LESSONS LEARNED FROM A COURSE-EMBEDDED ASSESSMENT PROCESS: FOREIGN EXCHANGE MARKETS IN PRINCIPLES OF ECONOMICS

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Abstract

This paper details a dynamic process of course-embedded assessment of student learning about foreign exchange markets. Three iterations of the assessment have occurred, and modest improvements in student outcomes are demonstrated. The process reveals the apparent difficulties that students face with using a demand and supply model to analyze changes in foreign exchange markets. In addition, faculty discussions have informed changes in both teaching and assessment techniques.

Key words: assessment; foreign exchange; principle of economics

JEL Classification: A22

Introduction

At its best, assessment of student learning is a dynamic process used to promote continuous improvement. Besides validating effective pedagogy and increasing student learning, assessment in introductory economics courses may perform several other important functions. As a prerequisite for many downstream courses in economics and finance, it is imperative to demonstrate that learning outcomes are achieved in the principles of economics course. In addition, many introductory economics courses reside in the general education programs of their institutions, and documentation of the courses' contributions to programmatic goals may be necessary. Finally, if the economics coursework is completed in a business college that is accredited by AACSB International, assurance of learning must be documented for the program outcomes. As part of the core curriculum, principles of economics courses contribute to these overall goals.

Barbara Walvoord (2004, p. 2) defines assessment as "the systematic collection of information about student learning, using the time, knowledge, expertise, and resources available, in order to inform decisions about how to improve learning." In general, successful assessment includes the definition of goals or outcomes, the gathering of evidence of student learning and the subsequent use of that information to improve future student learning (Walvoord 2004). Both direct and indirect assessment approaches may lead to improvements in learning. Direct assessment techniques evaluate actual student work (such as papers, exams, or presentations); while indirect approaches evaluate students' beliefs or perceptions about their learning (Maki 2004; Walvoord 2004). There are advantages and disadvantages to each approach, and a myriad of techniques can be used to implement them. However, many accrediting institutions emphasize the need for at least some direct measurements of learning within courses and programs. For example, in 2003 AACSB International revised its assurance

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of learning standards to mandate direct assessment, and stated that indirect measures could not be substituted (AACSB 2007).

Direct assessment is most commonly implemented through either course-embedded assessment or standardized exams. Course-embedded assessment uses the student performance on assignments or exams that already occur within the curriculum to indicate achievement of objectives, while standardized exams rely on an external source to measure performance. In economics, the most common standardized assessment instrument is the Test of Understanding of College Economics or TUCE, which is available through the Council for Economic Education. The TUCE, first developed in 1975, is currently in its fourth edition and has two main objectives (Walstad and Rebeck 2008). The first is to offer an assessment instrument for both the principles of macroeconomics and microeconomics courses. The second is to provide norm-referenced data for comparison to a national sample. In the principles course, it is often used in a pretest and posttest format to demonstrate value added. Recently, the TUCE has been used as an assessment instrument to satisfy the AACSB International assurance of learning standards for accreditation (Doyle and Wood 2005; Breslawski 2008) and for other accreditation agencies (Balassi 2010). The current version of the TUCE consists of 30 multiple choice questions each for microeconomics and macroeconomics. Each test has six content categories.

Despite the wide use of the TUCE, it has been criticized (Walstad 2001). While it may satisfy assessment standards for an outside accreditation agency, it may not provide adequate feedback to instructors for improvements in teaching and learning, especially when the course objectives are different from the content categories in the TUCE. In this sense, the TUCE is more summative than formative, making it difficult to use the TUCE to improve the quality of student learning. Nonetheless, the TUCE may help to target areas for evaluation with course-embedded assessment. In this way, standardized tests and course-embedded assessment can function as complements.

Course-embedded assessment is integrated directly into the curriculum. In the specific application described here, a classroom activity focusing on a narrow set of learning outcomes about foreign exchange markets is evaluated for student learning. Embedding assessment in the course has some clear advantages over standardized exams, and has been viewed as an improvement over past approaches in the assessment of general education courses (Gerretson and Golson 2005). Course-embedded assessment has also been used to document assurance of learning in colleges of business accredited by AACSB International (Ammons and Mills 2005). Because the assessment focuses on student learning outcomes which are defined by faculty, not an outside agent, there is no disconnect between what is taught and what is assessed. In addition, when the assessment is part of curricular materials, faculty are less likely to feel that assessment is an additional burden in terms of time and effort. As a result, the assessment may be more likely to lead to tangible changes in teaching pedagogy that will improve student learning. Finally, if the assessment results will be used to demonstrate a contribution to programmatic outcomes, course-embedded assessment can be closely align with the core mission at a teaching institution.

