The Capstone Experience – where it fits in the curriculum, and alternative forms

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Introduction

What is the place of the capstone in the Economics curriculum? And if a department decides to offer a senior capstone course, what is the best way to run it? This paper will explore both of these questions, and will discuss how the capstone course is presented at Pacific Lutheran University. In addition to considering the course itself, we will also discuss the changes we have made in the course and in the Economics curriculum to ensure that (almost all) students are able to successfully complete the capstone.

We will assume that the senior seminar is designed to help students make sense of their economic education, and bring together many of the ideas they have explored, through in-depth study and work on a topic of their choosing. We acknowledge the critique given in Colander (2006) that this work requires great motivation on the part of the student, and also a great deal of effort on the part of the faculty member teaching the course. However, we reject as unrealistic Colander's claim that the capstone should allow students to tie together the pillars of microeconomics, macroeconomics and statistics. Indeed, very few academic economists can claim that their work ties these three pillars together, which suggests that only Nobel laureates and principles textbook authors produce a "capstone" in their careers as economists. Thus, given the merit of the senior seminar (whether or not one wishes to call it a capstone), this paper will describe our experience in implementing such a course, and the effect that it has had on our economics curriculum, as success in the seminar requires that students begin preparing for the experience in the courses leading up to the capstone.

Section 2: Literature Review

The question of a capstone has been addressed in a large number of articles. Among these are Colander and Holmes (2006), who suggest that the capstone course does not belong in the general undergraduate economics curriculum, because producing a piece of original research is beyond all but the brightest, graduate-school bound students. For most students, they say, the exercise of producing a piece of non-trivial research is simply too difficult, or risks being so simplistic as to be useless to both the profession and the student. McElroy (1997), on the other hand, notes that a writing project, if clearly specified, benefits students by facilitating active learning and reflection. Economic reasoning can be enhanced through writing exercises, according to McElroy, because such assignments require students to be clear and think through their arguments, and to revise those that do not stand up to scrutiny. This benefit accrues directly to students, but indirectly to faculty teaching such courses. He further states that a correctly-designed senior seminar (note the absence of the word "capstone") can capture these benefits.

Elliott, Meisel and Richards (1998) point out that the senior project need not include original work. The benefits of the "capstone" experience, including the experience gained through writing and revising, can be gained through a guided exploration of a well-known economist's body of work, as well as through the production of original research. They suggest that one format the capstone could take would involve the production of a literature review on a particular topic, or of a particular economist.

An alternative approach to the capstone and how the economics curriculum can be structured around it is given by Carlson, Cohn and Ramsey (2002), who explain how the economics department at Illinois State University used the five "proficiencies" first described by Hansen (1986) to restructure their curriculum around a new capstone experience. These proficiencies provided the department a way to revise their curriculum and move students in a more directed way through the major and toward creation of new knowledge (Hansen's fifth and highest-level proficiency). While this paper reports on a revision of our economics curriculum, the restructuring of existing classes has been in assignments used to build the specific skills students need to successfully complete the capstone, and (we believe, and our students tell us) to succeed in the workforce. While similar to tasks designed around particular proficiencies, we have in mind changes that are more directly related to particular skills and activities required for success in the original research required in the capstone.

It has been reported by Becker (1997) that economists tend to use "chalk and talk" teaching methods, with undergraduate classrooms dominated by lecture and examination. He further claims that until recently, too little attention has been paid to economic education, with the major emphasis of academic economists being on research and publication. The contrast with other social scientists is striking, with the American Psychological Association organizing a national conference on undergraduate education (www.apa.org/ed/), the American Historical Association website noting that "[t]he American Historical Association has a long-standing commitment to teaching and history education at all levels…" (from www.historians.org/teaching/index.cfm), and the American Political Science Association website providing links to seven journals on teaching of political science. Until recently, conferences on economic education have been rare, and participation by undergraduates in economic conferences (with the exception of the American Agricultural Economics Association undergraduate paper competition) is even less common. The capstone experience can, we believe, prepare undergraduate economic students to tackle research problems and produce work that could be presented at scholarly conferences, as well as help them develop skills in writing, thinking, working in teams and presenting that they will use no matter what they do after completion of their bachelor's degree.

Before moving further, it might be useful to describe how we view the capstone. At our university, the economics capstone is a one-semester course in which students produce an original research paper on a topic of their choosing. There is no expectation to bring the three pillars of economics (micro, macro and statistics) together into a cohesive whole; further, a simple review of existing literature or of the writings of a single author are not deemed adequate. We expect that capstone students will make an original contribution to the field in which they are writing. Students are allowed (and encouraged) to write on any topic they choose, subject to the restrictions described below, and papers on a wide range of topics have been produced. In brief, the capstone is a student-directed research project utilizing production inputs such as peer and 'faculty-friend' feedback; 'an opportunity to apply economic theories to personal interests'; and a process which requires a community of scholars willing to think critically. In stark contrast, it is not a summary of literature nor a culmination of the broad set of concepts learned throughout their economics education. Most importantly, we have found that the

capstone experience is a peer-oriented, process-oriented exercise in which students learn actively alongside their peers.

