The Influence of Educational Psychology Variables on Student Grades in an Introductory Economics Course

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Abstract
In the two principles of microeconomics classes that I taught during the spring and fall semesters of 2013, 170 students participated in the completion of five questionnaires. The first questionnaire covered determinants of student performance recognized in economic education literature, including GPA, gender, age, and race. The other questionnaires were developed by well known scholars in the field of educational psychology, and they describe the following recognized educational psychology variables: a 29-item Locus of Control Scale, a 12-item Achievement Goal Scale, a 19-item Test Anxiety Scale, and a 16-item Procrastination Scale. The t test results were provided to show student characteristics and psychological profiles of students who outperformed others in terms of grades. The regression results show the influence of economic education and educational psychology variables on student grades. The regression equation with only economic education determinants shows that GPA, gender, and ethnicity are the significant variables on student grades, with GPA having a positive effect, males outperforming females, and whites outperforming non-white students. When psychological variables are added to the initial equation, regression results show a significant improvement as reflected by the increase of the adjusted R^2 from 0.25 to 0.39. Regression results show that GPA, mastery approach, and debilitating test anxiety are the only significant variables on student performance, with both GPA and mastery orientation variables having a positive effect, while debilitating test anxiety has a negative effect on student performance. The implication of these results for educators is discussed in the paper.

Keywords: economic education, educational psychology variables and student grades

Introduction

A small but growing number of studies have been published in the field of economic education to examine the impact of educational psychology variables on student learning outcomes in principles, intermediate, and upper level economics courses. The first study which incorporated a psychological perspective to examine student motivation and achievement was by Borg and Stranhan, who examined personality type as an influence on student success in upper level economics courses (2002). This was followed by a study which added metacognitive skill to economic education determinants to predict student performance in a large macroeconomics class, based on the difference between student self-perception of knowledge and revealed knowledge as measured by test performance (Grimes, 2002). Locus of control was introduced to describe the evaluation of teachers and to examine its effect on student achievement (Grimes et al., 2004). Hadsell added achievement goal orientation theory to examine its influence on student achievement in principles and intermediate economics courses (2010). Debilitating and facilitating test anxiety constructs were introduced to test their impact on student performance in principles of microeconomics (Kader, 2016).

This paper will contribute to the existing literature in economic education by testing the influence of four educational psychology variables on student learning outcomes in principles of microeconomics course. The four educational psychology variables tested in this paper are achievement goal orientation (consisting of mastery orientation, mastery avoidance, performance orientation, and performance avoidance); locus of control (divided into external and internal orientation); academic procrastination; and test anxiety (divided into debilitating and facilitating). These are highly recognized and are being tested extensively in the field of educational psychology as well as in other fields such as math, languages, medicine, and aviation, to name a few. The paper also will incorporate widely recognized economic education determinants on student performance, including GPA, gender, age, and ethnicity. The paper will provide the psychological profile as well as the student characteristic profile of students who outperform others in the course.

Review of the Literature

There are three motivational variables often used to describe self-regulated learning in the field of educational psychology, namely self-efficacy, motivation orientation (intrinsic and extrinsic), and achievement goal. Of the three motivational variables, achievement goal is considered to be the most prominent motivational theory (Anderman and Wolters, 2006). According to this theory, students engage in a given task for different purposes, either to learn or to perform (Elliot and Dweck, 2007). There are four components to the theory: mastery, mastery avoidance, performance, and performance avoidance. The mastery approach goal applies to students who focus on learning and understanding the new information by applying deep learning strategies to learn as much as possible, while the mastery avoidance goal applies to students who strive to avoid misunderstanding the course material (Elliot and Harackiewicz, 1996; Elliot and McGregor, 2001). Students with a performance goal focus on demonstrating their abilities relative to others by creating an aura of competence and doing better than their peers but following a shallow learning approach (Moller and Elliot, 2006; Kaplan and Maehr, 2007). Students with a

performance avoiding goal focus on avoiding demonstrating a lack of competence in the new course material (Moller and Elliot, 2006). Most of the studies found a positive effect on the mastery approach goal and mixed results with the performance approach goal effect. However, both approaches have been shown to have positive effects on learning outcomes if students pursue multiple tasks (Harackiewicz et al., 2002). Several studies showed a negative learning outcome with both the performance avoidance approach and mastery avoidance approach (Elliot and Church, 1997; Putwain and Syms, 2012).

