EFFECTS OF GENDER AND PERSONALITY ON STUDENT PERFORMANCE IN PRINCIPLES OF ECONOMICS

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ABSTRACT

This paper seeks to identify those factors that influence a student's learning in college macro- and microeconomics courses. Student and teacher personality type, gender, major, college-entrance exam scores, and overall GPA were correlated with student learning, measured by taking the difference in the Test of Understanding College Economics III (TUCE) pre- and post-test. By identifying those variables that affect learning, we hope to ultimately make suggestions on how to improve the teaching style for college principles of economics classes.

INTRODUCTION

This paper seeks to identify factors that influence a student's performance in college principles of macro- and microeconomics courses. Using student improvement, as measured by the difference in pre- and post-test scores on the Test of Understanding College Economics III (TUCE), personality type as determined by the Keirsey Temperament Sorter, the overall grade point average, ACT score, gender, major, and teacher personality as variables, we have attempted to draw some conclusions that will help economics instructors to meet the needs of our often dismally performing students. As female professors of economics at a university where teaching is the top priority, we were especially concerned about the possibility of relatively poor performance by women in economics courses.

The educational literature suggests that women tend to score relatively worse than men on quantitative material assessed on a time-constrained multiple-choice test (Greene, 1997). As economics courses are becoming increasingly quantitative (Becker, 1997) and professors are relying heavily on time-constrained multiple-choice question tests (Siegfried, Saunders, Stinar, and Zhang, 1996), this would suggest that women would perform significantly worse than men in economics

classes. This persists beyond graduation. Hirschfeld, Moore, and Brown (1995) find that women, even those with the same economics GPA and SAT scores, score 40 points lower on the GRE Subject Test for Economics.

In this paper we are attempting to identify factors that influence a student's performance in college principles of economics courses. We hypothesized that performance might be influenced by factors other than gender, specifically, such as personality type, major, ability of the student, effort put forth by the student, and teaching style of the teacher. We began evaluating our principles of macro and micro students at Jacksonville State University (JSU) in the winter semester 1997. On the first day of class the students took the TUCE III pre-test. Later in the semester they took the Keirsey Temperament Sorter, and then during the final exam they took the post-test, where correct answers earned them extra credit points. We repeated this cycle of events throughout the summer of 1998. We will briefly review the literature on student achievement in principles of economics classes with regards to gender and personality type. We then provide a brief explanation of the different personality types and the TUCE III. Next we describe the JSU data, our analysis, and the results. Last, we offer some possible explanations of our findings and propose some areas for future research.

LITERATURE REVIEW

Research on improving economic education at the college and university level has been extensive, although it has diminished significantly since 1980 (Becker, Highsmith, Kennedy, Walstad, 1991) However, this research has seldom focused on meeting the needs of women and of those with different personality types. In the first paper of its kind, Borg and Shapiro (1996) found that personality type is an important factor in the economics student's performance. They used the Myers-Briggs Type Indicator to determine personality and the course grade to determine the student's mastery of the material. They found gender to be insignificant. However, other authors suggest that frequently women struggle in economics courses, often dropping out before the first test (Greene1997), performing worse overall than males, and leaving many more questions blank on the GRE Economics Subject Test (Hirschfeld, Moore, Brown 1995). According to Arnold (1992), over their college years, women often lose confidence needed to handle economic problems. They also require more cues, such as good grades, to persist in economics courses (Becker 1997). Weltzel, Potter, and O'Toole (1982) found that the greater the difference between an instructor's teaching style and a student's learning style, the worse a student performs in principles of economics and the less he/she likes it. Thus, personality type and gender, we believe, might influence how a student assimilates economics information from a particular instructor. Since 83% of the economics

instructors in the US are male (Becker 1997), knowledge of such a relationship may be helpful in improving female performance in economics.

