

## **Learning Community Participation and Educational Outcomes: Direct, Indirect, and Contingent Relationships**

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## **Learning Community Participation and Educational Outcomes: Direct, Indirect, and Contingent Relationships**

This study examines the direct, indirect, and contingent relationships between participating in a learning community, student engagement, and self-reported learning outcomes. Using data from the 2004 administration of the National Survey of Student Engagement (NSSE), the results indicate that the relationships between a learning community experience and learning outcomes are mediated by students' levels of engagement. Learning community participation was not directly related to gains in learning and development, but it was related to student engagement. Student engagement, in turn, was strongly related to gains in learning. In addition, institutional characteristics were related to the strength of the relationships between learning community participation and student engagement.

From modest beginnings in the late 1980s and early 1990s, learning communities have become recognized as high-impact educational experiences positively related to students' learning and success during college (Inkelas et al., 2004; Kuh, 2008; National Survey of Student Engagement, 2007; Shapiro & Levine, 1999; Taylor, Moore, MacGregor, & Lindblad, 2003; Tinto, 2000). Although the positive educational experiences and outcomes associated with learning community participation are well documented, surprisingly little is known about how and why learning communities are beneficial (Pike, 2000). Most of the meaningful effects of college are conditional in that students with certain characteristics benefit more from some experiences than others. For this reason, Pascarella and Terenzini's (1991, 2005) recommended studies of student learning and development examine the indirect and contingent effects of educational programs and interventions. With this in mind, this study examined the direct, indirect, and contingent relationships between learning community participation and students' educational experiences and outcomes using data from the 2004 administration of the National Survey of Student Engagement (NSSE).

### Background

A wide variety of educational programs have the "learning community" label. In general, most learning communities consist of a cohort of students who take one or more courses together. Frequently, the courses are organized around a common theme and many learning communities require students to be involved in out-of-class activities. Some learning communities include a residential component. Even though they may have different features, participating in a learning community has generally been consistently linked to higher levels of student achievement, learning, and success (Taylor, Moore, MacGregor, & Lindblad, 2003).

In fact, the growing interest in learning communities is based, in large part, on evidence that participating in a learning community is positively related to a variety of beneficial educational experiences and outcomes. Research has found that participating in a learning community helps to facilitate the transition from high school to college (Inkelas, Daver, Vogt, & Leonard, 2007; Inkelas & Weisman, 2003; Knight, 2003; Szelényi, Inkelas, Drechsler, & Kim, 2007) and is positively related to high levels engagement during college (Inkelas et al., 2004; Inkelas, Szelényi, Soldner, & Brower, 2007; Inkelas & Weisman, 2003; Knight, 2003; Kuh, 2008; National Study of Student Engagement, 2007; Pike, 1999, 2002; Stassen, 2003; Tinto & Goodsell, 1993; Zhao & Kuh, 2004). Membership in a learning community also has been linked to a variety of positive educational outcomes, including grades (Baker & Pomerantz, 2000; Knight, 2003; Pasque & Murphy, 2005; Pike, Schroeder, & Berry, 1997; Purdie II & Rosser, 2007; Soldner, McCarron, & Inkelas, 2007; Stassen, 2003), desired learning outcomes (Inkelas, Szelényi et al., 2007; National Survey of Student Engagement, 2007; Peters & Sterns, 2003; Pike, 1999; Soldner, McCarron, & Inkelas, 2007; Zhao & Kuh, 2004), satisfaction with college (Baker & Pomerantz, 2000; Johnson & Romanoff, 1999; Zhao & Kuh, 2004), and persistence and graduation rates (Beckett & Rosser, 2007; Johnson & Romanoff, 1999; Knight, 2003; Pike, Schroeder, & Berry, 1997; Purdie II & Rosser, 2007; Stassen, 2003). Participating in a

learning community has also been linked to greater openness to diversity (Pike, 2002) and lower levels of binge drinking behaviors (Brower, Golde, & Allen, 2003).

The preponderance of research on learning communities has focused on direct effects, suggesting that learning communities “have positive outcomes for academic achievement” (Pasque & Murphy, 2005, p. 441), “shape civic leaders” (Peters & Sterns, 2003, p. 341), and help students “achieve academic success and find considerable satisfaction” (Johnson & Romanoff, 1999, p.395). This is not to say that the findings of these studies are wrong, but rather that the studies *presumed* that the observed associations represented direct relationships between learning community participation and positive educational outcomes without accounting for how or why these positive effects were realized.

#### *Indirect Effects of Learning Communities*

Several studies have attempted to determine whether the relationships between positive educational outcomes and membership in a learning community were direct or indirect. These studies employed student engagement measures as intervening variables. Student engagement construct as an effective educational condition dates back to the work of Ralph Tyler (1932). It was subsequently popularized by Pace (1980, 1984), Astin (1984, 1985), and Kuh et al. (1991). Although these writers used different terminology to describe their concepts of student engagement, their views were all based on the premise that what students learn in college is a function of how they spend their time and energy (Kuh, 2003). Research has provided strong, consistent support for this premise, finding that engagement is positively related to learning outcomes (Gellin, 2003; Kuh, Hu, & Vesper, 2000; Pascarella et al., 1996; Pike & Kuh, 2005; Pike, Kuh, & Gonyea, 2003), academic achievement (Astin, 1977, 1993; National Survey of Student Engagement, 2004), and student success broadly defined (Kuh, Kinzie, Buckley, Bridges, & Hayek, 2007; Kuh, Kinzie, Cruce, Shoup, & Gonyea, 2007).

Studies of the indirect effects of learning communities have found that student engagement plays an important mediating role. In their study of the relationships between learning community participation and first-year students’ transitions to college, Inkelas, Daver, Vogt, and Leonard (2007) found that interactions with faculty members, interactions with peers, and use of residence hall resources were significant mediating factors. Pike and his colleagues also found evidence to suggest that interactions with faculty members and peers play an important role in mediating the relationships between learning community participation and grades, learning outcomes, and retention (Pike, 1999, 2002; Pike, Schroeder, & Berry, 1997). Although they did not specifically test for indirect relationships, Zhao & Kuh (2004) suggested that learning community participation was more strongly associated with measures of student engagement than learning outcomes and that student engagement measures were strongly related to learning outcomes. Such findings suggest indirect, rather than direct effects for learning communities.

#### *Contingent Effects of Learning Communities*

Some researchers have examined some contingent effects of learning communities, more specifically how the relationships between learning community participation and student engagement and learning outcomes differ based on student, institution, and learning community characteristics. Zhao and Kuh (2004) found that the relationships between learning community membership and student engagement were stronger for first-year students than seniors. Conversely, Spencer (1998) found that differences between learning community participants and other students increased from the freshman to the sophomore years for some types of engagement, a somewhat surprising finding given the fact that students were not in learning communities during their sophomore year. Szelényi et al (2007) also found some evidence that the positive relationship

between learning community participation and a successful transition to college was stronger for low-SES students.

