Diversity and Educational Benefits: Moving Beyond Self-Reported Questionnaire Data

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Abstract

Effects of ethnic/racial diversity among students and faculty on cognitive growth of undergraduate students are estimated via a series of hierarchical linear and multinomial logistic regression models. Using objective measures of compositional, curricular, and interactional diversity based on actuarial course enrollment records of over 6,000 students at a public research university, the study finds no patterns of positive correlation with objective measures of cumulative academic achievement (i.e., final graduating GPA, GRE/GMAT test scores, graduate school enrollment) net of academic preparation at college entry and socio-demographic background, and with or without accounting for academic major, college curricular experience, and financial aid. Results are consistent with student self-assessed level of critical thinking skills after graduation, but not with self-assessed level of understanding of racial and cultural issues, both affective outcomes showing a positive correlation with curricular diversity. As the findings contradict most of the higher education literature on survey-based cognitive benefits of ethnic/racial diversity, the study calls for use of objective measures to advance the research in this area.

Introduction

Over the past twenty years a substantial body of research has accumulated that suggests ethnic and racial diversity among college students and faculty yields significant educational benefits, including enhanced cognitive development and critical thinking skills (Shaw, 2005; Milem, Chang, and Antonio, 2005; AAUP, 2000; Smith and Schonfield, 2000), as well as higher wages for men in the labor market and attainment of advanced graduate or professional degrees (Milem, 2003). Fundamental to these findings is the view that such benefits are maximized via the synergistic effect of structural diversity (i.e., the ethnic/racial composition of students) with institutional promotion of 'diversity' activities (e.g., 'diversity' courses in the core curriculum, workshops on 'diversity' issues). Evidence submitted to support the linkage between ethnic/racial diversity and educational benefits was critical to the favorable ruling in 2003 by the US Supreme Court in upholding the University of Michigan's affirmative action program for its law school admission (Coleman and Palmer, 2006).

Indeed, a wide range of educational studies on the impact of ethnic/racial diversity corroborate the key expert opinion by Gurin (1999) in support of the University of Michigan. A large-scale study by Astin (1993) of over 200 four-year institutions found that emphasizing diversity via curricular offerings is associated with greater cognitive development, in addition to greater overall satisfaction with the college experience, and improved democratic values and racial understanding. Hurtado (1999) echoed Astin's finding in a similar multi-institutional study, as enrollment in an ethnic studies course positively correlated with reported gains in general knowledge and writing skills, net of institutional selectivity, pre-collegiate preparation, and students' academic self-concept. Terenzini et al. (2001) reported that classroom diversity has some educational benefits on student learning, Antonio (2001) uncovered a positive link between interracial interactions and student leadership skills, and Chang et al. (2006) found that student interactions across race correlate with greater gains in critical thinking and problem-solving skills. A similar finding was presented in Reason, Terenzini, and Domingo (2006), where exposure to 'diverse' individuals and ideas correlated positively with student academic competence. Benefits are also reported to derive from greater faculty diversity: Trower and Chait (2003) stated that "the most accurate predictor of subsequent success for female undergraduates is the percentage of women among faculty members at their college, while Umbach (2006) concluded that an increase in faculty diversity leads to greater use of effective teaching strategies, including active and collaborative learning and focus on higher-order thinking skills. Faculty from underrepresented groups may also provide more effective mentoring to same-ethnic/race students, according to Santos and Reigadas (2002). The positive link between

diversity and educational benefits has been endorsed by leaders in the higher education community (Bowen and Bok, 1998; ACE and AAUP, 2000; Hale, 2003).

