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Product vs process: problem solving as a year one activity.

There are two important strands to mathematical activity. The use of routine techniques (such as calculus), and problem solving. Many university mathematics courses in early years concentrate on the systematic use of routine techniques. In this talk I describe my experience of running a problem solving class for six years. The goal of this course was not to teach specific content, such as calculus, but to give students a direct experiences of the process of mathematical discovery. Based on the Socratic method, the fundamental point of the course was for students to solve problems themselves; to present their solutions to their peers; and to criticize the solutions of others. The course had three 50 min sessions per week, and for the content I chose problems in elementary geometry. The subject matter is less important than giving students interesting problems, expecting them to take responsibility and providing students with an opportunity to re-submit and improve their work. The experience of this course was mostly positive, robust to a variety of different problem sets and with a range of colleagues. The obvious difficulty is that the staff time required scales linearly with student numbers in a way which does not occur with large lectures. Hence, these courses are expensive in staff time. My conclusion is not that we can't afford to teach students in this way, but that we can't afford not to teach at least one early course in this way.