AN APPLICATION OF PACE'S MODEL OF STUDENT DEVELOPMENT AND COLLEGE IMPRESS ON LEARNING COMMUNITY STUDENTS

Louis M. Rocconi
College of Education
The University of Memphis
Memphis, TN 38152-3570
lrocconi@memphis.edu

ABSTRACT

Pace (1979) delineates a model for the study of student development and college impress in which he postulates that the extent to which students exert their time and effort in the educational opportunities offered by institutions will directly impact their growth and development in college. Structural equation modeling is used to test whether Pace's model can be used to accurately describe a sample of learning community students' development and gains during college, with the student outcome being perceived gains in general education and intellectual skills. Results strongly support Pace's proposition that student effort is the most important determinate of perceived gains. Moreover, results support the use of Pace's model as a theoretical framework that may be used to study learning community students' development and gains in college.

Keywords: Learning communities, college student development

Introduction

The past twenty-five years have been a time of criticism and reform in higher education. The public and the federal government have raised questions regarding access, accountability, quality, and outcomes of participating in post-secondary education. Most recently, the Secretary of Education appointed a commission (Spellings, 2006) charged with recommending strategies to improve higher education in America. A major focus area of the commission was the quality of student learning. The commission highlighted some shortcomings of colleges and universities: declining graduation rates, the lengthy amount of time it takes earn a degree, attainment gaps, declining literacy skills, and the lack of programs in place for lifelong learning.

One innovative program emerging, during this time of criticism, to address the educational quality and persistence is learning communities. By taking courses together and regularly discussing their experiences in a structured first-year program, learning community students supposedly have better opportunities to make meaningful undergraduate experiences at college. Learning communities have received much press in the popular literature and are often the topics of recent education articles in publications such as *The New York Times* and *U.S. News*

and World Report. Despite the notoriety in the popular press, research on the outcomes of participating in learning communities is still limited (Pascarella & Terenzini, 2005).

This study aims to expand the research regarding students' participation in learning communities. Moreover, this study strives to incorporate Pace's (1979) model of student development and college impress as a causal model that may be used to study learning community students' growth and development in college. Using background characteristics, measures of students' quality of effort, and measures of students' perceptions of the college environment, this study examines the relationship of these variables on the reported academic gains of learning community students.

Literature Review

A growing number of institutions are beginning to implement learning communities as an attempt to improve undergraduate education (Shapiro & Levine, 1999). Learning communities have been defined by Gabelnick, MacGregor, Matthews, and Smith (1990) as the "purposeful restructuring of the curriculum by linking courses that enroll a common cohort or students. This represents an intentional structuring of the students' time, credit, and learning experiences to build community, and foster more explicit connections among students, faculty, and disciplines" (p. 5). Learning communities often attempt to move collaborative learning beyond the classroom and into broader aspects of students' lives. While there are many variations of learning communities on campuses across the United States, learning communities have two common elements: shared or collaborative learning and connected learning (Pascarella & Terenzini, 2005). Shared or collaborative learning comes from students enrolling in several common courses, thereby increasing the likelihood of an integrated social and academic experience. Connected learning comes from learning communities being organized around a central theme or topic, such as college major or interest. Cross (1998) suggest that the purpose of learning communities is to facilitate active over passive learning, teamwork and cooperation as opposed to competition, and community instead of isolation.

Research on learning communities is in its preliminary stage. Most research has measured student learning almost exclusively with student self-reported gains (Pascarella & Terenzini, 2005). Nevertheless, there is some evidence that suggests participation in learning communities is linked with the student perceptions that they are deriving greater benefit from their college experience. In their meta-analysis of more than 300 cooperative learning environment studies, Johnson, Johnson, and Smith (1998) report that learning communities help promote the social adjustment and integration to college life, persistence in college, and greater integration of students' academic and nonacademic lives.

