

Speaker:

Name: JEFF IRVINE

Institution: BROCK UNIVERSITY

Email: jirvine2@brocku.ca

Position: PhD student

Title: Problem Solving as Motivation in Mathematics: Just in Time Teaching

Intended Audience: (please choose)

Type of Presentation

Preferred: Short Presentation (less than 20 minutes)

Description:

Students work on a problem involving profit maximization for the school store. What mathematics concepts are they learning? Why don't they ask "When are we ever going to use this sir?" Problem solving is a central feature of mathematics (Schoenfeld, 1992). Real-world problems have the potential to increase motivation and engagement (Lee, 2012), provided that they are perceived by students to have value. Schoenfeld (1992) identifies the following goals of problem solving activities on mathematics: to train students to think creatively; to prepare students for problems competitions; to teach preservice teachers heuristic strategies; to provide a new approach to remedial mathematics; for students to learn standard techniques, such as mathematical modeling. (Schoenfeld, 1992). The case study described in this paper has, as its focus, the last of these, namely, for students to learn standard techniques, such as mathematical modeling. Problem solving is used as a natural motivational tool for engaging students in mathematics. In the case, ancillary benefits include thinking critically and creatively, and some heuristics and approaches typical to mathematics. These included heuristics such as similar but simpler, counter example, make a diagram, look at special cases, and so on. In this case study, a problem was considered real-world if it had one or more of the following attributes: students could use the mathematics immediately, for example, in their part time jobs, budgeting, or sports; students could use the mathematics in another subject in the near term, such as in science, geography, technical shops, family studies; someone close to the student could or did use the math content, such as a family member, relative, adult acquaintance; there were examples in the real world of people using the mathematics; the mathematics flowed from an investigation, experiment, or model in which the students were involved.

Every class started with a problem. When students needed additional mathematics to continue with the problem's solution, teachers engaged in "just in time teaching", providing students with the skill or concept needed to continue. Thus, there was natural motivation for learning the mathematics necessary to solve the problem.

The research question was: How can problem solving be used to support and enhance student engagement, intrinsic motivation, attitudes towards learning, and achievement?

Based on results from the case study, there was support for effects on student engagement and intrinsic motivation, but insufficient data to support effects on achievement. The lack of data was due to this being an ex post facto study, and much data had been lost over time.

This program foreshadowed by over a decade the move to a problem solving focus in mathematics education. It was a lighthouse program that was not without its detractors, since it was, at the time, very different than the traditional mathematics classroom. The brainchild of an aeronautical engineer turned teacher, this innovative program fostered new ways of considering the teaching of mathematics, and molded a team of teachers into a cohesive unit whose mission was to motivate students to learn.