

What is the Influence of Gender, High School Economics and Other Factors on the Learning of Economics?



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Abstract

This paper investigates the contribution of gender, high school economics classes, and the student's maturity, major and natural ability to the level of economic understanding and learning. The level of economic understanding was measured using pre- and post-test scores on a 40-question multiple choice exam (given at the beginning and end of the semester); the amount of economic learning was measured using the difference between pre- and post-test scores. Results suggest that students with economics in high school enter the college level introductory economics course with a significantly higher level of economic understanding, but the initial benefit diminishes over time. Additionally, the results suggest that gender differences in the level of economic understanding and learning are not as pronounced as previously reported in the literature. The results also indicate that the student's major plays a significant role in the amount of economic learning while gender, natural ability, maturity, or having had high school economics do not.

Introduction

Investigation of factors influencing students' performance in economics courses, particularly in the introductory courses, has been a recurrent theme in the literature. In these studies, students performance has been defined in terms of the level of economic understanding at a single point in time (stock of economic knowledge) and/or the amount of economic knowledge gained over a period of time, commonly referred to as learning (flow of economic knowledge). Many of the initial studies focused on examining the relationship between performance in introductory courses and gender and/or if the student had economics in high school. Other factors such as class standing, major area of study, number of hours spent

studying, etc., have also been investigated to determine their impact on students' performance.

Previous studies examining the influence of gender on students' performance include interesting and sometimes conflicting results. Many studies indicate that when multiple choice exams are used to evaluate performance, men perform statistically better than women (Ferber et al. 1983; Lumsden and Scott 1987; Gohmann and Spector 1989; Heath 1989; Walstad and Soper 1989; Watts and Lynch 1989). In his detailed literature survey of over 50 articles, Siegfried (1979) reported that about two-thirds of the studies relating gender to the level of economic understanding found that males performed statistically better than females. Other researchers have found that when essay exams are used to evaluate performance, women outperformed their male counterparts (Ferber et al. 1983; Lumsden and Scott 1987). However, other studies (Watts 1987; Rhine 1989; Williams et al. 1992; Bridges and Casavant, 2000) reported no significant difference in exam performance due to gender.

Studies examining the influence of gender on economic understanding and learning also suggest that these differences are apparent prior to college. Some researchers have found that gender differences were not present in elementary or in junior high students, where economics is generally taught in the context of the entire curriculum (Jackstadt and Grootaert 1980; Buckles and Freeman 1983), but differences in both economic learning and economic knowledge existed in high school students (Heath 1989; Walstad and Soper, 1989). This suggests that gender differences are established in high school, differences which may exist well into college.

On the other hand, the conclusions drawn about the influence of gender on the level of economic understanding and learning at the college level depends on whether the level of understanding was measured at the beginning or ending of the course. Some studies report that men enter and/or leave introductory economics courses with higher levels of understanding (Siegfried and Strand, 1977; Ferber et al., 1983; Lumsden and Scott, 1987; Gohman and Spector, 1989; Lopus, 1997). Other studies have indicated that there are no gender differences in the level of economic understanding at the beginning (Bridges and Casavant, 2000) or end (Brasfield, et al., 1993) of an introductory course. Studies examining the influence of gender on the level of economic learning suggest that gender differences do not exist in terms of the accumulation of economic knowledge (Lumsden and Scott, 1987; Watts and Lynch, 1989; Williams, et al., 1992). However, Siegfried (1979) reported that about one-third of the studies relating gender to the level of economic learning (mostly college courses) included in his detailed literature survey found that females performed statistically lower than their male counterparts. Although there is not complete agreement in the literature, in general the empirical research seems to suggest that although males may enter introductory college courses with a higher level of economic understanding, learning may occur at equivalent rates for both genders.

