

Gregory C. Wolniak
Matthew J. Mayhew
JE Mark E. Engberg

Learning's *Weak* Link to Persistence

As the nation becomes increasingly focused on improving college completion rates, policy makers, practitioners, and scholars are calling for renewed efforts to help students succeed (e.g., Lumina Foundation, 2009). The current administration points to regaining “lost ground” in our nation’s goal to lead the world in producing college graduates who are prepared for the challenges of the twenty-first century economy, and President Obama has outlined a plan for achieving student success through strengthening the education pipeline (Obama, 2009; The White House, n.d.). Central to this plan is the promotion of postsecondary access and opportunity, as well as the improvement of persistence and completion rates. College student persistence, in particular, is a necessary condition for social mobility, bridging access and attainment (e.g., Haveman & Smeeding, 2006). Once enrolled in college, understanding factors associated with student persistence is critical to strengthening the educational pipeline and achieving the broad economic and social goals fundamental to American society. The extent to which persistence and other measures of student success translate to a more effec-

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Gregory C. Wolniak is a Senior Research Scientist in Education and Child Development, NORC at the University of Chicago. Matthew J. Mayhew is an Associate Professor of Higher Education at New York University. Mark E. Engberg is an Assistant Professor of Higher Education at Loyola University Chicago.

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tive workforce or a productive citizenry depends on the kinds of learning students experience while in college, though even the impact of a college education on student learning has been questioned by recently published evidence (Arum & Roksa, 2011; Pascarella, Blaich, Martin, & Hanson, 2011).

Past attempts to broadly understand college student success as it relates to persistence vary, including human capital theorists interested in ascribing value to a higher education degree as a determinant of future economic performance (e.g., Cohn & Geske, 1990; Paulsen & Smart, 2001; Perna, 2003), policy makers concerned with educational opportunities and workforce development (e.g., Clotfelter, Ehrenberg, Getz, & Siegfried, 1991; Ehrenberg, Jakubsen, Groen, So, & Price, 2007; St. John, 2006), and enrollment managers charged with predicting enrollment patterns from year to year (Hossler, 2000; Hossler & Bean, 1990). Notably absent from any of these approaches, however, is a recognition of student learning and its relationship to persistence.

The purpose of this study is to advance our understanding of the relationship between student learning and college persistence. Data were collected in 2006–07 as part of the Wabash National Study of Liberal Arts Education (WNSLAE), a multi-institutional, longitudinal project designed to support research on individual and environmental factors affecting student learning. These data contained theoretically validated assessments of learning in combination with information on a wide range of college experiences and enrollment indicators. The distinctive qualities of these data enabled us to evaluate current notions of student success in relation to broader skills and dispositions students may need to succeed in the twenty-first century (see Association of American Colleges and Universities [AAC&U], 2007), and contribute new information to the dialogue concerning learning among today's college students (Arum & Roksa, 2011; Pascarella et al., 2011). With this study, we provide initial evidence linking student learning to persistence from the first to second year of college.

Theory and Evidence

Our understanding of student persistence is grounded in Tinto's (1975) pioneering work, which held that students' integration into the academic and social environment of an institution was an essential determinant of successful college completion. While researchers have criticized Tinto's interactionist approach to studying student retention, citing the lack of focus on institutional characteristics and relevancy for all racial/ethnic groups (Hurtado & Carter, 1997), many theoretical

advancements related to persistence were built upon Tinto's initial premises. More recent developments, for instance, have explored persistence as a function of external exigencies (Bean, 1990; Weidman, 1989), college involvement (Astin, 1993; Berger & Milem, 1999; Milem & Berger, 1997), organizational characteristics (Berger & Milem, 2000), and college choice (Paulsen & St. John, 2002), while still maintaining the relevancy of social and academic integration (Reason, 2009). Consistent among these approaches was the idea that academic and social integration were essential components to understanding persistence. For this reason, the present study examines academic and social integration in two ways: as direct determinants of persistence and as potential moderators of the relationship between student learning and persistence.

Understanding student learning lies at the heart of this study. In a recent report, *College Learning for the New Global Century*, the National Leadership Council for Liberal Education and America's Promise framed student learning as a series of "essential" (p. 3) conceptually distinct but mutually reinforcing outcomes that collectively explained what students should learn as a result of going to college (AAC&U, 2007). Among the essential outcomes, "personal and social responsibility" was defined across four distinct learning dimensions: civic knowledge and engagement, intercultural knowledge and competence, commitment to lifelong learning, and ethical reasoning and action (p. 3). We used this four-part definition to guide the selection of four of the five dimensions of learning examined for this study: Socially Responsible Leadership (Tyree, 1998), Intercultural Effectiveness (Fuertes, Miville, Mohr, Sedlacek, & Gretchen, 2000; Miville et al., 1999), Inclination to Inquire and Lifelong Learning (Cacioppo & Petty, 1982), and Moral Reasoning (Rest, Narvaez, Bebeau, & Thomas, 1999).

The fifth learning dimension included content mastery (measured by grade point average), which we investigated due to its established link to persistence (Adelman, 1999; Cabrera, Nora, & Castaneda, 1993; Cabrera, Nora, Terenzini, Pascarella, & Hagedorn, 1999; Nora & Cabrera, 1996; Pascarella & Terenzini, 2005). By examining these five learning dimensions, we provide empirical evidence linking learning to persistence, and answer Tinto's (1975) theoretical call for more nuanced approaches to understanding the relationship between learning and persistence.

Predictors of Student Persistence

Several key areas inform our understanding of students' likelihood of persisting after the first year of college. These areas consist of student demographics and socioeconomic status, precollege academics,

college choice and financial aid, institutional characteristics, the role of academic and social integration, and college grades. Below, we briefly review the major findings from each of these key areas.

Given the long history of college impact research addressing student persistence, a number of student demographic and socioeconomic factors have been uncovered, although the findings have not necessarily been consistent over time. Several studies, for instance, have demonstrated that students of color are associated with a stronger intent to re-enroll in college (Braxton, Bray, & Berger, 2000; Bray, Braxton, & Sullivan, 1999), whereas other studies have found either nonsignificant effects for race (Titus, 2006) or the presence of conditional effects for race based on socioeconomic considerations (Paulsen & St. John, 2002). Similar patterns have emerged in examining the effects of gender, with some studies finding females more likely to enroll (Braxton, Bray et al., 2000; Bray et al., 1999), others finding no statistical differences in persistence rates by gender (Leppel, 2002; Titus, 2006), and still others demonstrating that the effects of gender may be conditional on income levels or that factors related to persistence behave differently for men and women (Leppel, 2002; Paulsen & St. John, 2002). More consistent effects, however, have been reported in relation to family income (Braxton, Bray et al., 2000; Paulsen & St. John, 2002) and educational attainment (Ishitani & Desjardins, 2002).