From a national study of living-learning communities in 2004 and again in 2007, Inkelas and her colleagues found that the relationships between learning community participation and both student engagement and learning outcomes differed by institutional type as determined by Carnegie classification. In their 2004 report, students at Doctoral/Research-Extensive Universities showed the strongest relationships between participating in a learning community and interacting with faculty (Inkelas et al., 2004). However, the 2007 results differed in that relative to other institutional types, Doctoral/Research-Extensive universities did not have stronger relationships between learning-community participation and student interaction with faculty members. At the same time, the link between learning community membership and gains in intellectual abilities was stronger for Doctoral/Research-Extensive universities relative to other institutional types (Inkelas, Szelényi et al., 2007).

Although institutional type is commonly used as an independent variable, recent research suggests that the measures upon which the classifications are based may provide more powerful explanations of contingent effects. McCormick, Pike, Kuh, and Chen (in press) found that both the 2000 and 2005 Carnegie classification systems explained significant proportions of the variance in NSSE engagement and outcome measures, even after accounting for student characteristics. However, the measures used to construct the 2005 classifications are more strongly related to student-level NSSE scores. Although relationships differed somewhat by the engagement or outcome measure used, selectivity, residential character (the percent of students living on campus), and percent of students majoring in the arts or sciences were generally positively related to NSSE scores. Institutional size determined by FTE enrollment and graduate coexistence (the percent of undergraduate major fields in which graduate degrees are also awarded) tended to be negatively related to NSSE scores.

In a study of students attending 39 colleges and universities with a variety of learning communities, researchers found that learning communities with courses or discussion groups that were intended to help students integrate course material, and learning communities that required students to participate in out-of-class activities, had consistent positive relationships with a wide range of student engagement and learning outcomes (National Survey of Student Engagement, 2007). The effects of other characteristics, such as having peer mentors or a residential requirement, were relatively small and related to only a few types of engagement and outcomes. Given that virtually all learning communities emphasize integration of information, either through courses or discussion groups, membership in all types learning communities was positively related to student engagement and outcomes. Studies by Inkelas and Weisman (2003) and by Stassen (2003) generally confirm the NSSE findings. Learning community membership, in general, was consistently and positively related to engagement and learning outcomes. Differences in the types of learning communities influenced the relationships in subtle ways that corresponded to their design.

### *Research Questions*

To better understand how and why participating in a learning community is positively related to desired student outcomes, three questions guided this research that address direct, indirect, and contingent relationships between learning community participation and both student engagement and learning outcomes.

1. Is participating in a learning community directly related to self-reported gains in learning after accounting for differences in students' background characteristics and levels of engagement?
2. What role does student engagement play in how the learning community experience is related to self-reported gains in learning?
3. Are institutional characteristics and students' class levels related to the strength of the relationships between participating in a learning community and both student engagement and learning outcomes?

## Research Methods

### *Conceptual Model*

The conceptual model underlying the present research is shown in Figure 1. In the model, student learning outcomes are influenced by three elements: student background characteristics, participating in a learning community, and student engagement. Student engagement, in turn, is influenced by student background characteristics and participation in a learning community. Finally, participation in a learning community is related to student background characteristics. This last relationship assumes time ordering, but not causality. For example, the sex of a student precedes membership in a learning community, but may or may not *cause* a student to join a learning community. Clearly, participating in a learning community does not cause a student to be female or male. Not shown in Figure 1 are the possible contingent effects for student class level. It is assumed that all relationships in the model could differ based on student year in school. The relationships depicted in Figure 1 are represented mathematically by the equation:

$$Y_{ij} = \beta_{0j} + \beta_{1j}X_{1ij} + \beta_{2j}X_{2ij} + \dots + \beta_{qj}X_{qij} + r_{ij} \quad [1]$$

Where  $Y_{ij}$  is the outcome (i.e., either student engagement or learning outcomes) for a given student ( $i$ ) at a particular institution ( $j$ );  $\beta_{0j}$  is a coefficient representing the unique effect of the institution; and  $\beta_{qj}$  is a coefficient representing the effects for student background characteristics, learning community membership, or student engagement (when student learning is the outcome of interest). Finally,  $r_{ij}$  is a random effect for a given student within a particular institution.

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Insert Figure 1 about here

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In the conceptual model, the nature of the relationships between participation in a learning community and both student engagement measures and learning outcomes is influenced by a variety of institutional characteristics. Mathematically, these relationships are represented by the equation:

$$\beta_{qj} = \gamma_{q0} + \gamma_{q1}W_{1j} + \gamma_{q2}W_{2j} + \dots + \gamma_{qs}W_{sj} + u_{qj} \quad [2]$$

Where  $\beta_{qj}$  is the coefficient representing the relationship between learning community participation and the outcome measure (either student engagement or learning) for a given institution ( $j$ ). The  $\gamma_{qs}$  coefficients are the effects for institutional characteristics ( $W_{sj}$ ) on the relationships between learning community participation and the outcome measure, and  $u_{qj}$  is a random effect (i.e., residual) for the institution.

### Participants

The participants in this study were first-year and senior undergraduate students who completed the National Survey of Student Engagement (NSSE) in Spring 2004. The institutions that participated in NSSE 2004 are very similar to the national profile of universities in terms of geographic region and urban-rural locale. Master's colleges and universities were over-represented, whereas baccalaureate-general colleges were under-represented among participating institutions (National Survey of Student Engagement, 2004). Students at 200 colleges and universities had the option of responding via a paper-and-pencil questionnaire or via the Web, and 175 schools opted for Web-only administration. In 2004, NSSE introduced Web+ administration which included multiple electronic contacts and mailing a paper-and-pencil survey to selected nonrespondents. Ninety-eight (98) institutions selected this mode of administration. Approximately 13% of respondents completed the paper-and-pencil version of the questionnaire, and 87% used the Web (National Survey of Student Engagement, 2004). Generally, mode of administration does not affect NSSE results, except that Web respondents tend to report greater use of electronic technology (Carini, Hayek, Kuh, Kennedy, & Ouimet, 2003).

For the current study, complete data were available for 58,146 first-year students and 55,329 seniors attending 326 colleges and universities. Consistent with NSSE respondents generally, females (65%) and full-time students (92%) were over-represented. By and large, participants were similar to their classmates in terms of race/ethnicity, transfer status, campus residence, and academic major. In addition, the institutions included in the study tended to be similar to all four-year colleges and universities. Slightly more than 60% of the institutions were private colleges and universities. Approximately 23% of the participating institutions were doctoral/research universities, slightly less than 47% were Master's colleges and universities, 17% were liberal arts colleges, and almost 14% were baccalaureate-general colleges. Average FTE enrollment was slightly more than 7,000 students.

