

2005-2006 Mathematics and Science Strategic Initiatives

- I) Success in Math Strategic Goal:** Determine key characteristics of a successful developmental math student.
- A) Participants: David Keller, Joe Sedlacek, Kathy Davis, Kory Swart, John Weglarz, Olga Stephens, Diane Bean, Phil Koopman
 - B) The group completed research on placement procedures at the other 19 League schools that comprise the board of directors. We found a wide range of policies; some schools claim to enforce mandatory placement, many others left the final decision to the student. Some require placement test scores and/or transcripts, others only encourage it. In our judgment, Kirkwood's current policies are within the existing range of policies when compared to other League schools. We will continue to administer our pretest and common final exam in many of our developmental courses. John Weglarz, Joe Sedlacek, and David Keller have all compiled data to measure student performance at the beginning of the course and again with common questions on the final exam.
 - C) Joe Sedlacek and Diane Bean analyzed attendance data from previous semesters to determine if one month of attendance could accurately predict attendance for the entire semester. They determined we need to encourage faculty to keep accurate attendance records for the entire semester as no part of the semester adequately modeled the entire semester.
 - D) David Keller will study methods to enhance current placement strategies and improve student success with the support of an endowed faculty chair next year.
- II) Biology Readiness Strategic Goal:** Increase the success rate of students in College Biology I.
- A) Participants: Brenda Clark, Gary Donnermeyer, Barbara Harvey, Jill Scott
 - B) The participants in the project met with Rich Edwards to design a Perception exam to be given to students enrolling in College Biology I for Majors. The exam will determine if students have the basic knowledge expected for an entry-level majors course.
 - C) Team members were assigned topics for which they generated test questions. They met to review and amend the questions, entered them into the Perception Word Template, and forwarded them to Rich Edwards who created the final test bank.
 - D) All 109 test bank questions were administered to students enrolled in Biology I during the first full week of the Fall 2006 semester. Difficulty values will be analyzed for each question to identify outliers that may need to be amended, deleted, or substituted.
 - E) The test format will then be modified to generate approx. 40 randomized questions. This format will be given to all students enrolled in Biology I for the Spring 2007 semester.
 - F) Analysis of data collected in the 2006-2007 academic year will determine recommended cut scores for entry into College Biology I for Majors.
- III) Inquiry Learning Strategic Goal:** Provide opportunities for faculty development in Inquiry Learning.
- A) Participants: Jill Johnson, Mike Lyons, Susan Harthun, Fred Ochs, Zlatko Anguelov, Nick Sagan, Jeanelle Boyer
 - B) The group is interested in the inquiry learning method of teaching science, and how inquiry can be incorporated into our classrooms. We found that there is a large body of literature on inquiry learning, including a booklet of standards for science inquiry learning by the National Research Council (<http://www.nap.edu/catalog/9596.html>). There are also supporting websites of specific techniques (<http://www.pogil.org/>, <http://www.inquiry.uiuc.edu/index.php>) Inquiry learning covers a broad range of pedagogy, from case-study inquiry, and open-ended problem solving, to process-oriented and guided inquiry. The main difficulty we found as we explored these techniques was the ability to assess content-specific learning goals within a course. Guided inquiry seems to be the best approach towards addressing this concern.
 - C) Nick Sagan, Fred Ochs, and Mike Lyons found there can be institutional support within Kirkwood CC for instructors interested in pursuing these techniques for their classroom.
 - D) Mike Lyons has begun incorporating inquiry learning into his classroom.
 - E) Fred Ochs attended two meetings outside of Kirkwood about inquiry learning, and presented the material from those meetings to interested faculty.