A variety of other factors, in addition to gender, have been examined to determine their influence on the level of economic understanding and learning in college level economics courses. Some studies determined that having had economics in high school contributed positively to both the level of economic understanding when entering an introductory course (Moyer and Paden, 1968; Brasfield, et al., 1993; Lopus, 1997; Bridges and Casavant, 2000) but that the impact on the level of learning diminishes over the course of the semester (Moyer and Paden, 1968; Saunders, 1970; Lopus, 1997). Researchers have found that a student's natural ability or preparedness to learn, using either ACT or SAT scores as a proxy, has a positive impact on economic learning (Moyer and Paden, 1968; Siegfried and Strand, 1977; Watts and Lynch, 1989; Brasfield, et al., 1993; Lopus, 1997). The influence of a student's maturity level, chosen in the studies to be represented by class standing, has also been shown to influence economic learning, with upperclassmen outperforming freshmen (Moyer and Paden, 1968, Gohman and Spector, 1989; Watts and Lynch, 1989; Williams, et al., 1992). There is also evidence to suggest that the student's chosen field of study, or major, has a relationship to economic

learning abilities (Moyer and Paden, 1968; Saunders, 1970; Williams, et al., 1992).

In summary, the literature suggests that gender and having had economics in high school can be important determinants of both the level of economic understanding and learning, especially when the measurement tool used is a multiple choice test. However, various other factors such as the student's level of maturity (measured by class standing), natural ability (measured by ACT scores), and/or chosen field of study (major) could all play an important role in the student's ability to master, or learn, new material. Since college is often an individual's first exposure to economics, these factors may also be an important determinant of a student's success in learning economics.

Purpose and Objectives

The objective of this study is to investigate the relationship between amount of economic learning and the student's gender, maturity level, field of study, natural ability, and whether or not the student had economics in high school. Class standing (i.e., freshmen, sophomore, etc.) is used as a proxy for the student's maturity level and ACT composite scores are used to represent the student's natural ability. In this study, scores on a pre- and post-test are used to evaluate the level of economic understanding at both the beginning and end of the course, and the difference between these scores is used to determine the amount of economic learning that took place.

Methodology

To investigate how gender, economics in high school, natural ability, major, and class standing influence economic learning, performance on a pre- and post-tests and other relevant information was collected from students in a general studies economics course. The following discussion describes the data used and the procedure used to evaluate the data.

The Test -- A 40 question multiple choice exam was used to measure students' stock of knowledge at two points in time, at the beginning and again at the end of the semester. The exam, developed using questions taken from the Test of Economic Knowledge (TEK) (Walstad and Soper 1987), covered economic concepts in four distinct categories: fundamental economic concepts, microeconomic concepts, macroeconomic concepts, and international economic concepts. All four subject areas are covered in the course under consideration. The TEK was initially designed in 1987 by a national committee composed of test experts, economists and classroom teachers to

What is the Influence of Gender, High School Economics

provide a measure of economic understanding at the 8th and 9th grade level.

The Class -- The data used in this study were collected from students enrolled in a general studies economics course at the University of Nebraska at Kearney during the 1997-98 and 1998-99 academic years (both fall and spring semesters). Students were given the exam as a pre-test during the first week of the semester and as a post-test during the 15th week of the semester. The difference between the post- and pre-test scores was used as a measure of economic learning. In addition to test scores, demographic information collected included: gender (male/female); class standing (freshmen; sophomore; junior; senior); the student's major; and whether the student had economics in high school. Composite scores for the ACT, our proxy for natural ability, were obtained from the Registrar's Office.

The sample, limited to those students for which both pre- and post-test scores were available, includes observations on 333 students (48% males, 52% females). Of the 333 students, 47% are freshmen, 33% are sophomores, 14% are juniors, and 6% are seniors. The make up of class standing is fairly even between male/female students. Twenty nine percent of students had economics in high school (30% of males, 27% of females).

Evaluation Techniques -- Scores on the pre- and post-tests were categorized into groups based on gender, class standing, and high school economics in order to make comparisons between groups. Mean scores on the pre- and post-test for each group were compared, using a two tailed t-test ($\alpha = 0.05$), to determine if differences existed in the level of economic understanding at the beginning and end of the course. Paired t-tests were used to determine if the performance on the post-test was significantly different from pre-test performance for each group.