Across most studies of college persistence, students' precollege academic performance is a consistent and salient factor of college success. Students' performances on standardized tests, for instance, are generally positive predictors of college persistence (Braxton, Bray et al., 2000; Bray et al., 1999; Cambiano, Denny, & DeVore, 2000; Murtaugh, Burns, & Schuster, 1999; Reason, 2009), although some studies uncovered nonsignificant effects related to standardized test scores (Titus, 2006). Additionally, given the prominence of student involvement and institutional goal commitment in Tinto's (1975) original model, it is important to examine similar constructs at the high school level by capturing aspects of students' involvement in high school activities and their educational aspirations. Examining the cocurricular experiences of high school students, for instance, mirrors the importance researchers have placed on college-based cocurricular involvement in understanding student persistence (Hoffman, 2002) and reflects propensities toward involvement in college.

In examining the role of college choice decisions on persistence, several studies included indicators to ascertain how students ranked their current institution in relation to their overall choice set (Braxton, Bray et al., 2000; Bray et al., 1999). While findings from these studies did not

indicate a direct relationship with persistence, they do reveal important indirect effects that work through a number of constructs, especially students' later goal commitments. Scholars uncovered more prominent findings, however, in relation to the availability and type of financial aid offered to students (Furr & Elling, 2002; Ishitani & DesJardins, 2002; Paulsen & St. John, 2002). In general, these studies point to the higher likelihood of persistence for students who receive financial aid, although some studies have found differential effects for financial aid based on distinctions among race (Furr & Elling, 2002), socioeconomic status, and type of aid awarded (Paulsen & St. John, 2002).

Social and academic integration are perhaps the most heavily researched aspects of student persistence (Tinto, 2006). Numerous studies, for instance, have demonstrated the positive effects of social integration on student persistence (Beil, Reisen, Zea, & Caplan, 1999; Braxton, Bray et al., 2000; Bray et al., 1999; Milem & Berger, 1997). Other studies have focused on race/ethnicity by examining the role of social adjustment on African American retention (Gloria, Kurpius, Hamilton, & Wilson, 1999), and the role of social support and comfort in the university environment on Asian American retention (Gloria & Ho, 2003).

Researchers have approached academic integration from a number of different vantage points in understanding its link to persistence, including faculty teaching skills (e.g., classroom discussions, organizations, clarity in teaching practices; see Braxton, Bray et al., 2000; Braxton, Milem, & Sullivan, 2000; Pascarella, Seifert, & Whitt, 2008) and the effects of active learning strategies (Braxton, Willis, Hirschy, & Hartley, 2008; Kinzie, Gonyea, Shoup, & Kuh; 2008). Other researchers have examined the effects of college grades (Paulsen & St. John, 2002), as well as the role of faculty-student interaction, collaborative learning, and experiences with diverse others on student persistence into the second college year (Kinzie et al., 2008). Overall, the literature provides mixed evidence on the influence of college grades on persistence (Kuh, Cruce, Shoup, Kinzie, & Gonyea, 2008; Paulsen & St. John, 2002), which Paulsen and St. John suggest is a reflection of the combination of competing factors. For example, students with relatively better grades may be simultaneously experiencing higher levels of academic integration and other meaningful student experiences, effectively diminishing the estimated net effect of grades on persistence. There is also an option value accompanying high grades such that better students are more prone to transfer to different schools (Paulsen & St. John, 2002).

Conceptual Framework

The conceptual framework is based on the assumptions that learning can be accessed, measured, and used to inform a larger conversation concerning learning's relationship to persistence. Based on these assumptions and a broad review of the literature, the conceptual framework highlights several key areas of consideration necessary for understanding the distinctive contribution learning may have on students' likelihood of persisting after the first year of college. These areas include student demographics and socioeconomic status, precollege academics, college choice and financial aid, institutional characteristics, and the role of academic and social integration.

How we position measures of student learning in relation to persistence marks a departure from earlier models of student persistence (Milem & Berger, 1997; Tinto, 1975). We situate measures of student learning as critical dimensions related to, but not embedded within, traditional definitions of academic integration known for influencing persistence and retention. In doing so, the present study builds on Tinto's model of student departure by examining how dimensions of learning, including grade point average, may explain observed differences in college student persistence while being conceptually distinct from academic integration. Figure 1 illustrates the conceptual framework guiding this study.

Research Questions

The current study relies on assessments of students' learning to understand persistence. In particular, we incorporated measures of learning across multiple dimensions to examine student persistence between the first- and second-year of college. We organized this study around the central hypothesis that student learning during college positively affects persistence, above and beyond background characteristics, measures of social, human, and financial capital, and other confounding influences such as postsecondary institutional environment, and academic and social integration. Building on past research on postsecondary persistence and student learning during college, our analyses address the following two questions:

Question 1. Do measured dimensions of student learning at the end of the first college year affect the likelihood of persistence into the second college year? More specifically, net of demographic, socioeconomic, and academic background characteristics, as well as measures of college choice, financial aid, and institution attended, is the likelihood of

