

Standing: Roozbeh Vakil, left, and Bishnu Naraine facilitate “structured conversation” during a Feb. 8 study session for Math 330 students, including Nicole Vermager and Jeremy Miller, seated.



## Adventures in college learning

**E**leven College of Science and Engineering faculty share a special sense of adventure as spring semester 2007 is underway. These faculty were granted funding through the Initiative to Promote Excellence in Student Learning (IPESL – see box or sidebar) to implement projects designed to promote learning.

### Mathematics

“I am so excited to see this opportunity open up to us,” said Roozbeh Vakil, associate professor of mathematics. He and Bishnu Naraine, professor of mathematics education, in collaboration with Fatemeh Zarghami, associate professor of child and family studies, and Kimberly Schulze, professor of community psychology, are the creators of “Using Study Sessions in Conjunction with Regular Classes to Promote Effective Study Habits.”

The semester-long project is being implemented among a group of 20 students enrolled in Math 330: Mathematics for Elementary Teachers. The project is rooted in the belief that mathematics consists of thoughts and ideas individuals and groups have constructed and that the students, working in groups of four, can and should do the same.

Such an approach – which Vakil has used in teaching college-level math elsewhere – can help change learners’ attitudes, beliefs and habits, which can lead to liking math and to “confidence in professional life” – something he considers akin to happiness.

“Disliking math is highly contagious,” Vakil said.

A dislike for math is entirely too prevalent among today’s students, he said, adding that such dislikes often originate in elementary school and elementary teachers, unfortunately, are one source of the contagion.

Many elementary teachers “seriously lack confidence in teaching math and science,” Vakil said, referring specifically to concerns expressed by superintendents of three St. Cloud-area school districts during an April 2006 Science/Math Education Partnership meeting. This lack of confidence is often translated

ed by their students into the belief that only persons endowed with certain rare learning abilities can learn math – a belief Vakil disputes.

“Math is not just for the elite. Anyone can learn math,” he said.

“Learning is a social activity,” Vakil said, and project assignments require students to communicate regularly and frequently. This communication is facilitated by a process called “structured conversation,” described by Vakil as a form of Polya’s heuristic problem-solving blended with Socratic-like questioning.

“The students seemed to like it very much,” Vakil said of his previous experience with the cooperative learning approach used in the project.

### Chemistry

Every year, approximately 2,000 St. Cloud State University students take introductory chemistry courses – some on campus and some online in “virtual” chemistry classrooms. But far too many of today’s students lack the background necessary to progress satisfactorily in these courses, say chemistry professors Lakshmaiah Sreerama and Mohammad Mahroof-Tahir.

“About 50 percent really struggle,” Sreerama said.

This means approximately 1,000 students need a lot of tutoring help each year, he added.

Addressing such a need effectively might require a small army of well-equipped tutors. Or, it might require just one well-designed, interactive online tutorial that can be accessed regularly or occasionally, according to a student’s needs.

A virtual tutor for chemistry that has the potential of “reaching every student possible” has long been a dream of theirs, Sreerama and Mahroof-Tahir said, but they lacked the opportunity to create and launch it. So, when they learned of the IPESL opportunity, they decided to try to make the dream reality.

From left, Lakshmaiah Sreerama, Austin Pitcher, Karin Duncan and Mohammad Mahroof-Tahir share ideas Feb. 14 about developing interactive chemistry labs students can do at home or online via Desire-2-Learn. Pitcher is a chemistry student.



## Initiative to Promote Excellence in Student Learning

The Initiative to Promote Excellence in Student Learning (IPESL) was created in 2005 when a portion of the higher education base budget approved by the Minnesota Legislature was dedicated to compensate faculty and staff for creating and implementing projects designed to improve learning in critical thinking, reading, writing, mathematics and science skills.

Expected to contribute significantly toward the achievement of student learning goals in the Minnesota State Colleges and Universities' (MnSCU) 2006-2010 Strategic Plan, the projects received notice of funding Oct. 31, 2006, and are to be completed by Sept. 30, 2007. All projects will be assessed, and a report on outcomes will subsequently be made by MnSCU to the Legislature.

Of the \$4 million dedicated to IPESL, just over \$315,000 was allocated to St. Cloud State University. Among the 12 IPESL proposals chosen by the university to receive the funding, eight were submitted by College of Science and Engineering faculty. Totalling more than \$130,000, the funding is fueling creative and innovative learning experiences in chemistry, mathematics, biological sciences and statistics.

For more information on the IPESL program, please go online to <http://ipesl.project.mnscu.edu/>

### COSE faculty with IPESL-funded projects

Gazal, O.	1) Redesigning the Pathophysiology Class – A Major Biology Capstone 2) Increasing Minority Participation in the Sciences, Technology, Engineering and Mathematics (STEM) Disciplines
Kvaal, C.	"Enhanced Podcast" Production for a Large Lecture Biology Class
Sreerama, L., Mahroof-Tahir, M.	Increase Student Learning, Promote Student Retention and Provide Flexible Learning Environment in Introductory Chemistry Courses
Robinson, D.	Integrating Writing in Lower Division Statistics
Minger, M., Simpson, P.	Science Content Self-Study Modules and Weekly Study Sessions for Elementary and Middle School Pre-Service Teachers
Vakil, R., Naraine, B.	Using Study-Sessions in Conjunction with Regular Classes to Promote Effective Study Habit, in collaboration with Zarghami, F., Schulze, K
Nielsen, M., Braith, W.	Mathematics Skills Center Project Initiative

Their first step was to approach Karin Duncan, a member of St. Cloud State University's Web team, about collaborating with them.

"We had the expertise in creating the content," Sreerama said.

But Duncan had the expertise to create the Web pages, which are based on the existing Desire-2-Learn online framework already familiar to the university's students and teachers.

"The biggest thing was to incorporate interactive elements," Sreerama said, adding that he and Mahroof-Tahir share the belief that, in recent years, learners have changed the way they learn and that the instant feedback of interactive elements seems to have a positive effect on today's learners.

Mahroof-Tahir said studies have shown that online tutorials do facilitate learning, and that despite the novelty of this approach at St. Cloud State, "we are not re-inventing the wheel."

The Chemistry Department began making courses available online in 2004, and the response to that availability has fostered these professors' interest in expanding the boundaries of what already exists online.

"Our experience has been that students are willing to try it," Sreerama said of the popular online approach.

The IPESL funding they were awarded also gave the professors the opportunity to offer at-home chemistry labs to complement the online courses.

"These labs can be done using ordinary household chemicals," Sreerama said.

Mahroof-Tahir and Sreerama say they cannot predict the success of the online tutorial and laboratory project. However, they "have been pleasantly surprised" at the outcomes of the online approach they have used thus far, Sreerama said.

"This seems to somehow work," he added.