CBE Life Sciences Education

Feature: Evidence-Based Teaching Guide to Peer Instruction

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INSTRUCTOR CHECKLIST – PEER INSTRUCTION

The following summarizes literature-based recommendations for implementing peer instruction.

QUESTION PURPOSE AND STRUCTURE

- ❑ Consider the purpose questions are supposed to serve. Questions may be logistical, recall, algorithmic, or conceptual. Within the general category of conceptual questions, instructors may use application questions, case-study questions, or procedural questions, among others. Blogs from Derek Bruff (https://derekbruff.org/?page_id=2) and Julie Schell (https://blog.peerinstruction.net/author/peerinstruction/) provide examples of questions.
- ❑ Consider the structure that will best support the purpose of the question. Questions are often one-best-answer multiple choice, but multiple true-false, free response, and questions that promote drawing can encourage students to engage in different types of thinking that may support particular goals.
- ❑ Use some questions that require lower order and some questions that require higher order cognitive skills. Both types of questions can lead to robust peer discussion, and lower order questions are not necessarily easier for students. The Blooming Biology Tool can help instructors characterize the cognitive level of their questions.
- ❑ Use questions that uncover common misconceptions. Concept inventories from various subfields of biology identify common misconceptions (http://dbserc.pitt.edu/Assessment/Assessments-Biological-Sciences) and Coley and Tanner provide a description of the common origins of diverse biological misconceptions (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3433289/pdf/209.pdf).
- ❑ Use questions that are challenging enough to provoke interest and discussion. Questions that are too simple do not promote productive discussion.

ESTABLISHING GRADING AND SOCIAL INCENTIVES

- ❑ Use low-stakes grading incentives for student participation in peer instruction, awarding equal or very similar credit for correct and incorrect answers. Low-stakes incentives increase student engagement in peer discussion, produce more robust exchanges of reasoning, and result in more equitable contribution of group members.
- ❑ Avoid high stakes grading incentives, in which students receive significantly more credit for correct answers. High stakes incentives lead to dominance of the discussion by a single group member and a focus on finding the correct answer rather than understanding the reasoning.

- ❑ Randomly call on groups to explain reasoning for an answer rather than asking for volunteers. Random call serves as social incentive to participate and increases exchanges of reasoning during peer discussion.

INSTRUCTIONAL INTERACTIONS

- ❑ Vary your interaction with small groups during peer instruction. During small group peer discussion, instructors may stay in earshot of groups but not interact, may answer student questions, or may discuss possibilities with a group. Each type of interaction provides students the opportunity to engage in a different type of scientific activity. By varying your interaction, you provide a greater range of activities for student to practice.
- ❑ Vary your approach to discussing the solution. During this discussion, instructors may describe the solution, encourage students to jointly describe and evaluate the solution, and encourage students to describe alternate interpretations. As in interactions with small groups, varying your approach to discussing the solution provides students with opportunities to engage in a range of scientific activities.
- ❑ Identify the correct response and the rationale during whole class discussion. Because PI allows exposure to others' ideas, it has the potential to lead to misunderstanding. Providing an instructor explanation after PI helps reduce this possibility, and explanations of instructor reasoning also allow the instructor to model scientific practices.
- ❑ Explicitly encourage students to explain their reasoning during small and large group discussions. This practice influences classroom norms and student behavior, producing higher quality peer discussions.
- ❑ Coach undergraduate and graduate teaching assistants to prompt students to explain their reasoning.
- ❑ Consider whether to display the histogram of student responses after students answer individually but before peer discussion. Although traditional implementation of PI involves this practice, it may bias students toward the most common answer and result in less robust peer discussion.
- ❑ Consider the benefits and drawbacks of using personal response devices. Their use does not appear to impact students' learning, but students may exhibit higher participation and report greater enjoyment when using clickers compared to hand-raising.