The remainder of our paper is organized as follows: Section 3 gives an outline of the way the course is currently run and how it has changed over time. Section 4 describes some of the disadvantages to the current capstone structure, and also lists issues that remain to be resolved in the course. Section 5 considers changes that have been made in other courses in the economics curriculum to give students guided practice in the various skills needed to produce a capstone paper. Section 6 concludes.

Section 3: Running the Capstone Course

Prior to 2002, our capstone course was a standard course in the history of economic thought. The department believed that this background information on the development of economic theory as it is currently taught gave students a way to understand all of the courses they had taken for the major. In 2002, when one of the authors took over teaching the capstone, the department decided to move in a new direction, and use the course to help students create original work that contributed to the literature in some field of economics. This meant an extensive revision of the course and the way it is run.

From the beginning, it was clear that the process of creating an original research paper was going to have to be broken down for the students. For almost all of our students, this project is their first attempt at independent research. In 2002, the capstone was the first exposure to original research for many of our majors (this has since changed, as discussed in the following section). In the first two years, the milestones along the way consisted of drafts of the entire capstone paper, with comments from all classmates and from the professor on every draft. We now use a slightly different format, with different emphases at each deadline. The approach is very similar to the one described in Greenlaw (2005).

The first two weeks of the semester are spent in choosing and narrowing a topic. The first class starts with a mini-lecture on what makes a good research question, and then students are put in groups, with all members of each group taking turns describing their area/topic/question. The goal of these first few meetings is to brainstorm questions that could arise from a student's area of interest, and to begin to consider sources from the literature that have addressed that area. These discussions take up to three class periods, with groups being reformed as topics/questions change. During these two weeks, students also frequently make appointments with the professor to get one-on-one help in topic selection and question narrowing. This may be the most crucial time in the semester, as getting to the right question early gives students more time for the rest of the project, and a student who chooses the wrong question (or no question) can spend a month researching something only to have to change topics mid-semester.

At the end of the second week, students turn in a proposal. This is a short (one-paragraph) description of the research question, and why it is interesting. To make sure that students check to see if their question is feasible, and to move them into the literature review, we require that the proposal contain three sources. The objective of this deadline is to force students to focus on choosing and narrowing a topic, and to force them to start writing early in the semester. They are also required to comment on the proposals of others in their peer group. In order to encourage the students to take this seriously, the

class receives a short lecture on what makes a comment useful (and not so useful), and these comments are graded by the professor.

Once topics and questions are selected, the professor forms peer groups of two or three students, and assigns a faculty mentor to each student. The peer groups are organized by subject area, so that (for example) students writing on natural resources are grouped together and students working on theoretical topics are grouped together. These groups are never perfect, as some students choose a topic that is not particularly close to anyone else's topic. Sometimes these orphan topics are put together, and sometimes they are split between groups that have stronger members.

Each student is also assigned a faculty mentor, and encouraged to visit that mentor as they begin their literature review. The mentor's role is to help the student refine their question (if it needs refining), and to give the student one or two papers sources to get them started on reviewing the literature. There is no specific requirement to visit the mentor's office, but students are required to obtain mentor "approval" later in the semester, and are warned that it is a good idea to see the mentor before this deadline.

The rest of the first half of the semester is devoted to reviewing the literature. The class meets once per week, to check in, and to receive mini-lectures on how to find sources, how to decide if an article is useful or not, and how to preview an article before reading it completely. The goal here is to help students find and digest a fairly large number of articles quickly. Most of them are also looking for a particular model that they can modify and apply to their question.

The other first-half deadline is for the paper outline, which contains an introduction (probably the slightly revised proposal), a rudimentary literature review, and possibly the beginnings of a model presentation. The outline must contain five sources (although ten would probably be better), and be as complete as the student can make it. These are graded by the professor but do not receive comments from the peer group. In addition to grading, extensive feedback is given by the professor on the format of the outline, and the quality of the sources.

During the second half of the semester, students continue their literature review, and move into presenting their models or analyzing their data to address their research question. This poses some challenges for the students, as many of them have little practice in creating economic arguments (having only consumed them in other coursework) and overcoming the inevitable obstacles that arise. In fact, one of the most common jobs the professor has during this part of the semester is helping students see that changing questions would probably leave them worse off than sticking with the one they already have. This requires a fairly firm hand, as most students have limited experience sticking with a single less-than-perfect question through an entire semester.

