

NSF ATE DUE 0603308
Biotechnology Curriculum Development and Dissemination Project
Goals and Activities Report
Project Year 2 (July 1, 2007 – June 30, 2008)

Goal 1: Develop courses to expand life and agriculture sciences that will provide students with a unique opportunity to utilize scientific discovery procedures to understand modern animal genome biotechnology

Project Year 1 Reported:

- Course development: two courses have been developed and will be piloted fall 2007 term: “*Introduction to Bioscience*” which is a five-credit science course at State Fair Community College, and a four-credit science course at Iowa Lakes Community College and Northeast Iowa Community College. “*Introduction to Ethics*” has been enhanced through utilization of emerging biology and agriculture-based case studies and current events.
- A third course, *Introduction to Bioscience II*, has been developed and will be piloted at State Fair Community College and Iowa Lakes Community College spring 2008 term.
- Integration of the courses varies by partner community colleges.
 - Iowa Lakes piloted the *Introduction to Ethics* course spring 2007 term.
 - Iowa Lakes and Northeast Iowa Community College plans to pilot the *Introduction to Bioscience* course fall 2007 term.
 - State Fair Community College will pilot the *Introduction to Biotechnology I* course fall 2007 term and *Introduction to Biotechnology II* course spring 2008.
 - Southeastern Community College will integrate elements of the course into existing curriculum, as documented by syllabus and course activities outlined and submitted to the project administrative team for inclusion in project year two report.

Baseline project data by term (fall 2006, spring 2007) has been identified at each partner college, and potential partner high school. Data will be analyzed and added to project year one reports by July 31, 2007.

Project Year 2:

- Science laboratory improvements for all four (4) community college partners have been completed.
- Integration of the new courses varies by partner community colleges.
 - Iowa Lakes continues to offer the *Introduction to Ethics* course with growing enrollments. Spring 2007 four (4) enrollments (2 male, 2 female), summer 2007 ten (10) students enrolled (10 female: 3 Iowa Lakes students, 4 Iowa State University students, 1 Briar Cliff University student, and 2 University of Northern Iowa students), fall 2007 nine (9) enrollments (5 female and 4 male).
 - Iowa Lakes and Northeast Iowa Community College piloted the *Introduction to Bioscience* course fall 2007 term. Enrollments in the piloted transfer course: six (6) at Iowa Lakes Community College (evening course, adjunct faculty) and forty (40) students at Northeast Iowa Community College (NICC) (day course, team taught by full-time faculty). Mean course GPA at Northeast Iowa Community College was 2.7. Nine (9) of the students enrolled in the fall 2007 NICC course were PY1 cohort students.

- Iowa Lakes Community College (ILCC) instructors have also incorporated the laboratory equipment provided by the project to include DNA fingerprinting labs into both the *Forensic Chemistry* and *College Chemistry II* courses.
- Iowa Lakes Community College (ILCC) instructors have also incorporated the laboratory equipment provided by the project to include PCR labs into the *Forensic Chemistry*, *General Chemistry*, *Organic Chemistry* and *College Chemistry II* courses. (*Spring 2008 enrollments: 41 students*).
- NICC has infused new labs into *General Biology I and II*, *Microbiology*, and *Human Anatomy and Physiology* courses. These new lab experience are affecting over a hundred students each semester, with more enrollments anticipated. *Introduction to Bioscience Technology* is being integrated into several agriculture-based curricula. These changes are currently in committee and should be approved and effective 2009. NICC faculty also plan to offer the *Intro to Bioscience Technology* course at the new Regional Area for Math and Science (RAMS) site in the Oelwein area. This biotech course will provide educational experiences that are too costly for K-12 districts to offer. The RAMS facility is under construction and will be operational fall 2008.
- Southeastern Community College (SCC) documented course adaptation and Biotechnology integration in three science courses (*BIO125*, *CHEM101*, *BIO123*). Enrollments in these courses totaled 57, students achieved course mean GPA for these courses: 3.5, 3.3 and 3.4 respectively.
- State Fair Community College has integrated biotechnology into several science transfer courses, including Chemistry and Biology. The “*Intro to Biotech*” course at State Fair was offered Fall 2007, but not held due to lack of enrollment. Spring 2008, the course was piloted with seven (7) students. The “*Intro to Biotech*” course meets the general education science with lab requirement and is transferable to all accredited colleges and universities in the state of Missouri for students completing an Associate in Arts degree.
- Revised syllabi reflect additional activities and content for student learning as a direct result of the science laboratory update. Copies of new syllabi are included in the project notebook, maintained at Iowa Lakes Community College.
- Course articulations with institutions of higher education for the “*Intro to Bioscience*” course have been secured with the University of Iowa, Iowa City, (*general education credit*), University of Northern Iowa, Cedar Falls, (*Biology general elective*), Buena Vista University, (*BIO 200-level elective*), and Northwest Missouri State University, Maryville (*Biology credit*).
- Baseline project data by term (fall 2006, spring 2007) has been identified at each partner college, and potential partner high school. 316 students have been identified for baseline cohort tracking purposes (*79 Ag science*, *68 Education transfer*, and *169 Life science transfer majors*). Each of the community college partners continue to struggle with relatively small numbers of ethnic minority student enrollments (PY1 Cohort: 2.8% ethnic minority enrollment). PY1 Cohort consists of 48% female and 52% male students.
 - Other Characteristics, PY1 Cohort: 31.7% of the students identified have taken one or more developmental courses. Preliminary student retention by term: Fall