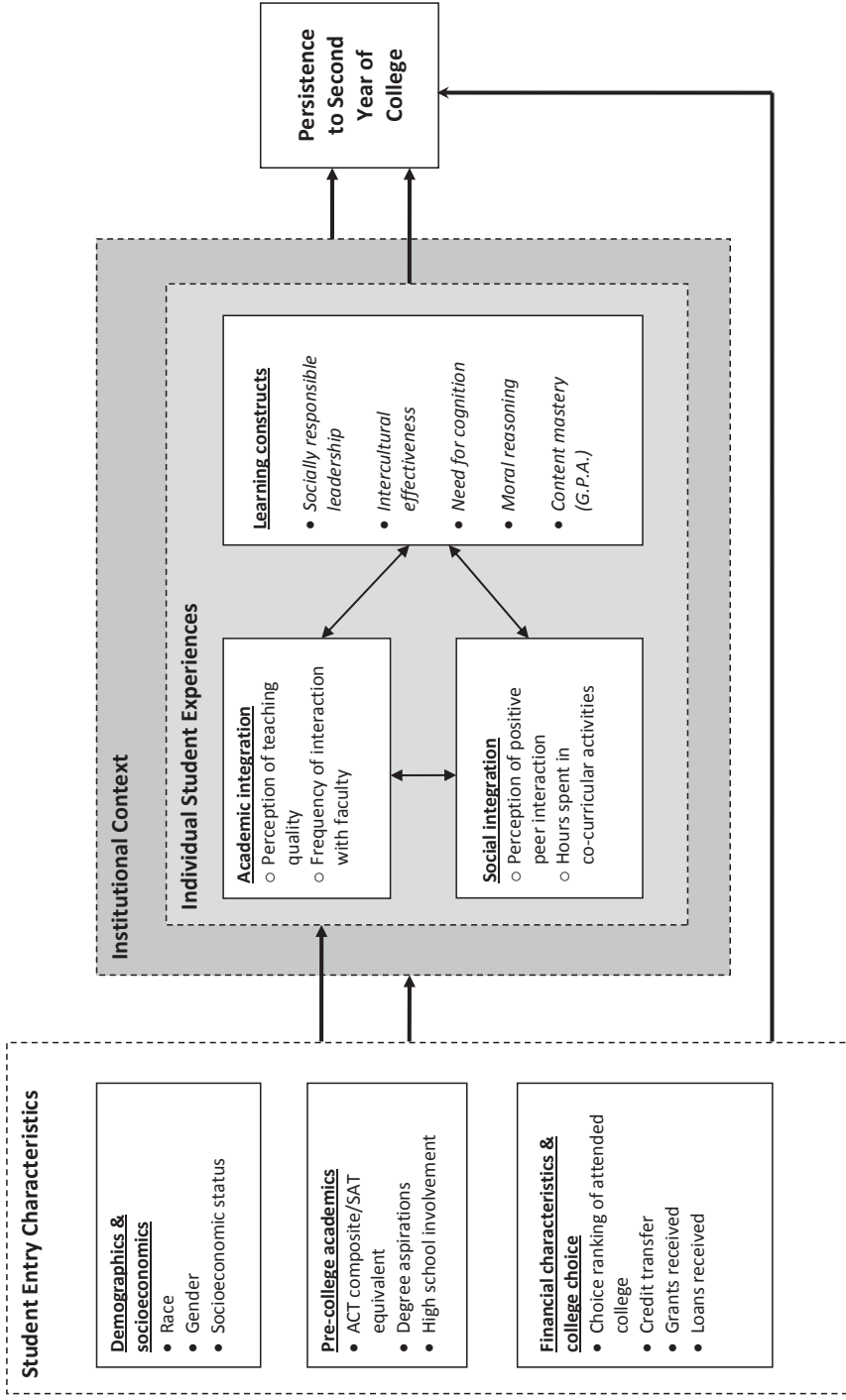


Fig 1. Conceptual Framework Linking Learning and Persistence

persisting into the second college year influenced by dimensions of student learning?

Question 2. Do the relationships between student learning and persistence found in question one remain after controlling for differences in academic and social integration during the first year of college? This question examines if the effects of student learning on persistence are moderated by academic and social integration.

Methods

Data

Data resources for this study were part of the Wabash National Study of Liberal Arts Education (WNSLAE). The WNSLAE began in 2006 as a large-scale effort to collect information on a variety of student characteristics, precollege and college experiences, educational and environmental conditions, as well as learning outcomes associated with liberal arts education. The longitudinal panel design of the WNSLAE provides researchers with opportunities to examine the educational conditions that foster student learning, as well as the factors that support student development and success at different times during the college experience (Center of Inquiry in the Liberal Arts [CILA], n.d.).

The student analytic sample consisted of full-time undergraduates who attended one of 16 four-year WNSLAE-participating institutions, including six liberal arts colleges and 10 universities. For students attending liberal arts colleges, the sample consisted of the entire incoming class of first-year students, while university students were randomly drawn from the pool of entering first-year students affiliated with their institution's College of Arts and Sciences. The institutional sample included colleges and universities purposefully selected from a group of institutions that responded to a national call for participants. While the institutional sample was drawn with the intention of representing a range of institutional characteristics (e.g., type, control, size, and selectivity), liberal arts colleges were overrepresented in accordance with the guiding principles of the project (CILA, n.d.). It is important to note that while the WNSLAE included two community colleges in the full study, these were excluded from the present project based on differences between students' orientations towards learning for those attending two- and four-year colleges (Pierson, Wolniak, Pascarella, & Flowers, 2003), as well as differences in the costs and benefits of remaining enrolled at two-year versus four-year institutions (e.g., Braxton, Hirschy, & McClendon, 2004; Paulsen & St. John, 2002).

Among the 4,501 students who participated in the fall 2006 inaugural survey, 3,081 students (68.5%) participated in the follow-up assessment administered in the spring of 2007. In addition to the information collected from the follow-up assessment, matched institutional records provided enrollment status for the second college year. After adjusting for missing data, our analytic sample included 2,439 students who attended one of the 16 colleges or universities. The analytic sample was predominately female (66%), White (81%), and had an average composite ACT score, or converted SAT equivalent, of 26 (an ACT composite score of 26 corresponds to an SAT summed score of approximately 1170; for explanations of ACT–SAT concordance see ACT, Inc., 2008; Dorans, 1999). Roughly 80% of the sample aspired to complete more than a four-year college degree. In terms of college choice and financial aid, the large majority (79%) of students in the sample entered college without transferring any college credits, and over half (54%) received financial aid in the form of student loans. At 92%, the large majority of our sample persisted into the second year of college, which ranged from 86 to 96% depending on institution attended. Table 1 describes the variables in our analysis and indicates where mean values differed between persisting and nonpersisting students ($p < 0.05$). We discuss these differences at the beginning of the Results section.

Variables in the Analytic Models

Persistence. The outcome variable was a dichotomous measure based on institutional records of enrollment, reflecting whether or not a student enrolled in college at the beginning of the second year (fall 2007).

Learning Constructs. The models contained five measures of student learning, including the following four dimensions: Socially Responsible Leadership (Tyree, 1998), Intercultural Effectiveness (Fuentes et al., 2000; Miville et al., 1999), Inclination to Inquire and Lifelong Learning (Cacioppo & Petty, 1982), and Moral Reasoning (Rest et al., 1999). The fifth measure of student learning captures overall Content Mastery (i.e., college grade point average) at the end students' first year of college. Table 2 provides additional information on each construct (CILA, n.d.).

To minimize respondent burden, the WSNLAE sample was designed such that not every respondent took the full battery of assessments. Roughly half of the original sample were randomly selected and administered the Moral Reasoning assessment ($n = 1,265$), while the entire sample of participating students were administered the remaining assessments ($n = 2,439$).

