Assessing the value of interdisciplinary team-teaching in a science curriculum
Phillip L. Quirk, Assistant Director, Human Biology Program

Interdisciplinary learning has become a common theme in the national conversation on the scholarship of teaching and learning. This is largely because interdisciplinary approaches foster a deep understanding of the complexities surrounding 21st Century realities. The ability to develop these complex understandings is a core component of the Principles for Excellence outlined in the National Leadership Council for Liberal Education and America’s Promise (LEAP) report, College Learning for the New Global Century (2007; p33). Even with the emphasis on interdisciplinary study, however, it has been shown that college graduates often fail to appreciate the value of disciplines in which they are not immersed. This may be attributed to their preconceived and unchallenged notions regarding the nature of those disciplines or to a misrepresentation of certain disciplines by biased faculty. These misperceptions are sometimes maintained throughout college and beyond (Elmore, et al., 2006).

The Association of American Colleges and University’s Statement on Academic Freedom and Educational Responsibility and Educational Responsibility (2006) explicitly states that colleges need to produce graduates who are “far more aware of the complexity of the issues at stake and better able to ground their commitments in analysis, evidence, and careful consideration of alternatives” (p.5). The Human Biology Program core curriculum was conceived and developed to meet just this sort of challenge. We strive to provide a forum that supports the development of cognitive complexity, a strong sense of civic responsibility, and the interpersonal capacities that facilitate the critical analysis of information within constructive contexts. Through this process we are confident that our students will become self-authors and graduate with the cognitive maturity and interpersonal skills to make significant contributions to society as they assume leadership roles in their communities.

The value of interdisciplinary study for learning outcomes is clear (e.g., Kleinberg, 2008), but there are challenges to implementing a strong interdisciplinary curriculum. We believe the best way to ensure that students internalize the complexities of constructing interdisciplinary knowledge is to model the process of interdisciplinary meaning-making and then guide students as they practice those skills by engaging with other students and faculty from a variety of disciplines to explore some of the big questions of today in a classroom setting. In the Human Biology core courses, interdisciplinary teams of diverse faculty present significant problems facing humanity from their own disparate perspectives in a collegial manner that models collaboration and the dynamic exchange of ideas. This helps students develop their own intellectual identity and novel approaches to difficult challenges.

Based on course evaluations in this year-old program, we believe that students value this pedagogical approach and integrate interdisciplinary thinking into their world view; using it to develop a rich understanding of their everyday surroundings and to critically evaluate information about the pressing issues facing society today. In a complex world, where scientific, cultural, and geopolitical influences affect the decisions made by individuals and governments, it is crucial for students to be not only able, but just as importantly willing, to think about big problems from multiple perspectives. The team-teaching approach, coupled with the use of team-based and case-based classroom activities, cultivates strong interpersonal skills and supports these objectives.

The immediate goal of the proposed research is to assess the value of our unique interdisciplinary team-teaching approach. In a traditional classroom with a single instructor, the value of interdisciplinary approaches to 21st Century problems is often acknowledged and perhaps even highlighted; however, until the process is explicitly modeled it is unlikely that students will fully appreciate its value or understand how it might be utilized in practice. The educational value of a team-based, problem-based curriculum for student learning has been well-documented. Enhancing the value and utility of those tools by modeling the
construction of knowledge by interdisciplinary faculty teams, however, is a novel approach that has not been addressed to any large extent in the literature.

**Impact on teaching and learning**

The results of this study will be used to demonstrate the value of interdisciplinary team-teaching. The methods we use in the Human Biology Program are unique, and demonstrating their effectiveness in the market-driven environment of the University will bolster the concept of team-teaching across campus and beyond. The educational value of team-based curricula for student learning is well documented and unequivocal. The importance of interdisciplinary approaches to complex problems is likewise an accepted reality in education and research. Further, the presence of interdisciplinary programs is a hallmark of quality in higher education. By combining interdisciplinary approaches with team-based pedagogies and demonstrating their value in terms of student outcomes, we will be able to validate a move toward the institutionalization of interdisciplinarity in the classroom; a move with broad implications for undergraduate and graduate teaching, learning, and research and for the status of IUB as a leader in fostering interdisciplinary activities.

**Preliminary /anticipated results**

In this unique year-old program, we employed the interdisciplinary team-teaching approach in three sections of two different Human Biology courses; two sections of B101, and one section of B201. In the B101 sections the course evaluation included a question explicitly aimed at assessing the value of learning from faculty with different disciplinary backgrounds. In the Fall 2007 section of B101 34/37 respondents scored the value of interdisciplinary teaching at 3 or higher on a 5-point scale (mean=3.84), and in the Spring 2007 section 28/29 students scored the value of interdisciplinary team teaching at three or higher (mean=4.27). In the B201 course, the question was not asked on the course evaluation, but several students (8/16) expressed their appreciation for the value of interdisciplinary team-teaching without being prompted for feedback on that particular aspect of the course. Below are some of the comments provided by students from the subjective portions of those course evaluations:

**B101**

- I thought it was one of the best aspects of the course!
- Do it more often
- I enjoyed seeing other people’s areas of interest
- Awesome!

**B201**

Question: What were your favorite things about this course?
- making social and biological associations
- How we had 2 different perspectives-sociologist and biologist
- I enjoyed the multidisciplinary learning taking place in this course. I was able to look at a disease in more than just the biology of it. I learned how the social and governmental issues affect disease and outbreaks
- I loved learning the scientific with the sociological view.

