How Student Perceptions of Learning Labs Affect Performance in the First Accounting Course

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A series of noncompulsory team learning labs was implemented in an effort to improve student performance in the first accounting course. Students were surveyed to determine their perceptions of the benefits of each lab experience. Students who perceived the labs to be helpful or very helpful realized an actual benefit as measured by exam performance. These results persist after controlling for academic aptitude as measured by ACT scores and GPA.

Key Words: Team learning, Management accounting, Student performance

Introduction

The ever-changing professional environment commands increasingly demanding curricular goals for accounting students. Accounting graduates must attain technical knowledge and significant critical thinking and problem solving skills. These needs, coupled with varying views of the peril faced by accounting education (for example, Nelson, et al 2002; Albrecht and Sack 2000), generate a call to accounting educators to change both the content of their courses and their teaching methods (AAA 1986; AECC 1990; The White Paper 1989). Changing the content and teaching methods of accounting programs can affect students' perceptions and performance in the program and lead to increased quantity and quality of students choosing accounting as a major and career. The focus of this research is at the forefront of the process, centering on methods that can affect student perceptions and performance.

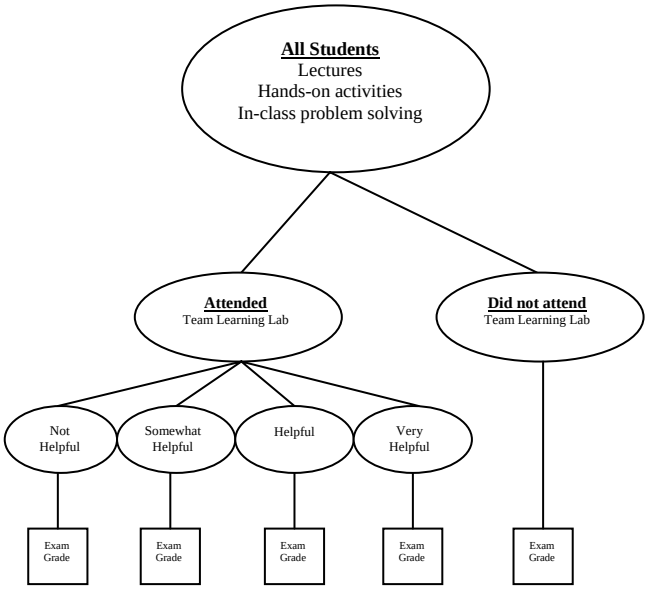
Student perceptions of accounting are developed in their first accounting course (Geiger and Ogilby 2000) and their experience with the course is an important factor in their selection of accounting as a major (Cohen and Hanno 1993). The difficulty of this first course often results in discouragement and an overall poor perception of accounting on the part of the students (Jones and Fields, 2001). Methods suggested to enhance student perceptions and performance include changes in pedagogy, inclusion of supplemental instruction, and incorporation of team-learning opportunities. Research regarding these methods has focused on the effect of the change on student perceptions from the beginning of the course to their perceptions at the end of the course and/or on the students' overall course performance (for example, Geiger and Ogilby 2000). This research identifies that learning labs affect students' perceptions and reveals whether those perceptions translate into better examination performance.

Specifically, we developed and implemented a series of three noncompulsory team-learning labs. The labs incorporated some of the key aspects of Supplemental Instruction (SI), a program that has been used across disciplines to improve student performance and retention in courses with high attrition rates (Jones and Fields 2001; Etter et al. 2000). The labs also provided an opportunity for students to have access to instructors in a familiar environment beyond the limitations of scheduled office hours. Hanno (1999) suggests that this increased access to faculty improves students' perceptions and performance.

Each team-learning lab linked to a specific exam. Student perceptions of these lab experiences were linked to performance on each exam, providing more detailed insight into the effectiveness of the individual labs than possible examining aggregate course performance. Given this linkage, it was

proposed that the team-learning labs were a defining component of the first accounting course and students who perceived value in the team-learning labs would perform better on examinations than students who did not perceive value in the labs or those students who did not attend. A representation of the comparisons is provided in Figure 1.

Figure 1



OVERVIEW OF THE TEAM-LEARNING LABS

No single teaching method can adequately address the needs of every learning objective or of every learning style. Enriching the learning environment allows instructors to increase student motivation and performance (Adler, et al. 2001). This requires that instructors use a variety of teaching methods designed to fit the needs of the various learning objectives and learners (Cunningham 1999; Hanno 1999).

