LOCUS OF CONTROL, METACOGNITIVE KNOWLEDGE, METACOGNITIVE REGULATION, AND STUDENT PERFORMANCE IN AN INTRODUCTORY ECONOMICS COURSE

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Abstract: In the Principles of Microeconomics course taught during the Fall Semester 2019, 158 out of 179 students participated in the completion of two questionnaires and a survey describing their demographic and academic profiles. The two questionnaires include the 29 items of the Rotter Locus of Control Scale and the 52 items of the Schraw and Dennison Metacognitive Awareness Scale. The 52 items consist of 17 items describing knowledge of cognition and 37 items describing regulation of cognition. The paper is intended to show the combined influence of locus of control, metacognitive knowledge, and metacognitive regulation on student performance. The survey covers variables that have been tested and recognized in economic education literature, which include GPA, gender, age, course level, race, student classification, whether the course was required or elective, employment, whether a high school economics course was taken, and attendance. Regression results show that of the economic education variables, GPA, classification, whether the course was required or elective, and attendance are the only significant variables in their influence on student grade. Of the educational psychology variables,

the regression results show that the locus of control variable has a negative and significant effect, the metacognitive knowledge variable has a positive but insignificant effect, while the metacognitive regulation variable has a positive and significant effect on student grade. The adjusted R-Squared value increased markedly with the addition of the locus of control, metacognitive knowledge, and metacognitive regulation variables to the regression equation. The t test results also show that students who are internally oriented and are high on the metacognitive regulation scale significantly outperform students who are externally oriented and are low on the metacognitive regulation scale. The implication of these results for educators is discussed in the paper.

Keywords: locus of control, metacognitive knowledge, metacognitive regulation, student performance, economic education.

I. Introduction

Researchers in the field of educational psychology have long promoted the theory of locus of control as a determinant of student performance in the classroom. The theory of locus of control maintains that student achievement is influenced by the way students attribute their success or failure to events that are either under or beyond their control. Locus of control as a personality construct was developed by Julian Rotter in 1954 and has since generated a great deal of research in a variety of areas

including education, health, civic engagement, and many other fields and 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 actions or are due to luck, fate, or chance. 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. Studies show that internally oriented students tend to perform better academically than externally oriented students, as reflected by their GPA scores or average grades (Carden, et al., 2004; Shepherd et al., 2006; Kader 2022).

The theory of metacognition, which is of thinking about thinking, was first introduced by Flavell (1979) to describe the knowledge of one's own cognitive process. It refers to one's ability to know and regulate metacognition (Schraw and Moshman, 1995). The two components, metacognitive knowledge and metacognitive regulation, have been theorized to be related to one another. Metacognitive knowledge can be described as what we know about our own cognitive process, while metacognitive regulation can be described as the actual activities that are involved to facilitate learning. Many researchers have examined the relationship between metacognition and academic achievement. Studies

show that students with high academic achievement also demonstrate a high level of metacognitive awareness and a high level of academic performance (Shraw, 1998; Coutinho, 2007; Uwzurike and Ndidiamake, 2010). Studies also show that the interaction of locus of control with metacognition provides a positive influence on student learning outcome (Schraw and Moshman, 1995; Karla Hrbackova et al., 2012). Educational psychology variables, namely locus of control, metacognitive knowledge, and metacognitive regulations, are examined in this paper to test for their influence on student performance.

This paper also includes economic education variables that have been tested in economic education literature, and they include GPA, gender, age, course level, race, student classification, whether the course was required or elective, employment, whether a high school economics course was taken, and attendance (Anderson et al., 1994; Borg and Stranahan, 2002; Grime et al., Savage 2009).

II. Data and Methods

During the Fall Semester of 2019, this author taught Principles of Microeconomics. Of the students enrolled in this class, 158 out of 179 students participated in a survey at the end of the semester describing their demographic and academic profile. The survey included GPA, gender, ethnicity, age, study time, class standing, employment, whether students took high school economics, and whether the course was

required. Attendance was taken six times by the instructor during the semester and was included in this study. Students were asked to fill out two questionnaires, one for locus of control and one for metacognition. The two questionnaires have a 5-point Likert scale for each item. The locus of control questionnaire includes 29-items (Rotter, 1966), with answers of "a" or "b" for each item. One point is awarded for certain answers and zero for the rest on 23 of the items. The other 6 items are fillers. The questionnaire is intended to identify by the answers provided by the participating students whether they are externally or internally oriented. For example, one question contains these choices: "a. When I make plans, I am almost certain I can make them work" and b. It is not always wise to plan too far ahead because many things turn out to be a matter of good or bad fortune anyhow."

