AN EFFORT TO MEASURE VALUE-ADDED IN THE MONEY AND BANKING COURSE

Gene Cole
Arkansas Tech University

Richard Smith
Arkansas Tech University

Abstract

The authors developed a brief test instrument designed to measure knowledge of material covered in a traditional course in money and banking. The test was administered to students enrolled in three Money and Banking classes on a pre and post course basis. Pre-test data provided some baseline information on student knowledge at the beginning of the course. For those students who took both the pre and post-test, the mean score of correct answers improved 21 percent. Other results indicated statistically significant improvement in correct answers for seven of the nine questions frequently missed on the pre-test.

An Effort to Measure Value-Added in the Money and Banking Course

Introduction

Money and Banking is a core course in many school of business undergraduate degree programs. The fundamental role of money and credit in the workings of an actual economy makes the substance of this course a vital part of the business student's foundation knowledge. The ability to measure value-added, or knowledge gained, by the course thus becomes important in the context of evaluating the effectiveness of a component of the school of business curriculum. Since the assessment of learning is a multi-dimensional activity, it is appropriate to obtain feedback using a variety of techniques such as the one used in this study (Angelo and Cross, 1993).

One purpose of this study is to gather feedback on any gain in knowledge associated with the experience of completing a course in money and banking. A second focus of the research is to use test results from the beginning of the course to provide an initial baseline of student knowledge about the course content. Data collected is analyzed both from a macro perspective – the overall results, and from a micro viewpoint – the results by individual question.

Methodology

Instrument

Criteria to be considered for a measurement instrument include such items as ease of construction, economy in scoring, coverage of test domain, potential bias in scoring and opportunity for guessing (Walstad, 2001). A fixed response multiple choice format satisfactorily meets all of these criteria except the opportunity for guessing (Siegfried et al, 1996). At the time of this research there did not appear to be an economically feasible standardized test available for measuring learning in the money and banking course. This led to the authors developing a twenty multiple-choice question test instrument (a copy of the test instrument is available upon request from the authors).   Questions were selected from testing resources furnished by the textbook publisher, and designed to cover material in the course (Burton and Lombra, 2000). Ten questions related to topics in money, monetary theory and policy. Six questions covered domestic and international financial markets, while four questions were about financial institutions.

Of course, a test instrument must meet reliability and validity standards. Conventional views of these standards are found in Cronbach (1971). The authors addressed the reliability standard by administering the test instrument over two semesters prior to this study and obtaining relatively consistent results. Content validity for the test instrument was addressed by using a panel of content experts (see Cohn, et al, 2001) that included four faculty with doctoral credentials who have extensive teaching experience in the finance field. These faculty reviewed the test instrument to determine if the questions tested for knowledge that was representative of material covered in the money and banking course. Certainly the comments of Brennan and Johnson (1995) are appropriate: "The realism of performance assessments comes at the cost of limitations in the generalizability of the results."

Procedures

The authors elected to use a straightforward pre and post-test approach to collecting data on student learning. An example of both the use of a short multiple choice test, and a pre and post-test methodology can be found in the previously cited Cohn, et al. (2001). On the first day of class students were given the twenty question test with the instructions to do as well as they could. Students were not told the test would be repeated at the end of the semester. With no prior notice, the test was given at the end of the semester. In order to obtain a conscientious effort by the students on the second take of the test, students were given bonus points (maximum of nine) for each additional correct answer on the second take of the test. Six hundred total points were used to compute the semester grade. While the authors recognize that the use of an incentive on the post-test may account for some of the improvement in correct answers, they felt the incentive would not significantly skew the test results.

Model

The primary interest of the research was to gather and evaluate information about gain in knowledge associated with completing the money and banking course. One measure of overall performance was the change in the mean number of correct answers on the pre and post-tests. A one-tail t test was run to compute the level of significance for the mean of the differences in pre and post-test correct answers.

