

Assessment Of The Economics Curriculum At A College Of Pharmacy

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ABSTRACT

This paper describes the method of assessing the outcomes of students' training in the Economics of Health Care course at the Albany College of Pharmacy (ACP). The following sections will: (1) describe the course and the various techniques that were used to ensure that the course outcomes were achieved, (2) explore the literature on assessment instruments for economics courses, (3) describe and analyze the assessment tools that were used in the course and the results from these instruments, and finally (4) discuss the different assessment methodologies that were used and their effectiveness and how the Economics of Health Care will be altered in the future to ensure greater comprehension by the students.

INTRODUCTION

An education and knowledge of economic concepts enables individuals to be more effective in their personal lives and to be a productive member in the global economy as a worker, consumer, and saver. This statement is particularly true for students in healthcare related fields such as pharmacy. Students in pharmaceutical education need to understand how to allocate scarce healthcare resources, as well as understand the various aspects of health insurance programs and pricing. Therefore, the Economics of Health Care course is part of the required curriculum for pharmacy students.

However, the Economics of Health Care is an upper-level undergraduate course that is taught to pharmacy students with little education in economics, often with their only exposure to economics coming in high school. Due to this lack of economics background, teaching the Economics of Health Care is challenging. Therefore, the assessment of educational performance and outcomes of pharmacy students in this course is essential.

This paper describes the method of assessing the outcomes of students' training in the Economics of Health Care course at the Albany College of Pharmacy (ACP). The following sections will: (1) describe the course and the various techniques that were used to ensure that the course outcomes were achieved, (2) explore the literature on assessment instruments for economics courses, (3) describe and analyze the assessment tools that were used in the course and the results from these instruments, and finally (4) discuss the different assessment methodologies that were used and their effectiveness and how the Economics of Health Care will be altered in the future to ensure greater comprehension by the students.

DESCRIPTION OF THE ECONOMICS OF HEALTH CARE COURSE

The Economics of Health Care, an upper-level course, is the first extended exposure to economics for most ACP students; many of the students have had some remedial economics in high school. Therefore, the students typically lack the introductory education that is necessary to successfully complete the course. Additionally, the Economics of Health Care is a prerequisite for two courses, Pharmacoeconomics and Pharmacy Administration, two and a half years and three years later, respectively. As such, teaching the course is challenging; students must be taught the foundation concepts of economics, as well as the advanced concepts of the Economics of Health Care, all while attempting to ensure that the material is learned so that they can recall the concepts for the next economics-based course.

The course is a lecture style, meeting for one hour and twenty minutes, twice per week, with enrollment ranging between 225 to 350 students. The size of the class restricts the teaching methods that can be used to ensure that the students are learning the material. The skill levels of the students also restrict the methods that can be used to teach the course. Therefore, a decision was made to break each lecture into two sections; the first half of the lecture dedicated to teaching introductory economic skills, then the second half of class used to focus on applying those introductory concepts to the advanced Economics of Health Care material. Once this decision was made, the next step was to develop a set of achievable but challenging learning objectives for the students taking the course. The number of objectives may seem like a lot, but they are specific so students know exactly what outcomes they are supposed to be able to do at the end of the semester. Students taking the course should ideally be able to:

1. understand basic economic tools, apply these techniques to issues related to the production and distribution of services, and understand what economists think is different about health care markets as compared to other markets;
2. understand the role of economic incentives, competition (or lack thereof), and regulation on the functioning of the medical care system and should be able to use this information to assess the economic efficiency and equity aspects of the current system;
3. have a broad understanding of institutional changes going on currently in the medical care system and be able to analyze the economic aspects of medical care policy issues and reform proposals using cost evaluation techniques;
4. explain the concept of opportunity cost, and apply this to the health care industry;
5. explain the principle of comparative advantage and how it affects trade, particularly in the pharmaceutical industry;
6. understand how various factors shift supply and demand and understand the consequences for equilibrium price and quantity;
7. calculate and discuss elasticity of supply and demand and how they affect business decisions, especially for the pharmaceutical industry;
8. explain and calculate average and marginal cost;
9. contrast perfect and imperfect markets;
10. apply the principles of consumer and producer surplus to explain efficient levels of production and sales in a market, and to use these concepts to measure health outcomes;
11. define and calculate gross domestic product;
12. explain the role of capital investment, education, and technology in determining economic growth;
13. explain what factors determine the level of, and to define unemployment;
14. explain the strategy behind government policies to stabilize the economy and the specific role of the Federal Reserve.

