

INDIVIDUAL DIFFERENCE VARIABLES ASSOCIATED WITH ACADEMIC SUCCESS IN A MICROECONOMICS INTERNET COURSE

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ABSTRACT

Many universities, including Governors State University, have ventured into initiatives aimed at offering either selected courses online, or at offering complete degree programs online. One goal of such program initiatives is to provide educational opportunities to students who might otherwise not be able to achieve their educational goals due to geographic location, employment obligations, personal obligations or other constraints limiting student access to traditional educational pedagogies. The development and delivery of entire courses and/or programs over the internet is a fairly recent phenomenon, arriving with the advent, popularity, and availability of technology which provides a student with the opportunity to learn at his/her own pace without the traditional structured classroom environment.

This study looks at relationships between student learning styles, measures of effort and motivation, and grades earned in an internet Principles of Microeconomics course. While the sample size ($n=14$) was too small to effectively perform any statistical analysis, some trends did seem to emerge from the data. In particular, many of those students scoring as internals on the locus of control scale achieved higher grades. Not surprisingly, it also appears that the level of effort exhibited by students in the course was correlated with a higher grade. However, neither of these measures were significant. Finally, while no conclusions can be drawn regarding the association of learning styles with grades in the course, there are some inferences that can be drawn from the raw data.

INTRODUCTION

Any self paced learning environment will usually require a greater motivation, and perhaps, level of effort, on the part of the student. One primary objective of this research is to assess whether motivation and effort are associated with performance in an Internet course in Microeconomics. In addition, the

research will also look at the relationship between performance in the course and student learning style.

Student motivation and effort are difficult constructs to operationalize. Prior studies (in accounting) have used number of quizzes taken (Eskew and Faley 1988) and student responses to questions about effort and motivation (Wooten 1998) to operationalize motivation and effort. This study will use two variables as surrogates for motivation and effort. First, students will respond to Rotter's (1966) locus of control questionnaire. The locus of control scale is a well-validated psychological construct purportedly associated with an individual's basic view of the relationship between effort and outcomes. Individuals scoring toward the lower end of this scale are termed "internal" and possess a view that they are in control of life outcomes, and therefore should view increased effort as related to achieving goals. Individuals scoring toward the higher end of the scale are termed "external", believing that life outcomes are merely a function of luck, fate, or chance. For those individuals, the outcome is perceived as more or less predetermined, and increased effort would have little impact on the outcome. Psychology studies provide support for the use of locus of control as a surrogate for motivation and effort. For example, studies have found that internals generally feel that there is a strong relationship between performance effort and desirable outcomes (Lawler 1971), seem to achieve greater success in a work environment (Andrisani and Nestle 1976), and are more persistent in striving toward goals (Burgher 1985).

Student effort will also be measured by the number of times the student has accessed

the course materials online. WebCT, the current platform used in GSU online courses, provides the instructor with information concerning how often the student has accessed the course, and which particular course materials the student has viewed. This is admittedly a crude measure of motivation and effort, as it would be better to assess the effectiveness of student study. However, effectiveness of study is not measurable. Number of accesses provides an additional measure of effort and could possibly be correlated with the student's score on the locus of control scale, lending some additional validity to using locus of control as a surrogate for motivation and effort.

It is also possible that students with particular "learning styles" will exhibit differential performance in an internet course. While there are many learning styles inventory instruments available, one in particular stands out as a candidate for assessing the relationship between student learning style and performance in Internet courses. Felder and Silverman (1988) have developed a learning styles inventory that categorizes students among eight main learning styles. These are active, reflective, sensing, intuitive, visual, verbal, sequential and global learners. Although everyone exhibits each of these learning styles at times, depending on the task, most individuals seem to be predominantly one or the other, along four scales. The scales are active versus reflective, sensing versus intuitive, visual versus verbal and sequential versus global. For example, considering the first two scales, an individual may be predominantly an active learner as opposed to a reflective learner and mainly a sensing learner versus an intuitive learner. For each of these individual learning styles, students exhibiting that particular style apparently perform better when the learning environment provides activities or materials that closely match their learning style.

Active learners generally must be "involved" in the course work in the sense that they are provided with opportunities to apply the concepts, working with the information

contained in the course until they understand it. In an internet course, active learners must be engaged in the course, perhaps through the use of the discussion board, or in regular chat sessions held by the instructor. Active learners also seem to perform better in courses that provide opportunities for group work. In contrast, reflective learners need time to consider the course material, considering where new material fits in with material already learned. Reflective learners might do better when the course requires that they develop notes or outlines of course materials. (Felder 1988)

Sensing learners often do better in fact and rule based courses, wherein they may be required to learn algorithms that can be applied to new situations. In contrast, intuitive learners are more comfortable with abstract relationships and generally excel in an environment that requires them to "discover" new relationships. (Felder 1988)

Visual learners are those who prefer charts, graphs, and films, whereas verbal learners rely more on auditory senses, perhaps preferring to listen to online lectures rather than viewing materials online. (Felder 1988) Certainly online course materials could be constructed with these two varying learning styles in mind, providing visual learners with opportunities to view films, for example, while providing verbal learners with PowerPoint presentations with voice over audio, or perhaps with just audio presentations.

