The goal, as we understand it, of the Teagle project is to record progress made by selected departments in assessing their pursuit of specific learning goals assisted by dedicated institutional support, and thereby identify ways of building on strengths and grappling with weaknesses in the process of closing the assessment loop in the face of documented challenges.

Since the spring of 2008, the Bryn Mawr Department has agreed to take on three learning goal assessment loops for our students focusing on

- The quality of the senior research paper (spring 2008 to the present)
- Promoting threshold concepts in Intermediate Microeconomics (spring 2012 to the present)
- Defending a thesis or claim (spring 2014 to the present)

All three are on-going.

For the first, the Department developed an assessment rubric (Appendix A) and has met each May since 2009 to discuss each of that year’s papers. From 2009-2013 that discussion was the basis for an assessment report to the Provost. The project was prompted by a request from Provost Kim Cassidy that each department choose a learning goal and use it as the basis for an annual assessment over a three year period. The presumption was that departments would move to different assessment projects for each three-year cycle.

The Faculty’s Curricular Rules now require that each graduate (starting with the Class of ‘17) fulfill a disciplinary writing requirement. Over the next couple of years the Department will be identifying 300-level seminars that, through increased engagement with writing, address that requirement. The steering committee drafting the College’s Middle States Periodic Review Report decided that each department should engage in an annual assessment related to student writing and required each department to provide a description of its assessment loop in May 2014. Bryn Mawr Economics has chosen (our third ongoing assessment loop) to focus on assessing our success at promoting the learning goal of structuring an analysis that relates a thesis or claim to relevant economic theory that is supported by evidence (see Appendix C).

In 2012, the Department accepted the invitation to participate in the extension of the Teagle Assessment Project with a focus on student mastery of key threshold concepts through one of our the core courses in the major: Intermediate Microeconomics. For ease of comparison, the original proposal appears as Appendix B. Like most courses, Econ 200 (Intermediate Microeconomics) has a set of specific learning objectives and assesses
mastery primarily through examinations leading to a final grade. But, at the level of the major, core courses such as this seek to move students from novice to expert in the sense of being able to use the core principles of economics to, for example, make reasoned assessments of public policy issues and formulate and test questions/hypotheses. The issue at hand is whether students completing Econ 200 have moved beyond being able to manipulate the analytical tools of microeconomics to developing to having a conceptual understanding of the underlying principles.

Key elements of the assessment loop chosen for the Teagle Project were developing a concept inventory to supplement the usual course assessments and flipping the classroom (moving as much content delivery as possible to periods outside class-time to allow more time for active engagement with concepts). The time line for the assessment loop has evolved into this current schedule which includes a comparison of the flipping-the-classroom “treatment” with more traditional instructional strategies represented used in Fall 2011 by David Ross and Fall 2014 and Fall 2015 by Andrew Nutting.

- Fall 2011 — original method
- Spring 2013 — flipped classroom
- Fall 2013 — flipped classroom
- Fall 2014 — control, Andrew Nutter
- Spring 2015 — flipped classroom
- May 2015 — graduating majors and minors
- Fall 2015 — control, Andrew Nutter
- May 2016 — graduating majors and minors

For each of these dates (other than Fall 2011) students are taking the *Test of Understanding of College Economics* as the concept inventory. Institutional Research is assembling a data set of controls and other performance indicators for a blind assessment. The project remains on target to assess whether flipping the classroom has had any effect on the success of intermediate Microeconomic students in making the transition to command of core concepts and whether that command is maintained or enhanced as students complete the major.

The data for Fall 2011, Spring 2013 and Fall 2013 demonstrate that flipping the classroom has had little effect on overall scores on the conventional exams. In Spring 2013 and Fall 2013, student scores on the concept inventory pre- and post-tests rose by a statistically significant 3 points out of 30.

Institutional involvement in all three assessment loops largely has taken the form of requesting assessment reports and commentaries. For the Teagle (2nd) loop, the support has involved convening meetings with other departments engaged in these projects and a willingness to provide supporting data.
**Rubric for assessing senior research paper in economics**

<table>
<thead>
<tr>
<th>Expectations for senior major in economics</th>
<th>Exceeds</th>
<th>Meets</th>
<th>Falls short of</th>
<th>NA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify and formulate an appropriate research question or hypothesis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform literature review of appropriate research and summarize findings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write a summary (précis) of a published piece of economic research</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apply economic theories to topic at hand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify and locate relevant economic data</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retrieve data, manipulate it, present it in an appropriate (tabular or graphical) form, and correctly interpret it</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perform appropriate statistical analyses of data, correctly interpret results, and explicitly tie to research question or hypothesis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Draw implications or conclusions of analysis for key question or hypothesis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correctly cite sources and construct a bibliography of references</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write clearly, using language of economics appropriately and correctly</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

Notes:
Appendix B

Bryn Mawr Economics Assessment Loop

Econ 200, Intermediate Microeconomics, is a core course in the major curriculum. It acts as a transition between the 200-level field courses (which apply basic economic concepts to explain market outcomes and evaluate alternative responses to those outcomes deemed unsatisfactory) and 300-level courses that expose students to primary research. The course seeks to turn students into informed consumers of microeconomic theory and to start them on the road to producing enhancements to that theory. It seeks to support their transition to thinking like economists as they observe their surroundings.