Integration. In addition to the aforementioned learning measures, the follow-up assessment included a battery of questions related to students'

TABLE 1
Descriptive Statistics

	Mean	SD	Min	Max
<i>Demographics & Socioeconomics</i>				
Female	0.66	0.47	0.00	1.00
Black, non-Hispanic	0.04	0.20	0.00	1.00
Asian, Pacific Islander	0.08	0.26	0.00	1.00
Hispanic	0.05	0.22	0.00	1.00
White, Caucasian	0.81	0.39	0.00	1.00
Other (reference racial group) ^a	0.01	0.12	0.00	1.00
Mother had attained at least a four-year degree	0.60 ^[+]	0.49	0.00	1.00
Father had attained at least a four-year degree	0.62 ^[+]	0.49	0.00	1.00
Parental income ^b	4.99	2.43	0.00	9.00
Student income ^b	0.81	0.60	0.00	9.00
<i>Precollege Academics</i>				
ACT composite / SAT equivalent	26.46 ^[+]	4.07	14.00	36.00
Aspires to complete more than a 4-year degree	0.80	0.40	0.00	1.00
High school involvement	0.53	0.50	0.00	1.00
<i>Choice & Aid</i>				
Choice ranking of college attended (reverse-coded)	3.53	0.84	1.00	4.00
Did not transfer any credits	0.79	0.41	0.00	1.00
Received federal grants	0.15 ^[+]	0.35	0.00	1.00
Received state grants	0.29	0.45	0.00	1.00
Received institutional grants	0.56	0.50	0.00	1.00
Received student loans	0.54	0.50	0.00	1.00
<i>Institution Attended</i> ^c	0.03–0.12	0.18–0.33	0.00	1.00
<i>Academic & Social Integration</i>				
Teaching clarity and organization scale ($\alpha = 0.887$)	0.05 ^[+]	0.67	-3.86	1.40
Frequency of faculty interaction scale ($\alpha = 0.702$)	-0.04 ^[+]	0.71	-1.40	2.15
Positive peer interaction scale ($\alpha = 0.871$)	0.02 ^[+]	0.71	-3.00	1.06
Hours spent per week in cocurricular activities ^d	2.58 ^[+]	1.50	1.00	8.00
<i>Learning Constructs</i>				
Socially Responsible Leadership scale ($\alpha = 0.914$)	0.00 ^[+]	0.96	-6.93	2.27
Intercultural Effectiveness scale ($\alpha = 0.851$)	0.00	1.00	-5.46	2.15
Need for Cognition scale ($\alpha = 0.897$)	-0.02 ^[+]	0.99	-3.99	2.31
Moral Reasoning scale ($\alpha = \text{NA}$) ^e	0.00	0.98	-2.89	2.65
Content Mastery (grade point average) ^f	6.21 ^[+]	1.46	1.00	8.00
<i>Persisted into the Second College Year</i>	0.92	0.27	0.00	1.00

n = 2,439

TABLE 1 (Continued)

Descriptive Statistics

^a Other includes respondents who did not affiliate themselves with any of the racial/ethnic groups, or indicated their race/ethnicity was unknown, American Indian/Alaska Native, or Multiracial.

^b Response categories include: 0 = Not applicable; 1 = Less than \$14,999; 2 = \$15,000–\$24,999; 3 = \$25,000–\$34,999; 4 = \$35,000–\$49,999; 5 = \$50,000–\$74,999; 6 = \$75,000–\$99,999; 7 = \$100,000–\$199,999; 8 = \$200,000–\$299,999; 9 = \$300,000 or more.

^c Institution Attended includes 15 dummy variables representing the 16 colleges and universities in the sample. Descriptive statistics for each of the institutions are available upon request from the first author.

^d Response categories include: 1 = 0 hours; 2 = 1–5 hours; 3 = 6–10 hours; 4 = 11–15 hours; 5 = 16–20 hours; 6 = 21–25 hours; 7 = 26–30 hours; 8 = More than 30 hours.

^e Scaled scores were computed by the Center for the Study of Ethical Development, University of Minnesota (Bebeau & Thoma, 2003). Alpha reliabilities are not available. Descriptive statistics are based on a subsample of $n = 1,385$.

^f Response categories include: 1 = C- or lower; 2 = C; 3 = C+; 4 = B-; 5 = B; 6 = B+; 7 = A-; 8 = A.

^{†1} Mean value among persisting students is significantly greater than the mean value among nonpersisting students at $p < 0.05$.

^{†2} Mean value among persisting students is significantly less than the mean value among nonpersisting students at $p < 0.05$.

TABLE 2

Learning Constructs [Variable label]

Socially Responsible Leadership ($\alpha = 0.914$) [*Leadership*]

Designed as a tool for assessing socially responsible leadership among college students. A second-order factor was constructed from the seven key measures in the Social Change Model for leadership (i.e., consciousness of self, congruence, commitment, collaboration, common purpose, controversy with civility, citizenship), plus a measure of change designed to capture the importance of making a better world and society (Tyree, 1998).

Intercultural effectiveness ($\alpha = 0.851$) [*Diversity*]

The M-GUDS-S is a 15-item multiple choice questionnaire that measures student attitudes, cognitions, and behaviors regarding diversity, awareness, and acceptance of both similarities and differences among people (Fuentes et al, 2000; Miville et al., 1999).

Inclination to inquire and lifelong learning ($\alpha = 0.897$) [*Cognition*]

Cacioppo and Petty (1982) developed a Need for Cognition Scale that measures how much people enjoy engaging in effortful cognitive activities. Individuals who rank high in “need for cognition” enjoy thinking and do it more often than individuals who rank low in this area and who only engage in careful thought when they have to.

Moral Reasoning [*Moral Reasoning*]

The Defining Issues Test (DIT-2) is a measure of moral judgment, consisting of five social problems to which participants respond, based on a different set of assumptions about how development unfolds. See Rest et al. (1999) provide a theoretical interpretation of the DIT-2 scores.

Content Mastery [*Grades*]

Survey question administered at the end of the first college year, asking students: What have most of your grades been up to now at this institution?

college experiences during their first year of college and was used as the basis for deriving measures of social and academic integration. Social integration included two measures, an eight-item factor scale reflecting students' positive interactions with their peers ($\alpha = 0.871$), and a single-item indicator of frequency of participation in cocurricular activities. Academic integration measures consisted of two factor scales: a 10-item composite measure of perceptions of teaching clarity ($\alpha = 0.887$), and a four-item indicator of frequency of students' interactions with faculty ($\alpha = 0.702$). Table 3 presents constituent items and reliabilities for each scale.