The difference between post- and pre-test scores is used to measure the rate of economic learning, and is the dependent variable in a regression equation. OLS is used to estimate the effect of the independent variables (gender, class standing, ACT scores, major, high school economics) on the rate of economic learning.

Description of Variables-- The dependent variable in the regression equation (DIFSCOR) was designed to measure the amount of economic learning that occurred during the course. Binary variables (= 1 if true; = 0 otherwise) were used to represent the independent variables gender (MALE, FEMALE), class standing (FR = freshmen; SO = sophomore; JR = junior; and SR = senior), and having

economics in high school (HSECON). Data on student's majors were classified according to the college in which the program of study resides (NS = Natural Sciences; SS = Social Sciences; ED = Education; FA = Fine Arts; BT = Business and Industrial Technology; and UD = undecided). Given the multiple choice question format of the test, the literature discussed earlier suggests that males would perform better than female students on both the pre- and post-tests, and possibly in the accumulation of knowledge as well. However, we did not have an a priori expectation as to the extent of influence of gender on the amount of economic learning. Since maturity and experience in understanding course structure and purpose generally increases with class standing, we expected class standing to have a positive influence on economic learning (coefficients on SO, JR, and SR should be greater than zero). Students whose majors are generally perceived to be more quantitative in nature (i.e., utilizing math, statistics, computer science, etc.) may possess skills enabling them to master the analytical material presented in economics courses more easily and quickly than students whose majors are less quantitative (i.e., art, history, etc.). Thus, we expected a positive relationship between majors associated with quantitative skills and the level of economic learning (expect NS > 0). Natural ability, represented by ACT scores, was hypothesized to positively influence the level of economic learning. Students with economics in high school are expected to have, on average, a higher level of economic understanding at the beginning of the semester than students without economics in high school (implying their pre-test scores would be higher). However, if our results are consistent with the literature, the initial benefit of having had high school economics should diminish over the course of the semester with little difference between the two groups in terms of the level of understanding at the end of the semester or the rate of economic learning. Thus, although we would expect a positive influence on economic learning from having had economics in high school (expect HSECON > 0), the influence may not be a strong one.

Results

Pre-test scores for the sample are presented in Table 1. In absolute terms, seniors performed better on the pre-test than their counterparts and, interestingly, freshmen performed better than either sophomores or juniors. The scores for male students (26.81) were not statistically different from those of their female counterparts (26.17). Students with high school economics had higher mean scores (27.66) than students without high school economics

(26.00), a difference that was statistically significant ($p < 0.01$).

Post-test scores for the sample are also presented in Table 1. As in the pre-test, seniors performed better, in absolute terms, on the post-test than their counterparts. The scores for male students (30.04) again were not statistically different from those of their female counterparts (29.73). Although students with high school economics had higher absolute mean scores (30.81) than students without

and females. Again, results indicated that no gender structural differences exist; consequently, the model was estimated using the entire sample of students.

Numerical results of the ordinary least squares regression for the dependent variable DIFSCOR are presented in Table 2. The results suggest that gender does not influence the rate of economic learning (estimated coefficient not statistically significant). This result is consistent with findings of many previous studies which suggest that although males may enter the introductory course with a higher level of economic knowledge, the accumulation of knowledge (or learning) occurs at a similar rate for males and females. The regression results indicate that having had economics in high school appeared to have a negative impact, but was statistically insignificant. Although initially counter intuitive, what this result suggests is that the initial benefit of having had economics in high school did diminish over the course of the semester.

The results very weakly suggest that natural ability plays, if any, only an insignificant role in economic learning ($ACT > 0$, but statistically insignificant). This indicates that differences in the rate of accumulation of economic knowledge due to natural ability do not exist.

Class standing also appears to have little influence on economic learning as none of the estimated coefficients are statistically significant. Thus, concerns about combining all classes of students (freshmen, sophomore, etc.) in introductory economic courses may be overstated. The weak performance by upperclassmen may be caused by the fact that, since many students in the sample take this course only to fulfill a basic requirement,

Table 1. Comparison of Pre- and Post-test Scores by Group.