Given the diversity of learning objectives and of students in the first accounting course, a variety of teaching methods were used throughout the course. Lectures were used because students must possess basic knowledge and skills before moving on to higher-level learning (Bonner 1999) and lectures can be an effective and efficient way to present material that is too complicated for students to learn on their own (Cunningham 1999). Interactive, individual, and group problem solving and hands-on activities were methods used requiring higher-level thinking and learning (Bonner 1999).

Research shows that cooperative learning groups are one method that can be used to improve higher-level thinking skills (Cottell and Millis 1993) and that these groups result in greater mastery of complex material than individual learning (Lindquist, 1995). To further enrich the learning environment, three two-hour noncompulsory team-learning labs were added to the course. The team-learning labs were designed to provide a supplemental cooperative learning experience for the students; therefore, the students who attended the labs were placed into learning groups of three to five members. One lab was offered on the Saturday morning and repeated on the Monday evening before each of the two mid-term exams and before the final exam. Two instructors and two to four student members of the accounting fraternity, Beta Alpha Psi, were present to provide assistance, answer questions, and work with the student teams on a one-on-one basis. Problems used for each team-learning lab represented concepts covered on exams and were similar to those worked during regular class meetings. Team-learning lab problems were posted on the course WebCT pages during the week prior to each of the labs, allowing students who chose not to attend the labs access to the materials to work through on an individual basis. No course credit was given for attending the lab or for completing the associated problems, and no effort was made to distinguish between active participants in the learning process and mere observers.

While the team-learning labs differ from SI in terms of the mechanics of implementation and the resource requirements, the two are alike in terms of the critical aspect of student led supplemental cooperative learning.

ASSESSMENT OF THE TEAM-LEARNING LABS

Literature examining the effectiveness of SI reports mixed results (Burmeister, et al. 1996; Congas and Schoeps 1998; Loviscek and Cloutier 1997; Schwartz 1992; Warren and Tonsetic 1997-1998). The typical study compares overall course grades and/or withdrawal rates between students who attend SI sessions and those who do not. This study provides

detailed insight into the effectiveness of specific activities on student perceptions and performance.

Sample Description

The data for this study were collected during the first accounting course, Management Accounting, at a medium sized university in the Southwestern United States. Students at this university are not allowed to declare a business major until they have completed general education and lower-level business core courses, including two accounting courses. During the semester, approximately 73 percent of the students taking the first accounting course were underclassmen (freshmen or sophomores). Approximately 13 percent of the students enrolled in the course were from colleges focusing on areas other than business. Table 1 gives an overview of the characteristics of the students in the sample.

Table 1

Sample Characteristics
(Number of Students by Characteristic)

Section

1	2	3	4	5	6	n[1]
54	45	46	51	52	47	295

Class

Freshman	Sophomore	Junior	Senior	n[1]
40	173	60	17	290

Major

Acct	Bus Comp Systems[2]	Fin	Mgt	Mktg	Other Bus[3]	Nonbus	n[1]
27	31	17	33	22	93	48	271

[1] The value of n varies because of non-response to some survey questions.
[2] Business Computer Systems is similar to Management Information Systems.
[3] This group contains small degree programs such as Economics, International Business, and Professional Golf Management. Students who are enrolled in the business college but have not yet selected a major (classified as Pre-business) are also included in this group.

Six sections of the first accounting course were offered during the semester the research was conducted. All of the instructors used the same textbook and syllabus, gave common exams, and used similar supplementary activities such as the hands-on exercises. Each instructor had discretion over lectures, quizzes, and general classroom management. The team-learning labs were offered on a common basis so that students from any section could attend either the Saturday morning or Monday evening labs. There were no significant differences in course grade distributions across the six sections.