Despite the desire to improve student learning, there are several aspects of assessment that many instructors find objectionable and may cause a considerable amount of resistance. The primary driver for assessment often comes from outside the department, such as an accreditation agency. Imposition from outside brings with it inherent resistance. The second aspect is that the learning curve for designing assessment processes is steep and long, especially for course-embedded assessment. Instructors may need to cycle through numerous iterations of assessment

before the process yields the understanding that they seek. Finally, instructors may be surprised or disappointed by the results of the assessment process. This can be very discouraging during the initial iterations of assessment. This paper details the dynamic process of course-embedded assessment and how it can successfully drive productive discussions about student learning.

The Assessment Process in Principles of Economics

For a decade and a half, assessment in the principles of economics in the Economics Department at the University of Wisconsin – La Crosse (UW-L) used an internally developed multiple-choice test in a pretest and posttest format. The test covered generally accepted content areas in the courses. The process was static and there was little systematic consideration of the results. Although the test provided some feedback on what students had learned, it was difficult to use the results to improve learning, in part because the content was not associated with clearly defined learning outcomes.

In ensuing years, learning outcomes were written and periodically revised for both the introductory micro- and macro-economics courses. The revisions have addressed changing content in the courses, such as an increased emphasis on long run economic growth in macroeconomics. The outcomes are clearly worded to reflect what a student will be able to do, rather than what the faculty will cover in the course. The development of course learning outcomes is an essential first step in the assessment process.

At UW-L, both principles of economics courses reside in the General Education Program (GEP). Beginning in the fall of 2008, each course in the GEP was required to complete a course-embedded assessment to evaluate one of the General Education outcomes. This was a direct result of recommendations by the North Central Association of the Higher Learning Commission, the accrediting agency for UW-L (General Education Task Force 2007). To fulfill this requirement for the Principles of Macroeconomics course, the Economics Department decided to assess student understanding of foreign exchange markets and changes in currency prices. This content area was identified by instructors as one with which students struggled. While the economics faculty had participated in intermittent, ad hoc discussions about how to present foreign exchange markets, the conversations had not been structured around an effort to discern the issues with student learning. Still, several tentative issues had surfaced. The first was that although students demonstrated basic graphing skills, they might not be able to apply those skills to interpret a demand and supply model. The second was that prior exposure to the demand and supply model may have been insufficient for students to successfully apply it to an understanding of foreign exchange markets. At UW-L, foreign exchange markets are addressed primarily in the principles of macroeconomics class. There is no sequencing requirement that would place students in microeconomics prior to macroeconomics, thus giving students increased familiarity with the basic model.

Besides addressing an area of student learning about which faculty were already concerned, applying course-embedded assessment to student understanding of foreign exchange markets allowed the department to assess both *course* and *program* outcomes. One of the objectives of the Principles of Macroeconomics course is to "use the market demand and supply model to predict changes in currency prices." In assessing this objective, the UW-L GEP outcome of "construct and use models to analyze, explain or predict phenomena" was also addressed. The assessment also measured learning with respect to the College of Business Administration's undergraduate global competency outcome.

To meet the General Education assessment requirement, the Economics Department developed a common task to be delivered across all sections of macroeconomics taught by all instructors. The task had to adhere closely to the course outcome and explicitly address the General Education outcome. The initial task had three sequential parts of increasing difficulty: 1) students must draw and correctly label an equilibrium in a foreign exchange market; 2) students must identify the changes in the market when consumer preferences change by appropriately shifting a demand or supply curve; and 3) students must identify a scenario that would result in an appreciation or depreciation of a currency. These steps capture the elements found necessary to demonstrate understanding of the course objective. See Appendix 1 for the task in its entirety.

Besides the common task, there were common administration details for faculty to follow. These included the timing of the exercise, incentives for students to complete the task, and the protection of the task so that it did not circulate among students. These details are also included in Appendix 1.