There are numerous definitions of procrastination in the field of educational psychology. In his meta-analytic paper, Steel defined procrastination as the act of "voluntarily delaying or postponing an intended course of action despite expecting to be worse off for the delay" (2007, 66). The negative consequences of delaying an intended course of action could be due to an unwillingness to act on an unpleasant or difficult task (Solomon and Routhblum, 1984) or to the absence of self-regulated performance (Tuckman, 1991). The self-handicapping behavior of procrastinators has led to the wasting of time, with higher stress and poor performance. Because of the negative impact on students' performance and well being, academic procrastination has been studied extensively in various disciplines and particularly in educational psychology. Procrastination among students at the college and university levels is a common problem, and it is estimated that about 80-85% of students engage in academic procrastination (Ellis and Knaus, 1977), and more than 50% of students procrastinate regularly and in a problematic fashion (Day et al., 2000). Academic procrastination has been found most often with writing term papers, preparing for exams, and doing homework assignments (Solomon and Routhblum, 1984). It is linked to adverse behaviors such as poor study habits, cramming for examinations, test anxiety, late submission of homework assignments and term papers, lower grades, sense of guilt, and depression, to name a few (Lee, 2005; Özer, et al., 2009). Procrastination was viewed initially as a self-defeating personality trait (Ferrari, 1991), but more recently the view has shifted to treating it more as a complex phenomenon that encompasses cognitive as well as behavioral components (Walters, 2003). Recent studies in educational psychology show that motivational and cognitive factors together provide a better explanation of academic procrastination. In this paper, achievement goal orientation is the motivational factor that influences procrastination while the cognitive factors influencing procrastination include locus of control and test anxiety.

Recent research in educational psychology divides procrastination into three types: academic, passive, and active (Chu and Choi, 2005; Steel, 2007; Choi and Moran, 2009). Academic procrastination measures the tendencies of individuals to waste time and intentionally put off a given task that should be done (Tuckman, 1991); active procrastination measures the preference of the individual for facing pressure and intentionally putting off performing a given task; and passive procrastination measures the tendencies of individuals to procrastinate due to laziness and difficulty in making decisions (Chu and Choi, 2005). Apparently, active procrastinators position themselves so that they perform as well as non-procrastinators in given tasks while passive procrastinators underperform in these tasks (Chu and Choi, 2005). Academic procrastination shows mixed results. A meta-analytic review of procrastination and academic performance (Steel, 2007) found a negative relationship between procrastination and student achievement as defined by their GPA, final exam scores,

and assignment grades. On the other hand, Soloman and Rothblum (1984) and Ferrari (1992) found no relationship between procrastination and student course grades. Active procrastination is shown to be positively correlated with student performance, while passive procrastination is negatively correlated (Chu and Choi, 2005).

The locus of control construct maintains that student achievement is influenced by the extent to which individuals attribute their success or failure to events that are either under or beyond their locus of control. This social-cognitive theory, which was developed by Julian Rotter (1966), is basically a social learning theory integrated with personality theory. Since then, the theory has generated a great deal of research in a variety of areas, including educational psychology, and it has become one of the most important constructs in the field of personality theory (Leone and Burns, 2000). The theory is conceptualized on an internal-external dimension. Individuals with an internal locus of control believe that events in their lives result primarily from their own actions, while individuals with an external locus of control believe that events in their lives are the result of someone else's action or are due to luck or fate. Internally oriented students believe in the connection between their behavior and its outcomes, and, as such, they strive to have more control over their academic experience than externally oriented students. Thus, internally oriented and externally oriented students tend to follow different strategies to acquire learning (Grimes et al., 2004). A study shows that an internal locus of control is associated with productive study habits among college freshmen, which provide a significant and positive effect on academic performance, as reflected by their grades (Zhang and RiCharde, 1999). This was supported by other studies which show that internally oriented students tend to perform better academically than externally oriented students, as reflected by their GPA scores (Carden, et al., 2004; Shepherd, et al., 2006, Gifford et al., 2006). Other studies show that locus of control has no significant effect on student grades (Hadsell, 2010; Kader 2016).