Pre-test	N	Mean ^z	Std. Dev.	CV ^y	Range
All Students	333	26.48	5.065	0.19	32.0
Freshmen	155	26.72	5.208	0.19	27.0
Sophomore	111	26.23	4.758	0.18	29.0
Junior	47	26.06	4.971	0.19	21.0
Senior	20	27.00	6.000	0.22	27.0
Male	161	26.81	5.714	0.21	29.0
Female	172	26.17	4.367	0.17	29.0
With High School Economics	96	27.66	5.479	0.20	29.0
Without High School Economics	237	26.00	4.818	0.19	32.0
Post-test	N	Mean ^z	Std. Dev.	CV ^y	Range
All Students	333	29.88	5.002	0.17	30.0
Freshmen	155	30.06	5.033	0.17	29.0
Sophomore	111	30.10	4.667	0.16	25.0
Junior	47	28.66	5.518	0.19	23.0
Senior	20	30.15	5.264	0.17	16.0
Male	161	30.04	5.491	0.18	30.0
Female	172	29.73	4.507	0.15	24.0
With High School Economics	96	30.81	5.270	0.17	25.0
Without High School Economics	237	29.50	4.848	0.16	29.0

^zMaximum score 40 points
^yCoefficient of variation

high school economics (29.50), the difference was not statistically significant, in contrast to the pre-test, suggesting the benefits of having high school economics diminishes over time.

A comparison of the post-test score to the score on the pre-test for each group was also conducted. Each group's post-test performance was statistically significantly different ($p < 0.01$) from their pre-test performance. This suggests that improvement, or economic learning, did occur over the course.

Ordinary least squares was used to estimate the effect of the independent variables (gender (FMALE), class standing (SO, JR, SR), high school economics (HSECON), ACT score, and major (NS, SS, ED, FA, UD)) on the dependent variable, DIFSCOR. A Chow test was used to test for structural differences in performance between males

Table 2. Ordinary Least Squares Results for the Dependent Variable DIFSCOR.

Independent Variables	Dependent Variable:	
	DIFSCOR	
FMALE	0.05	(-0.10)
SO	0.67	(1.32)
JR	-0.71	(-1.01)
SR	-0.13	(-0.13)
HSECON	-0.26	(-0.53)
ACT	0.04	(0.57)
NS	1.67	(2.05)
SS	1.31	(1.67)
ED	1.70	(2.24)
FA	1.50	(1.68)
UD	1.93	(2.52)
INTERCEPT	1.21	(0.86)
R ²	0.039	
N	333	

NOTE: Figures in parentheses are t statistics. For our sample size critical $t(0.01) = 2.576$, critical $t(0.05) = 1.960$, critical $t(0.10) = 1.645$.

they may not feel required to learn the principles material.

The results do suggest that the student's major has some influence on the amount of economic learning. Although all of the estimated coefficients are positive (NS, SS, ED, FA, and UD all > 0) only the coefficients NS (natural sciences), ED (education), and UD (undecided) are statistically significant. The positive coefficients on NS and ED are expected, as majors which require greater quantitative skills, such as math and science (NS), or which expose students to different learning methods (ED) provide valuable skills in the study of economics. Students who have not yet chosen a major (UD) may be more open to learning new material since they have not yet narrowed down their chosen field of study.

Summary And Conclusions

This initial study investigated, through measuring the level of economic understanding at the beginning and end of the semester, and the level of economic learning over the semester, the impact of selected factors (gender, maturity, high school economics, natural ability, and major) on students' economic learning. The results indicated that students having had economics in high school entered the course with a higher stock of economic knowledge. This initial advantage did diminish over the semester so that the two groups were similar, in terms of economic learning, at the end of the semester. The results also indicated that gender differences in performance, at the beginning and the end of the semester, were not nearly as pronounced as previously identified in the literature and that both males and females accumulate economic knowledge at a similar rate. Although this study indicated that the rate of economic learning was not influenced by class standing (freshmen, sophomore, etc.) or natural ability, the results do suggest that students= major does have some influence.