Tinto and Russo (1994) observe that students participating in a community college learning community reported significantly greater academic involvement in areas such as library usage, writing, course involvement, and interaction with faculty and students. Moreover, these

students indicate significantly higher learning gains than did their counterparts not in learning communities. Walker (2002) found that participating in learning communities enhanced students' self-reported gains in problem-solving skills and reading and writing ability. However, Pike, Schroeder, and Berry (1996) failed to find significant differences between learning community students and non-learning community students in their self-reported gains in math and science, communication skills, or general education. Pike (1999) also found that any direct effects of residential learning communities on general education gains seemed to disappear in the presence of controls for important background characteristics such as ACT scores, academic major, gender, and ethnicity. However, participation in learning communities had a positive indirect effect on general education gains.

In their extensive literature review of the research surrounding college students, Pascarella and Terenzini (1991, 2005) describe a variety of theories and models that have been used to study college effects on students. Astin's (1970, 1984) "input-environment-output" model and Tinto's (1975) longitudinal model of student departure have received much attention in the literature related to college effects on students. However, higher education scholars have paid little interest to the work of C. Robert Pace (1979), who in his book, *Measuring Outcomes of College,* delineates a model for the study of student development. While his model does not contain explicit assumptions and hypotheses related to predicting student behavior, it is as complete as the models developed by Astin and Tinto.

According to Pace (1998), "prior research had not included what turns out to be the most influential variable-- the quality of effort that students themselves invest in using the facilities and opportunities for learning and development that exist in the college setting" (p. 18-19). Pace postulates that student background characteristics will affect a student's status in college and a student's status in college will in turn impact the quality of effort that student invests in his or her collegiate activities. It is the effort that students expend that Pace argues is the most important determinant of college outcomes. This quality of effort will then impact students' impression of the institutional environment, and the students' perception of the college environment, along with the quality of effort expanded, will have the greatest influence on students' perceptions of development and gains.

Ethington and Horn (2002) found strong support for Pace's model when testing the model on a national sample of community college students. They found that quality of effort had a major influence on students' perceived personal and social development. Furthermore, the greater the efforts the more the students perceived the institution as a challenging and stimulating place. Consequently, student efforts were found to not only directly and positively impact students' gains in college but positively and indirectly enhance those gains by contributing to the students' perception of the institutional environment.

Methodology

Participants

Participants were freshmen at a public research university located in a large metropolitan city in the southeast part of the country. The university's learning community program consisted of nine communities with a total of 149 first-time, full-time students. These students' class schedules for the fall semester 2007 were prearranged depending upon their learning community section. Classes were linked together by a common theme such as science meets art; speaking, writing, and film; and human and computer interaction. Each section was limited to twenty-five students although not all sections were filled to capacity. Approximately 50 percent of the learning community students was White, 40 percent was African-American, and 10 percent was from other ethnic backgrounds. Due to the small number of participants from other ethnic backgrounds, only Whites and African-Americans were included in the study. The final sample consisted of 109 White and African-American students who had complete data on the variables described below. Approximately 27.5 percent of the sample was males and 72.5 percent was females. The average ACT score for participants was 21.82 with a standard deviation of 3.13.

Kline (2005) recommends having a sample size between 100 and 200 at the bare minimum; however, this does not take into account the complexity of the model. The more complex the model, meaning the more parameters to estimate, the larger the sample size needs to be. In their survey of about 500 applications of structural equation modeling in sixteen different research journals from 1993 to 1997, MacCallum and Austin (2000) found that 20 percent of these studies used samples with fewer than 100 cases.

Conceptual Model

The conceptual model used in this study was based on Pace's (1979) model of student development and college impress. Pace postulates that the extent to which students exerts their time and effort into the educational opportunities offered by institutions directly impacts their growth and development as a result of attending college. Pace further argues that while institutions provide the setting and opportunities for student engagement and students participate in these activities, it is the quality of that engagement not the mere participation that impacts students' growth and development. He defines quality of effort as voluntary behavior or personal investment that students are making for their own education. Pace believed that quality of effort could be measured, and he developed an instrument called the *College Student Experience Questionnaire* (*CSEQ*) to measure students' effort and involvement.

