

Combining Peer Instruction, ConcepTesting and Classroom Response Technology

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This article includes instructions for using a strategy that combines Peer Instruction, ConcepTesting, and Classroom Response Technology. Peer Instruction is an evidence-based collaborative teaching strategy developed by Dr. Eric Mazur during the 1990s. He also developed the ConcepTest which is based on the development of conceptual multiple-choice questions that focus on key concepts. Mazur, a physics professor at Harvard University, uses Peer Instruction and ConcepTesting to drive classroom instruction. Integrating Peer Instruction, ConcepTesting, and Classroom Response Technology in the classroom may increase student engagement and learning, increase student satisfaction, and improve student attendance (Hall, 2005; Judson, 2002; Mazur, 1997; and Sokoloff, 1997).

The ConcepTest method integrates Peer Instruction into a classroom activity using Classroom Response Technology (CRT) by using conceptual multiple choice questions. CRT may include a wide variety of methods including clickers, online polling, or a free resource for educators called [Plickers](#). These combined strategies may be successfully integrated within any K-12 or post-secondary educational classroom.

Plickers is an excellent formative assessment tool that may be used in the classroom at no cost. It is a comprehensive interactive classroom tool that enhances Peer Discussion and ConcepTesting. The Plickers program allows educators to establish classes where they may monitor, track, and provide prescriptions based on the collected data of students. The program may facilitate up to 63 students who may participate within a Plickers session. The only equipment needed is a computer, a projection device, and smart phone or tablet. Plickers cards come in different sizes and may be printed from <https://plickers.com/cards>.

Bloom's taxonomy should be considered when developing multiple choice questions for use in the ConcepTesting method. The focus of Bloom's should include Higher Order Thinking Skills (HOTS). Typically, polling students using multiple choice questions generally involves using the knowledge level of Bloom's Taxonomy which is considered to be Lower Order Thinking Skills (LOTS). During the developmental stages of the conceptual model, lower order

thinking skills should be avoided. Focusing on the higher order thinking skills during the developmental stages of this strategy should be the goal of this process. Combining Peer Instruction, ConcepTesting, and CRT (using Plickers), in the correct manner, will move this activity in the direction of Higher Order Thinking Skills. Included below, are four recommended steps to be successful for using this process.

This strategy may be described using the following steps-

Step 1: Assign concept related homework to the students prior to the topic being discussed in the classroom. This may be accomplished by using the traditional means or by using a [Flipped Classroom](#) strategy.