Control Variables. Demographic, socioeconomic, and academic background characteristics were measured by the following variables: sex, race/ethnicity (Black, Asian, Hispanic, White, and Unknown/Other), mother's and father's education attainment (at least a bachelor's degree vs. less than a bachelor's degree), parent's income, students' income, precollege academic achievement (composite measure of ACT or converted SAT scores), and educational aspirations (greater than a four-year degree vs. a four-year degree or less). To further control for students' dispositions towards engagement, the model also contained a dichotomous measure of involvement during high school. Due to variance heterogeneity of the items measuring involvement during high school, a summated scale of these items reflecting frequency of participation in academic and social activities was created and recoded through the use of a median split to reflect high versus low levels of involvement during high school.

Financial aid and college choice were included in the models with the following variables: received federal grants (yes/no), received state grants (yes/no), received institutional grants (yes/no), received student loans (yes/no), and choice ranking of college attended.

Postsecondary context was represented in two ways. First, a direct measure of credit transfer was included in the models: did not transfer credits to institution (yes/no). Second, in order to adjust standard errors for students nested within institutions, a set of 16 instrumental, dichotomous variables was included in the models indicating college or university attended, although parameter estimates for these variables are not presented in the final tables.

Analysis

We conducted three stages of analysis applying a variety of analytic techniques and multivariate logistic regression models. First, as a preliminary analysis, we tested for differences between persisting and non-persisting students by examining mean values within each group across

TABLE 3

Constituent Items for the Academic and Social Integration Scales

Quality Teaching—perceptions of teaching clarity and organization ($\alpha = 0.887$)

- Frequency that faculty gave clear explanations.
- Frequency that faculty made good use of examples and illustrations to explain difficult points.
- Frequency that faculty effectively reviewed and summarized the material.
- Frequency that faculty interpreted abstract ideas and theories clearly.
- Frequency that faculty gave assignments that helped in learning the course material.
- Frequency that the presentation of material was well organized.
- Frequency that faculty were well prepared for class.
- Frequency that class time was used effectively.
- Frequency that course goals and requirements were clearly explained.
- Frequency that faculty had a good command of what they were teaching.

Faculty Contact—frequency of interaction with faculty ($\alpha = 0.702$)

- During current school year, how often has respondent discussed grades or assignments with an instructor?
- During current school year, how often has respondent talked about career plans with a faculty member or advisor?
- During current school year, how often has respondent discussed ideas from readings or classes with faculty members outside of class?
- During current school year, how often has respondent worked with faculty members on activities other than coursework (committees, orientation, student life activities, etc.)?

Peer Interactions—perceptions of positive interactions with other students ($\alpha = 0.871$)

- Respondent has developed close personal relationships with other students.
- The student friendships respondent has developed at this institution have been personally satisfying.
- Interpersonal relationships with other students have had a positive influence on respondent's personal growth, attitudes, and values.
- Interpersonal relationships with other students have had a positive influence on respondent's intellectual growth and interest in ideas.
- Respondent's quality of relationships with other students.
- It has been difficult for respondent to meet and make friends with other students (reverse-coded).
- Few of the students respondent knows would be willing to listen to and help respondent with a personal problem (reverse-coded).
- Most students at this institution have values and attitudes different from respondent (reverse-coded).

Note. One additional measure of student integration consisted of a single survey item reflecting the number of hours per week respondent spends participating in cocurricular activities (ranging from 1 = 0 hours to 8 = More than 30 hours).

the full set of variables in the model. This preliminary, descriptive analysis is intended to provide a basic understanding of the differences in the backgrounds, educational experiences, and learning measures of students who persisted versus those who did not.

Second, we estimated a series of multivariate logistic regression models predicting the likelihood of second-year persistence. Blocks of variables were sequentially entered into each model to account for a host of relevant demographic, socioeconomic, and academic background characteristics, as well as measures of financial aid, choice, and institution attended. This analysis provided background information on which factors influence the likelihood of persistence, and the net effect of those factors.

Third, for the primary analysis we ran separate regression models for each scaled measure of student learning acquired from the spring 2007 follow-up assessment. Building on the model containing all three blocks of variables defined above, each student learning construct and set of academic and social integration measures were individually entered into the regression equation. This approach isolated the effects of each learning measure on persistence and allowed us to address the first research question. Where we detected evidence of a significant relationship between a dimension of student learning and persistence, we ran additional models that included the identified learning dimension and the set of academic and social integration measures. Thus, we addressed the second research question by examining changes in the parameter estimates of the learning measures before and after statistically controlling for levels of academic and social integration.

The multivariate analysis is represented according to Equation 1, where: P represents whether or not a student persisted into their second college year; X is a vector of demographic, socioeconomic, and precollege academic characteristics; C includes measures of college choice and financial aid; T represents a set of indicator variables reflecting each of the 16 institutions in the sample which were included in every model estimated and functioned as an instrumental variable; and e is random error. Equation 2 represents the stage of analysis where separate models were run for each of the five dimensions of student learning (L_j), and the set of integration measures (I). In cases where L_j was a statistically significant predictor of students' likelihood to persist, measures of social and academic integration were simultaneously entered into the model, represented as I . u_j represents random error for each model, and j reflects each of the five learning dimensions.

$$\text{Log (odds)} = \ln (P / (1 - P)) = b_0 + b_1X + b_2C + b_3T + e \quad (1)$$

$$\text{Log (odds)}_j = \ln (P / (1 - P))_j = b_0 + b_1X + b_2C + b_3T + b_4L_j + b_5I + u_j \quad (2)$$

Altogether, these analyses allowed us to address each research question and contribute new information on the factors affecting student persistence. When interpreting the parameter estimates we examined the odds ratios ($Exp(B)$) for categorical variables and Delta-p statistics for continuous variables. An odds ratio represents the change in the odds that a student persisted into the second year of college and is useful for interpreting the effects of belonging to one group versus a reference group for dichotomous variables. The Delta-p statistic represents the change in probability that a student persisted resulting from a one-unit change in a continuous, independent variable (Long, 1997; Peterson, 1985).