Finally, the faculty developed a rubric with which to assess student performance. The decision was made to follow the hierarchical nature of the task by designing a rubric that specified hierarchical levels of performance. This loosely followed Bloom's taxonomy, moving from knowledge to application and analysis (1956).

The most controversial part of the rubric design was the first step: that the axes of the demand and supply model must be labeled correctly. If students were unable to correctly label the axes of their graph, the work was deemed "unsatisfactory", and was not considered further. The controversy concerned whether or not a student could "construct and use" the model if they did not know what the axes represented. Although no consensus was reached, many of the faculty saw this skill as an essential element upon which the rest of the answer must be predicated. Additional levels of performance are explicitly defined in the rubric provided in Appendix 2. For a student to reach a particular level of performance, all previous levels had to be satisfied.

The rubric does not generate an overall "grade" for the assessment task. Instead, it indicates the highest bar to which a student performed. Put differently, instructors are able to identify the specific element of the task that prevented the student from progressing through the problem successfully. This approach provides a feedback loop to faculty identifying what students have failed to learn. This is different from assigning a summative grade for the completion of a task that can mask the individual elements that students do not understand.

At the conclusion of the semester, the results were compiled across all sections without identifying the results by individual faculty member. This kept the focus of the assessment results on student learning instead of faculty performance. If results are reported by faculty member, then an incentive exists for faculty to game the process for merit or retention purposes. The process emphasizes the participation of faculty in assessment activities as an essential contribution to the department.

Understanding the Initial Assessment Results

The assessment task was first administered during the 2008 academic year to 391 students across all sections of Principles of Macroeconomics. The results were distributed to the department, and a meeting was held to discuss the findings and consider alternative methods to improve learning. The faculty found the results presented in in Table 1 unacceptable. Nearly half of the students had difficulty getting past the first level in the rubric, because they were unable to correctly label the axes of the graph. Interestingly, over half of the students of one instructor received unsatisfactory scores because the graphs were not labeled correctly, but many of these same students drew an appropriate shift of the curve in the second step. Other students could articulate a response to the question in a text format, but were unable to draw a graph to illustrate the solution they described. This prompted discussion about whether students can to fail to understand the use of the *model* to explain changes in exchange rates, but still intuitively understand exchange rate fluctuations.

Table 1: Initial Results from Foreign Exchange Markets Assessment Task (2008)

Rubric Category	Total number of students N = 391	Proportion of all respondents
Unsatisfactory	182	.47
Underdeveloped	87	.22
Competent	46	.12
Proficient	31	.08
Exemplary	45	.11

The initial poor performance of students on this assessment task was a surprise. Most instructors taught the topic as an extension of the demand and supply model and thought that students would be able to move from the depiction of a product market to the foreign exchange market. This expectation may not have been met because the prior knowledge was insufficient (Ambrose et al. 2010). This is possible since the curriculum at UW-L does not require the sequencing of principles of microeconomics before macroeconomics, which would increase exposure to the basic demand and supply model.

The results also seem to demonstrate students' difficulty with transfer of knowledge of the demand and supply model from one context to another. Willingham (2009, p.99) explains this by arguing that when we learn something new, our "background knowledge will … shape how you interpret what comes next". If student understanding of the supply and demand model was "surface structure" (Willingham 2009, p. 98), then students may fail to see that the application of the demand and supply model in the foreign exchange market is similar to the application of the demand and supply model in a product market.

Discussions about the results revealed that there were significant differences among instructors in how this material was taught. The differences included: using a graph of both currency markets involved in the exchange versus only one market; discussing examples versus illustrating examples with graphs; using group versus individual active learning activities; and incorporating exchange rates into other topics in the course versus covering exchange rates as a self-contained unit at the beginning or the end of the course.

The timing of the assessment task relative to course coverage may also have contributed to the poor outcome, indicating student difficulty with retaining knowledge about the model. In

this initial administration of the assessment task, most of the instructors addressed foreign exchange markets early in the semester, immediately following their coverage of the supply and demand model. The assessment was delivered during the last three weeks of the semester. The results may indicate that students never generated long-term memory for explaining the fluctuations of foreign exchange markets. Willingham (2009, p.61) concludes that "memory is the residue of thought" and without repeated opportunities to think about the implications of exchange rate markets, students do not exercise enough thought to retain the essential concepts.

