

Classroom Participation Strategy In Principles Of Finance Courses

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ABSTRACT

The challenge of introductory finance courses often surprises junior level university students. This paper describes a strategy that effectively motivates students to prepare solutions to problems for each class and to be prepared to check work presented by classmates. Empirically, the participation grade was found to be positively and significantly related to performance on the final examination while controlling for other performance attributes. Collateral benefits observed included a gradually reduced level of stress in students making presentations and an improved ability to focus on presentations by colleagues whose work they might be called upon to verify and discuss pedagogically.

Keywords: Classroom Participation, Teaching Method, Pedagogy

INTRODUCTION

The undergraduate Principles of Finance course is often found to be very challenging when students at four year comprehensive universities reach junior status. The nature of the material in the course is at once very new to students, interconnected by important principles, and replete with detail. Successful students must quickly learn to maintain currency in the successive topics required to make progress from each stage of the course to the next. In recent years one instructor has adopted a class format that provides a strong participation component involving problems that are assigned for classroom presentation, verification, and discussion. Empirical evidence supports the intuitively sound idea that requiring advance preparation for contemporaneously graded classroom participation is valuable in encouraging the adoption of a continuous study ethic by students, thereby improving their performance. Historical student performance and contemporaneous course data are analyzed to empirically test the hypothesis that classroom participation was positively related to performance in other course requirements versus the null hypothesis that the participation strategy employed was not positively related to performance.

The remainder of this paper proceeds as follows. The next section reviews literature on the impact of required class participation in diverse fields. Following that, a section describes the specific classroom method used to incorporate the participation requirement and discusses the opportunity costs and potential benefits involved. The fourth section introduces the control variables included in the analysis of classroom performance and participation scores. The penultimate section presents the results of the analysis and discusses them. The last section presents conclusions regarding the main thesis and offers observations that active classroom participation may have important additional benefits for students.

CLASS PARTICIPATION LITERATURE

A Financial Economics Network Roundtable discussion on grading class participation (Bruner, 2000) reflected a general perception among academics that class participation in finance is valuable. This consensus makes the development of participation strategy and performance measurement germane for instructors. However,

only one paper was found relating participation (beyond mere attendance¹) to performance in economics and finance. Rich (2004) studied the performance of his senior level corporate finance students who received points for willingness to work homework problems on the board, either as volunteers or when randomly called upon. A regression of exam scores on homework points, participation points, and unprepared instances found significantly positive coefficients for participation and good questions, while the number of unprepared instances had a marginally significant negative coefficient.

Looking briefly beyond finance courses, there is an extensive literature dating back to Bane (1925) relating performance (and, in some cases, long-term retention) to the choice of lecture or discussion method; Costin (1972) and Peterson (1979) reviewed different strands of this literature. Pratten and Hales (1986), Kellum et al. (2001), and Magel (1996) are more recent examples of analyses of interactive learning at various educational levels. All found improved test performance (and improved student evaluation of teaching in Magel (1996)) relative to pure lecture classes. Subotnik and Strauss (1994) found that numbers of volunteer responses by high school students in an advanced placement calculus class predicted subsequent performance on the exam. Reinsch and Wambsganss (1994) studied students in two business law courses. Students in half of the course sections were awarded extra points for participation, with most of the points earned for “logical, well-reasoned arguments.” Exam scores for the Legal Environment of Business courses were significantly higher in graded-participation sections than in the control sections. In a study by Bowers (1983) on participation in a Commercial Law II course, students could decide midway through the course whether their post-midterm voluntary course participation (graded by quantity and quality) counted toward their individual grades. He found that those who elected to count participation, and who then were “required” to participate, had greater *improvement* in exam performance from the first two to the last two exams. The effect was strongest for the essay and short answer parts. Premo (1984) required introductory accounting students to present solutions on accounting problems and answer questions from other students and the professor. Students in his experimental sections performed much better on identical exams than those in classes taught by a different professor the same quarter. Finally, in an accounting theory class, Rowe and Vitartas (2003) found no significant relation between level of contributions to an online discussion forum and performance on exams or other assignments.

In summary, studies of classroom participation have generally found results that vary between positive and neutral relationships with student performance on examinations. Many studies used participation methods where participation was either voluntary or an un-graded option and few studies have implemented variables to control for performance factors other than participation levels. The next section describes the method of implementing classroom participation in the present study and the following section on the results describes the measures taken to control for non-participation performance factors.

