

Ensure Students Are Learning: Faculty Descriptions of Innovative Teaching Practices

Math Class Flowing With Creativity and Experimentation

Innovative Teaching Practice Description:

In this instructor's calculus classroom, learning is loud, chaotic, collaborative, and experiential. Students engage with content using their own sense-making processes through a problem-based curriculum. In this class activity, students develop an intuitive understanding of derivatives while reviewing functions.

Since group work is a daily occurrence, student desks are oriented toward each other in small groups of four. By facing their peers, students are physically prompted to collaborate.

Before introducing the activity, the instructor gives students a worksheet reviewing functions and graphs. As students complete the worksheet, the instructor circulates, answering questions and addressing misconceptions. This assignment helps students review the material and ensures that each is prepared to engage with the activity.

After collecting the worksheets, the instructor displays a graph exhibiting the changing height of water as it is poured into an unknown container at a constant rate over a given amount of time. Students must work together to design a 3D printed model of the container needed to re-create the water behavior demonstrated on the graph. Students are given written instructions to reference in addition to the instructor's verbal directions.

The instructor gives students space to discuss possible solutions. As he circulates, he monitors group collaboration, redirects off-task students, and offers guidance to teams when needed. Before proceeding to the 3D printing stage, groups must reach a unanimous agreement on their container design. In classrooms without access to 3D printers, teams can use clay to craft their models. After printing their container, students test their design by observing the water's behavior as it is poured. Although this activity is ungraded, the instructor notes that students are actively engaged when they settle disagreements, critique ideas, and practically apply their knowledge to solve the problem.