On Closer Examination

Though studies that show diversity has a positive effect on academic outcomes abound, there is a growing corpus of research, rarely referenced in the higher education scholarship (e.g., Shaw, 2005; Chang et al., 2003), which casts doubt on the reported findings. Some furnish data that question the positive impact of compositional diversity on educational outcomes (Staddon, 2003; Detterman, 2000; Holzer and Neumark, 2000; Rothman, Lipset, and Nevitte, 2002; Zuriff, 2002; Wood and Sherman, 2001), others take issue with diversity benefits by stressing the harmful effects of affirmative action on student academic performance, self confidence, and racial harmony (Sander, 2005; Pinel et al., 2005; Roper, 2004; Gryphon, 2004; Weeden, 2004; Nieli, 2004; Bradley, 2004; Massey et al., 2003; Parks, 2003; Hansen, 2003; Cole, 2003; McWhorter, 2000; Brown et al., 2000). Critics also maintain that diversity as a variable in education studies is too narrowly conceptualized (i.e., strictly around ethnicity/race) to yield meaningful insights into the effects on student learning (Raines, 2006; Alexander and Schwarzschild, 2004; Fitzpatrick, 2003; Schuck, 2003; Bryden, 1998; Hollinger, 1995).

The analytical quality of this contradictory research varies, with some studies omitting the type of methodological approach needed to gauge educational gains associated with diversity measures. For example, the Rothman, Lipset, and Nevitte (2002) study failed to control for the nested effect in its multi-institution data or student academic ability at college entry in order to produce a longitudinal 'college exposure' effect (Kuklinski, 2006; Saha, 2003). However, other studies were conducted with greater analytical rigor to warrant closer examination. Using randomized control groups, Hansen, Owan, and Pan (2006) found no significant link between a group's ethnic/racial composition and either group or individual academic performance in an undergraduate management class, net of student attributes. A similar study that used a structural-equation approach by Schoenecker et al. (1997) failed to produce a positive correlation between group diversity, as perceived by group members, and group performance in management capstone courses at both the undergraduate and graduate level. Another experimental approach was taken by Antonio et al. (2004) in a randomized small-group study to discern the effect of diversity in race and opinion on cognitive differentiation and integration of multiple perspectives, as measured on an *integrative complexity* scale (IC). Controlling for longitudinal effects of repeat exposure, the effect of minority *opinion* had a significant positive impact on IC rating, but not group membership *race*. Investigating the impact of diversity courses on student support for

policies to promote gender and racial harmony, Brehm (2004) failed to produce a significant positive effect associated with attending such courses. Testing the hypothesis that graduating from a more diverse college correlates with earned income, attainment of post-graduate degrees, or life satisfaction, Arcidiacono and Vigdor (2003) could not establish a significant link to college origin. They used the College and Beyond dataset, comprehensive student-level records, and a follow-up survey for a cohort that attended one of 30 selective colleges.

Perhaps most importantly, a detailed revisit of Astin's (1993) frequently referenced questionnaire-based study—employing 140 input characteristics for over 20,000 students—may lead to a different conclusion from the one typically cited by higher education studies. In his summary chapter, Astin concludes that the study largely failed to find significant positive correlations associated with student ethnic/racial composition on a campus (p. 362). Similarly, curricular diversity, as reflected in "progressive offerings" (e.g., ethnic or gender studies) produced few significant direct effects, all of small size (p.332). Contradictory references to Astin's study are due to highlighting certain results from the 82 regressions in the study without accounting for the cumulative findings in his summary. Others use the same dataset from the Cooperative Institutional Research Program (CIRP), but limit the analysis to select input variables, institutions, and student cohort years (e.g., Gurin, 1999)—notwithstanding Astin's exhortation "to control everything," to include all variables at one's disposal to better account for the non-random distribution of students (p. xv).

Outside higher education, Wise and Tschirhart (2000) undertook an analysis of 106 studies on the correlation between diversity in the workplace and both individual and organizational outcome measures (e.g., job satisfaction, problem-solving skills; or organizational innovation, social equity). They failed to show conclusive directionality of diversity effects either at the individual, group, or organizational level. They added, however, that most studies lacked sufficient reliability, validity, and generalizability. More convincing are Putnam's (2007) findings from the Social Capital Community Benchmark Survey. Though his large-scale study probes for ethnic/racial diversity effects within varied U.S. communities, not college campuses, his finding that community diversity is negatively correlated with a wide array of social capital and civic engagement indicators (e.g., trust in others, voter participation) runs contrary to the diversity benefits argument. Lastly, a review of the peer effect literature that correlates racial composition with academic outcomes at the K-12 level renders, at best, a mixed picture (Armor and Duck, 2007; Armor, Thernstrom, and Thernstrom, 2006; Hoxby, 2002; Hanushek et al., 2003).