### Measures

Measures of learning community participation, student engagement, and learning outcomes all come from the NSSE questionnaire, *The College Student Report*. Student characteristics came from institutional data and the NSSE, whereas institutional characteristics were taken from IPEDS, institutions' common data sets, and the College Board. Student learning outcomes were represented by two NSSE scales. The first was composed of nine items representing students' self-reports of their cognitive development, and the second was a seven-item scale based on self-reports on non-cognitive development.<sup>1</sup> The alpha reliability coefficient for cognitive gains was 0.86, and 0.85 for the scale representing non-cognitive development.

Self-report data are widely used in research on college outcomes, and the reliability and validity of these data have been studied extensively (Baird, 1976; Berdie, 1971; Pace, 1985; Pike, 1995; Pohlmann & Beggs, 1974). Research shows that self-report measures are likely to be valid under five conditions:

1. The information is known to respondents;
2. The questions are phrased clearly and unambiguously;
3. The questions refer to recent activities;
4. The respondents think the questions merit a serious and thoughtful response; and

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<sup>1</sup> Learning outcome scale scores were calculated using the same procedures employed in calculating NSSE benchmark scores for individuals. First, item scores were scaled from 0 to 100. Then scale scores were calculated as the arithmetic mean of the item scores.

5. Answering the question does not threaten, embarrass, or violate the privacy of the respondent or encourage the respondent to respond in socially desirable ways (Kuh, 2001, p. 4).

Studies indicate that *The College Student Report* meets these five criteria and yields accurate, meaningful information about students' college experiences and educational outcomes (Kuh, 2001; Kuh et al., 2001; Ouimet, Bunnage, Carini, Kuh, & Kennedy, 2004).

Student engagement was represented by students' scores on the five NSSE benchmarks: Level of Academic Challenge, Active and Collaborative Learning, Student-Faculty Interaction, Enriching Educational Experiences, and Supportive Campus Environment. The benchmarks are based on 42 items from *The College Student Report* and represent clusters of activities that research shows are linked to positive educational outcomes. The selection of items for the benchmarks was guided by theory and factor analyses of NSSE items (Kuh et al., 2001). The Academic Challenge benchmark focuses on activities that demonstrate an institution emphasizes to students the importance of academic effort and sets high expectations for student performance, particularly in the areas of writing and higher-order thinking. Active and Collaborative Learning benchmark questions ask students to report on the extent to which they are required to think about and apply what they are learning and to work with other students to solve problems and master difficult material. Student-Faculty Interaction items focus on how often students interact with faculty inside and outside the classroom. The Enriching Educational Experiences benchmark covers a wide range of educationally purposeful learning activities such as experiences with diversity, technology use, study abroad, and research with faculty members. For this study, the item concerning learning community participation was dropped from this benchmark. The final benchmark, Supportive Campus Environment, focuses on students' perceptions of institutional commitment to student success and the quality of students' relations with peers, faculty, and administration (Kuh et al., 2001). Using data from the 2004 administration of the survey, reliability estimates ranged from 0.61 for the modified Enriching Education Experiences benchmark to 0.78 for Supportive Campus Environment. Appendix A lists the items comprising the learning outcome and student engagement measures used in this study.

The measures of student characteristics included in this study were gender (being female), ethnicity (being White), transfer status (being a transfer student), enrollment status (being a full-time student), living on-campus, being a first-generation student (defined as neither parent holding a bachelor's degree), and majoring in the arts or sciences. All of these variables were taken from student responses to NSSE questions, except gender and race/ethnicity, which were provided by the participating institutions.

Six institutional variables were included in the study. These variable were (1) whether the institution was public or private, (2) institution size (measured by total FTE enrollment in thousands of students), (3) institutional selectivity (the mean ACT score of students at the 25<sup>th</sup> percentile of the entering class), (4) graduate coexistence (the percent of undergraduate fields in which graduate degrees were also awarded), (5) residential character (the percent of students living on campus), and (6) percent of student majoring in arts and sciences. Data for these measures were obtained using a combination of IPEDS data, information for the Common Data Set (CDS), and College Board data. Table 1 displays the means and standard deviations for the student- and institution-level variables included in the study.

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Insert Table 1 about here

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### *Data Analysis*

Because students were nested within institutions, a series of hierarchical linear models were specified and tested using the HLM6 computer program (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2004). A complicating factor in the current study is the sampling scheme used by NSSE. Specifically, institutions select themselves, and then random samples of students within institutions are selected. This approach is characteristic of cluster sampling, rather than simple random sampling (Kalton, 1983). When data are based on cluster sampling, the standard errors used in traditional significance tests are too small and Type I errors are likely (Pike, 2007). A variety of statistical packages can compute adjusted standard errors that are appropriate for data from cluster samples; however, the approach used to calculate adjusted standard errors is not available for hierarchical linear modeling (du Toit, du Toit, Mels, & Cheng, 2007). As an alternative, Thomas (2006) suggests setting a more conservative  $p$ -value for identifying statistically significant relationships. For this study, a conservative probability value of  $p < 0.001$  was selected to identify statistically significant relationships at the student level (i.e., level-1 analyses). At the institution level (i.e., level-2), cluster sampling was not a serious issue, and a conventional probability level ( $p < 0.05$ ) was utilized.

The sequence in which models were specified and tested was based on procedures recommended by Bryk and Raudenbush (1992) and Ethington (1997) and corresponded to the study's research questions. Answering the first research question involved determining whether there were statistically significant and meaningful direct relationships between learning community participation and students' learning outcomes. Separate analyses were conducted for cognitive and non-cognitive gains for both first-year students and seniors. Initially, a baseline model containing only institutions as an independent variable was specified and tested. The within-institution student-level variance component served as a baseline for calculating the variance explained by the variables added in subsequent models. In the second model, student characteristics were added as independent variables. The difference between the within-institution variance components for the first and second models, divided by the variance component for the first model, represented the variance explained by student characteristics. Next, student engagement measures were added to the model. The difference between the within-institution variance components for this model and the second model, divided by the variance component for the baseline model, represented the variance explained by student engagement measures. The final model specified and tested in this phase of the analysis included student characteristics, engagement measures, and whether the students participated in a learning community. A statistically significant ( $p < 0.001$ ) coefficient for learning community participation would indicate a direct relationship between learning communities and learning outcomes. The difference between the variance components for the final model and the third model, divided by the variance component for the baseline model, provided an indication of the variance in learning gains explained by learning community membership. To facilitate interpretation of the coefficients in the model, engagement measures were centered around their grand means.