Pace's (1979) model is formulated into three basic propositions. The first is that the college experience encompasses the events in which a student engages while in college. These events include not only activities occurring inside the classroom but also events that may occur outside

the classroom as well. These opportunities may include interaction with faculty and other students, utilizing the library, participating in clubs and organizations, or improving one's writing skills. The second proposition stipulates that the way students make sense of these experiences is impacted by the characteristics of the college environment and the quality of effort that students expend. Finally, Pace's third proposition is that the combination of institutional environment and effort that students exert both contribute to students' development and gains.

The model consists of four sets of measures. Pace (1979) argues that one must first consider the students' background characteristics they bring with them to college. In this study, the background variables are measures of students' gender, ethnicity, and prior ability, as measured by students entering ACT score. Secondly, Pace acknowledges that students' status in college must also be considered, such as whether they transferred or not, and whether they are full-time or part-time. Since all the participants in this study are full-time, first-year freshmen, this measure of a students' status in college is constant and is omitted from the analysis. Background characteristics are hypothesized to have a direct influence on students' college activities, conceived as the quality of effort students invest in taking advantage of the opportunities for learning provided by the institution. It is this effort that Pace argues is the most important determinant of academic outcomes. Having experienced the institution, students form an impression of the college environment, and subsequently, develop perceptions of the extent to which they have made gains or educational progress. The full structural equation model is presented in Figure 1.

Measures

All measures used in this study were taken directly from the *College Student Experience Questionnaire (CSEQ).* Self-reported measures are frequently criticized for their subjectivity. However, in his own study of the *CSEQ*, Pace (1984) has shown that students' reports of their college experiences are accurate and credible. In addition, Gonyea, Kish, Kuh, Muthiah, & Thomas (2003) have demonstrated the validity and reliability of the self-reported measures of the *CSEQ.* Gender (coded: 1 = male, 2 = female) and ethnicity (coded: 1 = African-American, 2 = White) were perfectly measured. Prior ability was measured as a student's highest score on the ACT. Student involvement in academic and social activities, conceived as quality of effort, was measured by five scales constructed from students' reported use of the library (8 items), effort in writing (6 items), effort in coursework (9 items), experiences with faculty (9 items), and participation with student acquaintances (10 items). Reliability coefficients for these scales were 0.80, 0.78, 0.87, 0.89, and 0.91, respectively. Perception of the institutional environment was measured by two scales derived from the *CSEQ* environment measures. The first scale measured students' perception of the academic environment and included three items related to emphasis on scholarship, aesthetics, and critical thinking. The alpha reliability coefficient for this scale was 0.79. The second environment scale measured the supportiveness of the interpersonal environment and included three items related to students' relationship with other students, faculty members, and administrators. The alpha reliability coefficient for this scale was 0.74.

Questions on the *CSEQ* asked students the degree to which they had made gains in several areas of learning. The outcome variable, gains, was measured by two scales derived from the *CSEQ* gains measures. Gains in general education were measured using six items that asked participants to indicate the degree to which they believe they had made progress in gaining a broad general education, the understanding and enjoying art, music, drama, and literature, understanding history and other parts of the world, and an awareness of other philosophies. The alpha reliability coefficient for this scale was 0.77. Gains in intellectual skills were measured using six items concerning thinking analytically, synthesizing ideas, learning independently, writing and speaking effectively, developing good health habits, and using computers and other technology. The alpha reliability coefficient for this scale was 0.85. Environment and gain scales were derived from factor scores of all the environment and gain items from *CSEQ Norms for the Fourth Edition* (Gonyea et al, 2003). Descriptive statistics for all the scales used in the study are presented in Table 1.