- IV) Biotechnology Strategic Goal:** Revitalize established curriculum in Biotechnology with appropriate acquisition of instrumentation and training.
- A) Participants: Jerry Bolton (Ag), Arlin Karsten (Ag), Brian Kreutner (Ag), Jeanelle Boyer, Joe Christopher, Bob Driggs, Cynthia Fabor, David Keller, Amy Rehnstrom, Jill Scott, Cate Sheller, Lisa Sweeney. Greg Peterson joined the group this fall.
- B) The major accomplishments include:
- 1) Recruiting a talented group of faculty from two departments to work on the project.
 - 2) Developing four Applied Science and two Arts and Science Biotechnology Options.
 - 3) Receiving positive feedback from area high school, college, industry, and Department of Education representatives at the BioScience Focus Group Meeting.
 - 4) Sending eight faculty members or administrators to visit existing programs, or to biotechnology-related conferences.
 - 5) Applying for and receiving an additional mini-grant from the Department of Education to fund additional discussions with area high schools for the future development of Biotechnology Career Edge Academies.
 - 6) Developing program competencies.
 - 7) Developing equipment and supply lists.
 - 8) Hiring a Biotechnology Instructor/Coordinator.
- V) Electrical Science Strategic Goal:** Redevelop Introduction to Electrical Science to include a greatly enhanced laboratory experience.
- A) Participants: John Elliff, Mick Arnett, Mario Meza, Shane Schiltz
- B) The curriculum was redesigned and implemented for Spring, 2006.
- VI) STEP Grant Strategic Goal:** Increase the number of successful STEM graduates.
- A) Participants: Dave Bunting, Susan Ludwig, Gary Donnermeyer, Bob Driggs, and faculty from the University of Iowa, the Cedar Rapids/Iowa City metro high schools, and several high schools in rural school districts.
- B) A variety of strategies have been implemented to assure that the goal will be reached. Broadly defined, the strategies can be grouped into five domains: 1) management, 2) recruitment of students to the STEM disciplines, 3) creating well-defined, articulated STEM pathways, 4) support for students making the journey, and 5) dissemination of the results.
- C) The major accomplishments include:
- 1) Enrolling 1300 STEM majors at Kirkwood in the 2004-2005 academic year.
 - 2) Graduating ninety four (94) and transferring an additional thirty one (31) STEM majors in the 2004-2005 academic year.
 - 3) Supporting five (5) metro high schools as plans were implemented to increase the number of students who become STEM majors in college.
 - 4) Recruiting an additional six (6) rural schools to begin their planning of strategies to increase the number of students who major in STEM disciplines in college. (the funds for this project extension came from the Grow Iowa Values Fund).
 - (a) Recruiting nineteen (19) high school students into the Summer Bridge Program.
 - (b) Enrolling forty seven (47) students in the NSF Technology Seminar.
 - (c) Creating enriched STEM academic and career awareness experiences for three thousand seven hundred and twelve (3712) metro high school students.
 - (d) Providing direct STEM workplace learning experiences for sixteen (16) high school teachers, four (4) college faculty, and thirty five (35) Kirkwood students.
 - (e) Recruiting thirty five (35) high school teachers, counselors and administrators for STEM Professional Development Workshops.
 - (f) Developing STEM career pathways in five (5) metro schools.
 - (g) Developing nineteen (19) Kirkwood STEM programs of study that will lead to formal program articulations with area colleges and universities.

VII) Scholarship Strategic Goal:

Provide monetary and academic support for STEM majors.

- A) Participants: Pat Matthes, Jody Donaldson, Debbie Mrkvicka, David Keller, Mary Lou Erlacher, Bob Driggs
- B) Faculty contributions to the Erv Poduska Scholarship have continued.
- C) NSF Technology Scholars Program
 - 1) Thirty five students received scholarships of up to \$3124, with a total distributed being \$91,268
 - 2) All students had demonstrated financial need, had GPAs that indicated successful completion of CSEM coursework, met residency requirements, and had the appropriate major.
 - 3) All students were enrolled in the NSF Technology Seminar where they engaged in processes that have been shown to increase persistence to a CSEM degree.
 - 4) The students have been very pleased with the support the NSF Technology Program has given them.
 - 5) All fiscal and monitoring responsibilities have been met.
 - 6) We got an extension from NSF to use unexpended funds for the NSF Technology Scholarship Program. We have invited 25 students to participate in the program. Students are supported with a scholarship up to \$3125; and by their participation in the NSF Technology Seminar.
- D) NSF STEM Scholarship Program
 - 1) Thirteen (13) students were awarded STEM scholarships of up to \$1000.
 - 2) Twelve (12) students have been invited into the STEP Scholarship Program for Fall, 2006. Students are supported with a scholarship of \$1000; and by their participation in the NSF Technology Seminar.
- E) NSF S-STEM Scholarship Program
 - 1) An application was submitted and funded by NSF in April for another \$500,000 to fund scholarships for STEM majors over four years.
 - 2) If funded, the grant will provide about \$109,000 each year for student scholarships in the STEM disciplines.