2006 to Spring 2007: 91.1%, Fall 2006 to Fall 2007: 65.5%; Fall 2006 to Spring 2008: 47.5%. During summer 2008, further research will be conducted to look for potential common barriers for persistence in the ag, science and education programs to assess project disconnects in terms of academic rigor or potential instructor development topics. The National Student Clearinghouse will be checked to see if students transferred to another college. Degree or education goal attainment will also be investigated before the persistence numbers are finalized. Further assessment of gender, minority and academically under-prepared student persistence will be shared with Project Steering Committee (*June 2008*) and included in the follow-up evaluation report July 2008.

- Project Year 2 (PY2) Cohort (Fall 2007) has been identified by all partner community colleges. Preliminary data has been entered into project database. Analysis and outcomes measurements will be included in the updated project evaluation report completed by July 31, 2008. External evaluation process is scheduled to occur April and May 2008. Findings will be shared with Project Steering Committee during the Summer Summit, June 2008.

Goal 2: Encourage students to investigate career possibilities in the animal-biotech industry.

Project Year 1 Activities:

- Industry employment projection and wage surveys have been sent to biotechnology-related companies in Iowa, Minnesota, Missouri and South Dakota (target areas for partner colleges). Responses will be used to create a brochure outlining biotechnology career pathways. The brochure may be printed prior to the Summer Institute. A copy of the brochure will be uploaded to the project web site and included in the annual project report.
- Informational displays for college career fairs and summer 2007 orientations will include informational brochure identified previously.
- Iowa Lakes project faculty will present biotechnology career opportunities at a career fair (April 4, 2007) on the Emmetsburg campus (10th and 11th graders). An informational display will also be set up. 856 students are registered to attend the event. Students attending the career session will complete interest profile cards and event evaluation.
- In Iowa, rising 9th grade students draft a career pathway and register for high school courses. The informational brochure will be sent to area guidance counselors, which will help support student enrollment (and continued enrollment) in math and science.

Project Year 2 Activities:

- Industry employment projection and wage surveys have been sent out to biotechnology-related companies in Iowa, Minnesota, Missouri and South Dakota (target areas for partner colleges). Responses will be used to create a brochure outlining biotechnology career pathways. The brochure may be printed prior to the Summer Institute. A copy of the brochure will be uploaded to the project web site and included in the annual project report.
- Informational displays for college career fairs and summer 2007 summer orientations will include informational brochure identified previously.
- Project faculty will participate in the April 8, 2008 Career Day activities hosted on the Emmetsburg campus. It is anticipated nearly 1,000 students will attend this event.
- Iowa Lakes math education transfer students, Allison Walders and Sarah Clark, have organized a math/science competition in conjunction with the 2008 Career Day. As part of their Capstone Project, these students have developed career path displays for STEM transfer and technical academic programs.