Another possibility is that the assessment task required students to construct a response rather than choosing from a menu of possible solutions as in a multiple-choice question. This may have been the first time that students were tested on this concept in this manner, as some faculty rely solely on multiple-choice exams. There has been considerable debate about the difficulty of multiple-choice versus constructed-response questions. Chan and Kennedy (2002) concluded that for some types of multiple choice questions, students perform better than if they had constructed their own answer. If that were true here, it would provide another explanation for the results. Specifically, if a multiple-choice question about exchange rates included a labeled diagram, students would never have had to create a figure on their own.

The faculty also considered that students might lack very broad skills that are essential to this learning objective, such as the ability to interpret graphical representations of data. Van Dyke and White (2004) studied students' ability to use graphs upon entering calculus or applied calculus at American University. Their findings indicated that students may not know how to read a graph and do not discern which aspects of a graph to focus on (Van Dyke and White 2004, pp. 42-43). This might explain students' shifts in demand or supply curves that had no logical connection to the problem, or why students that described the effect on the market accurately could not use the demand and supply model to articulate their results.

The results also prompted faculty discussions about the development of an assessment task and rubric that are hierarchical in nature. The task was written in such a way as to capture various levels of Bloom's taxonomy, and there was considerable agreement about this approach. The rubric design, however, immediately classified students as "unsatisfactory" due to their inability to label the graph correctly and disregarded the rest of their work. Consequently, other important information about student learning may have been lost. This is evidenced by the faculty's practice of generating two scores for the student work in this assessment task: a rubric score and a "grade" which accounted for other aspects of student performance.

Impact on Instruction

The discussion about student performance and improvements to instruction focused on several areas. First, faculty proposed spending more time presenting demand and supply as *a model* and emphasizing the relationships between variables in the graph. This allowed faculty to clearly articulate that labeling the axes of a graph is necessary to understand the subsequent changes in equilibrium price and quantity. One faculty member tried to demonstrate this by showing students a straight line with an inverse relationship between the x and y variable, and then asking students what the graph depicted. Most said that it was a demand curve, but then the instructor pointed out that it could be a production possibilities curve with constant costs. This demonstrated the point that labeling the axes mattered.

The most specific instructional difference about the presentation of foreign exchange markets that the department's faculty discovered was whether one or two currencies were depicted by the demand and supply models. Some faculty presented foreign exchange markets by

drawing the market for one currency and narrating the relationship to the other currency; others drew the currency markets for two countries side by side for every example. Sometimes the approach was influenced by the course text. Three different texts were in use during the initial assessment and each text used a different approach to drawing the demand and supply of a currency. The instructors who drew two corresponding markets felt strongly that this method was the most helpful for students and encouraged others to try this approach. Specifically, when drawing the exchange markets, students should consider why the *demand* for any currency might change and then the respective change in supply in the other currency market could be shown.

The other ideas discussed by faculty were less content-oriented and more about how the students encountered the material in the classroom. Most instructors provided active learning through in-class practice and/or homework problems. Some of these practice opportunities required individual work and others were group exercises. Although group or cooperative learning was seen to have an important role in learning about foreign exchange markets, free rider issues were also identified. This suggests that practice problems should include an individual element.

Repetition was also important. Several instructors chose to revisit foreign exchange markets at several points during the semester by looking at the impact that GDP, inflation, or interest rates had on the market. Others chose to move the coverage of the material about foreign exchange markets closer to the end of the semester. This meant that the material was covered closer to the completion of the task.

Subsequent Iterations of the Assessment Task

After the first year, the same assessment task was repeated in the 2009 academic year to see if the changes in instruction improved the outcome. The hypothesis was that with improvements in instruction that address students' learning difficulties, students' scores should improve. The results for 2009, found in the second column of Table 2, showed modest improvement. Two independent samples t-tests were run to determine whether the reduction in the proportion of students that scored unsatisfactory was statistically significant, and subsequently whether the reduction in the proportion of students that were unsatisfactory and underdeveloped was statistically significant. The change in the unsatisfactory category was not different, but the proportion of students in the two lowest categories combined was significantly less (Table 3). This suggests that while the changes faculty made did not impact the success of students in terms of labeling the axes of their models, there was movement into the "competent" range or above.