Test anxiety is another behavioral variable that is linked to academic achievement and it has been extensively tested in educational psychology as well as in other fields such as math, medicine, and languages, to name a few. Studies show that test anxiety is negatively correlated with academic performance among students at various levels of educational attainment (Hancock, 2001; Cassidy & Johnson, 2002; Chappell, 2005). According to educational psychology, test anxiety is divided into two parts, emotional and worry. The emotional part of test anxiety refers to the physical discomfort associated with the immediate uncertainty of test taking, which includes dizziness, nausea, feelings of panic, and a decreased choice consistency (Hembree, 1988; Balmont et al., 2002; Pollack et al., 2006). The worry part of test anxiety is associated with the consequences of failing the test in terms of comparing performance to peers and the fear of performing badly. It is this part that is significantly associated with lower academic performance according to various studies (Humbree, 1988; Bandloss et al., 1995).The worry type was identified by the Alpert and Haber Achievement Anxiety Test (1960) as debilitating test anxiety and the non-worry type as facilitating test anxiety. Debilitating test anxiety is associated with decreased problem solving capability, and, hence, lower exam scores while facilitating test anxiety is associated with enhanced and proactive problem solving, and, hence, higher exam scores. Of the 20 studies analyzed by Hebmree in his meta-analytic paper, debilitating test anxiety was found to be significantly and negatively associated with aptitude and achievement tests with an average correlation coefficient of -0.29, while facilitating test anxiety

was shown to have a positive and significant effect with an average correlation coefficient of +0.30 (Hembree, 1988, 1974). Regression results show that debilitating test anxiety has a significant and negative effect on student performance as reflected by average class score while facilitating test anxiety was positive but not significant (Kader, 2016).

Data and Methods

During the academic year 2013, this author taught two classes of principles of microeconomics consisting initially of 182 enrolled students. A survey questionnaire covering determinants recognized in economic education, including GPA, student classification, employment status, gender, age, race, and attendance was given at the end of the semester. Students also were given questionnaires to fill out that were developed by well known scholars in the field of educational psychology. The locus of control variable is described by a questionnaire (Rotter, 1960) which includes 29 items with answers of "a" or "b" for each item to determine whether the individual is internally- or externally-oriented. For example, one question contains these choices "a. The idea that teachers are unfair to students is nonsense" or b. "Most students don't realize the extent to which their grades are influenced by accidental happenings." Internally-oriented students answer "a." while externally-oriented students answer "b." One point is awarded for certain answers and 0 for others and the higher the score the more externally-oriented students are and the lower the score the more internally-oriented they are.

As will be shown in Table 1, the average score for the locus of control scale in our sample of students is 9.88, indicating that any score above this number represents students who are externally-oriented and conversely any number below that represents students who are internally-oriented. The other three surveys have a scale from 1 to 5 for each item. A 5-point Likert scale is designed to make meaningful comparisons among the three questionnaires from strongly disagree (1) to strongly agree (5). The procrastination variable is described by a 16-item questionnaire (Tuckman,1991) and is meant to show how individuals waste time and intentionally put off a given task that should be done. For example, "I postpone starting in on things I don't like to do." The test anxiety variable is described by a 19-item questionnaire (Alpert and Haber, 1960) with 10 items describing debilitating test anxiety and 9 items describing facilitating test anxiety. An item such as "Nervousness while taking an exam hinders me from doing well" describes debilitating test anxiety, and an item such as "I work most effectively under pressure, as when the exam is very important" describes facilitating test anxiety.