CLASS PARTICIPATION FORMAT

The subjects of this research are several classes of Principles of Finance with a maximum of fifty students each offered by the same instructor during various quarters spanning three years. The classes met three times a week for eighty minutes. All teaching and grading was by the instructor, with no teaching assistant.² A detailed syllabus was prepared in advance that included problems from each chapter to be presented by students selected at random each class day.

After the first meeting each quarter, the instructor prepared a deck of file cards with one student name on each. Throughout the course, a typical class began with a shuffling and cutting of the deck, followed by the selection

¹ Rich (2004) and Chan, Shum, and Wright (1997) found that the percentage of class sessions attended was significantly related to exam performance. However, the latter found that enrollment in a course with mandatory attendance did not have a significant relationship with performance. Koppenhaver (2006) found that both a student’s absences from team activities and the absences of that student’s team members were negatively related to exam performance.

² This research topic was conceptualized after the three year period during which the classes were held. Therefore, the performance measures and course grades would not be affected by any intention (even subconsciously) to affect the outcomes of the study.

of several students' file cards. Each student selected was asked to present her/his solution to one of the problems assigned for discussion that day.

If a student was absent, a zero was immediately recorded on the file card. Students attending who were unprepared received two points out of five for showing up. In each case of an absence or lack of preparation, another student was called upon. Students called upon who were prepared to participate put their work on the board, remaining there to explain the problem and the solution, including the details of calculations involved. After each participating student had presented in their turn, another student was selected at random to check the result and to explain the lesson in the problem. The latter requirement frequently gave rise to a useful exchange between students, and it often presented a valuable learning opportunity exploited by the instructor. For each problem, the work by the student at the whiteboard and the student called upon to check the work and explain the lesson learned were graded by the instructor at the end of the exchange, with three, four, or five points awarded for the quality of the responses. On a typical day the students would present and discuss from four to eight problems in the format described. During a quarter a class met twenty five times for a total of 2,000 minutes. With one class for orientation, a mid-term test, a mid-term review, and two classes devoted to review during the last week, participation was scheduled for twenty days. An average of six presentations and six verifications each day provided for a total of about 350 opportunities including absentees and unprepared students who were called upon and passed by with another random selection (about five or six per class, on average). Therefore, each student could expect to be called on about seven times in twenty days (more than seven if there were fewer than fifty students in the class). The presentations and discussions of problem sets took about thirty minutes on each of twenty days for a total of about 600 minutes or 30% of the 2,000 minutes available in a quarter. The remaining time was used in presenting lecture material and working examples to illustrate lecture topics. A mix of PowerPoint slides and whiteboard presentations were utilized, depending on the lecture topic for the day.

In order to justify the use of 30% of class time for student participation, thought was given to the opportunity costs incurred and the potential for benefits from adopting such a strategy. The opportunity costs consist of what could have been achieved by way of effective pedagogy in using the time in other ways. The potential benefits stemmed from the incentive for students to timely review the lectures and materials and to prepare problem solutions for the next class participation requirement in case they were selected (which would happen for each student with a probability of about 35% each day).

As a sidelight, the instructor observed that potential benefits would derive to students presenting their work and checking the work of colleagues. Through doing several presentations and discussions of the problems as well as discussions of the lessons in each problem, the students gradually became accustomed to public speaking. It was also observed that it seemed less stressful for students to make brief presentations in a forum where the focus was on the problem and not on the speaker, per se. While students were initially nervous of presenting material and discussing the lessons learned in a problem, the repetition of this activity gradually resulted in a feeling of increased comfort with making presentations and engaging in discussions with colleagues in class, which is a valuable accomplishment in itself.

Another related and very significant benefit that was initially unanticipated by the instructor, was the observation that students seemed to develop an improved observational ability during the quarter. Students were not only required to have the problem solutions at hand, but they had to assess the work of their colleagues in case they were called upon to check the work presented and explain the learning opportunity involved in the problem. Thus, while a student was presenting a solution the rest of the class was intently focused on the presentation, comparing the work with their own methods and solutions. After all, someone would be called upon to check the work, and all students knew their turn would surely come, perhaps sooner than later.

In summary, whether time is well used in the active participation of students in their work or in other ways is at least in part an empirical question. Of course, while the participation performance was graded and recorded for each instance, the improvements observed in student confidence when making presentations and discussing the presentations, and their increased ability to observe the work of colleagues was merely noted as a general observation in each class, rather than recorded in any detail. The following section describes the evidence that was

recorded regarding participation and performance in the course requirements, as well as the data that were used to control for intrinsic student ability.

