Title III Grant, Strengthening Institutions Program
Innovations in Learning Project Proposal

Title: The Biology/Chemistry Learning Community "BCLC"
Faculty: Jim Baxter, Anu Ganguly, Maru Grant and Yvette Niccolls
Date of proposal submission: March 14, 2007

Overview: the above instructors propose the formation of a Learning Community to increase the success of students enrolled simultaneously in both biology and chemistry, specifically:

General Biology (101A or 101B)	+	General Chemistry (101A or 101B) or Organic Chemistry (112A or 112B)

The team believes this collaboration will benefit students in the following ways:

- Students will appreciate the pervasive connectedness between biology and chemistry. Fundamental cross-disciplinary themes will be emphasized. If all the instructors stress the same identical principles this will help students see commonalities. Students will better appreciate how the concepts in one are intimately entwined and mutually support the other
- More efficient learning will take place by virtue of the commonalities. For a long time both the biology and chemistry teachers have observed many students commenting "oh, we are going the same thing in biology! (or chemistry)" In other words, the students have always known that this "learning community" existed, but unfortunately there were no formal efforts to recognize and nuture this cohort of students. By collaborating and maintaining frequent communication, the team will intentionally seek out and highlight shared topics and themes.
- Chemistry and biology teachers can alert students to differences of this sort.
- Another example, currently the topic of "entropy" is a major concept and driving force in both chemical and biological processes – perhaps instructors could dialogue ahead of time about how it is taught and why it is important to the other. Then it would be taught in a much more recognizable manner reducing student confusion and enhancing retention.

- Often the student had great difficulty trying to succeed in both subjects. Too many times a student ended up dropping one in order to succeed in the other, those student who did survive – somehow passing both classes – their grades and understanding took a real toll. In other words students felt that their taking one was actually diminishing their success in the other. By actively seeking out and highlighting commonalities, the biology and chemistry instructors will each teach a bit of the other subject.

Benefits to students (continued)

- The example was already mentioned where the Chem 101 instructor would be sure to teach dephosphorylation of ATP and how two reactions are coupled to produce a net energy release. Likewise the biology instructor might stress organic chemistry processes and principles to compliment the concepts in Organic chemistry. Communicating closely together, instructors will present examples which reinforce the subtleties of the other.
- Greater consistency in methods of instruction would benefit students. While it is certainly true that no two teachers teach alike and students can often adapt to differences in teaching styles, still the struggling, sleep-deprived student who is barely able to keep up with the torrent of material coming from both biology and chemistry would be greatly helped by collaboration.
- Increased consistency in policies would be helpful. Students would already be familiar with rules and expectations. They would encounter similar philosophies regarding partial credit, essay questions, tardiness, neatness, punctuality, safety, make-up tests, etc.
- The formation of cohorts encourages the formation of friendships and study teams, greatly increasing student support and boosting student morale.

Technology

The use of technologies such as Camtasia, "clickers", and OWL online homework in Chem 101A/B will increase student motivation, learning, and retention.

Benefits

Instant feedback devices "clickers"

- allows the instructor to have instant assessment
- creates an interactive classroom where all students participate, including the shy ones.
- provides a quick way to take attendance.
- makes science classes more understandable and enjoyable.

"Camtasia" - whatever the instructor writes on the labtop is projected and can subsequently be accessed on line

- provides recording of the complete lecture including slides, notes and audio
- downloaded to the internet, either to WebCT or to iTunes University, allowing the students of this learning community to review their classes
- instructors gain greater communication options, offering more opportunities to teach

Web-enhancement via WebCT

- the students will have access to their courses, homework, notes and assignments.
- there will be discussion topics increasing student interaction and involvement
- students can easily send messages and receive any updates or changes in the course.

Technology and benefits (continued)

OWL -- homework assigned on line via WebCT or using the program called OWL (On-line Web-base Learning)

- students improve their problem solving skills and visualize concepts
- students receive instant analysis and feedback to their responses
- students can retry the problems as many times as needed until the concept has been mastered.
- Increased variety of homework problems including tutoring, simulations, and short answer questions
- instructors can view cumulative statistics for each student including assignments attempted, total time spent on assignments, total number of questions submitted and so on.
- it allows the instructor to easily find students at risk and provide help before it is too late.

