Hybrid Redesign: Biochemistry 401 (BMB401)

Tami Mysliwiec
Design: Fall 2010 – Summer 2011
Implementation: Fall 2011
Final Report and Analysis: Spring 2012

Introduction:

A hybrid redesign of the upper level biochemistry (BMB401) course for our biology and life science majors was initiated in an attempt to increase student engagement with course content and enhance student learning. The course objectives for BMB401 center on understanding the structure and function of the four major macromolecules found in biological systems. BMB401 is a content heavy course that relies on a combination of prior knowledge from prerequisite chemistry and biology courses, the textbook, the instructor and primary literature. By moving some of the course content out of the classroom into an online format, more time in the classroom was allocated to focus on the last three objectives for BMB401 which included; evaluation of primary literature, development of problem solving skills and data interpretation.

Project Design:

1) Move the first and second course objectives into an on-line format
    a. Objective 1: Demonstrate an understanding of the fundamental ideas in biochemistry by focusing on a detailed analysis of the four macromolecules (proteins, carbohydrates, nucleic acids and lipids)
    b. Objective 2: Analyze the processes associated with these macromolecules in a biological setting

2) This was accomplished using the following approach:
    a. Searched and reviewed already existing on-line materials and resources for students to use in first exposure activities.
    b. Developed learning guides for each class session.
    c. Organized and/or developed first exposure activities including online chapter quizzes
    d. Made the activities accessible to students prior to class.
    e. Designed and organized course material. This was done in collaboration with CLT project manager and student intern.
    f. Met throughout summer to work on progress.
    g. Course set-up
    h. Mid-semester evaluations (both student and instructor) to gauge project success.
    i. Final survey question and (impromptu) focus group discussion
    j. Final report (March 2012)

Learning Outcomes and Discussion:

Three assessment tools were used to evaluate the hybrid version of BMB401. A mid-semester survey was employed to gauge student learning and course satisfaction. A final survey including a question regarding improvements and suggestions was utilized at the end of the semester and a focus group was questioned 6 weeks post the conclusion of the course.

Student Profile (self-reported on mid-semester survey)

For most students (61.5%) this was their first hybrid course. All students are upper-class standing (junior or senior level). 38.5% stated they worked 3-5 hours/wk on this course while 15.4% stated they worked 5-7 and 15.4% stated they worked 7-9 hours/wk. The course was designed to be consistent with Course Policy 42-43 (http://www.senate.psu.edu/policies/separate_policy/42-23.htm) that equates to 2.5 formal hours and 5 hours outside preparation required each week for students of a 3-credit course and the student feedback is consistent with similar archetypal versions of courses.

Mid-semester survey

The mid-semester survey probed course design, student satisfaction and online materials.

Daily schedule on ANGEL – 82.3% agreed/strongly agreed daily schedule was valuable

Online chapter quizzes – 53.9% agreed/strongly agreed online chapter quizzes valuable

Online discussion board – 38.5% agreed/strongly agreed online discussions valuable

Optional office hours (online weeks) – 69.2% agreed/strongly agreed hours valuable

To address the student satisfaction of online discussion boards, future plans / next steps have been determined and are explained in the next section titled “Conclusions and Future Plans”.

When asked, what students would like to see more of in this course?

46.2% - additional images embedded in online components

30.8% - more assignments ties to the interactive websites to encourage more use

Comparison of overall final grades and individual exams for three semesters

Table 1. Overall final grades (based on percent of total enrolled)

Final Grade	A	A-	B+	B	B-	C+	C	D/F
F'11	14.29	21.43	14.29	21.43	14.29	7.1	7.1	-----
F'10	11.11	11.11	14.81	33.33	-----	----	14.81	14.81
F'09	25	8.3	8.3	25	16.6	8.2		

There seems to be an increase in the overall final grades when comparing the hybrid version of BMB401 (F'11) and the archetypal version (F'10 and F'09). This is consistent with findings including A Meta-Analysis and Review of Online Learning Studies where "…students who took all or part of their instruction online performed better, on average, than those taking the same course … face-to-face…" as well as "…instruction combining online and face-to-face elements had a larger advantage … than did purely online instruction" and similar results acknowledged in "Core research and issues related to blended learning environments". It is hoped that future research endevaors within the educational community focus on comparing the modes of face-to-face, blended, and online modalities to have more results in this small field of research.

Table 2. Exam Averages

	Exam 1	Exam 2	Exam 3	Final Exam
F'11	78.33	76.35	78.20	77.14
F'10	76.90	78.15	79.37	76.51
F'09	74.00	71.58	77.17	61.33

There does not seem to be a significant change in the exam grades when comparing the hybrid version of BMB401 (F'11) and the archetypal version (F'10 and F'09).

Conclusions and Future Plans:

Changes have been formulated after reviewing comments from student surveys and a focused discussion with several students that went through the hybrid course. These changes will be initiated for the fall 2012 semester. Nearly one-third of the students surveyed and all of the students in the focus discussion suggested that the course be reformatted to meet one day on one day off. This was the original plan for the course but as we began to look at the learning objectives and the course content we felt one-week online followed by one full week face-to-face would be the best format. However, after careful reconsideration of the student comments and the objectives of the course we plan to rearrange the class to a MWF schedule with a M online

class meeting followed by a WF fact-to-face for some weeks or a MW online followed by a F face-to-face for other weeks. The weeks where we meet only once face-to-face we will have a synchronous online class discussion. This activity evolved from the online discussion boards we had this past semester. The discussion boards began slowly and with limited success in terms of carrying on a discussion. As the course progresses this became a successful activity that was used to apply the course content to a current area in biochemistry.

An additional change to the course involves the use of Voice Thread to articulate the Powerpoint lectures used in this course. Several students suggested that additional content be included in the Powerpoints used online in BMB401. Additional resources found and used by one student in the course will be incorporated into the fall 2012 course.

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References:

Graham, C. &. (2008). Core research and issues related to blended learning environments. In M. m. J.M. Spector, *Handbook of reserach on educational communications and technology.* Associates, Lawrence Earlbaum.

Means, B., Toymaa, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies.* U.S. Department of Education.