Table 2: Initial and Subsequent Results from Exchange Rate Markets Assessment Tasks

Rubric Category	Initial Results 2008 Total number and percent of all respondents N= 391		Results 2009 Total number and percent of all respondents N = 468		Results 2010 Total number and percent of all respondents N = 279	
Unsatisfactory	182	.47	198	.42	87	.31
Underdeveloped	87	.22	73	.16	65	.23
Competent	46	.12	46	.10	6	.02
Proficient	31	.08	40	.08	33	.12
Exemplary	45	.11	111	.24	88	.32

Note: In the fall of 2010, the final question of the task was changed, so that the categories of "proficient" and "exemplary" are not precisely comparable to previous years.

Table 3: Independent Samples Test Comparing Results by Year

	2008 vs. 2009	2009 vs. 2010
Proportion Unsatisfactory		
Mean Difference	.042	.111**
(Std. Error of Difference)	(.034)	(.036)
Proportion Unsatisfactory and Underdeveloped		
Mean Difference	.109**	.034
(Std. Error of Difference)	(.033)	(.038)

**Significant at .01 significance level

In fall 2010, question three in the task was changed. Questions 2 and 3 in the original task both involved shifts in demand or supply in foreign exchange markets. Since more students successfully completed both of these questions in 2009, the decision was made to change Question 3 to consider an implication of the foreign exchange markets. Specifically, the fall 2010 version of the task asked students to consider how a change in exchange rates affected net exports and aggregate demand. This means that the results reported in Table 2 for 2010 are not comparable to the categories of "Proficient" and "Exemplary" in 2008 and 2009. Nonetheless, changes in instructional strategies continued to show improvement as students moved up the levels of the rubric. Most notably, a statistically significant smaller proportion of students were classified as "unsatisfactory" (see Table 3).

Summary and Lessons Learned

Using the Demand and Supply Model to Teach Exchange Rates

The assessment process has revealed several things about the use of the demand and supply model by students. Many faculty involved in the discussion have seriously reconsidered what they thought their students understood, particularly when a graph is drawn to convey a concept. What is a highly functional and descriptive picture to us as economists, is clearly not so for many of the students. This realization has informed the teaching of many aspects of principles of economics, in addition to the specific case here. Since economists regularly rely on

graphical representations of decision-making and policy effects, they must be cognizant of the difficulty that students have with this visualization. In addition, the need for repetition and active learning opportunities has been reinforced. Free rider issues should be addressed by including individual learning activities as well as group activities.

At this time, no conclusions can be made about which of the specific pedagogical changes made by faculty was most effective. In order to make the burden of the assessment low and to avoid faculty concern about the use of the data for merit purposes, it was aggregated with no identification of students or faculty. A more thorough analysis would control for instructional method, instructor, prior knowledge of the student, and student demographics. As the department moves along the assessment learning curve, the collection of data can be refined to control for the different methods.

Course-embedded assessment process

For the principles course in economics, an assessment task designed with steps of increasing difficulty can take apart a complex task into its component parts and reveal where difficulties in student learning arise. This knowledge is essential for improving teaching and learning. Furthermore, the initial step(s) in the task can assess prerequisite knowledge or basic skills, especially math skills. Ballard and Johnson (2004, p. 21) found "that mastery of extremely basic quantitative skills is among the most important factors for success in introductory microeconomics". Thus, assessment of prerequisite knowledge is an important initial step in any course-embedded assessment.

On the other hand, a rubric that is hierarchical, or stops recording student performance when a step is not achieved, may result in the loss of important information. A rubric that evaluates and records performance at each step may be preferable. If a task or rubric does not fully reveal information about student learning, faculty should use this to inform further development of assessment tools. An essential aspect of the assessment process is to allow the task and rubric to evolve to better assess student learning.

The process followed in the principles course has influenced additional assessment activities within the department. There is increased recognition of the importance of defining student learning outcomes. In addition to revising the outcomes for the principles class, faculty have written outcomes for the department's intermediate theory courses as well. Since multiple instructors teach these courses, this effort to articulate course objectives drives discussions about common topics across all sections. The use of course-embedded assessment has had some traction because it allows faculty to create exercises that reflect the skill and/or content that they feel is important. This reduces, but does not eliminate, resistance to assessment activities. Further support for course-embedded assessment became apparent when the department used this approach to measure competency in the major for program assessment.