PERSONALITY TYPES

The Keirsey Temperament Sorter is a 70-question multiple-choice questionnaire. Although the Keirsey Test is both less complex and less expensive than the Myers-Briggs Test, it also has a high degree of accuracy and is used interchangeably by many university campuses. The students' answers determine what their preferences are on four scales: where the student likes to focus his/her attention (E or I); the way a student looks at things (S or N), the way a student likes to decide things (T or F); and how the student deals with the outer world (J or P) (Consulting Psychologists Press, 1976). The 4 areas of choice are described in more detail below (Lawrence 1982):

1.	E = Extroversion.	The person's interest flows mainly to the outer world of actions, objects, and persons, or,
	I = Introversion.	The person's interest flows mainly to the inner world of concepts and ideas.
2.	S = Sensing	The person prefers to focus on the immediate, real, and practical, or,
	N = Intuition.	The person prefers to focus on the possibilities, relationships, and meanings.
3.	T = Thinking	The person makes decisions objectively, impersonally, logically, or,
	F = Feeling.	The person bases decisions primarily on values, subjectively.
4.	J = Judgment.	The person prefers to live in a planned and orderly way, having things settled, or,
	P = Perception.	The person prefers to live in a spontaneous, flexible way, preferring to keep options open.

We measured improvement in the level of economics knowledge by giving all of our principles students the TUCE III test at the beginning and end of the

semester. The TUCE III consists of two (one for microeconomics and one for macroeconomics) 33-question, four-option, multiple-choice tests. According to Philip Saunders (1991) one of the main goals of the TUCE is to measure improvement in college introductory economics courses. About 70% of the questions are designed to assess student aptitude in applying economics to solving problems. Since 1968 the only consistently significant variable to influence post-TUCE scores are pre-aptitude measures, such as the pre-test and the SATand ACT (Becker 1997). A committee consisting of many economists long involved in the economic education of college students selected, wrote, and edited the questions on the TUCE exam (Saunders 1991). An extensive review process followed. Borg and Shapiro (1996) chose to use grades, not the TUCE, to measure economic performance: They claimed that the TUCE is no more objective than an individual professor's own test and that the TUCE reflects the personality types of the professors who composed it. Although their argument has merit, our goal was to measure the level of improvement in the course, not just the final grade. In order to improve our teaching of economics, we believed that whether a student comes in weak or strong in economics on the first day of class, our success in teaching should be based on how much that student has improved by the end of the course.

METHODOLOGY

The data consist of observations on 106 students in principles of macroeconomics courses and 83 students in microeconomics courses taught from spring 1997 through summer 1998. The actual number of students in the sections was much larger; however, many students had not taken the ACT. Since the ACT score proved to be a significant factor in our research, the results for students without ACT scores are not included in the sample. Also, some of the students had post-test scores that were lower than their pre-test scores. We assume that the negative scores and those showing no change were due to lack of motivation, since the post-test TUCE score had a minimal effect on their course grade. (Students were given ½ point added to their final exam grade for each correct answer on the post-test). These students were also deleted from the final samples. The following variables were recorded for each student in the final sample.

DIFF	The difference between the pre-test and post-test score on the TUCE

GEN	Gender
TCH	Teacher
PER	Personality type
MAJ	Major
GPA	The student's grade point average on all courses at this university
ACT	The student's score on the American College Test

DIFF, the improvement in the TUCE score, is a measure of how much the student learned in the class. A larger DIFF indicates that the student learned more in the course. In order to measure learning in the course, rather than simply knowledge of economics, we used the change in scores instead of the post-test score**.** GEN indicates the gender of the student, so that we could see if our students followed the typical result of men outperforming women. TCH represents the two teachers, both of whom are female. Their personalities differ slightly; one is ESTJ, and the other is ESFJ. PER represents one of sixteen possible personality types. In our sample the types represented were as displayed in Table 1A.

MAJ indicates if the student is a business major or other major. ACT**,** the score that the student made on the American College Test, represents a rough approximation of the student's ability or aptitude. We would expect a positive relationship between ACT and DIFF. GPA, the student's grade point average, serves as a measure of the amount of effort the student has put into his or her studies. GPA should be positively related to DIFF.