A second research interest was an examination of post-test results by question. Specifically, was there a significant improvement in correct answers? For each question, the difference between the proportion of correct answers (proportion of correct on post-test minus proportion correct on pre-test) was examined using a z test.

Data

Tests were given to students in three sections of Money and Banking during the spring and summer terms of 2001. One author taught two sections in the spring and the second author taught one summer section. There were a total of 54 students who completed both the pre and post-tests in the three sections. This is the data set used in the analysis. An effort was made to provide a common learning experience in the three sections. Both authors used the same text and the same teaching methodologies – lectures, including power point slides, internet resources, quizzes, and exams.

Results

Pre-Test Results

Student performance on the test instrument before the course is taken can provide both an indication of what students know, and conversely, what they don't know. Eleven of the twenty questions were answered correctly on the pre-test by approximately 75 percent or more of the students who completed both the pre and post-test. Eighty five percent or more of the respondents answered two of these questions dealing with exchange rates correctly. Apparently this topic is well covered in the principles of economics courses, which are prerequisites for the money and banking course. Students also performed well on questions about factors that affect economic growth and total spending in a market economy. Other topics on which students scored well on the pre-tests included commercial banking and financial markets and instruments.

There is typically more instructor interest in what students don't know at the beginning of a course. Often this is driven by an instructor's desire to address material that will add to a student's understanding of the subject matter at hand. Table I provides pre-test results for questions that were answered incorrectly by 25 percent or more of the respondents. While the 25 percent division is somewhat arbitrary, this level seemed to fit the data well and accommodate the research interest of focusing on the frequently missed questions.

When 90 percent of the students taking a test miss a given question, there is certainly an opportunity for improvement. More students missed question 18 than any other question. At the heart of this question is the distinction between common usage of the term "investment" and the definition used in economics. A second question (10), missed by 76 percent of the students, was about the relationship between price of existing bonds and changes in market interest rates. While the topic is specifically covered in principles of economics courses, there is a learning problem.

Other questions that students scored low on included question 2 about the demand for money, and question 13 about the meaning of deregulation. Some 67 percent of the students answered question 19 on the topic of real interest rates incorrectly. Knowledge of the subject matter of frequently missed questions can provide improvement ideas for instructors of both the principles of economics and the money and banking course.

Table 1

Questions Most Frequently Answered
Incorrectly and Most Common Incorrect Answer
Pre-Test Results

Questions and Answers (C=correct, I= most common incorrect)	Percent Incorrect N=54
Q2. The specific amount of money that spending units wish to hold at a specific interest rate is the: C: Quantity demanded of money. I: Quantity supplied of money.	69
Q4. The buying and selling of government securities by the Fed to change the reserves of depository institutions is called: C: Open market operations. I: Changing the required reserve ratio.	52
Q9. The primary advantage gained by purchasing a mutual fund rather than an individual stock is: C: Diversification. I: Deposit Insurance.	44
Q10. As market interest rates fall, what happens to the prices of existing bonds? C: They increase. I: They remain the same.	76
Q11. Which of the following serve as an asset for depository institutions? C: Reserves at the Fed. I: Large time deposits.	56
Q13. The term deregulation refers to which of the following? C: Dismantling regulation. I: Deleting outdated regulations and redefining appropriate regulations.	43
Q17. Which of the following is *not* associated with a firm's balance sheet?	59

C: Income flows.
I: Net worth.

Q18. Which of the following is *not* a reason for business investment?   91
C: To acquire financial assets that will pay a future income stream to the business.   I:
To add to inventories

                                                                                             67
Q19. The real interest rate is which of the following?
C: The nominal interest rate minus the expected inflation rate.
I: The nominal interest rate plus the expected inflation rate.

