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USING RESULTS OF THE NCEE LITERACY TEST TO ASSESS AND IMPROVE ECONOMIC INSTRUCTION

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Abstract

As part of a drive to improve economic literacy in the United States, the National Council on Economic Education developed an Economic Literacy Test. While the test is designed as a general survey instrument for measuring economic literacy, the question content closely parallels material commonly covered in an introductory college-level macroeconomics course. The literacy test was administered on a pre and post course basis, by two instructors in a college course entitled Principles of Economics I. Test results were analyzed to assess the impact of the course on economic literacy and to identify economic content that deserves special attention. One result of the data analysis was that students taking the Principles of Economic I course initially had more difficulty with macroeconomic content. It is also clear from the data that the economic literacy of most students improved during the course.

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Introduction

The National Council on Economic Education (NCEE) developed a twenty question multiple-choice examination in 1999 designed to measure economic literacy in the general population. The knowledge standards incorporated in the test closely parallel the topics covered in introductory level college economics courses. The test was given on a pre and post-course basis to principles of economics students in courses taught by the authors. A total of 154 students completed both the pre and post-course tests.

The purpose of this research is to explore the use of the Economic Literacy Test to assess the impact of the Principles of Economics I course on economic literacy and to identify course content that needs additional emphasis. An analysis of question content and responses can provide a basis for instructional improvement strategies. Regression analysis may help estimate the impact of the course on any change in the students' economic literacy. Methods used in the research, analysis of the data and discussion of the findings are presented below.

Methods

The Economic Literacy Test was designed to evaluate student and adult understanding of the Voluntary National Content Standards in Economics, developed and published by the National Council on Economic Literacy (NCEE). More specifically the test instrument was first used in a survey conducted by Louis Harris and Associates on behalf of the NCEE to measure adult and student familiarity with basic economic principles, knowledge about the U.S. economy, and understanding of some basic economic terms. Each of the twenty questions (available online at the NCEE website) corresponded to one of the twenty content standards identified by the NCEE. These standards were equally grouped into those relating to consumer economics, production economics, financial economics, the economic role of government, and international trade.

Two approaches to analyzing the survey results were employed. First, responses for each test question were reviewed to identify questions that were frequently missed on the pre-course test. Post-course responses were then compiled for these frequently missed questions. A lack of significant improvement in correct responses on the post-course test indicates content deserving instructional attention. Tests for significance of pre and post-course results were conducted on a per question basis for the questions most frequently missed on the pre-course test.

Regression analysis was used as a second approach for analyzing test results. The dependent variable was specified as the change in pre and post-course scores. Independent variables included grade in course, degree major, gender, instructor, composite score on ACT exam, and total college hours. The unspecified variable, that was expected to account for some of the variation in pre and post-course scores, was completion of the principles of economics course itself.

The Economic Literacy Test was administered by the authors to over 165 Principles of Economics I students on the first day of class. There were 154 students who completed the test on both the first day and last day of class. No explanation was given for the test on the first day. Instructions were simply to do your best. When the test was given at the end of the course, students were offered bonus points based on an improvement over their first day test scores, but were not given any advance notice of the test. The bonus points offer was made to encourage a conscientious effort on the post-course test.

Results

Most of the adults and students in the Harris survey conducted for the NCEE Literacy Test and the subjects of this research exhibited a good understanding of the economic principles having the greatest direct impact on their daily lives. These issues were primarily microeconomic (e.g., the operation of markets and the sources of personal income). All groups exhibited less understanding of macroeconomic issues, such as the role of money and the causes and impact of inflation.

During the Harris survey, the test was given to a national cross section of 1,010 adults age 18 or older as well as 1,085 students in grades 9 through 12. Surveyed adults received an average grade of 57%, with college graduates scoring significantly better than non-graduates. High school students averaged 48% correct answers, with 12th grade students scoring on a par with adults. The 154 college students who are the subject of the research in this paper scored 77% on the pre-course test indicating a significantly higher level of economic literacy than the two populations in the Harris survey reported above

Raw data for correct responses by question on pre and post-course tests appear in Appendix A. Table 1 provides improvement results for the questions most frequently missed on the pre-course test. The improvement percentage was computed by dividing the percentage change in the pre to post-course incorrect responses by the percentage of incorrect answers on the pre-course test. In other words, the improvement percentages reflect the reduction in incorrect answers.

A crude overall measure of the impact of the course is the percentage increase in post-course scores over the pre-course scores. Students averaged 15.4 correct answers for the 20 questions before taking the course compared to 17.2 correct answers at the end of the course. This represents an improvement of 11.7 percent which is statistically significant beyond the .001 level with an F value of 10.7 (one tail test). While the improvement percentage is not dramatic, the average of 86 percent correct answers at the end of the course is somewhat impressive.