The majority of the studies reported in the literature evaluated students' performance in classes composed of both economics and non-economics majors. What differentiates this study from the others is that the class was composed entirely of non-economics majors so a more homogenous population was tested. Thus, our results seem to raise the possibility that the differences in economic understanding and learning discussed in the literature may be due to a possible bias in the results stemming from evaluating students' performance in classes where majors and non-majors are mixed. This topic warrants further development and investigation.

Many factors affect students' performance in economic courses. This study focused on only a few select variables (gender, maturity, high school economics, natural ability, and major). Furthermore, this study is limited in scope as the sample used comes from one course at a single institution. However, the results obtained through this investigation suggest that other factors beyond those examined in this study, and many interactions among these factors, may contribute to students' economic understanding and learning. Therefore, the next step is to see if these results can be replicated and further refined using samples from other universities.

Literature Cited

- Brasfield, D.W., D.E. Harrison, and J.P. McCoy. 1993. The impact of high school economics on the college principles of economics course. *Jour. of Economic Education* 24(2):99-111.
- Bridges, D. and K. Casavant. 2000. An initial evaluation of factors affecting students= preparedness for economic learning. *NACTA Journal* 44(1): 35-40.
- Buckles, S. and V. Freeman. 1983. Male-female differences in the stock and flow of economic knowledge. *Review of Economics and Statistics* 65(2):355-358.
- Ferber, M.A., B.G. Birnbaum, and C.A. Green. 1983. Gender differences in economic knowledge: a reevaluation of the evidence. *Jour. of Economic Education* 14(2):24-37.
- Gohmann, S., and L.C. Spector. 1989. Test scrambling and student performance. *Jour. of Economic Education* 20 (3):235-238.
- Heath, J.A. 1989. An econometric model of the role of gender in economic education. *American Economic Review* 79 (2):226-230.
- Jackstadt, S.L. and C. Grootaert. 1980. Gender, gender stereotyping, and socioeconomic background as determinants of economic knowledge and learning. *Jour. of Economic Education* 12(1):34-40.
- Lopus, J.S. 1997. Effects of the high school economics curriculum on learning in the college principles class. *Jour. of Economic Education* 28(2):143-153.
- Lumsden, K.G. and A. Scott. 1987. The Economics student reexamined: male-female differences in comprehension. *Jour. of Economic Education*

18(4):365-375.

Moyer, M.E. and D.W. Paden. 1968. On the efficiency of the high school economics course. *American Economic Review* 58(4): 870-877.

Rhine, S.L.W. 1989. The effect of state mandates on student performance. *American Economic Review* 79 (2): 231-235.

Saunders, P. 1970. Does high school economics have a lasting impact? *Jour. of Economic Education* 2(1):39-55.

Siegfried, J.J. 1979. Male-female differences in economic education: a survey. *Jour. of Economic Education* 10(1):1-11.

Siegfried, J.J. and S.H. Strand. 1977. Sex and the economics student. *Review of Economics and Statistics* 59 (2): 247-249.

Walstad, W.B. and J.C. Soper. 1987. Test of Economic Knowledge, Examiner=s Manual. Joint

Council on Economic Education, New York, N.Y.

Walstad, W.B. and J.C. Soper. 1989. What is high school economics? Factors contributing to student achievement and attitudes. *Jour. of Economic Education* 20(1): 23-38.

Watts, M. 1987. Student gender and school district differences affecting the stock and flow of economic knowledge. *Review of Economics and Statistics* 69(3): 561-566.

Watts, M. and G.J. Lynch. 1989. The principles course revisited. *American Economic Review*. 79 (2): 236-241.

Williams, M.L., C. Waldauer, and V.G. Duggal. 1992. Gender differences in economic knowledge: an extension of the analysis. *Jour. of Economic Education* 23(3):219-231.