Diversity Studies and Data Quality

Contradiction in the research may likely be due to variation in the quality of data and analytical approach that underpin the findings. Reflecting on the reported positive effects of diversity on student learning over the past 15 years, Pascarella and Terenzini (2005) point out that "all the findings are based solely on student self-reports." Moreover, the accumulated research yields little insight into the educational benefits of structural diversity in the classroom (Terenzini et al., 2001). To move beyond what Bauerlein (2004) considers the "tendentious" nature of diversity research, confirming no more than student "attitudinal changes" interpreted as cognitive gains, Perloff and Bryant (2000) call for "hard-nosed empirical research showing, for example, that students know more and understand better the complexities of their courses when offered in a diverse classroom," and they believe diversity benefits are best estimated when controlling for a student's academic discipline. Taking a more granular view that disaggregates the diversity experience is favored also by Friedl (1999). In a piece entitled "Needed: Documentation of How Affirmative Action Benefits *All* Students" in *Change*, he recommends meta-analysis of campus-level assessments, rather than basing findings on a single survey conducted across multiple institutions, as is typically done (Pascarella and Terenzini, 2005). And the head of the College Board, weighing the implication of the Michigan ruling, is convinced that "more attention must be given to developing models of institutional research on the benefits of diversity" (Caperton, 2004). The state of diversity research exemplifies a key concern by Smart (2005) in his assessment of deficiencies in higher education literature: "[I]n the rush to provide "evidence" to advance knowledge and to respond to the needs of policy makers, we often ignore critical issues associated with the quality of data we bring to bear on those issues."

Thus, when gauging diversity benefits, an institutional study that goes beyond self-reported data and employs some randomized or census-based dataset may add significantly to the scholarship in this area. Since random assignment of students is largely impossible without significantly disrupting the natural flow of campus life, promise for better studies may rest in enriching, if not substituting, self-reported data with direct, objective measures that do not depend on the accuracy of impressionistic statements by students or faculty.

Studies on the validity of survey responses on academic development and cognitive growth suggest only a modest correlation with objective, standardized measures (Pascarella, 2001; Anaya, 1999), and others caution that self-reported data should not be used in lieu of objective metrics (Carrell and Willmington, 1996; Pike, 1996). One problem relates to survey respondents' failure to discriminate among conceptually distinct aspects of questions asked, introducing a *halo* error first identified by Thorndike (1920). Response bias due to halo effect has been well

documented in student-based assessments of academic growth and campus climate (Clayson and Sheffet, 2006; Gonyea, 2005; Feeley, 2002; Pike, 1999; Coren, 1998; Pohlmann and Beggs, 1974). Even straightforward, factual data may reflect significant bias when reported by students, as confirmed by a meta-analysis on the validity of self-reported grades and class rank (Kuncel, Crede, and Thomas; 2005). In national surveys that asked students whether or not they took remedial courses, comparison of self-reported data with college transcripts suggests that only a third of remedial students may have answered truthfully. More troubling, in national surveys (including the CIRP) students consistently over-report preparation in high school math, the strongest curricular predictor of college success (Adelman, 1999). Discrepancies between self-reported and actual data may also vary significantly by student race and socioeconomic background, as Fetters, Stowe, and Owings (1984) discovered in an analysis of high school course grades (i.e., the type of information collected by the CIRP survey).

Another problem arises when questions produce socially desirable responses; for example, probing for frequency of interaction with classmates from other ethnic/racial backgrounds, valuing other cultures, or promoting racial understanding (all items on the CIRP survey).[1] Social desirability pressure associated with racial issues was found to be greater among the more educated (Krysan, 1998), and has been identified as a significant predictor of self-reported competence in interacting with people from diverse backgrounds (Constantine, 2000). Relying on surveys that elicit socially desirable responses may introduce significant result bias, according to meta-analyses by Wentland and Smith (1993). Where possible, survey research should follow carefully designed randomized response techniques and adjust for response bias (e.g., via the Marlowe-Crowne Desirability Scale), where suspected (Thornton and Gupta, 2004; Fisher, 2000).