The second series of analyses was designed to evaluate the indirect relationships between learning community participation and learning outcomes. Separate sets of analyses were conducted for each engagement measure for first-year and senior students. In this phase of the analysis the dependent variables were the five NSSE student engagement measures. The first model analyzed

included only the intercept and was used to calculate the variance explained by variables included in subsequent models. Student characteristics were included in the second model, and the procedures used to calculate the variance in engagement measures accounted for by student characteristics were identical to those used in the previous set of analyses. The third and final model specified in this phase of the analysis included both student characteristics and the variable representing learning community membership. Again, the difference between the within-institution variance components for this model and the previous model, divided by the variance component of the baseline model, provided an indication of the variance in student engagement measures explained by the expanded model. Statistically significant effect coefficients indicated that participation in a learning community was directly related to student engagement. Assessing the likelihood that learning community participation was indirectly related to learning outcomes involved examining the relationships between engagement measures and learning gains from the first set of analyses. Statistically significant direct relationships between learning community participation and levels of engagement and statistically significant relationships between engagement and learning gains, coupled with weak or nonsignificant relationships between membership in a learning community and gains in learning, were required to demonstrate that relationships between participating in a learning community and gains in learning were likely indirect.

The final step of the data analysis focused on the variability in the coefficients for membership in a learning community across institutions. Only the statistically significant coefficients for learning community participation were included in this phase of the analysis. To determine whether there was sufficient variance in learning-community effects to warrant further analysis, the coefficients for learning community membership were specified as random variables and the models were re-analyzed. Statistically significant between-institution variance components for learning-community effects indicated that there was sufficient variance among institutions to warrant further investigation. In those instances, a level-2 model was specified and tested in which the effects (i.e., slopes) for learning community participation were the dependent variable and the eight institutional characteristics were the independent variables. Statistically significant coefficients would indicate that the relationships found in previous models between learning community participation and either learning outcomes or engagement measures were related to institutional characteristics. In other words, this would demonstrate the existence of contingent effects for a given institutional characteristic. All of the institution-level measures, except public/private control, were centered about their grand means.

## Results

### *Learning Communities and Learning Outcomes*

Table 2 displays selected results pertaining to the proportion of variance explained by the components introduced in each of the models specified and tested for each learning outcome. As shown in the table, student characteristics were very weakly related to learning outcomes, accounting for from 0.5% of the variance in first-year students' cognitive outcomes to 1.7% of the variance in seniors' non-cognitive outcomes. In contrast, the relationships between student engagement and learning outcomes were substantial, ranging from a low of 39.8% for the share of variance in seniors' non-cognitive outcomes accounted for by engagement measures to a high of 45.7% of the variance in first-year students' cognitive outcomes. Participating in a learning community did not account for a measureable proportion of the variance in outcome measures, except for a weak relationship between learning community participation and seniors' non-cognitive learning outcomes—only 0.1% of the variance in the outcome measure.

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Insert Table 2 about here

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Although the covariance between learning community participation and seniors' non-cognitive outcomes was extremely small, the relationship was statistically significant. In addition, analyses revealed that there was statistically significant variation in the strength of the relationship between learning community participation and seniors' non-cognitive outcomes ( $\chi^2 = 378.35$ ;  $df = 325$ ;  $p < 0.05$ ). Based on this finding, an institution-level model was specified and tested.

Table 3 presents the coefficients from the final student-level models for the first three learning outcome and class level combinations (cognitive and non-cognitive gains for first-year students, and cognitive gains for seniors), as well as the student- and institution-level coefficients for seniors' non-cognitive outcomes. In interpreting these coefficients, the intercept represents the grand mean for all students across all institutions when engagement measures are at their grand means and the values for all dichotomous variables are zero (0). The coefficients for the independent variables represent the amount of change in the outcomes variables associated with a one-unit change in the independent variables. Thus, the mean cognitive development score for a first-year student with average engagement who was male, not white, not a transfer student, enrolled part-time, living off campus, not a first-generation student, and not majoring in the arts or sciences was 63.94. An otherwise comparable white student would have a hypothetical cognitive development score that is 0.83 points lower.

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Insert Table 3 about here

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An examination of the results in Table 3 revealed small and highly variable relationships for some student characteristics. Being female was positively related to non-cognitive development for both first-year and senior students, but negatively related to seniors' cognitive outcomes. Living on campus was positively related to first-year students' non-cognitive outcomes, but negatively related to the cognitive outcomes of first-year students and seniors. Transfer status was negatively related to seniors' learning outcomes, but not to the outcomes for first-year students. This may be due to the fact that relatively few first-year students were transfers. Some student characteristics did show consistent patterns. For example, being White was negatively related to three of the gains in learning measures, and majoring in the arts or sciences was negatively related to all four measures. Conversely, first-generation status was positively related to the cognitive and non-cognitive gains of first-year and senior students.

All of the student engagement measures were significantly, and positively, related to the four learning outcomes and class level combinations. First-year and senior students' cognitive outcomes were most strongly related to academic challenge and perceptions of a supportive campus environment, whereas the relationships between cognitive gains and the remaining engagement measures were relatively modest. First-year and senior students' non-cognitive outcomes were most strongly related to perceptions of a supportive campus environment. To put these relationships into context, consider that the standard deviation for first-year students' academic challenge scores was 13.3, and the standard deviation for first-year students' cognitive gains was 20.1. Based on the coefficient for the relationship between the two variables, a one

standard deviation change in academic challenge would be associated with an increase in cognitive outcomes by about one-third (0.34) of a standard deviation.

Three institution-level coefficients were statistically significant in the model for seniors' non-cognitive outcomes: the institution-level intercept, the coefficient for institutional selectivity, and the coefficient representing an institution's orientation toward the arts and sciences. The interpretation of these coefficients is that, averaging across the results for each institution, participating in a learning community is associated with slightly more than a two-point increase in seniors' non-cognitive outcomes. However, the association between learning community participation and non-cognitive outcomes decreases by slightly more than 0.20 of a point for each 1.00 point increase in an institution's mean ACT score at the 25<sup>th</sup> percentile of the entering class. Conversely, each percentage point increase in the percent of students who are arts and science majors is associated with a 0.03 point increase in the strength of the association between learning community membership and non-cognitive outcomes.

#### *Learning Communities and First-Year Student Engagement*

Table 4 presents estimates of explained variance for the models of first-year engagement. In general, student characteristics accounted for 1% or less of the variance in engagement measures for first-year students. The relationships between learning community participation and first-year engagement were all statistically significant and stronger than the relationships between engagement and student characteristics. Estimates of the variance in engagement measures accounted for by learning community participation ranged from 1% to 3%, except for perceptions of a supportive campus environment. Participating in a learning community accounted for 0.6% of the variance in that engagement measure.

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Insert Table 4 about here

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Although learning community participation was significantly related to all five engagement measures, the magnitude of the relationships varied substantially across institutions for four of the five engagement measures. Statistically significant variance in relationships was found for academic challenge ( $\chi^2 = 475.80$ ;  $df = 325$ ;  $p < 0.05$ ), active and collaborative learning ( $\chi^2 = 607.18$ ;  $df = 325$ ;  $p < 0.05$ ), student-faculty interaction ( $\chi^2 = 856.96$ ;  $df = 325$ ;  $p < 0.05$ ), and enriching educational experiences ( $\chi^2 = 759.94$ ;  $df = 325$ ;  $p < 0.05$ ). The relationships between learning community participation and perceptions of a supportive campus environment did not vary significantly across institutions ( $\chi^2 = 351.30$ ;  $df = 325$ ;  $p > 0.05$ ).