Question: Would you take another course like this one? Why or why not?
- Yes, I loved the approach!
- I enjoy the way we learn (projects-interdisciplinary methods)
- Absolutely. I love Human Biology and the connection between biology and sociology

From these responses, especially the unsolicited responses from the B201 students, it is clear that a core goal of our team-teaching pedagogy, to help students develop the ability to make connections and think independently, is beginning to be met. Our aim with the proposed research is to collect additional data and
analyze it in a manner that will allow quantitative and qualitative assessments of the value of the interdisciplinary teaching approach. Based on our preliminary findings, we expect that students exposed to this unique pedagogy will favor it, be able to explore complicated problems from multiple points of view, and have a strong tendency towards self-authorship.

Methods

To fully assess the value and effectiveness of interdisciplinary team teaching we will employ qualitative and quantitative measures and leverage the advantages of each to gain a rich understanding of the value of our approach with the added advantage of providing quantitative data to the analysis. An overarching goal of interdisciplinary team-teaching is to support the development of self-authorship and complex cognitive ability. Thus, the assessment instruments we will utilize are geared toward measuring these components of student learning.

We have previously utilized student e-portfolios in the Human Biology Program as means to track student learning and cognitive development (Human Biology e-portfolios). We will continue to use proven e-portfolio assessment techniques to gain an understanding of the level of cognitive development exhibited by student in the Human Biology core courses and we will develop specific qualitative instruments that directly measure e-portfolio attributes that indicate self-authorship of knowledge. We view the e-portfolio as a central component of our assessment strategy.

To further investigate and document student learning and development we will conduct interviews with each student to help gauge the impact of the team teaching approach on their learning and, more importantly, the way they engage complicated problems. Baxter-Magdola and King (2007) have outlined interview strategies for assessing self-authorship and we will utilize their techniques to develop open-ended interview questions that assess the specific types of learning and thinking we expect to develop in our students.

To supply an objective analysis of Human Biology student’s cognitive development we will utilize selected components of the National Survey of Student Engagement (NSSE) developed at IUB. We believe that student engagement is a valid marker of cognitive development and illustrates an awareness of the importance of seeking out information to make meaning of their world; a central component of self-authorship.

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<tr>
<th>Assessment tool</th>
<th>Value \ advantage</th>
<th>Expected outcome</th>
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<tbody>
<tr>
<td>E-portfolio</td>
<td>A longitudinal e-portfolio is required of each student. Each e-portfolio is assessed upon completion of a Human Biology core course.</td>
<td>E-portfolios allow students the opportunity to showcase their best work. We expect that our students will choose to include artifacts that highlight their interdisciplinary understanding of course content</td>
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<tr>
<td>Interviews</td>
<td>Asking open-ended questions allow a rich dialog that explores the depth and breadth of a student’s understanding.</td>
<td>We expect that our students will demonstrate a tendency toward introspective analysis that draws on not only factual knowledge, but also upon their ability to integrate knowledge from a variety of sources to form self-authored responses</td>
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<td>National Survey of Student Engagement</td>
<td>Provides an objective assessment of student engagement.</td>
<td>We expect Human Biology students to exhibit a higher than average tendency to be involved in civic activities and hold leadership roles in their extracurricular activities</td>
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Milestones and plans for dissemination of information

The foundation for this research has already been laid and the infrastructure to collect the data is currently in place. We have preliminary data in-hand and are anxious to formalize our findings and present them to
the campus and to the wider community in a relatively short time frame. The Human Biology Program actively participates in IUB SoTL events and we will continue to do, presenting our findings at the appropriate venues. In addition, we anticipate submitting a proposal to present our findings at the ISSOTL conference to be held on the IUB campus in October, 2009.

**Timeline**

<table>
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<tr>
<th>Research activity</th>
<th>Spring 2008</th>
<th>Summer 2008</th>
<th>Fall 2008</th>
<th>Spring/Summer 2009</th>
<th>Fall 2009</th>
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<tr>
<td><strong>Research activity</strong></td>
<td>Collect data from B101 and B201</td>
<td>Analyze data from B101 and B201</td>
<td>Collect data from B101 and B301</td>
<td>Collect data from B201 and B401</td>
<td>Collect data from B101 and B301</td>
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<tr>
<td><strong>Dissemination</strong></td>
<td>Present preliminary thinking to SoTL at IUB</td>
<td>Participate at IUB SoTL venues</td>
<td>Participate at IUB SoTL venues</td>
<td>Present at ISSOTL</td>
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**Future directions**

The timeline presented above illustrates a portion of our research activities. We consider this an ongoing area of inquiry and will continue to explore the effectiveness of interdisciplinary team teaching and ways to improve our strategies as our program continues. In addition, we anticipate expanding this research to include assessing the impact of interdisciplinary team teaching on faculty learning and interdisciplinary engagement. We anticipate that our strategy of engaging interdisciplinary faculty teams to explore complex topics with their students will result in novel collaborative work and the generation of lasting interdisciplinary ties. Though beyond the scope of the present proposal we anticipate launching this complementary line of inquiry in the near future.

**Budget Statement**

This research will be conducted within the context of the existing courses (B101 and B201) and will continue as we track student learning outcomes through new Human Biology courses (B301 and 401) that come online in 2008-09. Assessment will be done utilizing resources that are currently available at IUB and the Human Biology Program and it is not anticipated that any additional funds or resources will be necessary.

**Personnel**

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<tr>
<th>Principle investigator</th>
<th>Participating faculty*</th>
<th>Consultants</th>
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<tr>
<td>Phillip Quirk</td>
<td>Phillip Quirk – Human Biology&lt;br&gt;Jane McLeod – Sociology&lt;br&gt;Andrea Wiley – Anthropology&lt;br&gt;Vivian Nun Halloran – Comp. lit.&lt;br&gt;Amy Berntson – Biology&lt;br&gt;Colin Johnson – Gender Studies</td>
<td>Whitney Schlegel – Human Biology&lt;br&gt;Jane McLeod – Sociology</td>
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*Faculty teams for B401 have yet to be determined

**References**