With the teaching pedagogy decided upon and the course outcomes clearly listed so students knew what was expected of them, attention was turned to assessment. Assessment is a fundamental part of the teaching and learning process in college-level economics education. Assessment is also much more than the typical tools of homework, exams, quizzes, term papers, and class participation. Assessment techniques can be used to detect what concepts students are having problems learning so the instructor can guide his or her teaching efforts (Angelo and Cross, 1993). Additionally, students can also use these instruments to determine their level of comprehension of the course material. Therefore, assessment is an important activity for both faculty and students.

As stated previously, the typical starting point for assessment consists of, among other things, a combination of homework, quizzes, exams, term papers, and class participation. The Economics of Health Care course is no different. Due to the size of the class, techniques such as term papers and class participation are not realistic assessment choices. Therefore, a combination of homework and exams were used. Both exams and homework assignments provide multiple indicators of student work, using a combination of fixed and constructive response items. Constructive response requires students answer questions by writing, calculating, graphing, or some other activity (e.g. short answer, numerical or word problems). Fixed response questions require that students select the best answer from a fixed set of answers, such as multiple choice and true/false (Walstad, 2001).

In the course homework assignments, consisting of thirty-five to forty questions each class, students are asked to answer a variety of questions ranging from news analyses to multiple choice to calculation and graphing. To accomplish this task, students are required to purchase an *Aplia.com* membership, as all homework was done in this system. *Aplia* is an internet based educational company that provides an interactive environment for students to learn economics. In 2005, students were assigned 669 homework questions. In 2006, students answered 730 homework questions. While this number of assigned questions may seem like a lot of homework, given that students must wait two and a half years before their next course in economics, the author deemed the amount of work necessary. Some of these homework assignments were conducted in class. However, group learning was encouraged for all coursework, as students, particularly those that are competitive for grades, often learn from one another in such an environment. The use of *Aplia* for homework permitted the author the opportunity to conduct assessment on all the assignments, as the percentage of students answering a question correctly can be calibrated for assessment. This type of assessment enabled the author to determine which concepts students had the most difficulty with so those could be expounded upon in class.

In both 2005 and 2006, two take-home exams consisting of 67 questions each were required. Take-home exams are effective instruments to encourage learning the material, rather than memorization. In pharmaceutical education, students are required to learn a substantial amount of material that must be memorized; a common practice in medical related fields. Therefore, a variety of instruments were used to encourage mastering the concepts instead of memorization, thereby eliminating rote learning. This holistic approach to education enables pharmacy students to build their knowledge through inquiry which is an integral part of their education. Additionally, using in-class and out-of-class projects, group-work, and assignments is important because it provides students frequent opportunities for self-assessment (Crooks, 1998; Walstad, 2001).

RELATED LITERATURE

The use of these indicators for grading purposes is appealing because they enable students the opportunity to answer questions that they prefer, compensating for those questions at which they do not excel. Furthermore, the large selection of question types permits instructors the opportunity to address concerns about miscalculations in measurement from relying on just one indicator to make a judgment about student achievement or performance in an economics course (Walstad, 2001).

While these assessment indicators are extremely valuable, the goal of the Economics of Health Care is retention. Stigler (1963) conjectured that five years after graduation there would be no difference in the performance on an essay test on current economic issues between alumni who had taken a one-year sequence in economics and those who had never taken an economics course.

To the best of the author's knowledge Stigler's hypothesis has never been tested, however other long-term assessment exams have been administered. Walstad and Allgood (1999) tested alumni five years after graduation who had and who had not taken a two-semester course in introductory economics using a thirty-three question multiple-choice exam. The results of their research are inconclusive. On one hand, Walstad and Allgood did find a statistically significant difference in test scores favoring alumni who took the year-long introductory course, thus casting doubt on the Stigler hypothesis. On the other hand, while the results were statistically significant, the difference was minimal, therefore the Stigler hypothesis cannot be rejected (Walstad, 2001).

These results are significant for the Economics of Health Care course because the next economics related course that students take is two and a half years later and the material is advanced. Therefore, Bloom's taxonomy (1956) is followed in the course; students must master basic economic concepts to comprehend the higher-order thinking necessary for the advanced topics. The goal of the course is to get pharmacy students to understand basic economic concepts so they can ultimately think like an economist for the advanced material (Siegfried, 1998).