Table 5 presents the coefficients for the final models of first-year student engagement. Interpretation of the coefficients in the table is the same as for Table 3. Thus, the mean academic challenge score for a hypothetical student with none of the student characteristics listed in the table was 47.01. If the student was female, the academic challenge score would increase on average by 1.79 points, and if the student was White the academic challenge score would decrease by 0.70 points. As with the results for learning outcomes, the results for gender and transfer status varied with the engagement measure. In addition, relationships between engagement and living on campus, being a first-generation student, and majoring in the arts or sciences were significant for some engagement measures, but not for others. Of the seven student characteristics included in the analyses, only being White and being enrolled full time were consistently related to all five engagement measures. Being a White student was negatively related to student engagement, whereas full-time enrollment was positively related to student engagement.

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Insert Table 5 about here

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The statistically significant coefficients (i.e., intercepts) for learning community membership clearly demonstrate that participation in a learning community is positively related to higher levels of student engagement. Dividing these coefficients by the standard deviations for the engagement measures (Table 1) reveals the substantial magnitudes of these relationships. Learning community membership was associated with an increase of more than one-third of a standard deviation for academic challenge (0.365), and over one-half of a standard deviation for active and collaborative learning (0.545), student-faculty interaction (0.552), and enriching educational experiences (0.610). The increase associated with learning community membership for perceptions of a supportive campus environment was slightly less than one-quarter of a standard deviation (0.227). Although the associations between learning community participation and student engagement varied significantly, relatively few of the institutional characteristics included in the study were related to this variation. Totalenrollmen was negatively related to the relationships between learning community membership and both academic challenge and student faculty interaction, whereas selectivity was negatively related to the relationship between participating in a learning community and being engaged in enriching educational experiences. It is worth noting that none of the institutional characteristics included in this study were related to the significant variation in the relationships between learning community participation and active and collaborative learning.

#### *Learning Communities and Senior Student Engagement*

Table 6 displays the estimates of explained variance for the models that include measures of engagement for seniors. Student characteristics generally accounted for substantially more of the variance in the engagement scores for seniors than for first-year students. With the exception of the supportive campus environment measure, student characteristics accounted for more than 2% of the variance in three of the engagement measures, and more than 5% of the variance in enriching educational experiences. The estimates of explained variance for learning community participation were also much higher for seniors than first-year students. Being a member of a learning community or having participated in one were associated with more than 5% of the variance in active and collaborative learning, student-faculty interaction, and enriching educational experiences. As was the case with first-year students, participating in a learning community was significantly related to all five engagement measures. Statistically significant variation across institutions was also present for four of the five engagement measures. For seniors, there was no statistically significant variation in academic challenge scores across institutions.

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Insert Table 6 about here

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An examination of the coefficients in Table 7 shows that the relationships between student characteristics and seniors' levels of engagement differed somewhat from the relationships found for first-year students. Specifically, being female was generally associated with higher levels of engagement (with the exception of student-faculty interaction, where no significant effect was found), and being White was not significantly related to any of the engagement measures. Results for the other student characteristics were more consistent with previous findings. Full-time

enrollment was consistently and positively associated with the engagement measures and mixed results were found for transfer status, living on campus, being a first-generation student and majoring in the arts and sciences.

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Insert Table 7 about here

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The coefficients representing learning community membership were all positive and substantial. Dividing the coefficients by the standard deviations for the engagement measures produced results for seniors that were quite similar to the results for first-year students. Participating in a learning community was associated with an increase in academic challenge scores of more than one-third of a standard deviation (0.387), and an increase in active and collaborative learning, student-faculty interaction, and enriching educational experiences scores of more than one-half of a standard deviation (0.586, 0.550, and 0.600, respectively). In addition, learning community participation was associated with an increase in supportive campus environment scores of slightly more than one-quarter of a standard deviation (0.279).

The results in Table 7 also indicated that institutional characteristics were associated with differences in the relationships between learning community participation and student engagement. Specifically, learning community participation at private schools had stronger effects on both enriching educational experiences and supportive campus environment relative to public institutions. In contrast, larger institutions, and institutions with a large percentage of students living on campus, evidenced somewhat less positive associations between learning community membership and enriching educational experiences scores. Institutions with higher percentages of arts and sciences majors tended to have stronger relationships between participation in a learning community and student-faculty interaction and enriching educational experiences scores. Again, it is important to note that none of the institutional characteristics included in this study were associated with variance across institutions in the relationship between learning community participation and active and collaborative learning scores.

### *Limitations*

The findings of this study are limited to the colleges and universities that participated in NSSE. Although the colleges and universities participating in the 2004 administration were typical of public and private institutions generally, studies using different samples of institutions might produce different results. These results also represent a snapshot in time. In general, the findings from the 2004 NSSE survey are consistent with the results for other years; however, it is possible that using data from different years would produce different results.

Because *The College Student Report* is a relatively short survey, it cannot measure all aspects of student engagement or all meaningful dimensions of student learning. If additional questions were asked, or a different survey used, the results might differ in unknown ways. The inability to determine the characteristics of the learning communities in which students participated and the inability to determine precisely when in their studies students were involved in learning communities are especially important limitations.

The study also employed a relatively small range of student and institutional characteristics in the analyses. Although the extant research shows that all of these characteristics were important factors in student engagement and learning outcomes, it is possible that using different variables in the study would have led to different results. Given the lack of detail inherent in multi-institutional

surveys of student engagement and learning outcomes, it is perhaps not surprising that the relationships in this study were quite modest.

Finally, and perhaps most important, the results of this research cannot be used to make inferences about *causal relationships* among institutional characteristics, student characteristics, learning community participation, student engagement, and learning outcomes. Much of the data collected for this study was based on a cross-sectional design. Without a clear time ordering of the data, it is not possible to make causal claims. It is also possible that variables not included in the study may have influenced students' decisions to participate in a learning community and also influenced students' levels of engagement and learning outcomes. This "omitted variable bias" does not allow causal attributions (Cellini, 2008; DesJardins, McCall, Ahlburg, & Moye, 2002). Although a variety of statistical techniques attempt to account for this type of bias, including instrumental-variable analysis (Angrist, Imbens, & Rubin, 1996) and propensity-score matching (Titus, 2006), there are serious issues associated with the identification of variables that can serve as instruments or be used to calculate propensity scores, and these issues limit the applicability of these techniques (Bound, Jaeger, & Baker, 1995). In addition, these statistical procedures are generally not compatible with hierarchical linear modeling. It is important to realize, however, that descriptive studies focusing on associations among significant constructs have an important role to play in higher education research. As Cellini (2008, p. 348) noted, "descriptive quantitative and qualitative analyses are equally important in establishing patterns of correlation, developing theory, and directing our attention to areas where further research is warranted."