First we performed simple t-tests and analysis of variance to compare DIFF, the performance variable, between male and females and different personality types. In addition, in order to determine the importance of personality, ability, effort, teacher, gender, and major on DIFF, the amount learned, we regressed these variables on DIFF. In the regression analysis, GEN, TCH, and PER were represented by dummy variables.

Table 1A
Gender and Personality – Macroeconomics Sample

Personality Type	Number of Men	Number of Women	Total
ESTJ	4	9	13
ESFJ	9	22	31
ENFJ	5	7	12
ENFP	6	5	11
ISTJ	8	4	12
ISFJ	4	18	22
INFJ	1	4	5
Total	37	69	106

Table 1B
Gender and Personality – Microeconomics Sample

Personality Type	Number of Men	Number of Women	Total
ESTJ	11	8	19
ESFJ	7	11	18
ESFP	1	4	5
ENFP	3	4	7
ISTJ	4	4	8
ISFJ	5	10	15
INTJ	1	4	5
INFJ	3	3	6
Total	35	48	83

EMPIRICAL RESULTS

The t-tests for differences in the means of DIFF for men and women in macroeconomics revealed that the average DIFF for the sixty-nine women was 5.0; for the 37 men, 4.2. The difference was significant at the 8% level. In microeconomics, the average DIFF for the 48 women was 4.4; for the thirty-five men, 4.0. The difference between men and women was not significant in the microeconomics classes. When improvement among personality types was compared, analysis of variance found no significant difference between the average scores of the different personality types in either of the two courses. The average values for DIFF for each personality type are given below in Table 2A and 2B.

Table 2A
Average DIFF for Personality Types in Macroeconomics

Personality Type	Average DIFF
ESTJ	3.5
ESFJ	4.6
ENFJ	5.8
ENFP	5.3
ISTJ	5.6
ISFJ	4.5
INFJ	3.0

Although the DIFF variable ranged from a low of 3.0 for INFJ's to a high of 5.8 for ENFJ's in macro and a low of 2.3 for ENFP's to a high of 6.0 for INFJ's in micro, the means were not significantly different, probably because there were relatively few observations of each of these personality types in the two samples (See Tables 1A and 1B).

Since several of the personality types in our sample contained less than ten students, we tested DIFF for opposite personality types; i.e., Extrovert vs. Introvert, Sensing vs. Intuitive, Thinking vs. Feeling, and Judging vs. Perceiving. The results are shown below in Tables 3A and 3B.

Table 2B
Average DIFF for Personality Types in Microeconomics

Personality Type	Average DIFF
ESTJ	4.3
ESFJ	4.2
ESFP	4.2
ENFP	2.3
ISTJ	5.4
ISFJ	3.9
INTJ	4.2
INFJ	6.0

Table 3A
Average DIFF for Broad Personality Types
(E vs. I, N vs. S, F vs. T, J vs. P) in Macro

Personality Type	Number of Students	Average DIFF
Extrovert	67	4.73
Introvert	39	4.62
Sensing	78	4.54
Intuitive	28	5.11
Thinking	25	4.52
Feeling	81	4.74
Judging	95	4.62
Perceiving	11	5.27

Table 3B

Average DIFF for Broad Personality Types (E vs. I, N vs. S, F vs. T, J vs. P) in Micro

Personality Type	Number of Students	Average DIFF
Extrovert	49	3.98
Introvert	34	4.59
Sensing	65	4.28
Intuitive	18	4.06
Thinking	32	4.56
Feeling	51	4.02
Judging	71	4.22*
Perceiving	12	3.08*

*Significantly different at the 3% level.

