The d’Arbeloff Interactive Mathematics Project

Mathematics is the language of science and engineering. Our goal is to help our students become fluent in it. We want them to know how to frame questions mathematically and to recognize when and how to apply mathematical skills and techniques to the problems they face at MIT and in their subsequent careers.

The d’Arbeloff Interactive Mathematics Project aims to reach its goal using several mechanisms, each of which represents a form of interactivity.

- We are initiating a change in the culture of classroom education in the Mathematics Department, introducing a variety of active learning and just-in-time teaching methods into freshman and sophomore level lectures, as well as computer based lecture demonstrations.

- We are tightening the connection between lecture and recitation by moving towards a system of explicitly given problems designed to foster group work. We are developing protocols and training procedures to help recitation leaders use these new methods.

- We are constructing a wide variety of computer manipulatives, often simulating instances of general concepts in applications and inviting active involvement by the student in controlling parameters. These simulations will form the basis for homework assignments, enforcing students’ interaction with this material.

- We are creating a variety of computer based courses and tutorials, incorporating text, video, manipulatives, and corrected problems. These tutorials will serve a number of distinct purposes, providing support for students in mathematics classes, remediation for students in need, and reference material to which faculty from across MIT can refer students for re-learning mathematics material as needed.

- We are increasing the transparency of basic Mathematics Department courses. Transfer is a two-step process, and these measures will make it much easier for down-stream courses to bring students back to fluency with this material.

All the components of this project are under development, and some results can be found at http://www-math.mit.edu/daimp. Much of this material has been used in courses over the past two years. We are actively engaged in a program of formative assessment of various components of this project.