#### Discussion

Despite these limitations, the results of this study have important implications for theory, practice, and future research. First and foremost, participating in a learning community has little *direct* effect on learning outcomes. When student characteristics and levels of student engagement were taken into consideration, learning community membership *was not related* to three of the four measures of student learning and development included in this study. Furthermore, the one statistically significant relationship, between learning community membership and seniors' non-cognitive learning outcomes, was very weak.

Although participating in a learning community was not directly related to student learning, learning community membership *was directly associated* with higher levels of student engagement. Moreover, the relationships between learning community participation and being engaged in educationally purposeful activities were very strong. Students' levels of engagement, in turn, were strongly related to cognitive and non-cognitive learning outcomes. Thus, the direct relationships between learning community membership and student engagement, coupled with the significant direct relationships between engagement and learning outcomes, strongly suggest that participating in a learning community is *indirectly* related to student learning.

Variations in the strength of the relationships across types of engagement and types of learning outcomes help us understand the nature of these indirect effects. The patterns of relationships suggest that, in general, the indirect relationships between learning community participation and non-cognitive outcomes may be stronger than the indirect relationships with cognitive outcomes. For both first-year students and seniors, participating in a learning community was most strongly related to active and collaborative learning, student-faculty interaction, and enriching educational experiences. Learning community membership was less strongly associated with level of academic challenge and perceptions of a supportive campus environment. However, the cognitive outcomes of both first-year students and seniors were most strongly related to level of academic challenge and perceptions of a supportive campus environment. The links between cognitive outcomes and the other forms of engagement included in this study, though significant,

were relatively weak. Thus, learning community participation appears to be most strongly associated with the types of engagement that are least strongly associated with cognitive outcomes.

Perceptions of the campus as a supportive place to live and learn were more strongly related to students' non-cognitive learning outcomes compared with other dimensions of engagement. However, the relationships between non-cognitive outcomes and active and collaborative learning, student-faculty interaction (for first-year students), and enriching educational experiences were stronger than for cognitive outcomes, leading to stronger indirect relationships between learning community participation and non-cognitive outcomes.

Institutions interested in improving student learning by implementing learning communities should consider carefully how to structure them to promote student engagement. That is, in designing learning communities faculty members and other institutional personnel would be well advised to focus on what students *will do* to learn, rather than simply *what* students will learn. The present research suggests that the extent to which learning communities create a sense of a supportive campus environment will most significantly influence both cognitive and non-cognitive learning outcomes. In addition, learning communities that engage students in more challenging academic activities are more likely to have a substantial impact on students' cognitive development and their non-cognitive development. Using active and collaborative learning activities, increasing student-faculty interaction, and increasing student engagement in a variety of educationally purposeful activities are all important in their own right. However, focusing learning community efforts in these directions appear to hold the least promise for increasing students' cognitive and non-cognitive learning and development.

The results of this study also indicate that the relationships between learning community participation vary significantly across institutions. It may not be possible to say that what works at one institution does not work at another institution, but it is likely that learning communities at some institutions are more effective than similar programs at others. Unfortunately, the results of the present research do not clearly indicate which institutional characteristics enhance or detract from the positive influence of learning communities. There is some evidence to suggest that learning communities may be more effective in some instances at smaller and/or less selective colleges and universities, and that learning communities may be more effective at private institutions, but no clear, consistent pattern of relationships across types of engagement or student level emerged from this research.

The ambiguity of the results concerning the contingent relationships between learning community participation and student engagement is undoubtedly due, in part, to a lack of information about how learning communities were structured on the various campuses. Differences that are attributed to institutional characteristics in this research may be the result of differences in learning community programs. At the same time, variations in how learning community programs are implemented on different campuses may mask the effects of institutional characteristics. Knowledge of what makes learning communities more or less successful within different college and university contexts is essential for understanding why they are beneficial. This type of information is also needed by colleges and universities as they attempt to structure learning experiences for students that promote specific learning outcomes. Future research on the contingent relationships between learning communities and student engagement and learning should include data on the nature and structure of learning communities as well as the characteristics of the institutions within which the learning communities operate.

One unequivocal finding is that the relationship between learning community membership and student engagement is not contingent on students' class level. To be sure, there were subtle differences between first-year and senior students in terms of how background characteristics

were related to engagement and learning outcomes, but the relationships between learning community membership and levels of engagement were remarkably similar for the two groups of students. For both first-year students and seniors, participating in a learning community was associated with an increase in levels of academic challenge of more than one-third of a standard deviation. Learning community participation was associated with increases in active and collaborative learning, student-faculty-interaction and enriching educational experiences of well over one-half of a standard deviation for both first-year and senior students. The increase in perceptions of a supportive campus environment associated with learning community membership was approximately one-quarter of a standard deviation, irrespective of whether the respondents were first-year students or seniors. This finding differs from the results reported by Zhao and Kuh (2004), but the reasons why results are similar across student levels are not clear. Again, the ambiguity of the results is likely due to a lack of information about when and how students participated in learning communities. If both first-year students and seniors were participating in learning communities at the time of the NSSE survey, the present research would say little about the long-term effects of learning communities on student engagement. On the other hand, if seniors had participated in learning communities as freshmen, the present research would clearly demonstrate that the effects of learning community membership persist throughout the college career. Additional research is needed to directly address questions about the long-term effect of learning community participation.

The findings of the present research also suggest another type of contingent effect that was not considered at the outset of the study— the type of engagement being studied. Much of the literature on student engagement discusses engagement as if it was a unitary construct, or at least as if different types of engagement were slices from the same pie. The present research indicates that the institutional characteristics, student characteristics, and high-impact educational experiences, such as learning communities, affect different types of engagement in very different ways. Moreover, different types of engagement have differential effects on student learning and development. For higher education researchers, teasing out the contingent effects of different types of student engagement requires going beyond using engagement measures as simple a set of dependent, or even endogenous, variables. Understanding the contingent effect of different types of engagement may require developing an engagement typology that takes into account student characteristics, institutional actions, and types of engagement in order to understand their relationships to various learning outcomes.

The contingent effects of different types of student engagement mean that institutional leaders must think carefully about the student learning outcomes they want to develop or improve, and what types of student engagement are most likely to lead to promote those ends. Faculty and staff members must then organize the curriculum and encourage students to participate in the kinds of activities that will lead to the high levels of engagement and essential learning outcomes needed to meet the demands of the 21<sup>st</sup> century (Kuh, 2008).