Data was collected from all students via a questionnaire (Appendix A). The survey asked whether the students attended the team-learning lab in preparation for the exam and, if so, to assess the level to which they perceived that the lab experience helped on the exam. The initial analysis indicated that students who completed the material on an individual basis and did not attend the labs were not significantly different from those students who did not attend the labs; and were categorized as *did not attend*. To control for the effects of prior academic performance and academic aptitude, we collected students' ACT scores and their beginning-of-semester GPA. Mean GPA and ACT values for the various levels of perceived benefit for each lab are reported in Table 2. Correlations between GPA and level of perceived benefit range from a low of 0.11 for EXAM1 to a high of 0.17 for EXAM2. For the relation between ACT and level of perceived benefit, correlations range from a low of –0.02 for EXAM2 to a high of –0.13 for EXAM3. Pair-wise comparisons of ACT across the different levels of perceived benefit generally show no significant differences. Mean GPA appears to be higher for students who perceived that the team-learning labs were *very helpful* or *helpful* than for students who perceived that the labs were *somewhat helpful* or *not helpful*. These differences, however, are not statistically significant. Overall, academic aptitude and prior academic performance did not affect perceptions of helpfulness.

Table 2

Mean GPA/ACT Values - by Level of Perceived Benefit

	Not Attend GPA/ACT	Not Helpful GPA/ACT	Somewhat Helpful GPA/ACT	Helpful GPA/ACT	Very Helpful GPA/ACT
Exam 1	2.86 / 21.37	2.81 / 19.77	2.73 / 20.05	3.08 / 21.75	3.19 / 20.82
Exam 2	2.85 / 21.52	2.85 / 22.00	2.64 / 19.54	2.92 / 21.61	3.30 / 21.34
Exam 3	2.86 / 22.18	2.87 / 20.35	2.87 / 21.03	3.05 / 20.53	3.31 / 21.50

Note: differences between groups are not statistically significant at 0.05 level

Table 3 shows the number of students by level of perceived benefit for each team-learning lab. Response rates to the survey were 95 percent (274/289), 94 percent (244/259), and 81 percent

(204/252) for Exam 1, Exam 2, and Exam 3, respectively. Of the students enrolled in the course, 43 percent ((21+51+29+24)/289) attended the team-learning lab for Exam 1, 51 percent ((4+36+54+38)/259) for Exam 2, and 44 percent ((33+40+25+13)/252) for Exam 3. Table 3 shows that between 34 percent (Exam 3) and 70 percent (Exam 2) of the students who attended the team-learning labs perceived that the experience was either *helpful* or *very helpful* on the related exam. Exam 3 lab related to the final exam. The less favorable perceptions for Exam 3 are most likely a result of its comprehensive nature and that the lab only covered the new material which entailed half of the exam.

Table 3

Number of Students Responding - by Level of Perceived Benefit For Each of the Team-Learning Labs Relating to the Three Exams

	No Response	Not Attend	Not Helpful	Somewhat Helpful	Helpful	Very Helpful	n[1]
Exam 1	15	149	21	51	29	24	289
Exam 2	15	112	4	36	54	38	259
Exam 3	48	93	33	40	25	13	252

[1] The value of n varies because of students who were enrolled in the course but did not take an exam and because of course withdrawals between Exam 1 and Exam 2. Only students who responded to the surveys are included in the analysis.

THE EFFECTS OF PERCEIVED BENEFITS OF LAB ATTENDANCE ON EXAM GRADES

Given that many students perceived some benefit from the lab experiences, a determination could be made as to whether those perceptions translated into observable course performance measured by exam grades. Exam grades of students who did not attend the labs were compared to exam grades of students who attended by level of perceived benefit. Exam grades were expected to increase as the level of perceived benefit increased, students who perceived some benefit from the lab experiences were expected to score higher on exams than students who did not attend the labs. This led to two testable hypotheses.

> **H1:** Students who attended the team learning labs and perceived some benefit from their attendance on average scored higher on the three exams than the students who attended the team learning labs but did not perceive any benefit.

> **H2:** Students who attended the team learning labs and perceived some benefit from their attendance on average scored higher on the three exams than the students who did not attend.

Hypotheses were tested using general linear model (GLM) procedures to estimate the following models:

$$EXAM1 = \gamma_1 BENEFIT1 + \gamma_2 GPA + \gamma_3 ACT + \gamma_4 BENEFIT1*GPA + \gamma_5 BENEFIT1*ACT + e$$

$$EXAM2 = \gamma_1 BENEFIT2 + \gamma_2 GPA + \gamma_3 ACT + \gamma_4 BENEFIT2*GPA + \gamma_5 BENEFIT2*ACT_i + e$$

$$EXAM3 = \gamma_1 BENEFIT3 + \gamma_2 GPA + \gamma_3 ACT + \gamma_4 BENEFIT3*GPA + \gamma_5 BENEFIT3*ACT + e$$

where EXAM1, EXAM2, and EXAM3 are exam grades for each of the three exams, BENEFIT1, BENEFIT2, and BENEFIT3 are class variables defined for five levels: *did not attend*, *attended/not helpful*, *attended/somewhat helpful*, *attended/helpful*, and *attended/very helpful*, GPA is the students' beginning-of-semester grade point average, ACT is the students' cumulative ACT score, and

BENEFIT1*GPA, BENEFIT1*ACT,

BENEFIT2*GPA, BENEFIT2*ACT,

BENEFIT3*GPA, and BENEFIT3*ACT
are interaction terms.