Table 1.

Descriptive Statistics for the CSEQ Scales

CSEQ Scale	Items	Means	Std. Dev.	Alpha
Library Usage	8	14.76	4.841	0.80
Writing Experiences	6	19.12	3.856	0.78
Effort in Coursework	9	27.38	5.179	0.87
Experiences with Faculty	9	21.82	6.051	0.89
Student Acquaintances	10	28.38	6.805	0.91
Academic Environment	3	16.54	2.784	0.79
Interpersonal Environment	3	16.82	2.799	0.74
General Education	6	14.96	3.835	0.77
Intellectual Skills	6	18.62	3.731	0.85

Data Analyses and Results

Data analyses were carried out in three phases. First, residual statistics were checked for potential outliers and influential data points. Additionally, variance inflation factors were checked for problems with mulitcollinearity. Prior to the estimation of the model, exploratory analyses were conducted testing the assumption of multivariate normality, which underlies application of maximum likelihood estimation. To test this assumption, data were analyzed using PRELIS 2.72 (Joreskog & Sorbom, 2005a). Multivariate normality was evaluated both univaritately by checking the marginal distribution of each variable and by the multivariate skewness and kurtosis coefficient (McDonald & Ho, 2002). The assumption of multivariate normality of was met ($\chi^2 = 3.691$, p > .05). Additionally, chi-square test of univariate normality for continuous variables showed that all CSEQ scales were normally distributed.

The second phase consisted of a confirmatory factor analysis testing the measurement model. Data were analyzed using LISREL 8.72 (Joreskog & Sorbom, 2005b) to determine if the observed variables provided an accurate representation of the latent constructs. Since the assumption of multivariate normality was met, maximum likelihood estimation procedures were used. Fit indexes were used to assess the degree of fit between the data and the model. The model chi-square, the Stieger-Lind root mean square error of approximation (RMSEA) with its 90 percent confidence interval, the Bentler comparative fit index (CFI), and the standardized root mean square residual (SRMR) were selected based on the current state of practice and recommendations about what to report in written summaries of structural equation modeling analyses (McDonald & Ho, 2002; Kline, 2005). An examination of the goodness-of-fit results revealed that the measurement model did provide an acceptable representation of the observed data (χ^2 (42) = 50.43, p > .05, RMSEA = 0.043, 90% C.I. RMSEA = (0.00; 0.082), CFI = 0.98, SRMR = 0.05).

The final phase tested the whether the theoretical model provided an acceptable representation of the causal structure. In this phase, the measurement and structural portions of the model were combined. The program tested whether the covariance matrix implied by the full structural equation model (Figure 1) differed significantly from the observed covariance matrix. Goodness-of-fit results revealed that the conceptual model did provide an acceptable representation of the observed data (χ^2 (48) = 50.07, p > .05, RMSEA = 0.02, 90% C.I. RMSEA = (0.00; 0.067), CFI = 0.99, SRMR = 0.051).

Table 2 presents the direct, indirect, and total effects for the conceptual model. An examination of the results in Table 2 revealed that females exerted more quality of effort in academic and social activities than males (γ = 2.34, p < .05) and that ethnicity (γ = 0.37, p > .05) and prior ability (γ = -0.11, p > .05) did not have a significant effect on quality of effort in academic and social activities (R^2 = 0.07, p < .001). Perception of the college environment was directly impacted by quality of effort in academic and social activities (β = 0.27, p < .001; R^2 = 0.48, p < .05); moreover; gender had an indirect effect on perceptions of the environment with females perceiving a more favorable college environment than males (γ = 0.64, p < .05). Quality of effort in academic and social activities had a significant direct impact on students' perception of gains (β = 0.46, p < .001); however, perceptions of the college environment did not have a significant impact on students' perceptions of gains (β = .36, p > .05; R^2 = 0.62, p < .01). Furthermore, gender had a significant indirect effect (γ = 1.29, p < .05) on gains through quality of effort as the mediating variable. Pedhazur (1982) argues that standardized coefficients greater than 0.10 are large enough to be of substantive importance and that these coefficients should be interpreted. Following Pedhazur's reasoning, it can be argued that although environment was not found to be significant using a two-tailed probability test, its standardized coefficient of β^* = 0.20 is of substantive importance and one reason for its nonsignificance could be due to the small sample size. Moreover, the coefficient for environment (β = .36, β^* = 0.20) was positive, as predicted by Pace. Standardized direct effects are presented in Figure 1.