In macro, Extroverts scored slightly than Introverts; Intuitive, higher than Sensing; Feeling, higher than Thinking; and Perceiving, higher than Judging. However, none of these differences was significant. In micro, Introverts scored slightly higher than Extroverts; Sensing, higher than Intuitive; and Thinking, higher than Feeling, these scores were not significantly different. However, the students with Judging personalities scored significantly better than those with the opposite personality type, Perceiving. Although not statistically significant, the personality types that should most improvement in macro, Extrovert, Intuitive, Feeling, and Perceiving, were opposite those that performed best in micro, Introvert, Sensing, Thinking, and Judging.

The basic empirical model used in ordinary least squares estimation was:

$$DIFF = f(MAJ, GPA, ACT, GEN, TCH, PER)$$

The results for macro sample, which contained 7 personality types, are found in Table 4A.

Table 4A
Regression of Personality, GPA, ACT, Teacher, Gender & Major on Macro DIFF

Variable	Coefficient	T-Statistic
MAJ	.28	.45
GPA	-0.24	-1.40
GEN	-1.29	-1.97**
TCH	-0.61	-1.07
ACT	0.18	2.43***
ESTJ	1.23	.79
ESFJ	2.02	1.43
ENFJ	3.44	2.19**
ENFP	3.02	1.88*
ISTJ	3.52	2.21**
ISFJ	1.36	.94
INFJ	.33	.16

R^2 = .17 Significant at * 10%, ** 5%, *** 1%

ACT was the most significant of the variables, indicating that the student's ability is an important factor in determining success in macro. Gender, significant at the 5% level, is also an important factor. Since the dummy variable was one for male students, the negative sign indicates that the men in the sample did not learn as much as the women. Three personality types, ENFJ, ENFP, and ISTJ, were all significant with positive signs, indicating that these types may have an advantage in macroeconomics. Although not significant, the negative coefficient for TCH indicates that students with Professor #1, who is ESFJ, did not do as well as those with Professor #2, who is an ESTJ. This might indicate that students learn more if the teacher is more **T,** thinking, rather than **F**, feeling. The thinking teacher is probably less likely to sympathize with excuses for poor performance than is the feeling teacher. Students know that they must work harder, and therefore, they learn more. Also, Professor #1 taught the course in a summer terms, which are more

intense with less time to study between classes than the regular term when Professor #2 taught the course. The results for the micro sample are given in Table 4B below.

Table 4B
Regression of Personality, GPA, ACT, Gender, and Major on Micro DIFF

Variable	Coefficient	T-Statistic
MAJ	-0.50	-0.84
GPA	0.92	2.21**
ACT	-0.22	-0.19
GEN	-0.33	-0.56
ESTJ	-1.31	-1.09
ESFJ	-1.58	-1.31
ESFP	-1.46	-0.93
ENFP	-3.29	-2.33**
ISTJ	-.50	-.035
ISFJ	-2.37	-1.92**
INTJ	-1.61	-1.03
INFJ	3.65	2.25**

R^2 = .18 Significant at ** 5%

For the micro sample, MAJ, ACT, and GEN were not significant. GPA, the indicator of the student's work effort, however, was significant in micro. Of the personality types, ENFP, ISFJ, and INFJ were all significant. Their signs indicate that INFJ's performed better than ENFP's and ISFJ's in micro. Since all of the micro samples were taught by the same teacher, the TCH variable was not used in the micro regression.

CONCLUSIONS

In contrast with previous research, our results found that women improved significantly more than men between the pre-test and post-test TUCE in macro. Although the difference was not statistically significant, women's improvement in micro was larger than men's. With respect to personality type, it appears that students who are Extroverts perform better than Introverts in macro. In micro, however, the Introverts appear to perform better than the Extroverts. Borg and Shapiro found that Introverts performed better than Extroverts, but their research included only macro students. Teachers with thinking rather than feeling personalities seem to be better at motivating students to learn in macro.

In future research in this area, we plan to enlarge our sample until most of the personality types have at least thirty observations. We will include data from male teachers in order to determine if our women students did better because we are female teachers. Since 83% of all economics professors are male, the fact that we had no male teachers may have biased our results.

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