Better Questions for Peer Instruction
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I. Our motivation: help instructors write better questions.

Peer instruction (PI) is an evidence-based strategy for developing students’ conceptual understanding. In PI, students answer a short concept-question (pre), then discuss it with their peers, and finally answer the same question again (post) [1]. We look as delivery of PI where students must also write explanations justifying their choice. Question attributes can affect the degree that students will progress through the discussion. In this correlative study, we investigate how question-specific attributes relate to pre-post gains in correct answer choices.

II. We ask: (1) what questions are good, and (2) what’s good in them?

We consider question difficulty, content addressed by the question, and types of understanding needed to answer the question. We look for good questions in which students gain more correct answers and better conceptual understandings.

III. Plot student gains and see patterns.

We draw data from multiple groups of engineering students taking sophomore courses covering conservation principles. Through a web-based interactive platform [2], questions, student answer choices, and written justifications were collected. Preliminary analysis shows that questions of mid-level difficulty were asked most often by instructors and also have the highest absolute gain. Easier questions show the higher normalized gain.

IV. Case study on three potential better questions.

Ongoing analysis includes classification of question content and written responses of students to relate those to gains [3]. Emergent coding process of written justifications has been conducted on the three questions listed below.

V. Question 1. Hard to say.

Wrong/hollow/right reasons can all get the right answer. Some wrong and hollow reasoning increased. Some correct and convenient reasoning increased. Some in-depth but inconvenient thinking decreased.

VII. Question 3. Huge absolute gain. Exciting!

A similar question was discussed through Peer Instruction in the same class right before question 3. Student spent longer time in discussing question 3 (15 minutes, compared to typically 7 minutes).

VIII. Next steps: look at the same questions in different groups.

Some questions always had high gains across different groups (such as question 1 and question 2). Some questions had a big range of gains when applied in different groups (such as question 3).

References