Table 2.

Direct, Indirect, and Total Effects for the Structural Equation Model

	Quality of Effort	Environment	Gains
Female Student	2.34*	-	-
	-	0.64*	1.29*
	2.34*	0.64*	1.29*
White Student	0.37	-	-
	-	0.10	0.20
	0.37	0.10	0.20
Prior Ability	-0.11	-	-
	-	-0.03	-0.06
	-0.11	-0.03	-0.06
Quality of Effort		0.27***	0.46***
		-	0.10
		0.27	0.55***
Environment			0.36
			-
			0.36

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$, n = 109

Discussion

These results strongly support Pace's (1979) proposition that student effort is the most important determinant of growth and development while attending college. As seen in these results, the most important influence on this set of learning community students' perceived gains was from the effort they exert in their academic and social activities. Furthermore, the greater the effort students exert in their activities on campus, the more challenging and friendly they perceive their institution, and that, in turn, impacts students' perceived gains. Thus, student effort not only directly and positively impacts student's perceived gains, but also positively and indirectly enhances those gains by contributing to students' perception of the college environment.

Although students' perceptions of the institutional environment did not have a significant impact on students' academic gains, the standardized coefficient of perceptions of the college environment was large enough, according to Pedhazur (1982), to be of practical importance. Thus, the more involved students were in academic and social activities lead these students to perceive the institutional environment more positively therefore leading to a higher perception of academic growth and gains in college.

Rocconi

Pace (1979) argues that students' perceptions of the institutional environment make up the background and motivation for student growth and development. Students first encounter the college environment at entry and develop their perception through involvement with other students, faculty, coursework, and utilizing campus facilities and other opportunities provided by the institution. Through this involvement, students learn the expectations of the environment and the behaviors it rewards. These experiences lead students to engage in the amount of effort that is required for their desired outcomes. Pace claims that it is the combination of the environment and effort students put forth that produces growth and development. These patterns of influences are all evident in this sample of learning community students. Furthermore, influence on gains from any background characteristic was manifested only indirectly through quality of effort in academic and social activities. The nature of learning communities fosters student and faculty interaction, collaboration on coursework, and relationships with other students, which promote positive perceptions of the collegiate environment and positive perceptions of academic gains.

These results present convincing evidence to support the utilization Pace's (1979) model of student development and college impress to study learning community students' development and gains in college. This study also justifies the use of the *CSEQ* as a tool college and universities can use to gauge learning community students' growth and development in college. Further studies utilizing Pace's model need to investigate differences between students that participated in a learning community and students that did not participate in a learning community. Given the support for Pace's model developed in this study and the fact that learning communities help foster academic and social involvement within a institution, Pace's model could be used as a theoretical model to explore differences in the type and quality of effort between students in a learning community and students not in a learning community. Future inquiries also need to examine whether students that participate in a learning community exert greater effort in the educational opportunities available on college campuses than students that do not participate in a learning community. Whereas, the current study only investigated learning community students at a single institution, Pace's model should also be tested using data from a national sample of learning community students.