Limitations

Several limitations are noteworthy. First, when compared to national averages (NCES, 2003), rates of persistence across the sample were exceedingly high, with approximately 8% of the students in the study not persisting to their second year of college. Given that this 8% represents both transfers and dropouts—two distinctive populations—and that the sample persistence rates reflect a more motivated and academically successful population than the associated institutional persistence rates, generalizations of these results to other institutions should be made with caution. Second, our conceptualization of learning and its measurement was based on the objectives of the WNSLAE project and framed according to the definition of student learning put forth in the AAC&U (2007) report *College Learning for the New Global Century*. Other dimensions of learning not assessed as part of this project may have had more profound effects on persistence; perhaps, for example, students' decisions to persist are more closely tied to occupationally aligned dimensions of learning than the more generalizable outcomes set by the WNSLAE project and AAC&U (2007) report. Third, this study's purpose involved empirically linking broadly conceived notions of learning to persistence. Future studies are needed to capture the distinctive potential each learning outcome plays on explaining persistence. Fourth, college grade point average was self-reported by students rather than directly captured from institutional records; past research has yielded mixed evidence on the reliability and validity of self-reported grades (Ewell & Jones, 1993; Kuncel, Credé, & Thomas, 2005; Pascarella & Terenzini, 1991). Finally, it is important to note that the institutional sample within the WNSLAE data was not randomly selected, limiting our basis for employing multi-level analytic strategies. However, because students are clustered within institutions, we included $n - 1$ dummy variables reflecting each of the institutions in the sample to take into account unobserved institutional

effects. By estimating fixed-effects models in this way we controlled for the average effects of each institution while focusing our analysis on student-level measures using blocked regression techniques (Kreft, 1996).

Results

The preliminary descriptive analysis provides a basic understanding of the differences in the backgrounds, educational experiences, and learning measures of students who persisted versus those who did not. Results indicated that students who persisted into their second year of college were more likely than nonpersisters to have parents with at least a four-year college degree and to have scored higher on their ACT or SAT exam (see Table 1). Persisting students reported higher levels of academic and social integration during their first year of college in areas related to exposure to quality teaching, frequency of faculty contact, peer interactions, and cocurricular involvement, while also demonstrating greater average scores on three of the five measures of assessed student learning (leadership, need for cognition, and content mastery). Alternatively, compared to nonpersisting students, a smaller share of persisters obtained financial aid in the form of federal grants.

Next, we used multivariate logistic techniques to regress second-year persistence on three blocks of variables, sequentially entered into each model. Because of sample variation across the measures of student learning, we began the first analytic stage by predicting the likelihood of persistence among the full analytic sample ($N = 2,439$). By running a multiple logistic regression analysis across three blocks of variables, we estimated the overall effects of demographic and socioeconomic background characteristics (Block I), measures of precollege academic involvement (Block II), and indicators of college choice, financial aid, and college or university attended (Block III) on the likelihood that students persisted into their second college year. As shown in Table 4, the overall predictability of the model increased as each group of variables were entered into the equation (based on χ^2 and *Naglerkerke* R^2 statistics, $p < 0.05$).

In examining demographic and socioeconomic characteristics contained in Block I, having a mother with at least a four-year college degree increased the likelihood of persistence. Block II variables included ACT/SAT composite scores which also increased the likelihood of persistence. Controlling for differences in all precollege measures contained in Blocks I and II, it appears in Block III that students who received state or institutional grants were more likely to persist than stu-

dents who did not, while the receipt of loans exerted the opposite effect. Thus, across all three blocks of variables, significant and positive effects were found for measures representing social capital (mother's education level), human capital (ACT/SAT composite score), and financial capital (receipt of grants). While not shown in the table, all model iterations (Blocks I, II, and III) included the set of instrumental dummy variables indicating institution attended and accounting for student clustering.

Given the overall effects of the background and control variables in Blocks I, II, and III, we next focused the analysis on the unique impacts of learning and integration on student persistence. For each dimension of student learning that significantly predicted the likelihood of persistence, we examined the moderating effects of academic and social integration by simultaneously adding integration variables to the model. Table 5 presents these results, yielding three key findings.

First, as shown in the Table 5, several measures of student learning (i.e., including intercultural effectiveness, need for cognition, and moral reasoning) failed to significantly affect likelihood of persisting. The two notable exceptions to these findings include socially responsible leadership and grades during the first year of college. Both of these learning measures yielded a positive and significant influence on the likelihood of persisting, with grades ($B = 0.295$, $\Delta p = 0.020$, $p < 0.01$) exerting a relatively greater influence than leadership ($B = 0.149$, $\Delta p = 0.010$, $p < 0.05$). In other words, after statistically controlling for a variety of background differences and other confounding measures, the more students demonstrated overall mastery of their course content or socially responsible leadership capabilities, the more likely they were to enroll during the fall of their second college year.

The second key finding occurred in examining differences in students' levels of academic and social integration during their first year of college. When we entered the four integration scales into the model containing all background and control variables (Table 5, column 1), three of the four scales, including quality of teaching, peer interaction, and cocurricular activities, were positive and significant predictors of persistence. Among these, students' levels of positive peer interactions yielded the greatest influence on the likelihood of second year persistence ($B = 0.816$, $\Delta p = 0.044$, $p < 0.01$), while the frequency of contact with faculty failed to have a significant impact.

Third, we examined moderating effects by simultaneously entering measures of academic and social integration to the models containing leadership and grades. Results from the combined model containing the leadership construct (Table 5, Combined Model 1) indicated overall improvements in model fit, with the integration variables accounting for

TABLE 4
Estimated Effects of Background and Control Variables on Persistence

	I			II			III		
	<i>B</i>	<i>Exp(B)</i>	Delta-p	<i>B</i>	<i>Exp(B)</i>	Delta-p	<i>B</i>	<i>Exp(B)</i>	Delta-p
<i>Demographics & Socioeconomics</i>									
Female	-0.002	0.998	-0.000	-0.006	0.994	-0.000	0.011	1.011	0.001
Black	0.366	1.442	0.024	0.575	1.777	0.034	0.688	1.990	0.039
Asian	0.417	1.518	0.026	0.472	1.604	0.029	0.468	1.596	0.029
Hispanic	0.739	2.093	0.041	0.933	2.542	0.048	0.935	2.547	0.048
White	0.605	1.832	0.035	0.595	1.814	0.035	0.609	1.838	0.035
Mom BA	0.590**	1.804	0.035	0.560**	1.750	0.033	0.576**	1.778	0.034
Dad BA	0.292	1.339	0.019	0.256	1.291	0.017	0.287	1.333	0.019
Parent inc.	-0.062	0.940	-0.005	-0.069	0.933	-0.005	-0.068	0.934	-0.005
Student inc.	-0.001	0.999	0.000	-0.012	0.989	-0.001	-0.003	0.997	0.000
<i>Precollege Academics</i>									
ACT/SAT composite				0.074**	1.076	0.005	0.065**	1.067	0.005
Aspirations				0.056	1.058	0.004	0.048	1.049	0.004
HS involvement				0.115	1.122	0.008	0.122	1.130	0.009
<i>Choice & Aid</i>									
College choice							0.153	1.165	0.011
No transfer credits							0.144	1.155	0.010
Federal grants							-0.393	0.675	-0.035
State grants							0.696**	2.005	0.039
Inst. grants							0.755**	2.127	0.042
Loans							-0.502*	0.605	-0.046
χ^2, df		49.512, 24			60.446, 27			84.671, 33	
Model R^2		0.047**			0.057**†			0.079**††	