### Conclusion

Learning communities have become a widely recognized and often utilized “high impact practice” to improve student achievement, learning, and success. The present research suggests that the relationships between learning community participation and student learning outcomes may be more complex than often assumed. Rather than directly affecting student learning, membership in a learning community appears to be associated with higher levels of student engagement which, in turn, leads to a host of positive educational outcomes. Similarly, the relationships among learning community participation, student engagement, and learning outcomes appear to depend on the characteristics of the institution and the way in which the learning community is structured.

The results of this study advance our understanding of how learning community participation is linked to desirable outcomes of college. A simple inoculation model in which learning community membership has a direct, linear effect on student learning does not adequately explain the complex interactions of learning community design, student characteristics, and institutional settings. In order to maximize the potentially positive effects of learning communities, intentional, contextualized design and implementation efforts are needed.

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Table 1

Means and Standard Deviations for Measures Included in the Research

Variable	First-Year		Senior	
	Mean	Standard Deviation	Mean	Standard Deviation
Cognitive Learning Outcomes	61.14	20.06	68.65	19.56
Non-Cognitive Learning Outcomes	47.25	23.16	49.69	23.58
Academic Challenge	53.31	13.30	56.75	14.03
Active/Collaborative Learning	41.05	15.02	50.89	16.38
Student-Faculty Interaction	31.89	16.59	43.20	21.09
Enriching Educational Experiences	27.99	12.25	42.75	17.80
Supportive Campus Environment	62.36	17.69	58.59	18.09
Female Student	0.66	0.47	0.64	0.48
White Student	0.81	0.39	0.82	0.39
Transfer Student	0.06	0.24	0.36	0.48
Enrolled Full Time	0.97	0.16	0.87	0.33
Lives on Campus	0.75	0.43	0.21	0.41
First-Generation Student	0.15	0.36	0.19	0.39
Arts & Science Major	0.26	0.44	0.26	0.44
Private Institution*	0.61	0.49		
Size (FTE in 1000s)*	7.02	7.87		
Selectivity (ACT at 25 <sup>th</sup> Percentile)*	20.60	2.67		
Graduate Coexistence*	24.22	23.12		
Residential Character*	45.99	25.38		
Arts & Science Orientation*	48.30	19.97		

\*Values are the same for first-year and senior students

*Table 2*

## Estimates of Explained Variance for Learning Outcomes

Model Component	First-Year Cognitive Outcomes	First-Year Non- Cognitive Outcomes	Senior Cognitive Outcomes	Senior Non- Cognitive Outcomes
Student Characteristics	0.005	0.008	0.008	0.017
Student Engagement	0.457	0.412	0.427	0.398
Learning Communities	0.000	0.000	0.000	0.001

Table 3

## Unstandardized Effect Coefficients for Models of Learning Outcomes

Variable	First-Year Cognitive Outcomes	First-Year Non- Cognitive Outcomes	Senior Cognitive Outcomes	Senior Non- Cognitive Outcomes
Intercept	63.94*	47.90*	72.26*	51.50*
Female Student	-0.32	1.21*	-1.07*	0.98*
White Student	-0.83*	-1.85*	-0.58	-2.30*
Transfer Student	-0.21	-0.75	-0.96*	-1.64*
Enrolled Full Time	-0.25	-0.51	-1.59*	-0.28
Lives On Campus	-2.05*	0.86*	-1.98*	0.05
First-Generation Student	1.12*	1.10*	1.30*	1.33*
Arts & Science major	-1.96*	-1.79*	-2.10*	-1.80*
Academic Challenge	0.51*	0.24*	0.44*	0.24*
Active/Collaborative Learning	0.08*	0.11*	0.08*	0.11*
Student-Faculty Interaction	0.06*	0.12*	0.04*	0.03*
Enriching Educational Experiences	0.04*	0.19*	0.02*	0.13*
Supportive Campus Environment	0.48*	0.58*	0.47*	0.61*
Learning Community (Intercept)	-0.36	0.07	-0.50	2.02*
Private Institution				0.23
Size (FTE in 1000s)				-0.02
Selectivity (ACT 25 <sup>th</sup> Percentile)				-0.22 <sup>†</sup>
Graduate Coexistence				0.01
Residential Character				0.01
Arts & Science Orientation				0.03 <sup>†</sup>

\* $p < 0.001$ ; <sup>†</sup> $p < 0.05$

*Table 4*

## Estimates of Explained Variance for First-Year Student Engagement

Model Component	Academic Challenge	Active & Collaborative Learning	Student-Faculty Interaction	Enriching Educational Experiences	Supportive Campus Environment
Student Characteristics	0.010	0.006	0.006	0.013	0.004
Learning Communities	0.012	0.026	0.023	0.032	0.006

Table 5

## Unstandardized Effect Coefficients for First-Year Student Engagement

Variable	Academic Challenge	Active & Collaborative Learning	Student-Faculty Interaction	Enriching Educational Experiences	Supportive Campus Environment
Intercept	47.01*	36.14*	29.80*	22.93*	59.71*
Female Student	1.79*	-0.18	-0.80*	0.82*	0.34
White Student	-0.70*	-0.78*	-1.79*	-1.34*	-1.33*
Transfer Student	0.35	1.50*	1.65*	1.03*	-1.90*
Enrolled Full Time	5.66*	4.76*	3.63*	3.63*	2.38*
Lives On Campus	-0.24	1.00*	-0.10	2.05*	1.68*
First-Generation Student	-0.06	-0.79*	-.54	-1.03*	0.64
Arts & Science major	0.40	0.86*	1.73*	0.66*	0.12
Learning Community (Intercept)	4.86*	8.19*	9.15*	7.47*	4.02*
Private Institution	0.13	0.25	0.10	0.21	
Size (FTE in 1000s)	-0.08 <sup>†</sup>	-0.06	-0.16 <sup>†</sup>	-0.04	
Selectivity (ACT 25 <sup>th</sup> Percentile)	0.03	-0.21	-0.28	-0.39 <sup>†</sup>	
Graduate Coexistence	0.01	0.01	0.01	0.01	
Residential Character	0.02	0.02	0.03	0.03	
Arts & Science Orientation	0.03	0.02	0.04	0.03	

\* $p < 0.001$ ; <sup>†</sup> $p < 0.05$

*Table 6*

Estimates of Explained Variance for Senior Student Engagement

Model Component	Academic Challenge	Active & Collaborative Learning	Student-Faculty Interaction	Enriching Educational Experiences	Supportive Campus Environment
Student Characteristics	0.028	0.023	0.024	0.053	0.004
Learning Communities	0.027	0.058	0.051	0.068	0.013

