Cline, Kelly S., “Classroom Voting in Mathematics,” *The Mathematics Teacher*, v.100, n.2 (September, 2006).

**Categories:** student-centered learning, active-learning, collaboration, mathematics

**Summary**

This article offers a simple, straightforward approach to making college math courses more engaging and student-centered. Recognizing that most students expect math courses to involve little more than passive learning, the author begins the article by posing the question of how to break this paradigm and employ the type of active learning techniques that research shows to be most effective in developing student understanding. One solution, according to Cline, is the application of a technique he refers to as classroom voting.

Classroom voting in mathematics courses is a multistep approach to learning that actively engages students in the process of learning mathematical concepts. In the first step of the process, the instructor poses a problem in a multiple choice or true/false format. The students are given a brief period (the author suggests two minutes) in which they may consider the problem and then discuss their solutions with a partner or in groups. When the allotted time period has ended, students are asked to vote for their answer choice. This voting can be accomplished in a variety of ways ranging from the use of color-coded index cards to a number of electronic systems, the latter of which allows for fuller incorporation of technology in the classroom as well as the use of visual representations of immediately tabulated data. After the students have registered their votes, the instructor then has several options: he or she may ask students to explain their reasoning for picking particular solutions; the instructor might open a general class discussion of the concepts involved; or, the professor might review the concepts involved in order to clarify any misunderstandings about the principles at work or their application.

The utility of classroom voting is best achieved, according to the author, through the use of question formats such as multiple-choice and true/false that force students to arrive at a limited set of possible solutions. These approaches work best because they simplify and streamline the voting process. Equally important, the use of these formats allows for the engineering of problems in a manner that will likely elicit predictable (and therefore more readily remediable) errors based common misunderstandings of the elements at play in the given questions. Further, utilizing these formats allows for more efficient scaffolding of questions from foundational to complex applications of the underlying concepts.

According to Cline, the use of classroom voting in mathematics courses has several advantages. First, and perhaps most importantly, the technique requires that all students are actively engaged in class sessions. This ensures that students are gaining fuller/more effective learning rather than simply passively receiving information. Moreover, the active learning aspect of the method is achieved through multiple modalities, as students as asked not only to think through problems on their own and critical examine and explain their reasoning, but also work collaboratively and thereby learn from each other. Another advantage of classroom voting is that it provides immediate feedback for both the students and the instructor. In this sense, professors have the opportunity to assess their students’ understanding of a given concept in real time and address any problems before students leave the classroom. Students
also receive feedback from both their peers and the instructor and can therefore learn how to remedy any weaknesses before they asked to replicate the work on any subsequent scored assessments. Finally, classroom voting promotes active engagement by all students, rather than just the few who may be willing to engage in discussion in a more traditional context, and does so in “fun” manner that helps spur student motivation.

Cline concludes the article by discussing some of the potential difficulties, for both students and instructors, inherent in the usage of the technique. From the standpoint of the instructor, employing classroom voting requires a willingness to surrender some sense of control over the classroom. For students, the problems encountered more directly relate to their preconceived notions of how mathematics course are supposed to operate. In other words, use of classroom voting may challenge students’ expectations that in a math class they are supposed to passively listen to and receive information. Given these expectations, the author suggests that use of classroom voting should be preceded by the instructor explaining the purpose or rationale behind the use of the method. Once these reservations are addressed and overcome, notes Cline, classroom voting can have a markedly positive impact on student performance and understanding in mathematics courses.

Applications

This article presents a readily applicable technique for improving student engagement in a wide range of courses. Though the article focuses on the use of classroom voting in mathematics courses, it could easily be adapted to almost any imaginable content area, especially those in which relevant concepts build upon each other. This seems particularly true given the potential to apply multiple iterations of the technique in one class session. One could, in fact, easily imagine broadening the parameters of the technique to allow its application in less formally structured content areas, such as the humanities. Indeed, as long as one could develop questions in a multiple choice format, the technique could be used to build and assess students’ knowledge and understanding of a broad array of concepts, whether abstract or concrete in nature.

Citations of Interest


Norwood, Karen S. "The Effects of the Use of Problem Solving and Cooperative Learning on the Mathematics Achievement of Underprepared College Freshmen." PRIMUS 5 (June 1995): 229-52