This study demonstrated the use of Pace's (1979) model of student development and college impress to investigate the growth and development of learning community students at a single institution. Pace developed his model and the *College Student Experience Questionnaire* in an effort to provide guidance to colleges and universities in their own studies for understanding institutional effectiveness. Pace argued that by focusing on both effort and environment in the model, a shared view of responsibility is shown. That is, institutions are responsible for providing students with the opportunities for learning and development and establishing an environment conducive to scholarship and growth, and it is the students' responsibility for taking advantage of these opportunities. Both types of responsibilities need to be considered to optimally understand college student development.
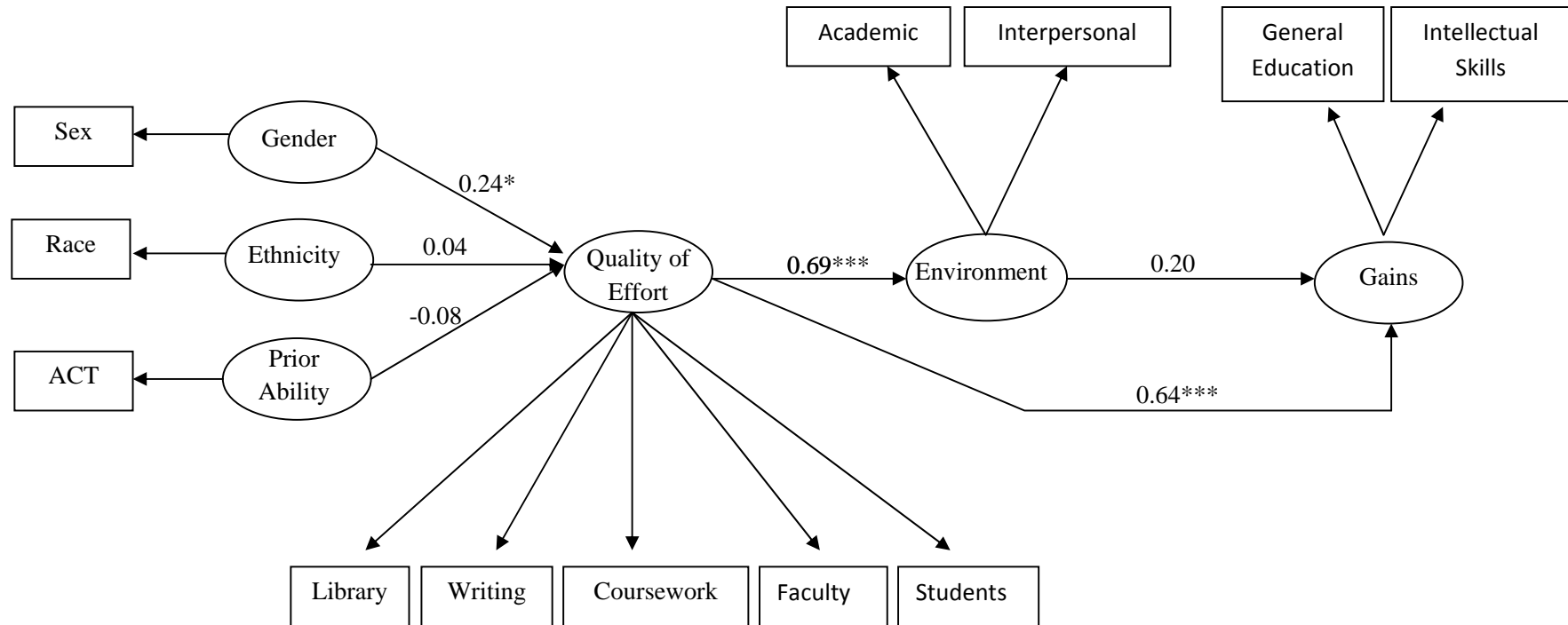
References

Astin, A. (1970). The methodology of research on college impact. *Sociology of Education, 43*, 223-254 & 437-450.

Chickering, A. (1969). Education and identity. San Francisco: Jossey-Bass.

Cross, K. (1998). Why learning communities? Why now? *About Campus, 3*(3), 4-11.