Table 4 presents the GLM results for overall between group effects of perceived benefit on exam grades. After controlling for ACT scores and GPA, a significant relationship is found between perceived benefit and exam grades for all of the team learning labs ($F = 9.01$, $F = 2.75$, and $F = 4.90$ for BENEFIT1, BENEFIT2, AND BENEFIT3, respectively).[1] There is generally no significant interaction between perceived benefits and ACT scores or between perceived benefits and GPA, so the analysis focuses on the main effects of perceived benefit.

Table 4

GLM Results for the Effect of Perceived Benefit on Exam Grades[1]

Panel A: Exam 1

	Sums of Squares	F-Value
BENEFIT1	9580.95	9.01***
GPA	17287.43	65.06***
ACT	11985.64	45.11***
BENEFIT1 * GPA	1141.58	1.07
BENEFIT1 * ACT	518.57	0.49
R-squared	0.45	

Panel B: Exam 2

	Sums of Squares	F-Value
BENEFIT2	2769.04	2.75**
GPA	8486.37	33.69***
ACT	4983.20	19.78***
BENEFIT2 * GPA	3310.53	3.29**
BENEFIT2 * ACT	477.88	0.47
R-squared	0.33	

Panel C: Exam 3

	Sums of Squares	F-Value
BENEFIT3	4277.25	4.90***
GPA	5407.72	24.78***
ACT	10487.41	48.06***
BENEFIT3 * GPA	864.62	0.99
BENEFIT3 * ACT	296.92	0.34
R-squared	0.42	

* significant at 0.10
** significant at 0.05
*** significant at 0.01

[1] Only students who responded to the survey are included in the analysis.

To further distinguish the relationship between perceived benefit and exam performance, pair-wise comparisons were made of exam grades for each level of perceived benefit. The results of these comparisons are presented in Table 5. The *not helpful* cell for Exam 2 includes only four observations and may not have sufficient power to detect differences. Nonparametric Mann-Whitney tests yield overall consistent results and do not change the outcome of the analysis. Results in Table 5, Panel A indicate that, in general, mean exam grade increased as the perceived benefit increased. Results in Table 5, Panel B, reflect significant differences in mean exam scores.

Table 5

Mean Exam Scores - by Level of Perceived Benefit[1]

Panel A: Mean Exam Scores

Perceived Benefit	Not Attend	Not Helpful	Somewhat Helpful	Helpful	Very Helpful
Exam 1	63.28	47.05	54.87	66.44	77.48
Exam 2	68.57	75.75	66.08	74.98	78.16
Exam 3	58.53	47.00	57.56	62.38	73.46

Panel B: t-values (std err) of pair-wise comparisons for Exam 1, Exam 2, and Exam 3

	Not Attend	Not Helpful	Somewhat Helpful	Helpful
Exam 1				
Not Helpful	**3.53*****			
	(4.60)			
Somewhat Helpful	**2.54****	-1.54		
	(3.31)	(5.08)		
Helpful	-0.76	**-3.42*****	**-2.31****	
	(4.18)	(5.67)	(5.00)	
Very Helpful	**-3.27*****	**-6.43*****	**-4.66*****	**-2.02****
	(4.34)	(4.73)	(4.85)	(5.46)
Exam 2				
Not Helpful	-0.70			
	(10.26)			
Somewhat Helpful	0.68	1.11		
	(3.67)	(8.70)		
Helpful	**-2.02****	0.09	**-2.49****	
	(3.17)	(9.00)	(3.57)	
Very Helpful	**-2.66*****	-0.28	**-3.25*****	-0.90
	(3.60)	(8.75)	(3.72)	(3.53)
Exam 3				
Not Helpful	**2.98*****			
	(3.87)			
Somewhat Helpful	0.27	**-2.38****		
	(3.58)	(4.44)		
Helpful	-0.90	**-3.07*****	-1.01	
	(4.27)	(5.01)	(4.75)	
Very Helpful	**-2.74*****	**-4.63*****	**-2.87*****	**-1.95***
	(5.44)	(5.72)	(5.53)	(5.68)

* significant at 0.10
** significant at 0.05
*** significant at 0.01

[1] Only students who responded to the survey are included in the analysis.