The next deadline is of the draft, which is a complete (though possibly rough) version of the final paper. This draft is due five weeks before the end of the semester, as students need to have time to read and comment on their peers' work, and faculty mentors need to have time to read and "approve" the draft. The professor, while grading drafts, does not give extensive comments, as this can lead to bias in grading the final paper. Instead, students are expected to give substantial comments on each other's work, and are expected to respond to the comments received in the final version of their paper. These comments are posted in an online discussion board that can be viewed by all faculty and the class members. Public posting of comments online (on a course website)

has greatly improved their quality, as stronger members of the class tend to post early and set a high standard for other students to follow.

Faculty mentor approval does not receive credit, but is required one month prior to the end of the semester to pass the capstone. As none of the faculty has expertise in all fields of economics, we rely on each other to determine whether the students have all the pieces they need in their papers, and whether they have found the key papers that address their question. Students tend to take this requirement seriously, as they are presenting their work not simply to the professor organizing the course but to another faculty member who is an expert on their question. While the vast majority of students receive mentor approval, there are one or two each semester who do not manage to produce an acceptable draft in time. These students receive either an incomplete or a failing grade.

Once comments on the drafts are written, attention turns to the final presentation. The last two weeks of the semester are devoted to final presentations, with students expected to give a 15-20 minute talk about their research and answer questions from their classmates, the professor, and other economics faculty members. Most students use power-point in making their presentations, and examples are given on the course website of good presentations. The schedule is set so that most or all of a mentor's students present on the same day, making it easier for mentors to see all of their students.

Finally, the completed paper is due (electronically) on the date the final would be given. Because there is a course website, copies of earlier drafts and peer comments are already available, and need not be attached to the last draft.

Section 4: Learning Goals/Adjusting the Curriculum

The primary motivation to the development of our capstone as currently constructed was the realization that several learning goals could not be met through changes to other courses. The following outlines learning goals primarily acquired in the capstone course as well as those developed through changes to other courses as well.

Within the capstone course itself, students (1) engage in the application of economics to an area of personal interest, (2) develop skills in clearly defining a problem or research question, (3) 'take an idea, theory, or question from conception to proof of concept and beyond', (4) incorporate feedback to refine scope of work & articulate ideas more clearly, and (5) gain appreciation for the application of economics to a wide array of topics. By developing a topic within nearly any field, students are free to explore questions first considered in a field class or those inspired from other sources. While a double major in mathematics and economics wrote on proofs and their applications in "A Review of Arrow's Possibility Theorem: Its Applications in Various Social Orderings", a double-major in history and economics considered "Nazi Economic Policy and International Labor Mobility: An Analysis of the Conflicting Plans of Albert Speer & Fritz Sauckel." The process used to narrow the scope of the research question through topic selection and peer-feedback is painful for many but highly fruitful for all but a few. Taking an initial idea through many benchmarks to create a well-argued and well-written thirty to forty page paper, we believe could only be achieved within a capstone course itself. The transparent student comments in online discussions serve to elevate not only the students' own work but their consideration of others' as well. Student evaluations continue to confirm that the experience cannot be matched in other courses. Finally, the sheer scope of topics produced in a given class exposes students to the breadth of

economics not typically available within a single field class. A highly diverse set of final papers serves to enhance this learning goal.

In order to support a quality capstone, those learning goals shared in other classes are important as well. We set out to (1) prioritize relevant literature and synthesize major conclusions, (2) 'be challenged to manage one's time…', and (3) refine oral & written communication skills. While we seek to achieve these goals in the capstone, we also have sought to modify the students' other courses to improve their preparation for the capstone. More economics writing and presentation has been incorporated into other courses which may focus on different elements. For example, several field courses now require oral presentation of articles, while others focus on refined methods to synthesize literature. While it is our goal that the student enter the capstone with sophisticated time management skills, we often hear that students consider the capstone experience to be the cornerstone of their collegiate experience in which to acquire this skill.

Section 5: Remaining Issues (Some resolvable, some not)

Two sorts of issues remain in the capstone. One sort is resolvable (similar to risk), while the other is not (similar to uncertainty). The resolvable problems include generating accurate student expectations about what the capstone is and how much time and effort it will take. Intermediate microeconomics students, when asked, thought the capstone was the course in which they would bring together all of their learning into a single research project. They also anticipated spending approximately four hours per week on the project. Students currently enrolled in the capstone stated that they had spent six hours per week (on average), and alumni of the program stated that they spent ten hours per week on average. Both currently enrolled students and alumni had a clearer understanding of the capstone as revolving around a single area within economics, and they also seemed to have a better grasp of the class as a PROCESS, rather than content that the teacher provides them. Helping students see the capstone as process, not content is an issue that we will be working on in the future.

