# Richard J. Daley College

FY 1999 Exemplary Initiative in the Classroom - National Council of Instructional Administrators.

The Keystone Project of the Department of Mathematics is an innovatate approach to improving the teaching of mathematics. The award was presented by the National Council of Instructional Administrators at the National Meeting of the American Association of Community Colleges on April 8, 1999 in Nasville, Tennessee.
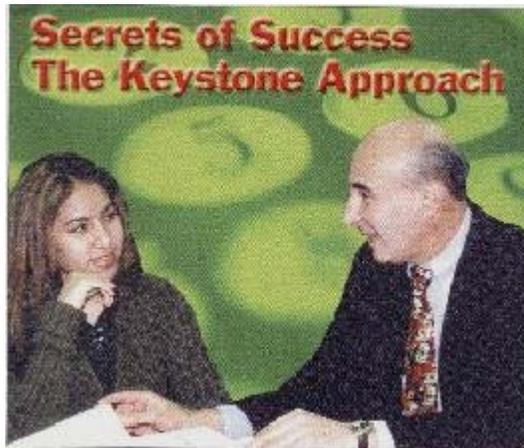
Congratulations!

to Project leaders Dr. M. Vali Siadat , Chairman of the Department of Mathematics and Professor of Mathematics and Mr. Paul Musial , Instructor of Mathematics.

Mathematics: Keystone to Student Learning

Have you noticed...how people with talent for the calculation are naturally quick at learning almost any other subject; and how a training in it makes slow mind quicker...?

Plato, The Republic

The Keystone Project at Daley College improves student performance in remedial mathematics. Developed as a research project by faculty at Daley College and the University of Illinois at Chicago, this project has developed a new teaching approach, utilizing psychological research, technology, and responsive/adaptive teaching techniques. The result has been dramatically improved student retention and success in introductory and college algebra classes. In addition, students in these classes -- in accord with Plato's observation -- perform surprisingly better in other subjects as well.

Why do students perform poorly in mathematics and others subjects? The problem does not appear to be lack of intelligence or the desire to succeed. Rather, they are held back by other factors and limitations leading to behavior patterns which inhibit learning. The Keystone Project addresses these factors in the following ways: a) to increase student's attention spans, the instructor administers time-pressured quizzes which require the student's full concentration; b) to encourage students to do homework, the instructor rewards students for success in homework-based quizzes; c) to address short-time horizons, the instructor presents students with frequent deadlines within those horizons; d) to help

students learn from mistakes, instructors provide immediate feedback and repeat "problem" questions on the follow-up quizzes; e) to combat passivity, the instructor brings students together for group work which promotes cooperation and peer tutoring; f) to address poor attendance, instructors issue administrative drops to students after three absences; students may petition to be reinstated, but reinstated students are not allowed additional absences; g) to address low self-esteem, instructors give well-defined tasks, the tools required to carry them out, quick feedback, and repeated success when the student achieves mastery; h) to teach students to listen, instructors provide a consistent code of behavior in the classroom, and provide repeated evidence that following instructions produces success.

Keystone classes are compared with control classes. Retention is somewhat improved: 81% in Keystone classes compared with 77% in the controls. This modest improvement becomes significant, however, given that Keystone students have to work hard and know they are being graded on an absolute scale. By mid-term, students have clear message of their performance. Yet even among those not doing passing work, many chose to remain in the class. As for achievement in the mathematics, during the control experiment involving 800 students, 65% of Keystone students passed the Elements of Algebra class compared with 18% in the control group. Longer term studies suggest that students also improve their ability to concentrate. Scores in reading comprehension for Keystone students based on pre- and post testing show a remarkable 12.3% increase compared with a decline in scores for the students in control classes. The best explanation of this increase is that as Plato suggested more than 2000 years ago, mathematics can indeed become a "keystone" to learning.

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