#2 Project Outcomes- Student centered

1. Alignment of course curricula and teaching styles so that students experience a smooth transition in going from CHEM 101 to CHEM 112 to BIO 101
2. Reinforcing common topics in these courses such that the students are able to see the application of science in a multidisciplinary approach
3. Establish competency levels and standards to go with it. ACS tests in Chemistry and other assessment criteria in Biology will be used
4. Students should be able to handle critical thinking problems as well as word problems which require proficiency in English
5. Smooth transition between lab exercises and student proficiency in being able to handle instrumentation/techniques in a multi disciplinary approach with application to both biology and chemistry
6. Ability to conduct scientific research in a joint biology/chemistry venture and communicate results in scientific forums

#3 Assessment strategies

Student learning objectives will be assessed by applying a common rubric to measure success at several points throughout the program. Assessment strategies that will be developed will focus on the student's achievement in understanding and applying common concepts and lab skills encountered in all science courses in the program (Chem 101A, Chem 101B, Chem 112A, Chem 112B, Biol 101A, and Biol 101B. Questions regarding common concepts will be embedded in exams. Predetermined lab skills will be tested by demonstration-type questions on lab practical exams. Additionally, since research is such a fundamental part of science, students engage in inquiry-based investigations spanning the content of all courses in the program and where research will be used not only as a learning tool for the student, but as a means of assessing student progress in achieving the stated learning objectives.

#4 Time Line
What has already taken place:

August 25, 2006
Maru Grant and Jim Baxter initiated a team "Transfer Major Core Programs (Chemistry, Biology, Engineering and Premedicine)" for the purpose of Program Review. This team discussed ways to improve student success for students in these field. The students traditionally have had much difficulty succeeding in this program. Maru and Jim noted that they share many of the same students in Chem 101B and Biol 101A; by working closely together, they could find ways to help this cohort of students succeed.

Thursday October 19, 2006
This collaboration was expanded to include Chem 112A/B as well as Chem 101A/B and Biol 101A/B. The first meeting of the instructors for this newly formed Biology Chemistry Learning Community included Maru Grant, Jim Baxter, Anu Ganguly, Yvette Niccolls, and Ron Quinta. Each instructor brought a sample exam. Discussion focused on testing policies and philosophies.

Tuesday Nov 7, 2006 Program Review Meeting in Bldg 25, 4:30 pm – 6:00 pm
Instructors from Science and Engineering departments shared and discussed student learning outcomes as well as strategies for improvement of programs in MSE.

Tuesday Dec 12, 2006 The BCLC met and compared course outlines, looking for shared features, topics, and themes. The instructors strategized how they might reinforce and enhance learning between the two disciplines.

Thursday Feb 15, 2007 3:30 pm - BCLC planning meeting to lay out collaboration strategies on a more formal basis. Each member of the team was given an assignment which involved composing a portion of the proposal.

Thursday Feb 22, 2007 3:30 pm BCLC planning meeting
Each part of the proposal was reviewed and finalized for submission

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Time Line: Future agenda
The BCLC agrees to meet every two weeks for discussion and support, at 3:30 – 4:30 pm on the following dates
March 1
March 15
April 5
April 19
May 3
At each meeting each member will report their activities and observations for the past 2 weeks as pertains to this collaboration. Discussion will focus on development of

Future agenda (continued)

common themes and shared practices. Through collaboration, instructors will gain an appreciate of the challenges of each course; they will seek ways to make each course compliment/augment the other with vision of the ultimate goal to increase student retention and success.

1st rough draft deadline: May 10, 2007
2nd rough draft deadline: May 17, 2007
Final report deadline: May 24, 2007

#5 Faculty responsible for Development and Implementation:

Maru Grant – Chem 101A and Chem 101B
Anu Ganguly – Chem 112A and Chem 112B
Jim Baxter – Biol 101A and Biol 101B
Yvette Niccolls – Math, Science, and Engineering Coordinator

#6 Technology requirements:

Tablet pc for every instructor
Camstasia software
Turning Point software and hardware for the immediate response devices (clickers)
WebCT shells
Microsoft Office programs
Spartan Program