Student Achievement of the Integrative Thinking Goal in the Capstone Experience: A Pilot Study

Integrative Thinking is one of the four Goals of the Gettysburg Curriculum. To help students achieve this Goal, the College requires students to take two interdisciplinary courses or a course cluster, a Quantitative, Inductive, and Deductive Reasoning course, and a capstone course/seminar in their major (or, in some departments, faculty-sponsored internship or individualized research). In the capstone experience, students are expected to bring together what they have learned in their major curriculum and demonstrate mastery over the chosen area of concentration.

COLA (Committee on Learning Assessment) is charged with assessing the four Goals of the Gettysburg Curriculum. As part of the efforts to fulfill this charge, in December 2010, a COLA subcommittee (members: Jack Ryan, COLA Chair & Associate Provost; Jonelle Pool & David Powell, Education faculty; Suhua Dong, Associate Director of Institutional Analysis) conducted a pilot study on the Integrative Thinking Goal. This study attempts to answer the following two questions:

- Are capstone instructors intentionally aligning their course objectives with the core learning outcomes of the Integrative Thinking Goal, outcomes articulated by COLA faculty members?
- Are students achieving these intended outcomes in their capstone experience?

Faculty members who were teaching a capstone course/seminar or supervising an internship/individualized research (designated to fulfill the capstone requirement) in Fall 2010 were identified and asked by Jack Ryan to complete a brief on-line evaluation form (Appendix A). Of the 14 instructors who were invited to participate, 12 provided valid responses to the form.

A total of 189 students were enrolled in the capstone classes included in the study. They represent the following 9 majors: Biology, Business, Computer Science, English, Health Sciences, Mathematics, Philosophy, Political Science, and Sociology.

Jonelle Pool and David Powell developed five learning outcome statements for the Integrative Thinking Goal, outcomes that COLA intends capstone instructors to use in their class. The evaluation form lists these five learning outcome statements, and asks capstone instructors whether they expect their students to achieve a certain outcome. Instructors were also asked to report how many students in their current capstone class actually achieved this outcome by the end of the class based on evaluations of student performance (i.e., performance on assignments, tests, exams, papers, thesis, individual or group project, and/or other classroom assessments associated with this capstone experience). Suhua Dong analyzed the data and wrote this report.
Outcome A. Outline a clear point of view in analyzing and interpreting multidisciplinary work.

8 out of 12 responded "Yes" 67% 89%

Outcome B. Produce work using interdisciplinary perspectives (i.e. the application of several disciplines to the study of an issue/problem, figure, work, period, or case, or to a closely-related cluster of these).

8 out of 12 responded "Yes" 67% 88%

Outcome C. Produce work using cross-disciplinary perspectives (i.e. the application of one discipline as a lens to examine the methods, conventions, or assumptions of another discipline).

4 out of 12 responded "Yes" 33% 96%

Outcome D. Produce work that demonstrates quantitative, inductive, or deductive reasoning.

11 out of 12 responded "Yes" 92% 86%

Outcome E. Produce work that synthesizes content, methods, and unique perspectives of the major discipline.

12 out of 12 responded "Yes" 100% 87%

Overall, capstone instructors are intentional about the Integrative Thinking Goal in their teaching. Their course objectives are generally aligned with the core outcomes for this Goal articulated by COLA. Instructors are using appropriate criteria in evaluating student work with regard to the Goal. The great majority of students successfully achieved all the expected outcomes, which yields direct evidence of student learning in achieving this Goal.

It is also clear that some aspects of the Integrative Thinking Goal receive more emphasis than other aspects in capstone classes. Instructors place the most emphasis on Outcome E (Produce work that synthesizes content, methods, and unique perspectives of the major discipline) and Outcomes D (Produce work that demonstrates quantitative, inductive, or deductive reasoning); all or almost all instructors expect students to achieve these two outcomes. Outcome A (Outline a clear point of view in analyzing and interpreting multidisciplinary work) and Outcome B (Produce work using interdisciplinary perspectives) receive modest emphasis; two thirds of the instructors emphasize these two outcomes. However, Outcome C (Produce work using cross-disciplinary perspectives) receives the least emphasis; only one third of the instructors are intentional about this outcome.
3. What are the common strengths and weaknesses/challenges in student learning with regard to the Integrative Thinking Goal?

A total of 10 instructors answered this question and provided comments.