Finally, we can categorize students as either sequential or global learners. This dimension mainly refers to whether a student learns better using a details to conclusion methodology, or conclusion to details methodology. The sequential learner is generally more comfortable proceeding in a linear fashion in learning a subject. Knowledge is acquired through learning the basic principles first, and then proceeding eventually to a grasp of the entire subject. In contrast, the global learner generally is more comfortable when he or she has an overview of the subject first, and then is able to fit the various facts, algorithms,

mathematical formulas, and so on, into this “global” picture. (Felder 1988)

DESCRIPTION OF THE COURSE AND STUDENT SUBJECTS

The course was offered during the Winter semester of 2004 entirely over the internet. The course uses the WebCT platform and is built around a publisher provided “course pack” modified so that it would closely mirror the content and coverage of a traditional lecture/discussion Principles of Microeconomics course. Given that Principles of Microeconomics is a highly graph intensive course, the instructor chose a course pack that contained graphical illustrations of all the major concepts covered (for example, supply and demand). Additionally, students could manipulate these graphs to enhance their understanding of changes that occur when one or the other variable involved changes. The course also contained instructional videos, PowerPoint presentations students could view, and lecture materials for each of the chapters covered. Also, as this course was one course in an entire program that GSU was putting online, extensive institutional efforts were made to make sure that the course closely mirrored the kind of experience students would likely have in a traditional classroom course.

During the course of the semester, the instructor also held several scheduled chat sessions to answer student questions. The course also contained a discussion board used to post questions asking students to apply the economic principles covered in the course. Students were required to post at least one response to each discussion question and then respond to at least two other student responses. This was an attempt to create instructor/student and student/student interaction in the course. Given that students rarely or never met, it seemed important to actively involve the students in the course and the learning process from the beginning.

At GSU, the Principles of Microeconomics course is offered once a year, generally in the Winter semester. The 2004 Winter semester was the third time the instructor taught this course, so it is likely that most of the “bugs” that might plague offerings of courses online had been worked out. Typically, the course, which has a limit of 30 students, fills within a week after registration begins. Although many of the students are local, students have enrolled from as far away as Japan. The typical reasons for students enrolling in this course online include lack of availability of educational opportunities in their geographical area (for example, we have had several students who lived in Vail, Colorado), or personal constraints, such as family or jobs, that preclude their attending a traditional course.

The course grade is based on a weekly chapter quiz, three examinations, and class participation as measured by postings to the discussion board and attendance at chat sessions. One problem that has been recognized with online courses, particularly those which have a relatively heavy analytical content, is that students are much more likely to drop out of the course than they would likely drop out of a traditional classroom course. In the Winter 2004, 28 students started the course and only 14 completed it. The author has also experienced similar dropout rates in an undergraduate basic financial accounting course and a graduate financial and managerial accounting course. This is somewhat disturbing, but may also point to a need to screen students prior to allowing them to enroll in particular online courses. Consequently, one of the goals of this research is to determine whether student individual differences are related to success in the course. If the findings support such a contention, then educational institutions could administer short exercises designed to evaluate a given student’s potential for success in the course prior to enrolling in an online course.

DISCUSSION OF RESULTS

On three of the four learning styles dimensions, students were approximately evenly divided. Six students exhibited an active learning style while eight students appear to have been reflective learners. Six students were visual learners and eight students were verbal learners. Eight students were sequential learners and six students were global learners. There did not appear to be any relationship between the student grades and these learning style preferences. Finally, ten students exhibited a preference for a sensing learning style, while only four appeared to be intuitive learners. Recall that the sensing learner is likely to do better in fact and rule based courses, laden with algorithms to apply to new situations, whereas the intuitive learner is more comfortable with abstract relationships and a requirement that they “discover” new relationships. While a microeconomics course contains elements of both of these learning situations, it would seem that the course content lends itself more to the sensing learner than the intuitive learner. Despite that, there does not appear to have been much difference in the grades earned by students exhibiting either of these learning styles, as shown in Table 1.

Table 1: Grades Earned by Sensing and Intuitive Learners

Student	Grade Earned Sensing Learner	Intuitive Learner
1	.795	
2	.793	
3	.784	
4	.735	
5	.727	
6	.592	
7	.567	
8	.531	
9	.436	
10	.408	
11		.790
12		.749
13		.675
14		.614

With such a small sample size, it is difficult to draw any inferences from this data. However, given the high drop out rate typical

of online courses, it most probably is safe to say that the course material may lend itself more to the preferences of a sensing learner than an intuitive learner, as the majority of the students completing the course appeared to have been sensing learners. The author will again be conducting this study in the Winter 2005 semester to gather more data that may either corroborate or refute this contention. It also appears from the above that students in general fared relatively poorly in the class. However, the above grades were computed based solely on the objective components of the students’ grades, the quizzes and exams. Students also earned participation points and could take advantage of an extra credit assignment. Consequently grades awarded were generally higher than the above table shows.