Hypothesis 1 focuses on the effects of differing perceptions for those students who attended the labs. The results in Table 5, Panel B, Column 3, labeled *not helpful*, show that students who perceived that the team learning labs were either *helpful* or *very helpful* scored significantly higher on Exam 1 than those who found the labs *not helpful*. Column 4 shows that the *helpful* and *very helpful* groups both scored significantly higher than the *somewhat helpful* group. The results in Column 5 indicate that students who perceived the labs to be *very helpful* scored higher than the students who perceived the labs to be *helpful*. Thus, for Exam 1, the results support H1; exam scores tended to increase significantly as the perceived benefit of the labs increased. Similar patterns are apparent for both Exam 2 and Exam 3.

Hypothesis 2 indicates that those students who attended the labs and perceived benefit scored higher on exams than those students who did not attend. The results in Table 5, Panel B, Column 2, labeled *not attend*, relates to H2. Students who responded that the team-learning labs were *not helpful* tended to

score significantly lower than students who did not attend. Students who perceived the labs to be *very helpful*, however, scored significantly higher than the *not attend* group on all three exams. There was no significant difference between the *not attend* and *somewhat helpful* groups.

The data generally support both H1 and H2 so it can be concluded that student perceptions of the labs tend to translate into actual performance. The results hold after controlling for GPA and ACT. There are no significant differences in GPA or ACT across the various levels of perceived benefit, and there are generally no significant interactions between level of perceived benefit and either GPA or ACT. This suggests that students at any level of academic ability can benefit from the lab experience and that, on average, perceptions translate into actual improvements in performance.

Discussion and Conclusions

The results of this study indicate that the team-learning environment has a positive effect on student perceptions of the benefits of each lab and actual performance. There are two general outcomes that warrant further discussion. The first is that the positive effects of the group learning activities were unrelated to specific academic preparedness as measured by ACT scores or past academic performance as measured by GPA. This broad-ranged effect suggests that any student can benefit from the lab experience.

The second outcome of interest is the relationship between perceptions and actual performance. One avenue for future research would be to determine the factors that influence student perceptions of the team-learning labs and to improve the labs so that aggregate perceptions improve. Identifying and continuously improving activities that affect student perceptions change the measurable results by which students are assessed and enhances student learning.

This study provides a framework for assessing the impact that any course component has on student perceptions and student performance. To this point, only the team-learning lab activities have been assessed. Future research will assess the other types of activities included in the first accounting course with two goals in mind. The first goal is to assess what particular types of activities have the greatest impact on student perceptions and student performance. The second goal is to assess whether including activities that impact student perceptions and student performance affect perceptions of accounting in general. Accomplishing these goals will provide educators with some of the information needed to attract students to enroll in accounting courses and to choose accounting as a career.

[1]In earlier versions of the models, gender, classification (Freshman, Sophomore, etc.), instructor, and major were also controlled. None of these variables were significant and were, therefore, excluded from the final form of the model.

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The authors wish to thank Taylor (Bill) Foster, Sherry K. Mills, the anonymous reviewers, and the editor of Journal of Business Inquiry for their many helpful comments on this paper. The input from workshop participants at the 2003 Southwest Decision Sciences Institute annual meeting is also appreciated.

Appendix A

Please answer the following questions.

1. Did you attend a learning lab for this exam on either Saturday, 9/21/02 or Monday, 9/23/02?

   Yes ☐ No ☐

2. If your answer to question #1 is "no", did you work the related lab materials outside of the lab?

   Yes ☐ No ☐

3. If you answered "yes" to either question #1 or #2, how much did the experience help you on the exam?

   Not Helpful ☐ Somewhat Helpful ☐
   Helpful ☐ Very Helpful ☐

4. What is your major? _____

   If your major is currently Pre-business, what do you intend to major in? _____

REFERENCES

Accounting Education Change Commission (AECC). 1990. Objectives of education for accountants: Position statement number one. *Issues in Accounting Education* 5 (2): 307 – 312.