Note: In addition to the variables shown, all models contain 15 dummy variables representing Institution Attended. Model R^2 represents the Naglekerke statistic. The increase in R^2 from the previous model is statistically significant at † $p < 0.05$, †† $p < 0.01$, ††† $p < 0.001$. $n = 2,439$. * $p < 0.05$, ** $p < 0.01$.

TABLE 5
 Net Effects of Student Integration (variable block 1) and Learning (variables 2–6) on Persistence

	1		2		3		4		5		6	
	Quality teaching	Faculty contact	Peer int.	Coocurr. inv.	Leadership	Diversity	Cognition	Moral reasoning	Grades			
Separate Model												
<i>B</i>	0.299*	0.134	0.816**	0.130*	0.149*	0.035	0.113	0.041	0.295**			
Delta-p	0.020	0.009	0.044	0.009	0.010	0.003	0.008	0.003	0.020			
Model <i>R</i> ²	0.172**				0.082**	0.079**	0.081**	0.110**	0.106**			
Combined Model 1												
<i>B</i>	0.354**	0.172	0.843**	0.139*	-0.154							
Delta-p	0.023	0.012	0.045	0.010	-0.012							
Model <i>R</i> ²	0.174**											
Combined Model 2												
<i>B</i>	0.202	0.065	0.831**	0.132*					0.266**			
Delta-p	0.014	0.005	0.044	0.009					0.018			
Model <i>R</i> ²	0.192**											

Note. In addition to the variables shown above, all models include measures of student Demographics & Socioeconomics, Precollege Academics, Choice & Aid, and Institution Attended as shown in Table 1. Model *R*² represents the *Nagelkerke* statistic. The increase in *R*² from adding integration measures to models 2 and 6 are statistically significant ($p < 0.01$). Models containing variables 1–4 and 6: $n = 2,439$. Model containing variable 5: $n = 1,265$. * $p < 0.05$. ** $p < 0.01$.

nearly all of the predictive power (Model $R^2 = 0.174$, $p < 0.01$). Estimates from the model containing grades (Table 5, Combined Model 2) also showed a sizable increase in model fit from adding the integration measures (Model $R^2 = 0.192$, $p < 0.01$). Based on the loss of statistical significance in the estimated net effects of leadership and the decrease in effect size of grades ($B = 0.266$, Delta- $p = 0.009$, $p < 0.01$), the combined model estimates provide evidence that academic and social integration moderate the effects of these two learning measures on persistence.

Fourth, net of all background and control variables and holding constant differences in leadership skills as well as grades (see Table 5, Combined Model 1 and 2), results indicated the importance of social integration during the first college year. We found that positive peer interactions and the number of hours per week participating in cocurricular activities consistently increased the likelihood of persistence. In terms of academic integration, involvement in courses with clear and organized teaching also had a significant influence on persistence even when controlling for socially responsible leadership, but not when taking into account first-year grades. Frequency of faculty contact did not have a significant effect on persistence in any of our estimated models.

Discussion and Conclusions

Based on longitudinal data collected in 2006–07 as a part of the Wabash National Study of Liberal Arts Education, this study employed descriptive and multivariate techniques specifically to understand the net effects of student learning on the likelihood of persistence, and the extent to which academic and social integration moderated these effects. Building on past research and organized around the hypothesis that student learning during college positively affects persistence, the analyses were designed to address two research questions.

The first research question examined the direct effects of student learning on second-year persistence, controlling for a number of background and experiential measures. Results indicated that only socially responsible leadership and grade point average shared statistically significant relationships with persistence. Thus, one major conclusion from the study is that persistence decisions are influenced by overall mastery of course content, as reflected by first-year grades, and the extent to which students possess values such as equity, social justice, self-knowledge, citizenship, and commitment towards social change as measured by the leadership construct.

The findings related to grade point average and persistence are consistent with and expand results from past studies (Adelman, 1999; Cabrera et al., 1993; Cabrera et al., 1999; Nora & Cabrera, 1996; Paulsen & St. John, 2002), and underscore the importance of including content mastery as a determinant within theories and frameworks intended to predict student persistence. Such a finding reminds educators of the value students place on extrinsic rewards and the assessments faculty use to measure content mastery.

The relationship between socially responsible leadership and persistence marks one of this study's important and distinctive findings. Why does socially responsible leadership influence persistence differently than other measures of learning? Perhaps, students with higher scores on measures of socially responsible leadership were more likely to place value on persistence as a mark of being a good leader. For these students, leading wide-scale social change may begin with understanding the importance of obtaining an undergraduate degree; an understanding exemplified by their increased likelihood of persisting to the second year in college. Alternatively, research has shown significant associations among students' capacity for leadership and general campus involvement, cross-group interactions, and engagement with faculty (Antonio, 2001; Dugan, 2006; Dugan & Komives, 2010; Kezar & Moriarty, 2000; Komives, Longerbeam, Owen, Mainella, & Osteen, 2006). Socially responsible leadership may therefore also be a proxy for empirically validated experiences related to academic and social integration. In either case, future research is needed to examine the collegiate conditions and educational practices necessary for spurring gains in socially responsible leadership.

The second research question examined whether academic and social integration moderated the relationship between persistence and learning outcomes related to grade point average and socially responsible leadership. Overall, the effects of academic integration on learning's link to persistence were relatively weak, with exposure to good teaching practices moderating the effects of grade point average on persistence. This result echoes those from previous studies, touting the importance of good teaching on increasing persistence (Pascarella, Salisbury, & Blaich, 2011; Reason, 2009). That only one of the two measures of academic integration moderated the effects of one of the two tested learning dimensions is telling: for students in this study, faculty contact had little to do with students persisting to their second year of college. Therefore, the study's second major conclusion is in terms of academic integration; the results add to evidence suggesting that teaching prac-

tices within the classroom setting exert a stronger positive influence on persistence than frequency of interactions with faculty (e.g., Pascarella & Terenzini, 2005; Reason, 2009).