The achievement goal orientation is described by a 12-item questionnaire (Elliot and Murayama, 2008) with 3 each describing mastery approach, mastery avoidance, performance approach, and performance avoidance. The following item describes the mastery approach "It is important for me to understand the content of this course as thoroughly as possible," while the following item describes mastery avoidance "I worry that I may not learn all that I possibly could in this class." The following item deals with the performance approach "My goal in this class is to get a better grade than most of the other students," while the following item shows performance avoidance, "My goal in this class is to avoid performing poorly." The surveys were voluntary and confidential, but not anonymous. Students were given extra credit

points for their participation, but these points were not included in the test results. Of the 182 students who remained in both classes, 170 students participated in the survey and completed all of the questionnaires, which represents a 93% participation rate.
Although the sample was not random, it included a wide spectrum of students in terms of gender, age, and ethnicity. Of those who responded to the survey, 54 percent were males, 46 percent were white, and their average age was 22. The nonwhites included African American, Hispanic, and Asian students. Thus, it seems reasonable to argue that the sample is representative of the student population and that students enrolled in this course are similar to those enrolled in principles of economics nationwide.

Empirical Models and Estimated Results

1. The first objective of this paper is to provide psychological as well as student characteristic profiles of students who outperform and those who underperform in this course based on their median grade score, as is shown in Tables 1 and 2.

2. The second objective of this paper is to test for the impact of economic education determinants on student performance, using OLS multiple regression, as shown in Regression 1, Table 3.

3. The third objective of this paper is to test for the impact of educational psychology variables as well as economic education determinants of student performance, as shown in Regression 2, Table 3.

Table 1 reports the mean, standard deviation, and the minimum-maximum numbers for the variables included in this study, while Table 2 reports the t test results by comparing the mean scales of the variables included in the study based on the high vs. low median scores of student grades. It is standard procedure in educational psychology to use the median value for splitting samples into high and low categories. (See for example Choi, 1998, Carden et al., 2004.) In this paper, the sample is divided equally by a median split of a 70 score and those with a higher median value are treated as outperformers and those with the lower median value are treated as underperformers compared to their peers in class. As Table 2 shows, the average score of the subsample of 85 outperformers is 82.26, while the average score of underperformers is 58.19. The t test results shown in Table 2 indicate that there are only seven variables that are significant in their average mean difference namely: student grades, GPA, age, mastery orientation, mastery avoidance, performance orientation, debilitating test anxiety, and facilitating test anxiety. The t results show that students who outperform others have a significantly higher average grade score, higher GPA, tend to be older students, have a higher mastery orientation scale, have higher mastery avoidance scale, have higher performance orientation scale, have lower debilitating test anxiety scale, and have higher facilitating test anxiety scale. All of the above results are consistent with the priori expectation excepting for mastery avoidance scale which should have being with a lower scale for outperformers. Surprisingly, gender and race variables are insignificant although they are in the right direction. Also, note that externally oriented students have a lower grade average score than internally-oriented students but the difference is not significant although in the right direction. Notice also that the difference in the average procrastination scale of outperforming students is slightly higher than that of underperforming students.

One possible explanation is provided by Chu and Choi (2005, p 245) who argue that although active procrastinators procrastinate to the same degree as passive procrastinators, they are more similar to non-procrastinators than to passive procrastinators in terms of purposive use of time, control of time, self-efficacy belief, coping styles, and outcomes including academic performance . Thus, it is possible that a procrastination scale has been elevated by outperformers due to their active procrastination behavior and it acted positively in terms of their performance. As a result, a higher procrastination scale is associated with higher average score.

To test for the impact on average score of educational psychology variables as well economic education determinants identified in this paper, the following two regression equations were used:

1. $S = \alpha_1 + \alpha_2 G + \alpha_3 N + \alpha_4 A_+ \alpha_5 R++ \varepsilon$

2. $S = \alpha_1 + \alpha_2 G + \alpha_3 N + \alpha_4 A_+ \alpha_5 R+ \alpha_6 AP + \alpha_7 L + \alpha_8 D+ \alpha_9 F+ \alpha_{10} M+ \alpha_{11} MA+ \alpha_{12} PR+ \alpha_{13} PRA+\varepsilon$

Where S is the average score and is the dependent variable. This is consistent with other studies which use grade as the dependent variable since it measures student performance. (See, for example, Anderson et al., 1994; Arias and Walker, 2004; and Ballard and Johnson, 2005).

