COMPUTER SIMULATIONS IN MATHEMATICS EDUCATION

Ronit Hoffmann
Kibbutzim College of Education, Israel

Many educators agree that a more extensive use of computers in school in general, and in mathematical education in particular, is desirable. The NCTM standards (1989) recommended this over 10 years ago.

In this presentation, I will present a teaching module (Hoffmann, 1996), meant for teachers intending to teach in the higher grades of elementary school and/or the upper grades in high-school.

To demonstrate the teaching module I will describe **The Monte Carlo simulation for area approximation,** focusing on **the computation of the area of a unit circle** (a topic taught in the 6th grade in Israel), which leads to the approximation of the number π. (Hoffmann, 2000). The term "Monte Carlo method" is general in nature. It refers to numerical methods based on probabilistic or randomized algorithms, which use elementary statistical methods, allowing rapid approximate solutions for problems for which computational solutions are either not known or are inefficient (Harel, 1992). Monte Carlo methods are used in various fields of computational science: economics, statistics, nuclear physics, chemistry, biology, mathematics, and the like.

In my talk I will show how modern day technology enables embedding this topic within the school curriculum. I will review our experience in teaching the topic to a variety of populations in teacher education. The following data will be presented : (a) algorithms written by students; (b) the numerical output received using the Excel spreadsheet; (c) a mathematical graphic presentation of the convergence to the approximate area; (d) a visual presentation clarifying the process as a whole; (e) the "Buffon`s needle" simulation (Breuer & Zwas, 1993); (f) some simulations in basic probability.

The students in all the classes engaged in this module with great enthusiasm and interest. The topic created opportunities to discuss important mathematical concepts such as: area; probability; the use of simulation; approximations. In addition, the students were introduced to yet another facet of computer use in mathematics, and were lead to experience mathematical studies from a new perspective.

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