Question #7 responses suggest some students were not clear on the effects of interest rate changes at the end of the course. Question #10 is a classic question about the relationship between prices and quality. Some students still failed to view quality as a competitive tool for retailers on the post-course test. Results for questions #19 and #20 are also noteworthy. About thirty percent of the students still answered these questions incorrectly after taking the course. Question #19 tests not only for the definition of GDP but also for the ability to reason logically. On the other hand, question #20 (see Table 2) is strictly a recall question that should not be missed by any students after having taken the principles course. Clear success cases are represented by results for questions #6 and #9. The improvement in test scores is significant well beyond the .01 level and ten percent or fewer of the students missed these questions on the post-course exam.

Table 1

Pre-Course To Post-Course Improvement On Most Frequently Missed Questions

Question Number	Percent Improvement	Level of Significance	Z Test Scores*
6	68	**<.01**	3.65099
7	48	**<.05**	1.88389
9	70	**<.01**	3.40984
10	34	**<.05**	1.96449
11	24	**>.**05	1.45884
14	42	**<.01**	2.33016
15	17	>.05	1.16508
17	48	**<.05**	2.17949
19	51	**<.01**	3.86633
20	37	**<.05**	2.23463

*For alpha of .05, a z test score above 1.645 is statistically significant.
For alpha of .01, a z test score above 2.326 is statistically significant.

Table 2 summarizes pre and post-course test results for those questions that were answered incorrectly on the pre-course test by at least 25% of the students. It was felt that focusing on the most frequently missed questions provided the greatest potential for evaluating the value added by the course and for identifying content areas that deserve instructional attention. For every question in Table 2, post-course test scores improved. However, for questions #11 and #15 the improvement was not statistically significant at the .05 level (see Table 1). Results for these twoquestions definitely point to the need for the instructor to put more emphasis on the impact of inflation (macro) and the effects of government imposed maximum prices (micro).

Table 2

Questions Most Frequently Answered Incorrectly And Most Common Incorrect Answer

Pre and Post-Course Test Results

Questions and Answers (C = Correct, I = Incorrect)	**Percent Incorrect**	
	Pre-Test n = 154	**Post-Test n = 154**
Q6. The resources used in the production of goods and services are limited, so society must: **C: Make choices about how to use resources.** **I: Try to obtain additional resources**	31	10

Q7. An increase from 5% to 8% in the interest rates charged by banks would most likely encourage: **C: People to save money.** **I: Businesses to invest.**	25	13
Q9. The stock market is an example of an institution within our economy that exists to help people achieve their economic goals. The existence of this institution: **C: Brings people who want to buy stocks together with those who want to sell stocks.** **I: Helps predict stock earnings.**	27	8
Q10. A large increase in the number of fast-food restaurants in a community is most likely to result in: **C: Lower prices and higher quality.** **I: Lower prices and lower quality.**	38	25
Q11. Which one of the following statements about the function of money is wrong? **C: Money holds its value well in times of inflation.** **I: Money makes trading goods and services easier.**	42	32
Q14. Which of the following are most likely to be helped by inflation? **C: People who borrowed money at a fixed rate of interest.** **I: Banks that loaned money at a fixed rate of interest.**	36	21
Q15. If your city government sets a maximum amount landlords can charge in rent, what is the most likely result? **C: There will be fewer apartments available than people want to rent.** **I: There will be more apartments available than people want to rent.**	29	24
Q17. When governments supply products and services, these products and services usually benefit: **C: More than one person at a time whether they have paid for them or not.** **I: Business at the expense of consumers.**	27	14
Q19. If the gross domestic product of the United States has increased, but the production of goods has remained the same, then the production of services has **C: Increased.** **I: Decreased.**	61	30
Q20. When the federal government's expenditures for a year are greater than its revenue for that year, the difference is known as: **C: A budget deficit.** **I: The national debt.**	46	29

Regression analysis of the semester data was also used to assess the impact of the economics course on economic literacy. Of primary interest was the improvement in post-course test scores that might be associated with the course itself. Thus the dependent variable was specified as the change in pre and post-course test scores.

Independent variables chosen reflected both a rationale for being associated with variations in the dependent variable and availability of information. The initial group of independent variables included grade in course (Gr), major- either business or non-business (Maj), gender (Gen), instructor (Ins), composite score on ACT exam (ACT), cumulative grade point in college hours (GPA) and total college hours (Hrs).

Examination of these variables led to the suspicion that rather high correlations may exist among the Gr, ACT and the GPA variables. Pearson correlation coefficients were computed and are presented in Table 3. Values for these coefficients were .41 for ACT and GPA, .37 for ACT and Gr and .63 for GPA and Gr. Based on this information, GPA was excluded from the regression runs to avoid problems of multicollinearity.

While grade in the course could be viewed as a dependent variable, there was an interest in the possible association of improvement in pre and post-course exam scores and grade in the course. Exactly 50 percent of the regression observations were business majors and 50 percent non-business majors. This mix reflects the fact that the course is one option for meeting a general education requirement. The gender mix for the group was 57 percent male and 43 percent female. One instructor taught two sections with a total of 88 students while the other instructor had 40 students in one section. Instructional materials, course content, and teaching methodologies were virtually the same in all class sections in the survey. The number of college hours completed by students before taking the course ranged from 0 to 197 with a mean of 41 hours.