THE EMPIRICAL EVIDENCE

In addition to data on participation grades and course performance results, additional data were compiled to control for several other determining factors to remove potentially confounding effects. These performance factors include such well known attributes as intelligence, emotional and physical well being, ambition, perseverance, diligence, academic experience, preparation, and contemporaneous workload. Suitable control variables were readily available and have support in the existing literature on determinants of student performance. One such was a variable for status as a student who was native to the university, rather than a transfer from a community college (with more than 44 credit hours transferred). Native status may plausibly identify a student who was more or less prepared for the rigors of a university junior level course in finance. At minimum it indicates a differential in academic experience. Previous studies have shown mixed results, with native status either being significantly positively related to performance (for example, Borde, Byrd, and Modani, 2005) or not significantly related (Chan, Shum, and Chhachhi, 2005). Other variables were used to indicate status as a declared business major with a separate zero-one variable for each of several common majors that were offered. Many previous papers, including Terry (2002) and Chan, et al (2005) found that finance majors and accounting majors performed better in Principles of Finance courses than students who selected other majors.

The next set of controls consisted of percentage grades in an introductory statistics course and two accounting courses that are all prerequisites to finance. A significantly positive relationship has been found between accounting prerequisite grades and finance principles grades (Terry, 2002)³, but such relationships have lacked significance in other studies. The same holds for statistics grades, with Paulsen and Gentry (1995) providing an example of a significantly positive relationship.

Finally, two contemporary variables were included that control for both intrinsic student attributes and temporary influences. The grade point average in other courses taken during the same quarter was used to control for general intelligence, study skills, and effort. It might also have captured the effect of life's distractions and the like that impacted a student during the quarter in question⁴. Many previous studies have used overall GPA, generally prior to the quarter that Principles of Finance is studied, but the use of a contemporaneous measure was expected to provide even greater control. The second contemporary variable employed was each student's contemporaneous course load, measured in credit hours completed. It was included to control for positive or negative performance factors such as workload, capacity, time constraints, distractions from finance, and the like. It was not known a priori what sign the coefficient might have, or whether it would be statistically different from zero. A high course load might indicate the choice of a capable student or of one who had few extra-curricular obligations. It might also imply that the student was overburdened with courses. Most previous studies have found no significant relationship between course load and performance.

In summary, the data included two dependent variables that measured student performance (the final exam grade and the overall course grade, abstracting from the participation component), one main explanatory variable of interest (the participation grade), and thirteen control variables. The results are discussed in the following section.

³ Terry (2002), in addition to analyzing one of the larger data sets in this literature, summarizes results of many previous studies on performance in introductory finance, accounting, and economics.

⁴ A positive relationship is expected between contemporaneous GPA and the performance in Principles of Finance. However, because other control variables also capture ability, a high contemporaneous non-finance GPA may indicate a focus on other courses, rather than finance.

Table 1

Dependent Variables	Mean	Std. Dev.
Overall course except participation %	72%	11%
Final Exam %	68%	14%
Independent Variables - Continuous	Mean	Std. Dev.
Class Participation %	71%	21%
Contemporaneous Credits (Credit Hours)	14.3	2.6
Contemporaneous Course Average %	70%	19%
Financial Accounting Grade %	76%	21%
Introductory Statistics Grade %	65%	22%
Managerial Accounting Grade %	75%	19%
Independent Variables (Zero-One)	# Ones	# Zeros
Management Information Systems Major	16	196
Accounting Major	19	193
Finance/Financial Economics Major	49	163
General Studies Major	10	202
Management Major	25	187
Marketing Major	32	180
Native Student*	169	43

The table provides the elementary statistics and descriptions of the study variables. The dependent variables are the final exam and the overall course grade in percentage points calculated without the participation grade included in the weighting. The final exam covered material from the entire course and the exam consisted of 40% multiple choice questions, 20% open ended questions with short answers, and 40% numerical problems. The overall course grade variable abstracts from the participation grade for purposes of the study and is a weighted average of results from quizzes, assigned homework, a mid-term test and the final exam.

*Native students are those who have transferred not more than 44 credits studied at another college or university before moving to the present institution.