The nature of the discussion about learning has improved because of the *common* task and rubric. No time was lost discussing the exercises that individual instructors gave their students and then trying to determine where the content intersected. The common activity gave faculty a basis for discussion and the conversation that has occurred around this task has been lively and challenging. Explicit in the process was that student learning was being evaluated and not faculty teaching. This opened up the platform for discussions around teaching and learning. The discussions embodied the suggestion of Abrose et al. (2010, pp.112-113) to use discussions with colleagues to help faculty move past their own expertise and break a task down into the component parts that students need to understand. The course-embedded assessment process has

helped the participants do just that. The results of the assessment process show statistically significant improvements in student learning that can be attributed to identifying the challenges students face and making subsequent changes in pedagogy.

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Appendix 1. The Assessment Task (Initial and Subsequent Versions)

General Education Student Learning Outcome: 1.6 Construct and use models to analyze, explain or predict phenomena.

Economics Department Learning Outcome: Use the market demand and supply model to predict changes in currency prices.

Instructional Content and Administration: The content is based on the fundamental model used in economics – demand, supply and equilibrium. The application of the model includes a global focus, as the student must use the model to analyze and predict movements in the exchange rate, and subsequently consider the impact of exchange rates on trade.

Administration details:
- All instructors teaching ECO 1XX in the fall semester will administer the task.
- The identical task will be administered by instructors of the course during the last three weeks of the fall semester or during finals week to individual (not groups of) students during a class period.
- Some credit will be given to students as an incentive for participation.
- Instructors will not return the assignment after it is scored, so that no advantage is gained by students completing the task in a subsequent week.
- All tasks will be scored by the instructor of each class using the uniform rubric
- It is recommended that if an instructor teaches ECO 1XX only in the spring semester that the task is administered then.

Assessment Task:
1. Consider the Euro or U.S. Dollar market. The current exchange rate is 1.50 U.S. Dollars per Euro (or 0.67 Euros per U.S. Dollar). Graphically illustrate the exchange market and indicate the equilibrium exchange rate. Clearly label the axes and the curves.

2. Consider the following scenario: U.S. consumers' preferences change so that they prefer fewer European goods. Use the graph of the exchange market from question 1 to predict the change in the equilibrium exchange rate. Clearly label the axes and the curves.

3. Initial Task:
   Propose a scenario which would cause the U.S. Dollar to depreciate against the Euro. The scenario should be different from a change in U.S. consumers' preferences. Explain and diagram the exchange market to illustrate the depreciation. Clearly label the axes and the curves and be specific in describing the scenario.

3. Subsequent Task:
   Now consider a different scenario. Suppose the Mexican Peso appreciates against the currencies of its major trading partners. Holding everything else constant, what do you expect to happen to Mexico's net exports over time and why? What is the impact on Mexico's aggregate demand from this change in net exports?

Appendix 2: The Common Rubric for Evaluating Student Performance

Performance Level	Criteria and Standards
Unsatisfactory	For question 1: axes or curves on diagram are not drawn or labeled correctly.
Underdeveloped	For question 1: axes of diagram for question 1 are labeled correctly; and demand and supply curves are correctly drawn and labeled; and the equilibrium exchange rate is correctly indicated and labeled.
Competent	For question 2: the decreased supply of U.S. Dollars (or decreased demand of Euros) is correctly depicted; and the new equilibrium is indicated to show the appreciation of the dollar (or depreciation of the Euro).
Proficient (Initial Version)	For question 3: a scenario is explained <u>or</u> drawn correctly to show a depreciation of Dollar
Exemplary (Initial Version)	For question 3: a scenario is explained <u>and</u> drawn correctly to show a depreciation of Dollar:
Changes made in <u>subsequent iteration:</u>	
Proficient (Subsequent Version)	For question 3: net exports <u>or</u> aggregate demand are identified as declining.
Exemplary (Subsequent Version)	For question 3: net exports <u>and</u> aggregate demand are identified as declining; and the explanation identifies that the change in the exchange rate affects the price of the goods.

Notes: Subsequent version is presented for Fall 2010. Performance level is indicated by the highest sequential box checked.