Consistent with past studies documenting a strong relationship between social integration and persistence (Beil et al., 1999; Braxton, Bray et al., 2000; Bray et al., 1999; Milem & Berger, 1997), the results further confirm that cocurricular activities and peer relationships are critical for helping students persist to their second college year. Our findings suggest that socially responsible leadership and grade point averages were each moderated by social integration, including measures of peer interactions and cocurricular involvement. These results serve as important reminders for administrators to be attentive to, if not allocate resources toward, cocurricular programs and services specifically designed to involve first-year students on campus (Kuh et al., 2008; Zao & Kuh, 2004). A third major conclusion of the study is that, put simply, involving first-year students in the cocurriculum facilitates second-year persistence, irrespective of content mastery, socially responsible leadership, or entry characteristics.

Implications

Examining student success through an expanded understanding of factors that influence student persistence is critical for improving the nation's postsecondary completion rates. While college persistence has received considerable attention in the past, notably absent from the extant research is an examination of the connections between student learning and persistence. With increasing attention to learning outcomes necessary in the twenty-first century (AAC&U, 2007), coupled with growing concern over lagging completion rates (Bowen, Chingos, & McPherson, 2009), and emerging evidence that students are too often not developing critical thinking and complex reasoning skills during college (Arum & Roksa, 2011), this study examined the interconnections between student learning and college persistence.

Given the study's findings, there are several research, practical, and policy implications for higher education. For example, results from this study contribute to the body of evidence showing the significant role of student engagement on persistence and expand past research in which student learning has largely been confined to the single dimension of content mastery, operationalized by students' grade point averages (e.g., Cabrera et al., 1993; Pascarella & Terenzini, 2005). By conceptualizing student learning as a collection of empirically validated constructs (King et al., 2007; Pascarella, Wolniak, Seifert, Cruce, & Blaich, 2005),

the study provides new information on the relationships among integration, learning, and persistence, and differs from other examinations of persistence in three ways.

First, we measured several learning dimensions, including grade point average, for their effects on persistence. Second, in order to isolate the amount of variance learning had on persistence, we conceptualized learning to include content mastery as one of five dimensions of learning, and distinct from academic integration. Our approach expands upon previous studies, in which learning and perceptions of the academic environment have been subsumed under academic integration in what Tinto (1975) referred to as “intellectual development.” Finally, this strategy of separating learning from perceptions of the academic environment enabled us to test if such perceptions moderated learning’s influence on persistence.

Furthermore, this study raises important questions concerning the conceptual relationship between learning and persistence. Although we chose to position the different learning dimensions as determinants of persistence, others might be equally concerned with examining the cumulative influence of continued enrollment and progress towards a degree on learning. Students’ enrollment decisions are predicated on assumptions concerning the overall value of, and satisfaction with, higher education (Knox, Lindsay, & Kolb, 1992; Paulsen & St. John, 2002), and the weak link between learning and persistence we uncovered with this study suggests a need for researchers to continue challenging different approaches to studying persistence.

Turning to institutions, results from this study suggest that effective teaching indeed influences persistence. Moderating the effects of grade point average on persistence and exerting a stronger positive influence on persistence than frequency of interactions with faculty, teaching practices within the classroom setting appear to play a large role in influencing persistence for students participating in this study. As such, we echo sentiments that have been raised by other scholars (see Pascarella et al., 2008; Pascarella, Salisbury, & Blaich, 2011) interested in teaching and learning: Institutions benefit, by way of increasing persistence, from investing significant resources into faculty development programs aimed at enhancing teaching. In tandem, we urge higher education programs to offer courses in effective educational practices to graduate students from all disciplines: If higher education faculty members don’t teach how to teach, then who should?

In addition, the lack of findings between many of the measured dimensions of student learning in the study and persistence suggests that the prevailing definitions of institutional quality ought to extend

beyond enrollment measures in order to take into account learning as an essential determinant of quality. The *U.S. News and World Report*, for instance, weights institutional retention rates as 4% of an institution's overall ranking, yet measures of learning remain a strikingly absent feature of their quality index. While many have criticized this lack of emphasis on student learning (Hersh, 2005), the results from this study suggest, in part, that metrics such as persistence are not reliable proxies for the type of learning that occurs within an institution.

Although policy makers have yet to reach any consensus on how to incorporate learning into a generalized indicator of institutional quality, the continued public disaffection toward higher education highlights the need to rethink the ways in which we measure and transmit quality in our educational system. It would seem that we must acknowledge that institutional quality measures based on enrollment indicators likely fail to capture important learning dimensions, such as socially responsible leadership, moral reasoning, or inclination to inquire and lifelong learning. And while the findings of Arum and Roksa's (2011) book, *Academically Adrift: Limited Learning on College Campuses*, and Pascarella et al.'s (2011) replication study highlight concerns surrounding the impacts of a college education on student learning, it is important to recognize persistence as a primary mechanism by which access to college leads to degree attainment and a stronger educational pipeline.

From a broader policy perspective, the fact that results indicate a weak relationship between measured student learning and persistence calls into question prevailing notions of student success. Evidence that persistence is essentially unrelated to many important dimensions of student learning examined in this study suggests a need to refine broad educational policies. The study's findings provide justification for policy makers to apply a multifaceted approach for conceptualizing and achieving student success. Based on our results, it appears that persistence rates may be improved and the educational pipeline strengthened with programs fostering social integration, and to a lesser extent, academic integration, whereas concern over economic competitiveness and workforce development may best be addressed with programs designed to promote critical aspects of student learning. Multifaceted approaches to fostering peer interactions, participation in the cocurriculum, and improved teaching, along with attention to learning outcomes across several dimensions holds the potential of bolstering enrollment from one year to the next, enhancing preparation for the complex challenges of the twenty-first century workforce, and achieving the nation's broad educational goals.

In the midst of the current economic crisis, some have called into question the importance of "nonessential" areas of colleges and univer-

sities, such as those areas not directly connected to or concerned with the academic mission of the institution. Yet, our results suggest that students' involvement in the cocurriculum, their relationship with peers and, to some degree, exposure to quality teaching are likely determinants of second-year persistence, underscoring the importance of creating programs and services that provide leadership opportunities for first-year students, a population often not targeted for leadership positions. The results, therefore, provide an empirical basis to develop internal policies and practices that increase collaboration among student and academic affairs, and approach the understanding of student success from a more holistic and developmental perspective.

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