DESCRIPTION AND ANALYSIS OF THE ASSESSMENT EXAMS

In order to determine if the objectives stated above were met, an additional assessment tool was used. Since 2005, Economics of Health Care students have had to take both a pre-test and a post-test in both microeconomics and macroeconomics to obtain a quantitative measure of their retention of the course material. During this time period the assessment exams have undergone some significant changes.

The first year the assessment exam was administered the Test of Understanding of College Economics (TUCE) for was used. The TUCE is a standardized test that was first administered in 1975 for outcome measurement purposes (Saunders, 1991). The test has been used for hundreds of studies, but the exam is controversial due to the content the exam covers and that it is a multiple-choice test (Walstad, 2001). The TUCE has two objectives: (1) to provide a reliable and valid assessment tool for students in introductory economics courses; and (2) to provide norming data for a national sample of students from introductory classes so instructors can compare the performance of their classes on both the pre-test and post-test to a national average (Walstad, Watts, and Rebeck, 2006). The test emphasizes the application of economic principles to real-life problems, including public policy (Fels, 1967). The latest edition of the exam, TUCE-4, was administered in the fall of 2005, with 3,255 students taking both the thirty question pre-test and post-test in macroeconomics and 2,789 students taking the thirty question pre-test and the post-test in microeconomics (Walstad, Watts, and Rebeck, 2006). For more specifics on the TUCE, readers are encouraged to read the paper by Walstad, Watts, and Rebeck (2006), as well as papers by Fels (1967), Saunders (1981; 1991a; 1991b), and Saunders, Fels, and Welsh (1981).

In the fall of 2005 the TUCE pre-test and post-test was administered to a random selection of one hundred twenty-one students enrolled in the Economics of Health Care at ACP. The mean scores for the results of the microeconomics and macroeconomics exam, reported in Table 1, indicate that both the pre-test and post-test were difficult. The pre-test mean for the microeconomics exam was 11.49 questions correctly answered, or approximately 34%. On the macroeconomics pre-test the mean number of questions answered was 9.31, or roughly 28%. Due to the fact that the students have little economics knowledge at the time of taking the pre-test these scores provide an approximate level for pure guessing for a four-option multiple-choice test (Walstad, Watts, and Rebeck, 2006).

Table 1. Mean Test Scores for the 2005 Assessment Exams

	Microeconomics	Macroeconomics
Pre-test Score	34.84 (13.25)	28.22 (9.88)
Post-test Score	37.79 (14.02)	32.76 (10.85)
Change (%)	8.48%	16.06%

Note: Standard deviations are in parentheses.
All results significant at the 99% confidence level.

The results of the post-test, also shown in Table 1, illustrate the improvement that students achieved. On the microeconomics post-test, the students improved to 12.47 questions answered correctly, or approximately 38%. The scores on the macroeconomics post-test increased by nearly the same amount as the mean number of questions answered correctly were 10.8, or approximately 33%. These scores indicate that student scores improved 8.48% for the microeconomics test and 16.06% for the macroeconomics test. A paired t-test was conducted to determine if the means of the pre-tests and the mean of the post-tests were significantly different from each other. The t-statistic for the microeconomics assessment was -4.53 and for the macroeconomics assessment was -6.17; both significant at the 99% confidence level. Thus, the improvement in student scores, while minimal, was significant.

The results outlined above for the first assessment exams provide several findings. First, that ACP students have a better knowledge of microeconomics on the pre-test than the national sample, 11.49 questions correct as compared to 9.38 (Walstad, Watts, and Rebeck, 2006). Second, the knowledge that ACP students have about macroeconomics is lower than the national average, 9.31 questions correct versus 9.8 (Walstad, Watts, and Rebeck, 2006). Lastly, the improvement that students achieve is less than the national averages, answering 12.47 questions correct on the microeconomics test and 10.8 on the macroeconomics test, as compared to 12.77 and 14.19 respectively on the national averages.

These findings for the Economics of Health Care course in 2005 may be attributed to several factors. First, and most significant, ACP students are enrolled in a specialized field of study and have a much different focus on classes not related to pharmacy. Second, as with any course, the quality of students can vary. Therefore, one possibility is that students in the 2005 Economics of Health Care Course might not have had the foundation in economic concepts that they needed for the class. Third, the pedagogical framework that the author used for the class may have needed to be recalibrated to increase student interest for learning the course concepts. Lastly, the TUCE national average is for those students at traditional four year colleges and universities, where students tend to have a broader view of education. ACP students, on the other hand, have chosen an education that is narrowly focused on pharmaceutical sciences. Thus, ACP students, while possessing strong skills in the pharmaceutical sciences, tend to be weaker in mathematics and the social sciences; two key areas that students need to be proficient in to be successful in economics.