The second questionnaire is the Metacognition Awareness Inventory (MAI) developed by Schraw and Dennison (1994) and consists of 52 items. The 52 items are 17 items describing knowledge of cognition and 37 items describing regulation of cognition. The knowledge of cognition is divided into three components: declarative knowledge (8 items), procedural knowledge (4 items), and conditional knowledge (5 items). The following item describes declarative knowledge, "I understand my intellectual strengths and weaknesses," while the following item describes procedural knowledge, "I try to use strategies that have worked in the past," and the next item describes conditional knowledge, "I know when each strategy I use will be most effective." The regulation of cognition is divided into five

components: 1. planning (7 items); 2. information management strategy (10 items); 3. comprehensive monitoring (7 items); 4. debugging strategy (5 items); and 5. evaluation (6 items). The following item describes planning, "I pace myself while learning in order to have enough time"; the following item describes information management strategy, "I slow down when I encounter important information"; the following item describes comprehensive monitoring," I ask myself periodically if I am meeting my goals"; the following item describes debugging strategy, "I ask others for help when I don't understand something"; and the following item describes evaluation, "I know how well I did when I finished a test."

As shown in Table 1, the profile of the students participating in the survey shows that their average score for the semester is 83.4 and is based on four exams given during the semester, and their self-reported GPA is 3.32. The participating students have an average age of 21.89 years, 44 percent are males, 49 percent are whites, and the rest are of Hispanic, Asian, and Black ethnicity. Sixty-two percent of the students are freshmen and sophomores, and students participating in the survey work an average of 14.48 hours a week in the hospitality industry. Slightly over 80 percent of the students are taking the course as a requirement, and 16 percent of them spend more than 4 hours a week. The average attendance taken by the instructor in class is 4.86 out of a maximum of 6.

Table 1
Principles of Microeconomics Student Profile-The Whole Sample

Variable	Mean	SD	Variable	Mean	SD
Average Score	83.442	9.499	Time Studied	0.164	0.372
GPA	3.320	0.469	Required Course	0.816	0.388
Gender	0.443	0.498	High School Economics	0.190	0.393
Age	21.892	5.529	Attendance	4.854	1.358
Race/Ethnicity	0.487	0.501	Locus of Control	11.316	3.716
Class Standing	0.620	0.487	Metacognitive Knowledge	3.566	0.502
Employment	14.481	14.206	Metacognitive Regulation	3.542	0.481

Description of the variables in the Table 1.
Average Score of the Four Exams during the Semester
GPA Self-Reported by Each Student
Age (the age of the student at the time of the survey)
Gender (0 = female, 1= male)
Race/Ethnicity (0 = nonwhite, 1= white)
Class Standing (1= Freshman and Sophomore, 0= Junior, Senior, and other)
Employment Per Week (hours from zero to maximum)
Require Course (1=yes, 0=no)
High School Economics (1=yes, 0=no)
Study Time Per Week (0= 4 hours and less, 1= more than 4 hours)
Attendance (actual attendance taken from 0 to 6)
Locus of Control (low scale =1, high scale=20)
Metacognitive Knowledge (low scale=1, high scale=5)
Metacognitive Regulation (low scale=1, high scale=5)

III. Empirical Model and Estimated Results

1. The first objective of this paper is to estimate the influence of student characteristic determinants, as well to estimate the influence of locus of control, metacognitive knowledge, and metacognitive regulation on student performance, as reflected by average student score, using OLS

multiple regressions, as shown in Table 2. For the regression analysis, the average score is treated as the dependent variable, while all other variables are treated as the independent variables.