Lastly, surveys on the educational benefits of diversity rest almost exclusively on students' responses to attitudinal questions about perceptions of their analytical and problem-solving skills, ability to engage in critical thinking, and other general academic skills (Shaw, 2005). These concepts of academic ability invoke multiple meanings, based on context, and are scarcely well defined (Gonyea, 2005; Banta, 1991). Graph 1 and 2 illustrate this problem perhaps compellingly. When comparing over 6,000 freshmen's self assessment of their academic abilities with their demonstrated performance on the college admission test, the majority of those considering themselves "above average" or in the "top 10%" are in fact no different from those rating themselves "average" (Graph 1). The lack of true performance separation based on

[1] Large incongruity between the 2006 pre-election surveys of likely Michigan voters on Proposal 2, banning racial preferences at state agencies (including colleges), and final ballot results confirms that people are reluctant to furnish honest answers on race-related issues—predicted to be rejected, Proposal 2 passed by a wide margin (Schmidt, 2006).

students' rating in the freshmen survey is even more pronounced when gauging their math ability (Graph 2). Lack of conceptual clarity together with the above limitations render self-reported data questionable as a single source to establish the diversity-educational benefits link. At a minimum, the analysis should draw on multiple sources of data, including actuarial records of objective measures, particularly when trying to underpin high-stakes decisions, as recently recommended by Adelman (2006) and Gonyea (2005).

Research Approach

To address limitations of self-reported data, this study uses direct, objective measures of diversity and learning outcomes for students who graduated with a bachelor's degree. In addition, both objective and subjective metrics of post-graduation success are used that relate a student's undergraduate experience to a range of outcome measures. Both fixed and random effects of diversity are estimated across academic major, while controlling for curricular experience, student demographics, financial need, and pre-collegiate preparation. Though the principal focus is on estimating cognitive benefits due to diversity exposure, the range of control variables in tested models will allow discussion of specific curricular experiences and how they relate to academic achievement and post-graduation success. Accordingly, the study will inform both theories on diversity and educational benefits as well as institutional policy on curriculum development to maximize student academic success.

Conceptually, this study follows Astin's (1993, 1991, 1977) input-environment-outcome (I-E-O) model to gauge diversity-related effects on student academic development and post-graduation success. Accordingly, various sets of variables that control for a student's demographic background, pre-collegiate preparation, college environment, and curricular experiences are entered into regression models to estimate effects of diversity on students' final grade-point average (GPA), graduate school test scores (from the Graduate Record Examination [GRE] and the Graduate Management Admission Test [GMAT]), and graduate school enrollment by level of selectivity. Student grades and test scores from actuarial sources are typically the most readily available objective measures to gauge cognitive growth and achievement. But how valid are they in reflecting student academic progress and in predicting future success?

College grades in conjunction with standardized test scores at college entry are used typically to gauge cognitive growth and to help isolate the influence of certain college experiences on such gains (Carini et al., 2006; Klein et al., 2005). The cumulative undergraduate GPA reflects the expert judgment of academics from different fields as to a student's ability to organize and express thoughts effectively, to comprehend reading assignments and varied perspectives on a

topic, to think creatively, and to conduct research both independently and collaboratively (Zuriff, 2002). In turn, grades strongly correlate with standardized test scores after controlling for academic subject, grading variations, teacher ratings, and certain student behaviors (Willingham, Pollack, and Lewis, 2002). Meta analyses of graduate-level admission tests confirm their validity in predicting subsequent school success across a wide range of academic disciplines and student attributes (including ethnicity/race, gender, age, and mother tongue). This validity extends beyond first-year school grades and includes faculty ratings (of students), retention, comprehensive exams, and even degree attainment (Sireci and Talento-Miller, 2006; Kuncel, Hezlett, and Ones, 2001). Though admission tests are not designed to predict post-graduate job performance, general aptitude tests are valid predictors of career potential and creativity and show consistent linearity with employment performance in meta-analyses (Kuncel, Hezlett, and Ones, 2004; Coward and Sackett, 1990). Standardized tests have been found to be free of content and prediction bias (Hunter and Schmidt, 2000; Jencks, 1998; Klitgaard, 1985), and test outcomes are only marginally affected by test-preparation courses (Briggs, 2001). Though the predictive validity of standardized tests has room for improvement (Sternberg, 2006), such tests far outweigh the predictive power of socioeconomic status, student motivation, academic goals, and self-efficacy when estimating first-year academic success, based on a recent meta-analysis of 109 studies (Robbins et al., 2004). Thus, performance on graduate school admission tests provides a suitable benchmark to assess academic growth and preparation for post-graduate success. Additional outcomes examined include student ratings of analytical skills, satisfaction with the undergraduate experience, and understanding of racial and cultural issues. Though these indicators are based on subjective alumni responses to an institutional survey questionnaire, and thus suffer limitations of self-reported data, they are correlated with academic experience and college environment factors that are based solely on objective measures.