We\(^1\) do this primarily by expanding the number and depth of analytical tools beyond those encountered in Econ 105 (Introduction to Economics) and the following 200-level electives. Mastery of tools necessarily goes beyond definition and mechanics, to knowing which tool to apply when. The vast majority of Econ 200 students can solve a problem like the following on the final exam:

> Suppose the price elasticity of demand for automobiles were -1.5 and the elasticity of supply were 1. If 20 million automobiles are sold each year at an average price of $16 thousand, what would be the effect on the market of the imposition of a $4 thousand excise tax.

However, unless properly cued, those students are likely to be tripped up by the following question.

> If the government were to raise the sales tax on a consumer goods product, the tax would be

A. . . . put on the top of the price due to the market power of the sellers (sellers dictate price to protect profits)
B. . . . put on the top of the price due to inelastic demand (the buyers need the things they want to buy so much that the sellers can just add the tax to the prices)
C. . . . shared due to elastic demand (if the burden is not shared the buyers would be less willing to buy)
D. . . . shared due to elastic supply (the sellers can cut back on the supply)
E. . . . shared due to elastic demand and supply (the distribution depends on the relative bargaining power of sellers and buyers).

\(^1\) David Ross has taught Intermediate Microeconomics exclusively for the Department since 2006. Vlad Kontorovich teaches the corresponding course (Econ 300) with similar objectives at Haverford. Several years ago, the Swarthmore Economics Department stopped incorporating multivariable calculus in its Intermediate Microeconomics course; so that course no longer fulfills a core requirement for the Bryn Mawr major or minor.
Those students haven’t really crossed the threshold to thinking like economists and aren’t adequately prepared to meet the goals of the remainder of our major.

This sort of learning outcome – students who master the skills taught in class, but nevertheless struggle with core concepts of the field when encountered outside of the framework of a course – has caught the attention of instructors in many fields (most notably physics). The argument goes that much of what distinguishes an economist or physicist from a novice is the integration of certain threshold concepts – like elasticity, interaction of forces, opportunity cost, or light diffraction – into one’s way of thinking. Students who fail to cross the threshold often fall back on memorization or imitation, strategies that can prove successful on examinations but don’t provide the understanding they seek and require.

At Bryn Mawr, we encounter this phenomenon in our senior Economics research seminars, where students who earn 3.0 or above in our intermediate theory courses nonetheless, struggle to

- Apply economic theories to topic at hand
- Identify and formulate an appropriate research question or hypothesis
- Draw implications or conclusions of analysis for key question or hypothesis

among other goals from our assessment rubric of student ability to engage in economic research. It also seems plausible (although we haven’t tested it), that our very good students (whether majors, minors or just student who take one or two economics courses) leave Bryn Mawr with a limited capacity to articulate the economic processes behind the headlines or challenges of daily life.

The purpose of this project is to enhance the effectiveness of Econ 200 in helping our students cross this threshold.

**Goals and Objectives**

As of October 2009, the Department set the following expectations for students completing an AB in economics:

A. The ability to understand and apply fundamental economic reasoning, concepts, theories, and models
B. The ability to use economics to make reasoned assessments of public policy issues
C. The ability to formulate and test questions/hypotheses in economics
D. The ability to identify, access, and use appropriate information including data and published economic research
E. Analytic and quantitative skills
F. Written and oral communication skills
The Fall 2011 syllabus for Econ 200 set the following objectives: Microeconomic theory focuses on interactions among firms, households and government as buyers and sellers and (in the last case) regulator. By the end of this course you will master the construction of those theories using (primarily) three analytical tools:

- Constrained optimization – pursuing goals subject to limited resources
- Equilibrium analysis – characterizing outcomes in which no agent has an incentive to seek change
- Comparative statics – how equilibrium outcomes respond to changes in one or more starting conditions

This maps tightly with expectation (E) above, but has not been, but ought to be, linked effectively with (A) and (C)

Learning Strategies

David Ross proposes to follow an increasing number of our physics colleagues in experimenting with the flipped classroom/peer instruction as a method for enhancing mastery of threshold concepts in Intermediate Microeconomics (Econ 200). The essence of the approach is to shift much of the derivation of theoretical results and exposition of analytical tools (through reading, on-line lecture, and interactive modules) to preparation time before class; and to use time in the classroom to help students articulate solutions to concept questions like the elasticity question above.

On-line blended learning techniques allow one to assess student comprehension of the readings and videos to plan classroom activities “just in time” to meet the needs of the students. The majority of class time is spent in think-pair-share engagement among different groupings of the students, with the instructor acting as coach rather than expositor. For the purpose at hand, the key is to shift the focus from mastery of tools to developing a level of comfort with the concepts underlying the use of the tools.