- I found that students were often very resistant to breaking out of their comfort zone in terms of disciplinary study; they become rather anxious when the usual set of rules for what is expected of them no longer applies. It seemed clear they had never really done any truly interdisciplinary work before this. However, this also meant that there was a lot of room to grow, and by the end of the semester, they were doing a very fine job, and their final projects were intellectually quite successful. I was very impressed with what they were able to accomplish in such a short time!

- It is challenging to teach students the rigor necessary (which I feel is transmitted through disciplinary training) and still get them to work cross disciplinary. Conversely, it may be fairly easy to get them to think interdisciplinarily, but a challenge to get them to think rigorously.

- Not quite sure what to say here. Maybe motivating students to appreciate the value of true interdisciplinary thought? Works well one-on-one (as in an independent study type capstone), but I see a lot of advisees who don't get this, and don't understand why it's of value.

- The Integrative Thinking Goal as it relates to our department helps reinforce the power of the liberal arts education and the mission of Gettysburg College. Reflection is a component of our assessment. Through this reflection, most students are able to analyze and evaluate their Gettysburg College experience and effectively communicate their future goals and aspirations.

- Weaknesses: students resist perspectives from other areas, not as open to them as they should be  
Strengths: This question seems phrased in a funny way...do you mean: What are the common strengths and weaknesses/challenges we found in our students ... ? Or... ?

- In science courses there may not be as many opportunities for interdisciplinary approach in the capstone.

- Inability to properly develop research oriented assignments

- I don't think questions A, B, and C (especially the available responses for B and C) do a good job of capturing the opportunities for inter- and cross- disciplinary learning in my seminar. This particular question (3) is awfully vague. I hope my answers to D and E helped here. There should be a "somewhat" response choice for A through C.

- "Writing is making sense of life" -- Nadine Gordimer  Science majors write too little and too seldom -- the major hurdle in this major, in my estimation, is to bring students to a level of writing that matches their intellect and laboratory training. Writing to produce an as-for-publication 30+ page manuscript, in which students integrate a semester-long, multi-component original, hands-on research project with complex and confusing scientific literature, is the most difficult academic undertaking that many of our majors have faced or will face. The effort required to substantively and effectively train students to do this well is overwhelming and exhausting for both the learner and the professor, particularly as it is the last facet of many in a
rigorous, integrative capstone experience that emphasizes independent bench research. Are most faculty willing to spend 3-4 hours per paper during the drafting process, followed by approximately two hours per paper on the final product? In my experience (living the nightmare right now), this is what it takes to shepherd a student towards an adequate, semi-professional outcome.

- Some disciplines are based on other disciplines, so integrative thinking must occur as part of that discipline. However, one challenge of trying to balance multiple approaches (e.g., both quantitative and qualitative) is gaining competence in any of them. There’s a danger that the materials may become watered down or particularly confusing due to the effort to provide several perspectives.
Appendix A: Online Evaluation Form

Instructions: The purpose of the study is to collect information about how well students achieved the Goal of Integrative Thinking through their capstone experience (course, seminar, or other supervised learning experience). In the following questions, "students" refer to majors enrolled in your capstone class to fulfil the Capstone Experience requirement. (Please exclude non-majors.)

1. How many students are enrolled in your class (Fall 2010)? Type the number in the box below.

2. Below are some of the Integrative Thinking outcomes that you may expect your students to achieve through the capstone experience you are instructing in Fall 2010. If a certain outcome is expected, please indicate how many students in your class actually achieved this outcome by the end of this capstone experience based on your evaluation of student performance (i.e., performance on assignments, tests, exams, papers, thesis, individual or group project, and/or other classroom assessments associated with this capstone experience).

If a certain outcome is not expected, please select "Not Applicable".

<table>
<thead>
<tr>
<th>Do you expect students to achieve this outcome through this capstone experience?</th>
<th>How many students achieved this outcome?</th>
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<tbody>
<tr>
<td>A. Outline a clear point of view in analyzing and interpreting multidisciplinary work.</td>
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<tr>
<td>B. Produce work using interdisciplinary perspectives (i.e. the application of several disciplines to the study of an issue/problem, figure, work, period, or case, or to a closely-related cluster of these).</td>
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<td>C. Produce work using cross-disciplinary perspectives (i.e. the application of one discipline as a lens to examine the methods, conventions, or assumptions of another discipline).</td>
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<td>D. Produce work that demonstrates quantitative, inductive, or deductive reasoning.</td>
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E. Produce work that synthesizes content, methods, and unique perspectives of the major discipline.

3. What are the common strengths and weaknesses/challenges in student learning with regard to the Integrative Thinking Goal?