RESULTS

Table 1 presents the study variables with descriptive statistics. Of the 212 students analyzed, 49 were finance or financial economics majors. Transfer students numbered 43 with 169 native to the university. There was significant spread in the prerequisite grades. For example, the mean managerial accounting grade was 3.04 on a 4 point scale (slightly above a B), or 76% in the normalized value for the study, but it had a plus or minus one standard deviation range from 55% to 97%. There was also meaningful variation in the participation score, with a mean of 71% and a standard deviation of 21%. The overall grades in principles of finance were somewhat less diffuse with a standard deviation of 11%.

Table 2

Variable	Final Exam %	Course % Without Participation	Final Exam %	Course % Without Participation
	(1)	(2)	(3)	(4)
Regression				
Intercept (1)	27.3% (4.75)	38.6% (9.65)	29.6% (7.22)	38.2% (13.37)
Class Participation (%)	8.7% (2.08)	9.0% (3.09)	8.4% (2.10)	8.8% (3.19)
Accounting Major (0,1)	9.4% (3.06)	4.3% (2.02)	9.6% (3.39)	4.2% (2.11)
Finance/Financial Economics Major (0,1)	6.1% (2.73)	5.8% (3.69)	6.4% (3.33)	5.8% (4.34)
Financial Accounting (%)	9.9% (2.16)	5.7% (1.78)	10.3% (2.33)	5.6% (1.82)
Managerial Accounting (%)	11.9% (2.24)	5.3% (1.44)	11.0% (2.27)	6.7% (1.99)
Contemporaneous Course Average (%)	20.3% (3.93)	23.2% (6.47)	20.4% (4.24)	23.2% (6.93)
Native WWU Student (0,1)	0.8% (0.40)	1.3% (0.91)		
General Studies Major (0,1)	-0.4% (0.09)	-2.7% (0.92)		
Management Major (0,1)	-0.2% (0.09)	-0.8% (0.39)		
MIS Major (0,1)	-0.8% (0.25)	0.2% (0.10)		
Marketing Major (0,1)	-1.8% (0.72)	1.1% (0.64)		
Statistics (%)	-2.3% (0.52)	0.5% (0.15)		
Contemporaneous Credits (Credit Hours)	0.2% (0.67)	-0.1% (0.23)		
N	212	212	212	212
R Squared	40.5%	51.4%	40.1%	50.8%
Regression F-value	10.37	16.13	22.88	35.29

The table provides an estimate of the percentage effect of graded in-class student participation on the the final exam and the overall class grade calculated without including the performance grade component. Class participation presented above the faint line is the variable of interest with the regression coefficients and t-statistics in parentheses. The variables below that line are control variables used to hold constant such performance determinants as prior preparation in prerequisite courses, diligence, intellect, course load and performance in other courses studied in the same quarter. The latter may also control for physical and emotional health during the quarter, as well as other, perhaps unknown performance factors. Coefficients in bold font are significantly different from zero at the 95th percentile in a t-distribution.

Table 2 displays the main results. Using Ordinary Least Squares methods, the final exam score and then the overall course score excluding class participation were regressed on the independent variables. Columns (1) and (2) of the table present results employing all independent variables, while (3) and (4) present results after excluding the control variables that were not significantly different from zero in the first instance. For the control variables, several of the zero-one variables for declared major status failed to enter significantly. Their small coefficients suggest that test power was probably not the reason. Likewise, coefficients on status as a university native, the number of contemporaneous credits studied, and performance in the statistics prerequisite were not significantly different from zero.

The participation grade coefficient was significantly positive in all four regressions, rejecting the null hypothesis and giving support to the hypothesis that class performance is positively related to participation levels in the Principles of Finance courses under study. After controlling for other determinants of performance, students with high participation grades performed significantly better than those who performed poorly.

CONCLUSION

The main objective of this research was to investigate the benefits of a strategy requiring graded daily classroom participation in finance courses, with assigned problems presented each class day by randomly selected students and checked by other randomly selected students who also must speak to the pedagogic intent in the problem. The benefits would derive from the timely study of course lectures and materials as well as preparation of solutions to assigned problems in order to be prepared for each class. The relationship between performance and the participation grade was found to be positive and significant in the empirical results

Additional benefits were observed in the course of implementing the strategy of active participation. The first, anticipated by the instructor, was a gradually reduced level of stress in the students as they became more comfortable in the roles of presenters and discussants. A second, unanticipated result, was a gradual, but clearly apparent, increase in student abilities to focus and effectively observe presentations by colleagues. These collateral benefits are clearly valuable to the overall societal goal of helping students develop their potential leadership qualities.

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