The author believes that any of the aforementioned reasons are a possibility, but, from experience, speculates that the main contributors to the lack of improved performance are reasons one and four. Therefore, in 2006 a different assessment tool was used. Instead of using the TUCE, which does have the benefit of having a national benchmark, the author created pre-tests and post-tests of twenty-five questions each for both microeconomics and macroeconomics specifically targeted towards the objectives of the course. In addition to having questions specifically targeted to the course objectives, the new assessment exams used both fixed and constructive response questions. The questions included graphing, calculations, multiple-choice, and reading comprehension. The content of the assessment exam for microeconomics included questions from the following categories:

1. Markets and price determination (i.e. supply and demand, elasticity, monopoly)
2. The economic problem (i.e. deadweight loss, opportunity cost)
3. Theory of the firm (i.e. profit, revenues, costs, marginal analysis)
4. Factor markets (i.e. consumer and producer surplus)
5. The role of the government (i.e. taxation)
6. International economics (i.e. comparative and absolute advantage)

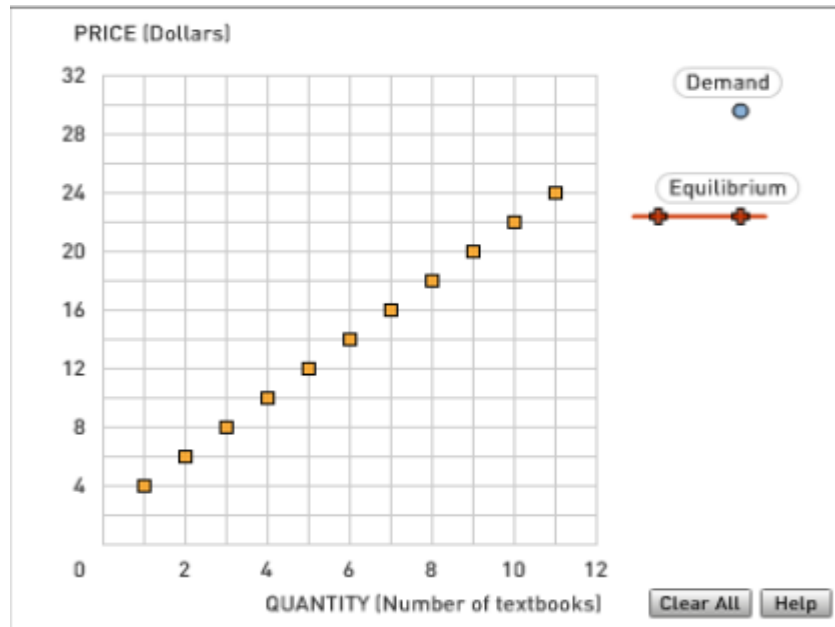
Three sample questions are provided below to demonstrate the content and type of questions, fixed and constructive, that were asked.

1. Suppose now that the professor teaching the course announces that a large part of the class grade will depend on problem sets from the textbook. This makes owning a copy of the textbook more valuable to each of the potential buyers. The buyer value (or willingness to pay) increases for each student planning to take the course. The seller costs stay the same. Here are the new buyer values after the announcement:

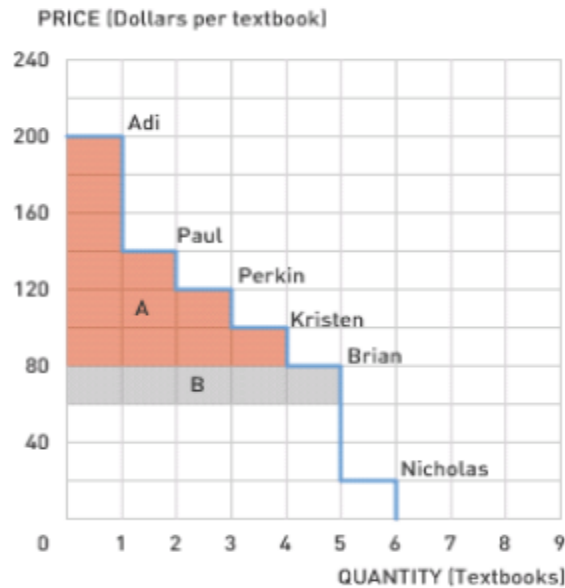
Buyer	Buyer Value	Seller	Seller Cost
Charles	\$32	Stuart	\$4
Anand	\$30	Loela	\$6
Sam	\$28	Cheryl	\$8
Mica	\$26	Lucy	\$10
Todd	\$24	Christine	\$12
Mark	\$22	Mary	\$14
Peter	\$20	Saul	\$16
Sven	\$18	Rajeev	\$18
Amy	\$16	Jessica	\$20
Jordan	\$14	Ramin	\$22
Kerri	\$12	Joe	\$24