Table 7

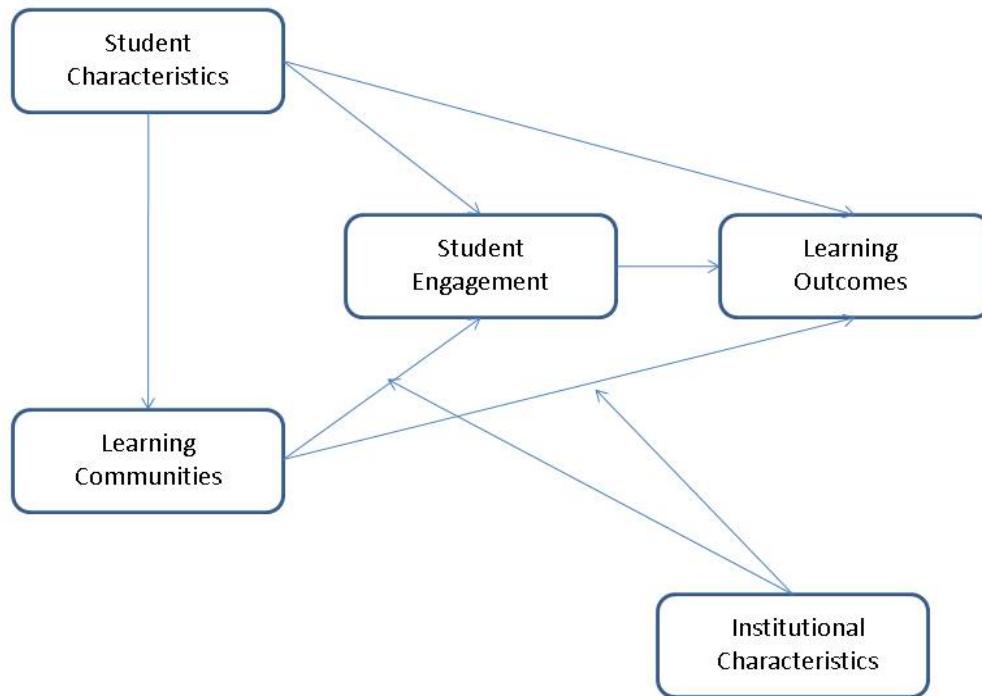
## Unstandardized Effect Coefficients for Senior Student Engagement

Variable	Academic Challenge	Active & Collaborative Learning	Student-Faculty Interaction	Enriching Educational Experiences	Supportive Campus Environment
Intercept	49.48*	45.08*	36.42*	36.88*	57.11
Female Student	2.40*	1.55*	-0.06	2.17*	0.93*
White Student	-0.39	-0.32	-0.25	-0.26	-0.79
Transfer Student	0.89*	-0.82*	-2.11*	-4.76*	-0.68
Enrolled Full Time	5.64*	4.89*	5.45*	4.65*	1.41*
Lives On Campus	-0.38	0.30	2.06*	2.62*	1.55*
First-Generation Student	0.12	-0.66*	-1.70*	-2.41*	0.37
Arts & Science major	0.16	-2.07*	4.32*	1.34*	-0.59
Learning Community (Intercept)	5.42*	9.59*	11.59*	10.70*	5.05*
Private Institution		-0.27	1.08	1.67†	1.33†
Size (FTE in 1000s)		-0.05	-0.04	-0.10†	-0.03
Selectivity (ACT 25 <sup>th</sup> Percentile)		-0.10	-0.23	-0.16	0.07
Graduate Coexistence		-0.02	0.01	0.02	0.01
Residential Character		-0.02	0.01	-0.03†	-0.01
Arts & Science Orientation		0.02	0.06†	0.05†	-0.01

\* $p < 0.001$ ; † $p < 0.05$

*Figure 1*

## Conceptual Model of Learning Community Participation



## Appendix A

### *Gains in Cognitive Learning and Development ( $\alpha = 0.87$ )*

- Acquiring a broad general education
- Acquiring job or work-related knowledge and skills
- Writing clearly and effectively
- Speaking clearly and effectively
- Thinking critically and analytically
- Analyzing quantitative problems
- Using computing and information technology
- Learning effectively on your own
- Solving complex real-world problems

### *Gains in Non-Cognitive Learning and Development ( $\alpha = 0.85$ )*

- Working effectively with others
- Voting in local, state, or national elections
- Understanding yourself
- Understanding people of other racial and ethnic backgrounds
- Developing a personal code of values and ethics
- Contributing to the welfare of your community
- Developing a deepened sense of spirituality

### *Academic Challenge ( $\alpha = 0.75$ )*

- Preparing for class (studying, reading, writing, rehearsing etc. related to academic program)
- Number of assigned textbooks, books, or book-length packs of course readings
- Number of written papers or reports of 20 pages or more; number of written papers or reports of between 5 and 19 pages; and number of written papers or reports of fewer than 5 pages
- Coursework emphasizing analysis of the basic elements of an idea experience or theory
- Coursework emphasizing synthesis and organizing of ideas, information, or experiences into new, more complex interpretations and relationships
- Coursework emphasizing the making of judgments about the value of information, arguments, or methods
- Coursework emphasizing application of theories or concepts to practical problems or in new situations
- Working harder than you thought you could to meet an instructor's standards or expectations
- Campus environment emphasizing time studying and on academic work

### *Active and Collaborative Learning ( $\alpha = 0.65$ )*

- Asked questions in class or contributed to class discussions
- Made a class presentation
- Worked with other students on projects during class
- Worked with classmates outside of class to prepare class assignments
- Tutored or taught other students
- Participated in a community-based project as part of a regular course
- Discussed ideas from your readings or classes with others outside of class (students, family members, co-workers, etc.)

*Student-Faculty Interaction ( $\alpha = 0.75$ )*

- Discussed grades or assignments with an instructor
- Talked about career plans with a faculty member or advisor
- Discussed ideas from your readings or classes with faculty members outside of class
- Worked with faculty members on activities other than coursework (committees, orientation, student-life activities, etc.)
- Received prompt feedback from faculty on your academic performance (written or oral)
- Worked with a faculty member on a research project outside of course or program requirements

*Enriching Educational Experiences ( $\alpha = 0.61$ )*

- Participating in co-curricular activities (organizations, publications, student government, sports, etc.)
- Practicum, internship, field experience, co-op experience, or clinical assignment
- Community service or volunteer work
- Foreign language coursework or study abroad
- Independent study or self-designed major
- Culminating senior experience (comprehensive exam, capstone course, thesis, project, etc.)
- Serious conversations with students of different religious beliefs, political opinions, or personal values
- Serious conversations with students of a different race or ethnicity
- Using electronic technology to discuss or complete an assignment
- Campus environment encouraging contact among students from different economic, social, and racial or ethnic backgrounds

*Supportive Campus Environment ( $\alpha = 0.78$ )*

- Campus environment provides the support you need to help you succeed academically
- Campus environment helps you cope with your non-academic responsibilities (work, family, etc.)
- Campus environment provides the support you need to thrive socially
- Quality of relationships with other students
- Quality of relationships with faculty members
- Quality of relationships with administrative personnel and offices