The independent variables are:
G = student self-reported GPA at the time of the survey
N = gender (0 = female, 1= male)
A = age of students at the time of the survey
R = Race (0 = nonwhite, 1 = white)
AP = Academic procrastination (1= low level, 5= high level)
L = Locus of control (1= low level, 5= high level)
D= Debilitating test anxiety (1= low level, 5= high level)
F= Facilitating test anxiety (1= low level, 5= high level)
M=Mastery Approach (1= low level, 5= high level)
MA=Mastery Avoidance (1= low level, 5= high level)
PR=Performance Approach (1= low level, 5= high level)
PRA=performance Avoidance (1= low level, 5= high level)
α = the coefficient to be estimated, and
ε = error term

Table 3 shows the results of the two regression equations. In Regression 1, GPA, gender, and race are significant and the three variables have a positive effect on student achievement. Note that GDP is highly significant, which is consistent with the results obtained in other studies. (See for example Agarwal and Day 1993; Savage, 2009). The regression coefficient for gender indicates that males outperform females in their scores .which is in support of the findings elsewhere. (See, for example, Anderson et al., 1994; Ballard and Johnson, 2004.) The regression coefficient value for the ethnicity variable is also significant, indicating that whites outperform nonwhites in their scores, which is supported by some studies. (See for example

Stocky, 2009.) However, the regression results of both gender and ethnicity are significant only at the 0.1 level.

The regression results shown in Equation 2 of Table 3 indicate that the inclusion of educational psychology variables have improved the estimated regression results, as reflected by the increase of the adjusted R^2 from 0.25to 0.39. The results in Equation 2 show that of the economic education variables, GPA is highly significant and positive while gender, age, and race are insignificant but in their expected influence. Of the educational psychology variables, mastery approach and debilitating test anxiety are both highly significant, while the rest are insignificant in their influence on grades. The highly significant and positive effect of the mastery orientation variable supports the findings elsewhere that deep learning strategy enhances student grades and provides a stronger effect on learning outcomes than the shallow learning strategy of the performance orientation. Notice that the regression coefficient of the performance approach is negative, implying that the two variables, mastery approach and performance approach, do not complement each other in their influence on grades and the results do not support the multiple goal perspective suggested by Harackiewicz et al., (2002). The highly significant and negative impact of debilitating test anxiety on student performance in this study adds further support to the existing literature about the negative influence of test anxiety on student achievement (See Humbree, 1988; Kader 2016). Aside of mastery approach and debilitating test anxiety, other psychological variables are insignificant. Although locus of control and facilitating test anxiety are insignificant, they have the expected sign, with locus of control having a negative effect on learning outcomes, while facilitating test anxiety is positive. On the other hand, other psychological variables, although insignificant, are in the wrong direction. This includes performance approach, mastery avoidance, performance avoidance, as well as procrastination. It should be added here that the positive but insignificant influence of procrastination on student performance could be due to the positive role of active procrastinators, which masks the direction of the influence of the procrastination variable on student grades (See Chu and Choi, 2005).

Conclusion

This paper adds to the existing literature by incorporating highly recognized and test four educational psychology variables in their influence on student grades in a principles of economics course. Of the educational psychology variables being tested, only mastery approach and debilitating test anxiety are significant. In this study, students who pursue a deep learning strategy through a mastery approach seem to achieve their goal as they attempt to control their cognitive, behavioral, and motivation to achieve their goal and hence realize the best learning outcomes. However, it is possible that under different scenarios such as different instructors and teaching styles, coupled with different types of tests as well different levels of difficulty of the subject taught, student may follow different strategies to achieve their goals. Thus, some may try harder, follow shallow learning strategies, or use multiple pathways to achieve similar goals. Hence, more research is needed in this area. Given that this shows a detrimental influence of debilitating test anxiety on student performance, professors should make the effort in introductory economics courses to identify students who may suffer from test anxiety and assist them in locating the help necessary to improve their performance. Researchers in educational psychology have attempted to address this problem through early assessment intervention. Many

universities have websites with suggestions for reducing test anxiety and information for obtaining assistance (Sloan and Wilson, 2009). Aside from the psychological variables examined in this paper, others such as self-efficacy, motivational orientation, and metacognitive skills could have been added to the estimation procedure. Thus, a great deal of research is needed to explore various situations and aspects that may affect student grades through achievement goal theory and test anxiety.

