take an example pedagogy that we know works *really* well in the f-2-f environment and recreate it in a fully online environment?”

→ Online Peer Instruction utilizing student answer rationales as proxy for student discussion.
Live Demo

https://goo.gl/bBmZS2

Be sure to use HTTPS.
Key Features

- Asynchronous two stage MCQ interaction
- Multiple algorithms for distributing student answers
- Ability to set the number of student answers displayed
- Ability to seed “student” answers for each option
- Grading - currently only completion grade
- Images and HTML input / display
- Graphical presentation of activity statistics
- Internationalization support
- Event tracking
- Available on edx.org and edge.edx.org as XBlock
Peer Instruction

Peer instruction problems give learners an opportunity for interactive engagement while they answer a multiple choice question. Learners complete these problems in three steps.

First, the learner answers a multiple choice question and provides a rationale for the answer. Next, the learner sees the rationale provided by another learner for each of the other possible answers. After assessing this input, the learner can make revisions and resubmit an answer and rationale. Finally, the learner sees the correct answer and the rationale that you provide for it.

Display Name
This name appears in the horizontal navigation at the top of the page.

Peer Instruction Question

Problem Weight
Defines the number of points each

Save  Cancel

Editing: Peer Instruction Question

Question Text
The question appears above the possible answers that you set below. You can use text, an image, or a combination of both. If you wish to add an image to your question, press the "Add Image To Question" button.

<p>Where does most of the mass in a fully grown tree originate?</p>

Add Image To Question

Minimum Characters
This is the minimum number of characters the student explanations must contain.

1

Save  Cancel
Possible Answers
The answers appear as choices underneath the question, with a maximum of 10 allowed per question. Each answer may contain text, an image, or a combination of both.

To add another answer press the "Add New Answer" button. To remove an answer press the blue "x" next to the blue option you want to remove.

Answer 1
Add the text for this answer. If you wish to add an image, press the button below.

Air

Answer 2
Add the text for this answer. If you wish to add an image, press the button below.

Soil

Correct Answer
Choose the answer you consider correct.

Option 1

Explanation
Explain to students why this is the correct answer. Students see the correct answer and explanation after submitting their final answer.

Photosynthesis

Save  Cancel
Events

- ubc.peer_instruction.accessed
- ubc.peer_instruction.original_submitted
- ubc.peer_instruction.revised_submitted
{
...
"username": "USERNAME", -- common field
"event_source": "server/browser", -- common field
"name": "ubc.peer_instruction.original_submitted",
"context": {
  "user_id": "####", -- common field
  "org_id": "", -- common field
  "course_id": "", -- common field
  "path": "", -- common field,
  "module": {
    "display_name": "Peer Instruction Question 1",
  }
},
"referer": "", -- common field
"event": {
  "answer": "1", -- An integer
  "rationale": "This is the rationale", -- string field
  "truncated": False, -- boolean field,
},
"event_type": "ubc.peer_instruction.original_submitted",
"page": null
}
Development Process

- Initial Proposal and Feedback
- Options Exploration and Challenges
- Coding
- Code Review
- Merging and Deployment
- Documentation
Experiences and Feedbacks

Were peer answers helpful to students?

- Yes: 55.2%
- No: 20.7%
- Not Sure: 20.7%
- na (Not Seen): 0%
Experiences and Feedbacks

Were before-after charts useful to students?
- Yes: 58.6%
- No: 24.1%
- Not Sure: 13.8%
- na (Not Seen): 3.5%

Did peer answers influence students?
- Changed answer: 27.6%
- Revised rationale: 10.3%
- Confirmed answer: 55.2%
- None reported: 6.9%
Main reasons answers were helpful

Legitimized Alternatives:
"[Answers] provided other options that you might have overlooked", "it made me think would [another answer] work?"

Provided Guidance:
"[Answers] guided you in a direction", "now I see what I'm supposed to look at", "it helped me target my attention to specific clues".

Second Thoughts:
"It made me stop and be more careful, to question myself"

Increased Confidence:
"[Other answers] helped me feel like I was assured with my choice", "confirmed to me my answer was correct"
Reasons students gave for liking the exercise

"Other students' insight could provide a different perspective"

"When we're not sure about our choice, we can see other answers" these can help you "get to the correct way to approach the question"

There's value when you can "see the reasoning in the [other] answers instead of just the correct answer". [It] gives me an idea how to formulate my answers"

"Just to have other student opinions is good" in any assignment.
Evaluation Process

Evaluation of two PI tools: *UBCPI* and *Dalite*

- Piotr Mitros - edX
- Nina Huntemann - edX
- Melanie McFarlane
- Colin Fredericks - Harvard
- Yigal Rosen - Harvard
- Saif Rayyan - MIT
- Ido Roll - UBC
- Pan Luo - UBC
- Derek White - UBC
Evaluation Process

- Measure impact on engagement
  - Time on pages, how often switch answer, positive switching, negative switching, quality of answers
  - Impact on persistence in course, time on task...
- Measure impact on learning
  - Correlate to performance in course, grades...
  - Perceptions of value and competence (survey)
- Design
  - What questions work better?
  - How does this interact with learner characteristics?
Development Roadmap

• Grade for correct answer
• Additional answer selection algorithms
• Ability for student to ask for additional student answers to view before submitting final answer
• Flagging inappropriate answers
• Enhance event emitting to include answers shown to students
• Explore option of synchronous discussion groups
Development Team

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William Ono
John Hsu
Michael Tang

Special thanks to Open Edx team for the help, code review and contribution!
We’d like to hear from you

• Interested in using the tool?
• Want to participate in evaluation project?
• Want to contribute or suggest enhancements?

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• github.com/ubc/ubcpi