- In Iowa, rising 9th grade students draft a career pathway and register for high school courses. The informational brochure will be sent to area guidance counselors, which will help support student enrollment (and continued enrollment) in math and science.
- High school superintendents/principals/guidance counselors in Clay, Dickinson, Emmet, Kossuth and Palto Alto counties have received print materials and information regarding career opportunities in Biotechnology during quarterly Tech Prep/Perkins consortium meetings.
- Tasida Fisher, Iowa Lakes science transfer student, completed a Research Undergraduate Experience Internship at Iowa State University, summer 2007. Ms. Fisher was selected by a panel of ISU professors and was supported with NSF ATE funds as an identified project activity. She completed a research project on the role of Asp181 in Itk Kinase Autophosphoryllation through Mutation.
- External evaluation process is scheduled to occur April and May 2008. Findings will be shared with Project Steering Committee during the Summer Summit, June 2008.

Goal 3: Provide professional development opportunity for secondary teachers and college faculty that will enable them to better instruct and advise students to explore life science careers.

Project Year 1 Activities:

- National Biology Teacher Association Conference, October 2006, Stacie Cornwall attended the conference and will present a session at the Summer Institute.
- National Science Foundation ATE PI Conference, October 2006, Neal Williamsen, Marvin Carlson, LaRoy Brandt, and Jolene Rogers attended the conference, project displays and student exhibits.
- Renewable Fuels Association National Conference, February 2007, Cal Christensen (*Agriculture Professor*) and David Peterson (*Biomass Energy Processing Program Coordinator*) attended the conference and will present a session at the Summer Institute.
- Summer Institute will be hosted on the Iowa Lakes Community College Emmetsburg Campus June 19-21, 2007. Thirty (30) [fourteen (14) secondary, fourteen (14) community college and two (2) university] agriculture and life science instructors attended.
- Introduction to Biotechnology instructor course was held on the Iowa Lakes Emmetsburg Campus June 18-20, 2007. Michael Zeller, Biotechnology Education Outreach Center Director taught this one credit, graduate-level course (*Participants: High school (1) and community college (6) instructors*).
- Advanced Biotechnology instructor course was held on Iowa Lakes Emmetsburg Campus June 20-22, 2007. Michael Zeller, Biotechnology Education Outreach Center Director taught this one credit, graduate-level course (*Participants: High school (2) and community college (6) instructors*).

Project Year 2 Activities:

- National Biology Teacher Association Conference, October 2007, Dr. Robert Klepper and Dr. LaRoy Brandt attended the conference and will present sessions at the 2008 Summer Institute.
- National Science Foundation ATE PI Conference, October 2007, Neal Williamsen, Dr. Robert Klepper and Dr. LaRoy Brandt attended the conference, project displays and student exhibits. The team also participated in the poster session, highlighting project DUE 0603308.
- Tasida Fisher, Iowa Lakes science transfer student, completed a Research Undergraduate Experience Internship at Iowa State University, summer 2007. Fisher will be a featured

presentation at the Iowa Academy of Science (*instructor conference*) April 11 and 12, 2008. She completed a research project on the role of Asp181 in Itk Kinase Autophosphorylation through Mutation.

- Web seminars: as of March 31, 2008, eight web seminars are scheduled and three have been completed. Topics/presenters include: “*Biotechnology: Bridging the gap from high school to community college*” Kacia Cain, Science Dept. Chair, East Des Moines High School; “*Cool things about DNA*” Michael Zeller, Biotechnology Outreach Education Coordinator, Iowa State University; and “*Genetic Engineering DNA*” Michael Zeller, Biotechnology Outreach Education Coordinator, Iowa State University. Scheduled: “*Forensic Chemistry*” and “*Assessing Student Outcomes*” Dr. Robert Klepper, Professor, Iowa Lakes Community College; “*Intro to Ethics – hybrid, case-based course implementation and resources*” Jolene Rogers, Adjunct Faculty, Iowa Lakes Community College; “*Embryo transfer*” Dr. Vince Collison, DVM; and “*Renewable Fuels Education*” David Peterson, Instructor, Iowa Lakes Community College. Participants have been entered into project data base. Follow-up session evaluations and implementation plans will be included in the final project year 2 evaluation, July 2008.
- External evaluation process is scheduled to occur April and May 2008. Findings will be shared with Project Steering Committee during the Summer Summit, June 2008. Advanced Biotechnology instructor course will be held on Iowa Lakes Emmetsburg Campus June 16-20, 2008. Michael Zeller, Biotechnology Education Outreach Center Director will teach this one credit, graduate-level course.
- Summer Institute is scheduled June 17-19, 2008 on the Emmetsburg campus. June 18 has been designated as “*Energy*” day. Sessions will be held on the Iowa Lakes Algona campus and instructors will tour industry sites to get further ideas for curriculum adaptation and laboratory implementation. Two distinct tracks will be offered in terms of agriculture and laboratory science tracks, including student outcomes assessment.
- Introduction to Biotechnology instructor course will be offered at Southeastern Community College, to provide opportunity for high school and community college instructors to prepare for integrating Biotechnology into high school curriculum and strengthen academic preparedness for students transferring to college during project year 3 (*August 2008*).