For these buyer values and seller costs, the supply and demand model predicts that the price will be:

- A. \$4
 - B. \$12
 - C. \$18
 - D. \$24
 - E. \$32
2. This graph plots the supply curve for the sellers (orange squares). Add the demand curve by dragging the blue circles to the appropriate points on the graph. Drag the equilibrium line onto the graph and adjust it so that it runs horizontally through the equilibrium price.



3. The graph below shows the demand schedule for a group of students in the market for an economics textbook. Each student wants only one textbook. Assume that if an individual has a willingness to pay just equal to the market price, he or she will make the purchase.



How much does the market price for a textbook have to be in order for Nicholas to gain a consumer surplus of \$15 from buying an economics textbook?
 \$ _____

The content of the macroeconomics assessment exam included:

1. Measuring economic performance (i.e. GDP and its components, real values, nominal values, unemployment, inflation, productivity, saving)
2. Financial markets (i.e. financial institutions)
3. International economics (i.e. open economies, closed economies)

Three sample questions from the macroeconomics assessment exam are provided below to demonstrate the content and type of questions that were asked.

1. This table shows the components of U.S. gross domestic product (GDP) in 1999. All figures are in billions of dollars.

Consumption	\$6,283
Investment	\$1,626
Government	\$1,621
Net Exports	\$ -261

Source: Bureau of Economic Analysis

What percentage of GDP is consumption?
 _____% (Please enter 1 digit after the decimal point)

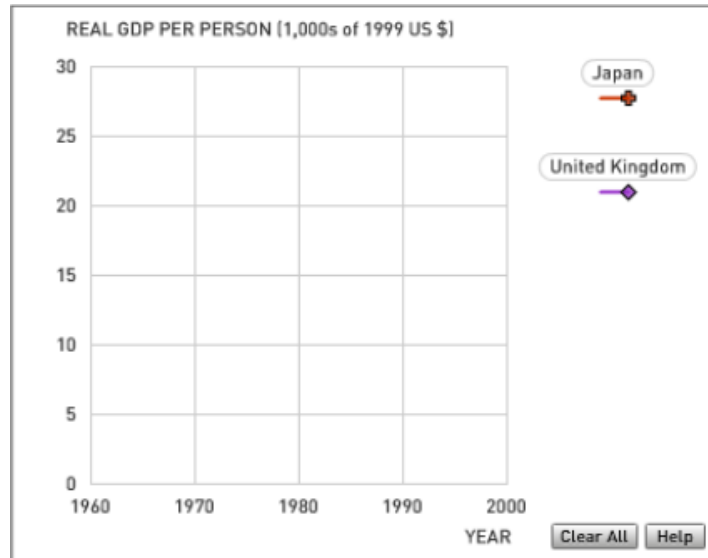
The population of the United States was approximately 273 million in 1999. Calculate GDP per person in 1999. (Round answer to the nearest dollar.)
 \$ _____

2. This table shows the real GDP per person in Japan and the United Kingdom. All figures are in 1999 U.S. dollars.

Year	Japan	United Kingdom
1960	\$4,950	\$10,328
1970	\$11,712	\$12,955
1980	\$16,010	\$15,501
1990	\$22,642	\$19,855
2000	\$25,450	\$23,723

Source: Organization for Economic Cooperation and Development

Graph real GDP per person for Japan and the United Kingdom between 1960 and 2000. Place red points (cross symbol) to show the real GDP per person for Japan and place purple points (diamond symbol) to show the real GDP per person for the United Kingdom. Round to the nearest thousand dollars. Line segments will automatically connect the points.



3. National saving (S) in a closed economy is equal to total income (Y) minus consumption by households (C) and government purchases (G).

$$S = Y - C - G$$

Adding and subtracting a value equal to government taxes (T) on the right side leaves the equation unchanged. Rearranging terms yields

$$S = (Y - T - C) + (T - G)$$

What does (Y - T - C) represent in the equation?