The success of this flipped classroom approach in raising student mastery of threshold concepts has been documented in physics instruction by Eric Mazur and others. David will apply this approach starting with Econ 200 this spring. He is supported in this effort by his participation in several threshold concept seminars and other activities sponsored by the Teaching Learning Initiative.

Completing the Loop

David’s leave pattern offers something of a quasi-experiment for evaluating this approach, since he expects a visitor (or Vlad Kontorovich at Haverford) to teach a more conventional version of the course during his next sabbatical leave.
The first step in the project will be to create the first draft of a concepts inventory to use as pre- and post-tests of the mastery of underlying concepts covered in Econ 200 (important to the goals of the major and integral to what it means to think like an economist). This will be administered at the start and end of the spring semester and (with minor modifications) in subsequent terms to assess the effectiveness of changes made to the course. Such inventories are widely accepted in physics and some other fields, but are lacking in economics. David will draw on questions from the *Test of Understanding of College Economics*, AP exam and GRE.

Administering the concepts inventory at beginning and end of the next few semesters of Intermediate Microeconomics will be the primary assessment vehicle. It would also be worth considering administering the inventory to senior majors and to recent graduates. The new approach should also improve performance on a standard course final exam. Ideally, the approach should also lead to noticeable improvement on the senior seminar assessment rubric.
Appendix C

Disciplinary Writing in Economics

The learning objective we plan to assess in our annual report to the Provost:

- Structure an analysis that relates a thesis or claim to relevant economic theory that is supported by evidence

We will focus on these primary elements

<table>
<thead>
<tr>
<th></th>
<th>Exceeds Expectations</th>
<th>Proficient</th>
<th>Developing</th>
<th>Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear thesis</td>
<td>Clearly and concisely makes a claim that is controvertible (testable)</td>
<td>Easy to identify a thesis statement</td>
<td>Analysis is relevant to a discernible claim</td>
<td>Analysis lacks a primary focus</td>
</tr>
<tr>
<td>Linked to Relevant Economic Theory</td>
<td>Organization of ideas flows logically from the underlying economic theory</td>
<td>Correctly presents theory relevant to claim</td>
<td>Theory partially developed or of at least limited relevance to claim</td>
<td>Linkage between incompletely developed theory and thesis difficult to discern</td>
</tr>
<tr>
<td>Supported by Evidence (primarily empirical)</td>
<td>Sophisticated application of hypothesis testing or other quantitative analysis to appropriately selected and organized data</td>
<td>Correctly interprets application of an appropriate statistical technique to relevant data</td>
<td>Limited application of an appropriate statistical technique to data with some relevant variables</td>
<td>Inappropriate or incorrectly applied quantitative analysis using data of limited relevance</td>
</tr>
<tr>
<td>(primarily literature-based)</td>
<td>Correctly and succinctly summarizes findings of multiple relevant high quality sources</td>
<td>Identifies conclusions from appropriate sources that logically support claim</td>
<td>Identifies and partially summarizes a subset of sources relevant to claim</td>
<td>Few sources of limited quality, only peripherally relevant to claim</td>
</tr>
</tbody>
</table>

and discuss success in these secondary elements.
<table>
<thead>
<tr>
<th>Context</th>
<th>Exceeds Expectations</th>
<th>Proficient</th>
<th>Developing</th>
<th>Weak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Motivates by linking research question to literature or policy debates</td>
<td>Explains why a problem, question, or issue is worth pursuing</td>
<td>Provides partial motivation for problem, issue or research question</td>
<td>Analysis lacks focus or motivation</td>
</tr>
<tr>
<td>Citations</td>
<td>Appropriately applies citation style in text and bibliography without distracting from the flow of the analysis</td>
<td>Consistently applies citation style in text and bibliography</td>
<td>Incorrect citations are complete enough to locate sources</td>
<td>Acknowledgement of intellectual debts insufficient to distinguish among or verify accuracy of sources</td>
</tr>
<tr>
<td>Audience</td>
<td>Establishes direct rapport with and holds interest of target audience</td>
<td>Appropriate awareness of audience familiarity with topic and analytical framework</td>
<td>Assumes too little or too much familiarity with topic and analytical framework</td>
<td>Writes with little awareness of the needs and capabilities of target audience</td>
</tr>
<tr>
<td>Conclusion</td>
<td>Compelling summary of claim and supporting logic</td>
<td>Summarizes evidentiary case for the claim or thesis</td>
<td>Restates thesis and partial reference to theory and evidence</td>
<td>Fails to reinforce case for claim</td>
</tr>
</tbody>
</table>

Faculty in each senior research seminar will apply the rubric to the final drafts of the student research papers, completing an evaluation form for later review. We will collect and store the completed forms on the secure department server.

This process will supplement the usual evaluation or grading of student work in the senior seminars.

During a department meeting in May, each seminar instructor will review the rubric assessments from their seminar with the group. We will brainstorm changes we might make to our writing intensive electives and senior research seminars to address identified weaknesses in student writing.