Goal 4: Disseminate project results to a national audience through professional conferences and publications.

Project Year 1 Activities:

- Will establish a project website <http://www.iowalakes.edu/nsfbitech>. The web site will also be featured under the quick links option and will be “announced” on the Iowa Lakes home page in May and June (annually) to provide easy access for instructors interested in learning more about the summer conference and resource materials. The website has been developed by a student and the webmaster is reviewing it, to assure it meets with ADA requirements and the links work correctly. The website is up and operational. *Completed April 10, 2007.*

Activities:

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and the links work correctly. The website is up and operational. *Completed April 10, 2007.*
Our first year, April – June 30, 2007: 55 hits.

- Web site continues to be updated and linked with other projects. Web seminars completed during spring 2008 were recorded and uploaded to the project web site for free download. All science and agriculture instructors in the state of Iowa were emailed a link announcing the opportunity to view the sessions.
- The press release on Tasida Fisher's research in undergraduate education project has had 113 hits.
- Project outcomes and conference have been submitted to Bio-Link and Agrowknowledge Center for dissemination.
- Project faculty continue to look for additional ways to strengthen the dissemination of curriculum developed through this project. The project steering committee will continue to host teleconference meetings on a quarterly basis to strengthen project dissemination activities and support for secondary instructor integration of Biotechnology curriculum in preparation for project year 3 and improving targeted high school science labs.
- External evaluation process is scheduled to occur April and May 2008. Findings will be shared with Project Steering Committee during the Summer Summit, June 2008.
- Press releases and informational articles in regional newspapers and radio spots.

Formal Conference Presentations:

- *Presentation* by Tasida Fisher, Iowa Lakes Community College science transfer student, completed a Research Undergraduate Experience Internship at Iowa State University, summer 2007. Fisher will be a featured presentation at the Iowa Academy of Science (*instructor conference*) April 11 and 12, 2008. She completed a research project on the role of Asp181 in Itk Kinase Autophosphorylation through Mutation.
- *Formula(s) for Successfully Enrolling and Retaining Students to Degree Attainment*, Retention 2008 International Conference, Education Policy Institute, Julie Carlson and Jolene Rogers, San Diego, California, May 2008.
- *Panel Discussion and Poster Session: NSF Faculty Workshop, Region VII Council for Resource Development* event, June 19-20, 2008.

Activities scheduled (*will occur prior to June 30, 2008*), not yet completed and project recommendations:

- Internal evaluation team follow-up with External Evaluator, Mari Kemis, RISE Institute, to assure focus groups and evaluation activities are conducted with community college and high school partners (*spring 2008*).
- Institutional research staff, Rogers, will visit each community college partner, as previously completed during project year 1, to assist with process improvements in terms of data collection and partnership building with targeted high schools (*June 2008*).
- DVD promotional video, which has been on hold from previous year, will be completed with the assistance of secondary students and further industry participation in developing the script for encouraging career exploration in this emerging, rapidly evolving career field: Biotechnology (*anticipated activity completion, November 2008*).
- Expand and enhance project web site to include all education partners (*and links*).

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- Continue to explore additional dissemination opportunities. Investigate implementing informational sharing during Tech Prep and Carl D. Perkins consortium meetings (high school principal and guidance counselor) at partner colleges. Seek ways to replicated activities implemented at Iowa Lakes with project partner colleges. We anticipate there are additional dissemination activities occurring at the partner colleges, Colleges don't always notify Principal Investigator, Klepper, of dissemination activity.
- Principal Investigator, Klepper, has made great strides in terms of encouraging ag and life instructors to participate in professional development conferences. During project year 3, it is anticipated a minimum of 12 presentations will be submitted for consideration to conference committees on project outcomes and the curriculum development process utilized.