TABLE 1
Principles of Microeconomics
Characteristics of Variables from Economics of Education and Educational Psychology

Variables	Mean	SD	Min Max
Average Score	69.2	13.83	28 98
GPA	3.18	0.49	1.67 4.00
Gender	0.57	0.50	0 1
Age	22.06	5.27	17 46
Race	0.47	0.5	0 1
Locus	9.88	4.16	1 20
Procrastination	2.17	0.60	1.25 4.06
Mastery Orientation	4.35	0.68	1 5
Mastery Avoidance	3.67	1.01	1 5
Performance Orientation	4.16	0.92	1 5
Performance Avoidance	3.96	1.17	1 5
Debilitating Test Anxiety	3.09	0.75	1.10 4.80
Facilitating Test Anxiety	2.65	0.77	1.11 4.44

*Significant at 0.1. **Significant at .05 ***Significant at 0.01.

TABLE 2
Principles of Microeconomics
Low vs. High Average Score
t Test

	Avrge. Score	GPA	Gender	Age	Race	Locus	Proc.	Mast.	Mast. Avd.	Perf.	Perf. Avd.	Debilt. Test Anxiet.	Facilit. Test Anxiet.
Mean w/High Average Score	80.26	3.37	0.60	22.98	0.51	9.27	2.72	4.53	3.99	4.30	4.06	2.84	2.82
Mean w/Low Average Score	58.19	2.99	0.54	21.36	0.44	10.35	2.68	4.17	3.59	4.04	3.88	3.36	2.46
SD w/Low Average Score	9.05	0.43	0.50	4.37	0.50	3.97	0.68	0.77	1.06	0.85	1.13	0.63	0.70
SD w/High Average Score	7.53	0.48	0.49	6.19	0.50	4.31	0.53	0.52	0.93	0.98	1.18	0.77	0.78
Observations w/Low Average Score	85	85	85	85	85	85	85	85	85	85	85	85	85
Observations w/High Average Score	85	85	85	85	85	85	85	85	85	85	85	85	85
t Stat	17.43***	5.17***	0.87	1.98*	0.95	-1.60	0.40	4.11***	2.67***	1.89*	1.08	-4.93***	3.23***
ρ (T<=t) two-tail	0.00	0.00	0.39	0.05	0.35	0.11	0.69	0.00	0.00	0.06	0.29	0.00	0.00

Note: The upper numbers are estimated regression coefficients and the lower numbers in the parentheses are standard errors *significant at 0.10 ** significant at .05 ***significant at 0.01.

TABLE 3 Regression Results Predicting Average Score Microeconomics Class		
Independent Variables From Economic Education and Educational Psychology Variables	**Independent Variables From Economic Education Equation 1**	**Independent Variables From Economic Education and Educational Psychology Variables Equation 2**
Constant	17.22** (7.16)	19.25 (12.17)
GPA	13.91*** (1.88)	11.96*** (1.75)
Gender	3.19* (1.87)	2.51 (1.74)
Age	0.20 (0.18)	0.18 (0.16)
Race	3.21* (1.86)	0.43 (1.81)
Locus of Control		-0.18 (0.22)
Academic Procrastination		1.54 (1.46)
Mastery Orientation		4.01*** (1.39)
Mastery Avoidance		1.35 (0.92)
Performance Orientation		-1.39 (1.20)
Performance Avoidance		0.88 (0.93)
Debilitating Test Anxiety		-5.63*** (1.46)
Facilitating Test Anxiety		0.43 (1.37)
Number of Observations	170	170
Adjusted R^2	0.25	0.39
Standard Error	11.97	10.76
F	15.10***	10.17***

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