As mentioned, student motivation was measured using the locus of control scale. This scale runs from zero to 23, with those individuals scoring toward the lower end of the scale classified as internals, who view their efforts as being able to impact outcomes, and those individuals scoring towards the higher end of the scale classified as externals, who view outcomes as being a product of luck, fate, or chance. Table 2 shows student grades and the score on the locus of control scale. The correlation between grade and locus of control score was -0.07 . This is directionally as expected (i.e., a lower score on the locus of control scale would be expected to be associated with a higher grade), however it was not significant. Again, this is likely the result of the small sample size, coupled with the fact that the student earning the highest grade in the class (.795) was a fairly extreme external (locus of control scale score of 17).

Table 2: Locus of Control Score and Grade

Student	Grade Earned	Locus of Control Score
1	.795	17
2	.793	12
3	.790	3
4	.784	6
5	.749	4
6	.735	13
7	.727	4

8	.675	6
9	.614	11
10	.592	15
11	.567	9
12	.531	6
13	.436	8
14	.408	11

Student effort was also measured by the number of “hits” the student scored with respect to viewing the course materials. This is admittedly a crude measure of student effort, but with the inability to measure effectiveness of effort in studying, the number of hits does represent some indication of the time students put into the course. Table 3 shows the number of hits and grades earned. The correlation between hits and grade earned was 0.40. This is positive as expected and reasonably high, but again not significant.

Table 3: Student Grade and Number of Hits

Student	Grade	Number of Hits
1	.795	670
2	.793	613
3	.790	725
4	.784	755
5	.749	437
6	.735	1,315
7	.727	1,026
8	.675	1,138
9	.614	643
10	.592	356
11	.567	304
12	.531	385
13	.436	331
14	.408	747

Finally, correlation analysis was conducted to test the association of the locus of control score with student hits. As both variables are measures of motivation/effort, it is logical to hypothesize that they would be correlated. As with grade, the expectation is that there would be a negative correlation, with a higher number of hits correlated with a lower, or internal, locus of control score. The values are shown in Table 4. The correlation was -0.04, a very weak negative correlation. As with grade and locus of control score, this result is directionally as expected, but most probably not significant due to the small sample size.

Table 4: Locus of Control Score and Number of Hits

Student	Locus of Control Score	Number of Hits
1	3	725
2	4	437
3	4	1,026
4	6	755
5	6	1,138
6	6	385
7	8	331
8	9	304
9	11	643
10	11	747
11	12	613
12	13	1,315
13	15	356
14	17	670

SUMMARY

This research had two primary objectives. First, assessing the relationship between motivation/effort and performance in an Internet course has important implications for guiding students in course selection. For example, if the research findings indicate that those students scoring more internal on the locus of control scale achieve a higher level of performance in an internet class, then guidance counselors could administer the instruments to assist students in selecting either an Internet course or a traditional course. Alternatively, the instructor for an internet course could administer the instruments with the intention of providing additional tutorials, reviews, course materials or other tools to assist students whose scores would otherwise indicate substandard performance in the course.

The second primary objective involves design of internet course materials. Categorizing students in a given class according to their predominant learning style has definite implications for the development of content in an internet course. For example, if the instructor finds that most students in the class appear to be visual learners, the course could make extensive use of learning tools such as flowcharts, graphs, films, and diagrams to provide students with a learning environment that closely matches most students' predominant learning style. Alternatively,

materials which closely match all of the varying styles could be placed in the course, and those students leaning toward one end of each scale (e.g. visual versus verbal) could be individually directed toward the materials that better mesh with a particular student's learning style.

While more of the students were sensing learners than intuitive learners, the students were evenly divided on the three other dimensions of learning style, active versus reflective, visual versus verbal, and sequential versus global. The study also used locus of control and number of hits as surrogates for motivation/effort. Given the small sample size, no significant associations can be shown for these variables. However, the weak negative correlation between locus of control score and student grade was in the expected direction. The author will be conducting this study again with another section of the Principles of Microeconomics class in the Winter 2005 semester. That data will be combined with this data to determine whether a larger sample size yields stronger correlations. Another direction this and other research should take is to administer the locus of control and learning styles instruments to those students dropping out of internet courses. As mentioned, the author teaches three internet courses, two in accounting, and this one in economics. The typical drop out rate is 50%, which should be a cause for concern to educators. The author has begun administering these instruments to the students as soon as they enter the course, in an attempt to gather data that might shed some light on individual difference variables associated with dropping out of an internet course.

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