Table 2
Regression Results Predicting Average Score of the Principles of Microeconomics Class

Variables	Regression Results of Economic Education Variables	Regression Results of Educational Psychology Variables	Regression Results of the Complete Model
Constant	56.86*** (8.298)	72.334*** (10.398)	52.242*** (5.703)
GPA	7.954*** (5.319)		7.104*** (4.851)
Gender	-0.347 (-0.252)		-0.843 (-0.621)
Age	-0.029 (-0.205)		-0.109 (-0.787)
Race/Ethnicity	1.818 (1.329)		1.021 (0.755)
Class Standing	-2.313 (-1.43)		-2.946* (-1.859)
Employment	-0.081 (-1.587)		-0.080 (-1.602)
Time Studied	-0.766 (-0.412)		-1.814 (-0.998)
Required Course	-4.182** (-2.317)		-3.090* (-1.753)
High School Economics	1.828 (1.038)		1.979 (1.149)
Attendance	1.206** (2.381)		1.213** (2.481)
Locus of Control		-0.582** (-2.885)	-0.450** (-2.364)
Meta Knowledge		2.560 (1.430)	1.267 (0.745)
Meta Regulation		2.411* (1.730)	2.811* (1.741)
N	158	158	158
Adjusted R Square	0.214	0.112	0.272
Standard Error	8.424	8.953	8.103
F	5.264***	7.579***	5.519***

NOTE: The upper numbers are estimated regression coefficients and the lower numbers in the parentheses are t statistics
*Significant at 0.10 **Significant at 0.05 ***Significant at 0.01

2. The second objective of this paper is to estimate the influence, respectively, of locus of control, metacognitive knowledge, and metacognitive regulation on average score based on a t test. The t test is

also used to examine the combined influence of the locus of control and metacognitive regulation on average student score, as shown in Table 3.

Table 3
Principles of Microeconomics t Test

Variable	Mean	SD
Average Score - The whole Sample (N=158)	83.412	9.500
Average Score- Internals (N=79)	86.167	9.015
Average Score- Externals (N=79)	80.880	9.190
t Statistics	3.697***	
ρ (T<=t) one- tail	0.0002	
Average Score - The Whole Sample (N=158)	83.412	9.500
Average Score- High Meta Regulation (N=79)	85.979	8.717
Average Score - Low Meta Regulation (N=79)	80.619	9.687
t Statistics	3.536***	
ρ (T<=t) one- tail	0.0007	
Average Score – The Whole Sample (N=158)	83.412	9.500
Average Score- Internals with High Meta Regulation (N=49)	88.307	8.163
Average Score- Externals with Low Meta Regulation (N=50)	80.137	10.084
t Statistics	4.488***	
ρ (T<=t) one- tail	0.00002	

Significant at *** level

Table 2 shows the regression results. Column 2 of the table shows the regression results of the economic education variables with GPA, required course, and attendance as the only significant variables. Of the educational psychology variables shown in Column 3, locus of control and metacognitive regulation are the only significant ones. Adding the economic education variables with educational psychology variables in Column 4 shows that GPA, class standing, required course, attendance, locus of control, and metacognition regulation are all significant. Notice that locus of control has a negative influence, while metacognitive regulation has a positive influence on student grades, which is consistent

with the findings in other studies. Notice also that that the inclusion of the educational psychology variables improves the regression results by increasing the adjusted r value from 0.112 to 0.272.

Table 3 shows the difference in average score between internally oriented vs externally oriented students. Splitting the sample by a median locus of control score of 11 shows that the average score of internally oriented students is significantly higher than the average score of externally oriented students (86.167 vs 80.880). Also, splitting the sample by a median metacognitive regulation score of 3.50 shows that the average score of high metacognitive regulation students is significantly higher than the average score of low metacognitive regulation students (85.979 vs 80.618). The unequal variance t test results also show that students who are both (N=49) internally oriented and with high metacognitive score significantly outperform students who are both (N=50) externally oriented and with low metacognitive regulation score (88.307 vs 80.137). This supports the notion that both internal orientation and mastery high metacognitive regulation scores reinforce each other in their influence on student performance

IV. Conclusion

Previous research on locus of control and metacognition have shown that both have a strong influence on student performance. However, these variables were often examined separately to predict academic

performance in courses taught at the university level. This paper attempts to integrate the two educational psychology variables along with economic education determinants into one framework to provide a better understanding of their influence on student grades. The evidence provided in this paper shows that locus of control interacts significantly with metacognitive regulation and that both variables reinforce each other in their positive influence on student performance.

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