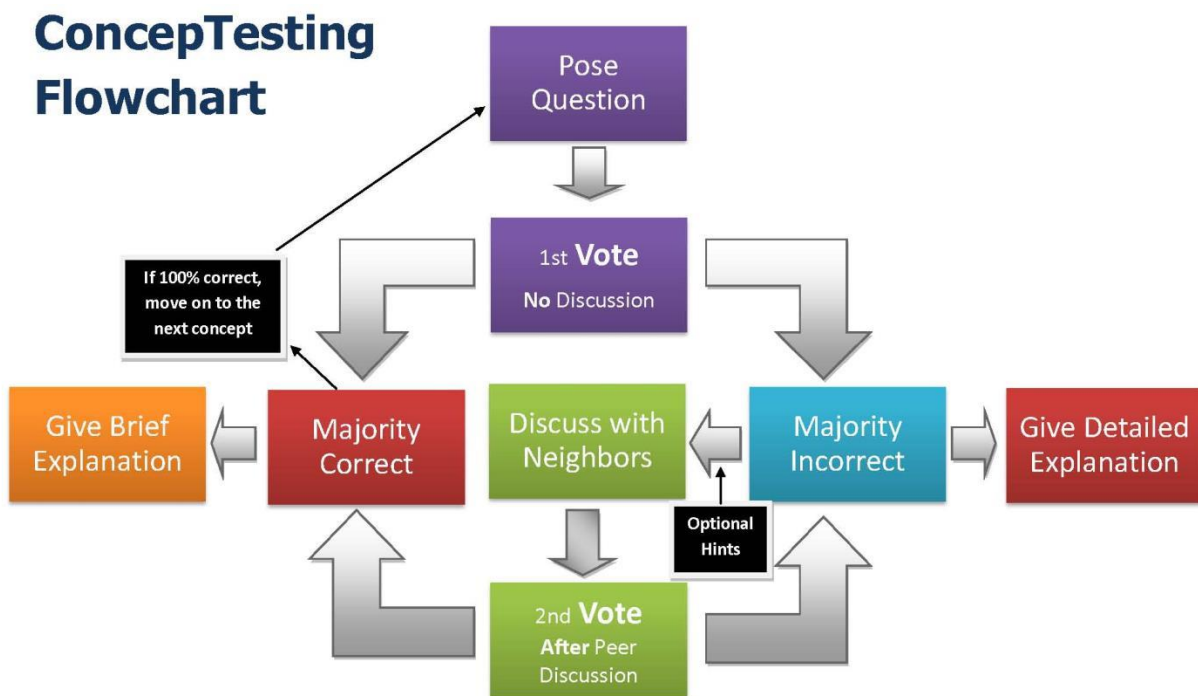
Step 2: The second step involves posing a single conceptual question to the students. During the introduction of the classroom lesson, and prior to any discussion about the topic, pose a concept related question to the class and allow the students to vote. Initially, students should analyze the question working alone with no peer discussion. Step 4 includes students having open discussions with other students; however, this type of discussion should not be allowed during Step 2. The question may be posed using any type of Classroom Response Technology such as clickers, other online polling websites, or the best choice [Plickers](#). Again, it is important to remember that no discussion is allowed during or prior to the first vote. Allow 1-3 minute(s) for the students to respond to the question without any discussion.

As a side note and based on the polling results from the questions, it may be easy to determine which students have completed their homework assignment as described in Step 1. This may be accomplished by looking at the students' scores, from collected Plickers responses, which should provide the educator with the ability to identify those students who are actually completing assigned homework as described in Step 1. Reviewing these data may also provide the educator with the ability to identify students who may be struggling.

Step 3: After posing the question to the class using CRT. Tally the *1st No Discussion Vote* responses and calculate the results; Plickers will provide immediate access to these data. It is extremely important not to display or share the correct answer. If more that 90% or a

higher percentage of the students have answered correctly, provide a brief explanation and move to the next question. The 90% mark is only a suggestion; the facilitator may choose to increase the percentage of this benchmark, especially if it is a high-stakes concept.

Step 4: If the responses are less than 90% correct, allow the students to openly discuss and analyze the question with their neighbors. The educator’s role is that of facilitator, he/she monitors the discussions to insure that the students stay on task, and he/she may provide hints to the participants. After the Peer Discussion session, open the voting for a second time and allow the students to vote. Allow enough time for the students to resolve their answers and provide them with the opportunity to change their answer if needed. This may occur a few times during the actual discussion phase. If the *2nd Vote after Peer Discussion* tally vote is less than 100%, you may repeat the process, provide activities, or give a detailed explanation of the concept. This may also provide students with the opportunity to present to the class on how they came up with the correct answer.



To be successful, it is essential to follow each of the 4 steps to the letter. Deviations from these 4 Steps may move HOTS back into the direction of LOTS which may not be the desired

outcome. It may seem like this strategy requires more classroom time; however, the benefits far outweigh the loss of classroom time. Another inconsequential benefit for using this strategy is that it may provide students with the opportunity to observe the thinking strategies of other students and how they derive the answers to questions.

The article, *Why Use Concept Tests?*, discusses seven principles involved with using this strategy. The benefits discussed in this article include: encourages student-faculty contact; encourages cooperation among students; encourages active learning; encourages prompt feedback; encourages time on task; and encourages respect for diverse talents and ways of learning (McConnell, 2017). These seven principles support the use of this strategy within any classroom setting.

In addition, it is important not to single out students when tallying votes while using CRT. Only the group responses should be displayed for each of the questions. Individual responses should only be shared with the individual student.

References

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