Regression results are presented in Table 4. Less than three percent (r-square = .026) of the variation in pre and post-test scores is accounted for by the independent variables used in the regression equation. None of the independent variables even approach a .10 level of significance. A case can be made that one likely factor accounting for the improved scores is the experience of the course itself. Another element affecting regression results is the higher pre-test scores made by students with higher ACT scores. This leaves less room for improvement on the post-course test. As previously pointed out, the students averaged 77% correct answers on the pre-course test. Regression results fail to reveal any definite trait associated with variations in pre and post-course test differences.

Table 3

Pearson Correlation Coefficients
Prob > r under HO: Rho = 0
Number of Observations

	Gr*	**ACT***	**GPA***
Gr	1.00000	0.37129	0.62566
		<.0001	<.0001
	153	128	134
ACT	0.37128	1.00000	0.41291
	<.0001		<.0001
	128	128	117
GPA	0.62566	0.41291	1.00000
	<.0001	<.0001	
	134	117	134

*Gr-Grade in course; ACT-Composite ACT; GPA-Cumulative college GPA

Table 4

Regression Results
N = 128

Dependent Variable: Differences in pre and post-test scores.

R-square	0.026222	**Root MSE**	2.176711
Coeff Var	117.5640	**Diff Mean**	1.851563

Independent Variables*	DF	Type III SS	Mean Square	F Value	Pr > F
Gr	4	7.37029624	1.84257406	0.39	0.8163
Maj	1	4.41764827	4.41764827	0.93	0.3362
Gen	1	0.12850627	0.12850627	0.03	0.8695
Ins	1	0.42580147	0.42580147	0.09	0.7649
ACT	1	1.50158996	1.50158996	0.32	0.5745
Hrs	1	3.44314143	3.44314143	0.73	0.3957

*Gr-Grade in course; Maj-Major, business or non-business; Gen-Gender; Ins-Instructor; ACT-Composite ACT score; Hrs- College credit hours.

Discussion

Assessment of the learning process frequently requires the use of multiple approaches and tools. The feedback from pre and post-course test results is but one source of data to be included in an assessment effort. The test used in the present research lacks a rigorous validation process, but did seem to address some appropriate issues for a general education course in economics. An analysis of questions that were frequently missed on both the pre and post-course test was particularly useful in understanding areas of difficulty. It was also obvious that different instructional strategies will be needed to make progress in addressing these difficult issues. A safe comment seems to be that traditional students have somewhat more difficulty with macroeconomic topics than with the microeconomic material in an introductory course.

Focusing on the most frequently missed questions on the pre-course test provided identification of material that warrants special attention in the future. The lack of improvement in post-course test scores on several of these questions was a disappointment. Specific issues that proved troublesome were the consequence of maximum prices in markets, the impact of inflation, and the role of money. The most improvement in post-course test scores related to questions about the stock market and GDP. It is noteworthy that the average post-course test score for the 154 students in the study was 86% or 17.23 correct out of 20 questions. This compares to an average score of 57% for all adults in a national survey cited earlier.

While the regression results did not directly identify factors associated with test score improvement, there is an obvious inference in the data. One experience the students had in common was the completion of an introductory course in economics. A case can be made that the course experience itself was the variable that impacted improved test scores. Another inference in the regression results is the opportunity for students of different sex, career interests, ACT score levels, and grade achievement to benefit from an introductory course in economics.

Future research plans include administering the NCEE Literacy Test on a pre and post-course test basis to a sample of students who have not had, and are not taking, a college level course in economics. During this same time frame the test will also be given on a pre and post-course basis to students enrolled in the principles of economics course. A comparison of test results should provide even stronger evidence of the impact of the Principles of Economics I course on economic literacy.

References

National Council on Economic Education. *Economic Literacy Test.* http://www.nationalcouncil.org/cel/index.html

National Council on Economic Education. *Literacy Survey: Results from the Standards in Economics Survey*. http://www.nationalcouncil.org/poll/results.html

National Council on Economic Education. *Contents: Index of Standards.* http://www.economicsamerica.org/standards/contents.html

Salemi, Michael K. and Siegfried, John S. 1999. "The State of Economic Education", *American Economic Review 89* (May): 355-361.

Walstad, William and Rebeck, Ken, 1999. "How Does Economic Education Impact Economic Literacy?" *The Region*, (June): 18-21.

Appendix A

Economic Literacy Test Results By Question
(Number Correct; N=154)

Question #	Pre-Course	Post-Course	Change
1	154	153	-1
2	119	125	6
3	151	149	-2
4	118	121	3
5	145	152	7
6	106	139	33
7	116	134	18
8	145	147	2
9	113	142	29
10	95	116	21
11	89	105	16
12	146	148	2
13	144	150	6
14	98	122	24
15	109	117	8
16	142	151	9
17	113	133	20
18	143	146	3
19	60	108	48
20	83	109	26