Post-Test Results

A principal research focus was to measure any "value-added", or knowledge gained, as a result of completing the Money and Banking course. A one tail test for significance of the mean of the differences (2.85) in pre and post-test correct answers produced a t score of 6.73 (see Table 2 for data). Thus, the gain in correct answers is statistically significant at the .01 level and beyond. The possible score of correct answers on the test was 20. The mean score for the pre-test was 12.6 while the post-test mean was 15.3. This represents an average increase of 2.7 correct answers or an improvement of 21 percent (2.7 ÷ 12.6).

Table 2

Test Results by Question
(correct answers)
N=54

Question Number	Pre-Test	Post-Test	Difference*
1	44	47	3
2	17	35	18
3	44	40	-4
4	26	43	17
5	40	29	-11
6	51	52	1
7	46	49	3
8	48	51	3
9	30	40	10
10	13	41	28
11	24	29	5
12	44	45	1
13	31	46	15
14	46	48	2
15	47	54	7
16	41	51	10
17	22	38	16
18	5	7	2
19	18	36	18
20	43	46	3

* The mean of the differences = 2.85.

Pre and post-test results may include some "embarrassing" outcomes. Table 2 on complete pre and post-test data by question contain at least two such results. The most regressive outcome was for question 5 about market participants. Eleven more students answered question 5 incorrectly on the *post-test* than on the pre-test. A similar but less dramatic outcome is found in results for question 3 about the effects of saving decisions. For this question the number of correct answers decreased by four on the *post-test.*

While the value-added question probably defies a definitive answer, looking at post-test results by question may prove helpful. For each question, the proportion of correct answers on the post-test minus the proportion of correct answers on the pre-test was examined using a z test. Results of these computations are presented in Table 3. For nine of the twenty questions there were statistically significant improvements in correct answers. Seven of these questions were missed by 25 percent or more of the students on the pre-test (bold), thus there was more opportunity for improvement. The percentage improvement in pre and post-test scores was significant at least at the .01 level for six of these seven questions.

Table 3

Pre to Post-Test Improvement by Question

Question Number	Proportion Correct		Z Test Scores	PercentImprovement[1]
	Pre-Test	Post-Test		
1	.8148	.8704	0.793	5.56
2	**.3148**	**.6481**	**3.466**	**33.33****
3	.8148	.7407	-0.926	-7.41
4	**.4815**	**.7963**	**3.406**	**31.48****
5	.7407	.5370	-2.204	-20.37*
6	.9444	.9630	0.458	1.85
7	.8519	.9074	0.887	5.56
8	.8889	.9444	1.044	5.56
9	**.5556**	**.7407**	**2.015**	**18.52***
10	**.2407**	**.7593**	**5.389**	**51.85****
11	.4444	.5370	0.962	9.26
12	.8148	.8333	0.253	1.85
13	**.5741**	**.8519**	**3.191**	**27.78****
14	.8519	.8889	0.573	3.70
15	.8704	1.0000	2.736	12.96**
16	.7593	.9444	2.709	18.52**
17	**.4074**	**.7037**	**3.098**	**29.63****
18	.0926	.1296	0.612	3.70
19	**.3333**	**.6667**	**3.464**	**33.33****
20	.7963	.8519	0.758	5.56

*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.
[1] The percent improvement for each question is computed by subtracting column 2 from column 3.

The most dramatic improvement was the 51.85 percent increase in correct answers for question 10 about the relationship between interest rate changes and bond prices. Also impressive were 33 percent gains in correct answers for questions 2 and 19 concerning the demand for money and real interest rates respectively. Two of the frequently missed questions on the pre-test that eluded instructional efforts for significant improvement were questions 11 and 18. The first was an accounting question about bank assets and the second was on the economic definition of investment.   Ten of the questions lacking significant improvement on the post-test were answered correctly by 75 percent of the students on the pre-test. As noted earlier, there was a regression of correct answers for questions 3 and 5 and for question 5 the results were statistically
significant!