- A. Private saving
- B. Government purchases
- C. Government saving
- D. Investment

The pre-tests and post-tests in microeconomics and macroeconomics were administered to the entire enrollment, 289 students, in the Economics of Health Care course in the fall of 2006. Both assessment instruments consisted of twenty-five questions, four points each. Similar to the TUCE results, the pre-test results indicated that ACP students have limited knowledge of economics. Furthermore, the mean scores for the results of the microeconomics and macroeconomics exam, reported in Table 2, indicate that both the pre-test and post-test were difficult. The mean for the pre-test on the microeconomics exam was 41.68% and 57.1% for macroeconomics.

Table 2. Mean Test Scores for the 2006 Assessment Exams

	Microeconomics	Macroeconomics
Pre-test Score	41.68 (14.12)	57.10 (13.25)
Post-test Score	81.76 (15.94)	67.82 (12.93)
Change (%)	96.16%	18.77%

Note: Standard deviations are in parentheses.

All results significant at the 99% confidence level.

The results of the post-tests, shown in Table 2, indicate the amount of improvement the students achieved. The mean of the microeconomics post-test was 81.76 and the mean of the macroeconomics post-test was 67.82. These results illustrate that the 2006 Economics of Health Care students improved 96.16% in microeconomics and 18.77% in macroeconomics. Once again a paired t-test was conducted to determine if the means of the pre-tests and post-tests were significantly different from each other. The t-statistic for the microeconomics assessment was -38.2 and for the macroeconomics assessment was -11.34; both significant at the 99% confidence level. Thus, the improvement in student scores was significant.

The results mentioned above provide some interesting findings. First, student improvement in microeconomics is substantial, and progress in macroeconomics, while good, is not on the same level. This result is not surprising because the Economics of Health Care is primarily based in microeconomic principles. Macroeconomics was included in the course to provide ACP students a broad-based curriculum in economics. Additionally, a majority of ACP students will either own or work in a pharmacy store and they must understand how changes in the United States and global economy can affect their business prospects. However, macroeconomics is not the focus of the course and much less material is taught on the subject. Therefore, student achievement in microeconomics should be greater. Second, the use of an assessment tool specifically aimed at the objectives in economics courses taught to students enrolled in a specialized field of study (i.e. those students enrolled in pharmacy or medicine degree programs) is likely to be a more appropriate measurement of student achievement than the TUCE. While the TUCE has a benefit of having a national benchmark, that benefit is overshadowed by the fact that the course is a mixture of introductory concepts with advanced topics.

CONCLUSION AND DISCUSSION

Students in specialized degree programs enrolled in economics, such as the pharmacy students described in this paper, can often be a challenge to teach. This statement is particularly true for ACP students who are required to take the Economics of Health Care, an upper-level undergraduate course, with little or no foundation in the principles of economics. Therefore, assessment of student learning and comprehension is vital in this course.

Typically, assessment has comprised of a combination of homework, quizzes, exams, term papers, and class participation. The Economics of Health Care course at ACP is similar, but due to the large enrollment only homework and exams are possible choices. This paper described how homework was used as an assessment tool. However, the focus of the paper concentrated on two different assessment exams that were used during the 2005 and 2006 academic years for the Economics of Health Care course at the Albany College of Pharmacy.

The results of the assessment exams administered in both 2005 and 2006 indicate that students in the Economics of Health Care significantly improve in microeconomics while their progress in macroeconomics lags behind. This result is not surprising as the Economics of Health Care primarily applies microeconomic techniques to health care problems. However, the large discrepancy in the scale of improvement in microeconomics as compared to macroeconomics was surprising. As a result, future Economics of Health Care courses will emphasize the foundations of macroeconomics more in an attempt to increase student comprehension in the subject.

The assessment exam used in 2005 was the TUCE. While this particular assessment tool is widely used for introductory economics courses and provides a benchmark to compare student achievement, this exam was found not to be an effective assessment tool for students in specialized fields, such as those in pharmacy. Therefore, an alternative assessment exam was developed for use in 2006. The test used in 2006 was found to be a more effective assessment instrument because the exam was structured to the course objectives, whereas the TUCE tests specific categories of economic thought. Additionally, the alternative assessment exam used in 2006 permitted both fixed and constructive response questions to be answered, thus testing different levels of student understanding. Therefore, for courses taught to students enrolled in a specialized degree program an assessment exam specifically created for the course may be a more appropriate tool to measure student retention.

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