The issue of what it means to choose and develop a research question is another area where student expectations do not tend to match reality. Many students complain that their work is not "original" or that their research has already been done by someone else, without seeing that their contribution lies in applying a pre-existing model to a new field. Student proposals often state that the research will develop a new model of (your major issue here), something that has yet to be done although the field has been well-explored by many experienced practitioners. Getting students to scale their expectations to a manageable level is the task of the first part of the semester, but it would be helpful if this task were done before students arrive in the capstone course. One of us gives out (in jest) the "you're going to write a seven-volume set for your capstone" award to a student every semester.

The other main fixable issues are class size and scheduling. For the level of support that is necessary for a credible capstone, smaller class sizes are mandatory. We find that between ten and twenty students makes an ideal capstone. Any fewer and there are not enough students to put into similar peer groups. Any more and the professor is overwhelmed by reading and commenting on drafts. We find that at PLU, we have enough economics majors to offer the capstone three semesters out of every four.

The three-semesters-out-of-four schedule raises another set of problems. Since we have a one-semester capstone, the course is either offered in the fall or spring semester (or both). The advantages to offering the capstone in fall are that students have time to receive an incomplete and still graduate in the spring, and that "senioritis" does not tend to set in until after spring break. In addition, the extra post-capstone semester to edit and revise is extremely useful for capstone papers that are submitted to conferences or competitions. The disadvantage to a fall capstone is that students do not have as much time for field courses, econometrics in particular, and are thus not able to successfully generate as wide a variety of capstone papers. For late converts to economics (those declaring the major in their junior year), this can be especially burdensome.

There are some issues that cannot be fixed, but depend on a particular type of department structure. All members of a department must be willing to spend time mentoring, which involves a significant contribution at both the beginning (literature review) and end (mentor approval) of the capstone. A degree of collegiality is also necessary for the capstone to work, as the professor will be assigning students to faculty mentors based on interest and sometimes ability of the student (or the mentor), and as it is usually necessary for professor and mentor to discuss problems that particular capstone students encounter. In the capstone, more than for other courses, egos must not get in the way of helping students through a research project. A split department, or one in which not all faculty members are willing to accept their responsibility to capstone students would make this sort of undertaking extremely difficult.

Along this line, it is imperative that mentoring count toward tenure and promotion. Junior faculty tend to make very good mentors, as they are often closer to a major research project (the dissertation) and can thus give students better feedback and more current literature to review. But it must be recognized that time spent on mentoring is time not spent on research or teaching, which can be costly to pre-tenure faculty.

Another issue to be aware of is the variety of fields a given department can support. Our department, for example, would have trouble supporting a student in behavioral economics or in public finance, as none of us has particular expertise in these fields. This may not preclude a strong student from writing in the field, but the capstone professor (and potential faculty mentors) needs to be careful in helping students choose topics with which some member of the faculty can assist. Smaller departments than ours (seven members) will need to be even more careful in limiting topic choice to areas of faculty expertise or interest.

Section 6: Conclusion

In summary, whether a capstone experience is preferred for the undergraduate major may depend largely on its construction and implementation. In an economics department with a strong commitment to undergraduate teaching, with sufficient breadth of faculty members' expertise, and with relatively small classes, a capstone project can be highly beneficial. We have found that with faculty responsibility spread across the department and with student peer groupings and feedback, students have been able to produce high quality work, including papers that were the precursors to two Fulbright awards, for example. With particular learning goals, such as how to refine a topic for consideration, and how to apply an economic model to a new question and articulate it effectively, a separate course was warranted. Further, modifications to existing courses

serve to enhance preparation for the capstone research. While certain challenges of the capstone may be remedied through thoughtful scheduling and credit to tenure-track faculty, other challenges remain. The most serious of these for other departments to consider may be the necessary condition of department collegiality. In sum, we continue to explore and refine the process of teaching undergraduate research in the capstone at Pacific Lutheran University and believe its current construction as an active learning experience rewarding to our students and faculty members alike.

Bibliography

Becker, W.E. "Teaching Economics to Undergraduates" *Journal of Economic Literature* 35 (1997): 1347-1373

Carlson, J.L., R.L. Cohn, D.D. Ramsey "Implementing Hansen's Proficiencies" *Journal of Economic Education* 33 (2002): 180-191

Colander, D., Holmes, J. "A Capstone Course in Economics: To What, and For Whom?" in Colander, D. *The Stories Economists Tell* (2006) New York, McGraw-Hill Irwin

Elliott, D., J. Meisel, W. Richard "The Senior Project: Using the Literature of Distinguished Economists" *Journal of Economic Education* 29 (1998): 312-320

Greenlaw, S. *Doing Economics* 2005 New York, Houghton Mifflin Company

Hansen, W.L. "What Knowledge is Most Worth Knowing – For Economics Majors" *American Economic Review* 76 (1986): 149-152

McElroy, J. "The Mentor Demonstration Model: Writing with Students in the Senior Economics Seminar" *Journal of Economic Education* 28 (1997): 31-35