Adler, R.W., M.J. Milne, and R. Stablein. 2001. Situated motivation: An empirical test in an accounting course. *Canadian Journal of Administrative Sciences* 18 (2): 101 – 115.

Albrecht, W.S. and R.J. Sack. 2000. *Accounting Education: Charting the Course through a Perilous Future.* Accounting Education Series 16. Sarasota, FL: American Accounting Association.

American Accounting Association (AAA) Committee on the Future Structure, Content, and Scope of Accounting Education (Bedford Committee). Future accounting education: Preparing for the expanding profession. *Issues in Accounting Education* 1 (1): 168 – 196.

Big Eight Accounting Firms. 1989. *Perspectives on Education: Capabilities for Success in the Accounting Profession* (White Paper). Sarasota, FL: American Accounting Association.

Bonner, S.E. 1999. Choosing teaching methods based on learning objectives: An integrative framework. *Issues in Accounting Education* 14 (1): 11 – 39.

Burmeister, Sandra L., P. Kenney, and D. Nice. 1996. Analysis of effectiveness of SI sessions for college algebra, calculus, and statistics. In *Research in Collegiate Mathematics Education II*. Providence, RI: American Mathematical Society: 145 – 154.

Burns, C.S. and S.K. Mills. 1997. Bringing the factory to the classroom. *Journal of Accountancy* 183 (1): 56 – 60.

Cohen, J. and D.M. Hanno. 1993. An analysis of the underlying constructs affecting the choice of accounting as a major. *Issues in Accounting Education* 8 (2): 219 – 238.

Congas, D. and N. Schoeps. 1998. Inside supplemental instruction sessions: One model of what happens that improves grades and retention. *Research & Teaching in Developmental Education* 15: 47 – 61.

Cottell, P.G., Jr. and B.J. Millis. 1999. Cooperative learning structures in the learning of accounting. *Issues in Accounting Education* 8 (1): 1, 40 – 59.

Cunningham, B.M. 1999. Energizing your teaching: A view from deep in the trenches. *Issues in Accounting Education* 14 (2): 307 – 321.

Etter, E.R., S.L. Burmeister and R.J. Elder. 2000. Improving student performance and retention via supplemental instruction. *Journal of Accounting Education* 18 (4): 355 – 368.

Geiger, M.A. and S.M. Ogilby. 2000. The first course in accounting: Students' perceptions and their effect on the decision to major in accounting. *Journal of Accounting Education* 18 (2): 63 – 78.

Hanno, D.M. 1999. Energizing your teaching: Developing a community of learning. *Issues in Accounting Education* 14 (2): 323 – 335.

Jones, J.P. and K.T. Fields. 2001. The role of supplemental instruction in the first accounting course. *Issues in Accounting Education* 16 (4): 531 – 547.

Lindquist, T.M. 1995. Traditional versus contemporary goals and methods in accounting education: Bridging the gap with cooperative learning. *Journal of Education for Business* 70 (5): 278 – 284.

Loviscek, A.L. and N.R. Cloutier. 1997. Supplemental instruction and the enhancement of student performance in economics principles. *American Economist* 41 (2): 70 – 76.

Marcheggiani, J., K.A. Davis and J.F. Sander. 1999. The effect of teaching methods on examination performance and attitudes in an introductory financial accounting course. *Journal of Education for Business* 74 (4): 203 – 210.

Martin, D.C., et. al. 1977. *The Learning Center: A Comprehensive Model for College and Universities.* Kansas City, MO: University of Missouri. ERIC ED 162 294.

Martin, D.C., and D.R. Arendale. 1994. Understanding the supplemental instruction model. In *Supplemental Instruction: Increasing Achievement and Retention.* San Francisco, CA: Jossey-Bass: 11-22.

Nelson, I.T., V.P. Vendrzyk, J.J. Quirin and R.D. Allen. 2002. No the sky is not falling: Evidence of accounting student characteristics at FSA schools, 1995-2000. *Issues in Accounting Education* 17 (3): 269-287.

Schwartz, M. 1992. Study sessions and higher grades: Questioning the causal link. *College Student Journal* 26: 292 – 299.

Warren, B. and R. Tonsetic. 1997-1998. Supporting large classes with supplemental instruction (SI). *Journal of Staff, Program, and Organizational Development* 87: 377 – 383