Comments

Efforts to assess the learning process often require the use of multiple approaches. Feedback from pre and post-tests is but one source of data to be considered in the overall assessment process. Questions chosen for the test instrument are ones used on exams in the course and covered topics that are included in the money and banking course. Further review of the specific questions on the test is certainly appropriate. Future data from repeat testing could lead to an improvement in both the reliability and validity of the test instrument. One planned improvement in procedure is to alter the pre-test instructions. For example, students could be offered bonus points on the pre-test results just as they are on the post-test outcomes. For each point scored above the class average, the student would receive three bonus points up to a total of nine possible bonus points. Hopefully, a procedure like this could provide relatively equal incentives for the students to do as well as they can on both the pre and post-tests.

Instructors commonly gather some type of baseline data about student knowledge of the course material at the beginning of a course. While certainly not inclusive, the data collected on the pre-test was useful in identifying some strengths and weaknesses of student awareness and understanding of the material covered in the money and banking course. It seems imperative for teaching faculty to approach their improvement efforts in a spirit of experimentation for both assessment and instructional strategy.

Learning for an instructor is found in feedback on both successes and failures. Often successes point to an approach of continuing to do what is working. It is the failures that capture our interest and identify needed change. A test, similar to the one in this paper, used over a period of several semesters and by different instructors can provide guidance for improvement efforts. While there was a 21 percent improvement in correct answers on the post-test, more research needs to be done to determine if the taking of the money and banking course adds value to student learning, and if it does, how much value. Failure to improve student performance is frustrating and in a couple cases embarrassing. As stated previously, assessment usually requires multiple approaches and pre and post-tests are but one tool that can be used to pursue the elusive goal of assessing learning.

References

Angelo, T.A., and K.P. Cross. 1993. *Classroom Assessment Techniques: A Handbook forCollegeTeachers,* 2nd edition, Jossey-Bass, Inc.: San Francisco.

Banta, T.W., J.P. Lund, K.E. Black, and F.W. Oblander. 1996. *Assessment in Practice: Putting Principles to Work on College Campuses.* Jossey-Bass, Inc.: San Francisco.

Becker, W.E., and W.B. Walstad. 1990. "Data loss from pretest to posttest as a sample selection problem". *Review of Economics and Statistics* 72(1): 184-188.

Becker, William E., and Michael Watts. 1999. "The state of economic education: How departments of economics evaluate teaching." *American Economic Review* 89(2): 344-349.

Brennan, R.L., and E.G. Johnson. 1995. "Generalizability of Performance Assessments." *Educatioinal Measurement: Issues and Practice* 14(4): 5-17.

Burton, Maureen, and Ray Lombra. 2000. *Test Bank for The Financial System and the Economy,* 2nd edition, (prepared by Reynold F. Nesiba), Cincinnati: South-Western College Publishing.

Cohn, Elchanan, Sharon Cohn, Donald C. Balch, and James Bradley, Jr. 2001. "Do Graphs Promote Learning in Principles of Economics?" *Journal of Economic Education* 32(4): 299-310.

Cronbach, L.J. 1971. Test Validation. In R.L. Thorndike(Ed.) *Educational Measurement* (2nd Ed.) Washington D.C.: American Council on Education.

Johnston, Carol, Ian McDonald, and Ross Williams. 2001. "The Scholarship of Teaching Economics." *Journal of Economic Education* 32(3): 195-201.

Siegfried, J.J., P. Saunders, E. Stinar, and H. Zhang. 1996. "How is Introductory Economics Taught in America?" *Economic Inquiry* 34(1): 1182-92.

Walstad, William B. 2001. "Improving Assessment in University Economics." *Journal of Economic Education* 32(3): 281-294.

Walstad, William, and Sam Allgood. 1999. "What do college seniors know about economics?" *American Economic Review* 89(2): 350-354.

Walstad, William, and Ken Rebeck. 1999. "How does economic education impact economic literacy?" *The Region* 13(2): 18-21.