Ethington, C. & Horn, R. (2002). An examination of Pace's model of student development and college impress. *Community College Journal of Research and Practice*, *31*(3), 183-196.

Gabelnick, F., MacGregor, J., Matthews, R., & Smith, B. (Eds.). (1990). *Learning communities: Creating connections among students, faculty, and disciplines. New Directions for Teaching and Learning*, No. 14. San Francisco: Jossey-Bass.

Gonyea, R. M., Kish, K. A., Kuh, G. D., Muthiah, R. N., Thomas, A. D. (2003). *College student experiences questionnaire norms for the fourth edition.* Bloomington, IN: Indiana University Center for Postsecondary, Policy, and Planning.

Johnson, D., Johnson, R., & Smith, K. (1998). Cooperative learning returns to college: What evidence is there that it works? *Change, 30*, 26-35.

Joreskog, K. G. & Sorbom, D. (2005a). PRELIS 2.72. Chicago: Scientific Software.

Joreskog, K. G. & Sorbom, D. (2005b). LISREL 8.72. Chicago: Scientific Software.

Kline, R. B. (2005). *Principles and practice of structural equation modeling.* New York: The Guilford Press.

MacCallum, R. & Austin, J. (2000). Applications of structural equation modeling in psychological research. *Annual Review of Psychology, 51*, 201-226.

McDonald, R. & Ho, M. (2002). Principles and practices in reporting structural equation analyses. *Psychological Methods, 7*(1), 64-82.

Pace, C. R. (1979). *Measuring outcomes of college: Fifty years of findings and recommendations for the future*. San Francisco: Jossey-Bass.

Pace, C. R. (1984). *Measuring the quality of college student experience. An account of the development and use of the college student experiences questionnaire*. Los Angeles:

University of California, Graduate School of Education, Higher Education Research Institute, Project on the Study of Quality in Undergraduate Education.

Pace, C.R. (1998). Recollections and reflections. In J.C. Smart (ed.), *Higher education: Handbook of theory and research*, (vol. XIII, pp. 1-34). New York: Agathon Press.

Pascarella, E. (1985). College environmental influences on learning and cognitive development: A critical review and synthesis. . In J.C. Smart (ed.), *Higher education: Handbook of theory and research*, (vol. I, pp. 1-64). New York: Agathon Press.

Pascarella, E. & Terenzini, P. (1991). *How college affects students: Findings and insights from twenty years of research*. San Francisco: Jossey-Bass.

Pascarella, E. & Terenzini, P. (2005). *How college affects students: A third decade of research*. San Francisco: Jossey-Bass.

Pedhazur, E. J. (1982). *Multiple regression in behavioral research, second edition*. New York: Holt, Rinehart and Winston.

Pike, G. (1999). The effects of residential learning communities and traditional residential living arrangements on educational gains during the first year of college. *Journal of College Student Development, 40*, 269-284.

Pike, G., Schroeder, C., & Gonyea, R. (2003). The relationship between institutional mission and student involvement and educational outcomes. *Research in Higher Education, 44,* 241-261.

Shapiro, N., & Levine, J. (1999). *Creating learning communities: A practical guide to winning support, organizing for change, and implementing programs.* San Francisco: Jossey-Bass.

Spellings, M. (2006). *A test of leadership: Charting the future of U.S. higher education.* A report of the commission appointed by the Secretary of Education. Washington DC: U.S. Department of Education. Retrieved December 1, 2009 from http://www.ed.gov/about/bdscomm/list/hiedfuture/reports/final-report.pdf.

Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Higher Education, 45*, 89-125.

Tinto, V. & Russo, P. (1994). Constructing educational communities: Increasing retention in challenging circumstances. *Community College Review, 22*, 16-25.

Walker, A. (2002). *Learning communities and their perceived effect on students' academic abilities.* Paper presented at the meeting of the American Educational Research Association.

Figure 1.
Full Structural Equation Model with Standardized Direct Effects