Structural, or compositional, diversity in this study refers to the average proportion of minority students (i.e., Blacks, Hispanics, and Native Americans) in classes taken by a student on the way to graduation. In other words, it is a metric of classroom compositional diversity, as it measures a graduate's cumulative exposure to classmates in terms of their ethnic/racial background (as well as their gender identity). Separate measures are included that capture classroom diversity for courses that focus on diversity issues (e.g., race, gender, and non-western culture versus non-focused 'general' diversity courses), as exemplified in Table 1. Since completion of at least one diversity course is a graduation requirement for all students—55 percent of graduates in this study took two or more diversity courses—the data furnish objective measures of classroom and curricular diversity, as they originate with official institutional

enrollment records. Unlike most diversity-impact studies, the effect of Asian American students is estimated separately from other non-white students. The impact of faculty diversity on students is captured via the proportion of minority instructors (including Asian Americans) among all faculty members a student was exposed to, again based on courses completed by graduates included in this study. To further isolate the effect of diversity, metrics for participation in, and achievement with, curricular diversity include number of diversity courses completed, average grade received in those courses, average grade awarded to *all* classmates in those courses, average class size, and enrollment timing in those courses. The latter indicator measures time elapsed, on average, from course completion to graduation in order to gauge cumulative effects on academic growth (e.g., if diversity courses promote critical thinking skills, early exposure may yield greater benefits in terms of overall student academic achievement).

Since final graduating GPA and graduate school admission scores correlate with undergraduate curricular experience, control variables include program major, and academic experience in the core curriculum, both general and major-related capstone courses, independent study, internships, and participation in overseas-based courses. Pre-collegiate academic preparation is accounted for with scores on the college-entry test (ACT/SAT), and number of Advanced Placement credits earned based on the student's admission record. Academic effort during degree progress is in part measured with a total count of how many times a student was put on probationary status after falling below a certain grade point average (GPA). Freshmen disposition on race (through survey response) is entered to gauge post-graduate satisfaction with understanding of racial issues. All models tested control for student demographics, campus residential experience, financial aid, and other academic experiences with sufficient statistical significance ($\alpha \leq .20$) during exploratory analyses to warrant inclusion (see Tables 2 and 3).

Data Sources and Statistical Methodology

Data on the pre-collegiate and undergraduate experience originated with the institutional student information system (SIS), complemented with freshmen disposition on race, taken from the CIRP survey. GRE and GMAT scores were extracted from SIS or furnished through the Educational Testing Service, with GMAT scores converted to a GRE scale. Graduate school enrollment information was supplied by the National Student Clearinghouse (NSC), yielding information for 90% of students after deletion of blocked and non-matched records.

New freshmen who completed a bachelor's degree between spring 1999 and spring 2005 are the cohorts for the final, cumulative GPA analysis. They constitute 80 percent of all 5,310 non-transferred graduates after listwise deletion of missing cases, statistical outliers, and

homogenization of required curriculum over time (affecting some earlier starters with different core math and English requirements). To estimate graduate school enrollment, 6,252 graduates—both new and transfer-ins—from 1995 through 2001 are included and tracked for four years past their graduation. They comprise 70 percent of all graduates during that period, net of listwise missing cases and statistical outliers. The graduate school test-score models are based on 2,140 students for whom scores were available, but only 735 cases when limited to graduates that entered as new freshmen. Post-graduation satisfaction responses are taken from over 3,000 alumni that responded to the institutional survey, or about 50% of all graduates between 2002 and 2005 (i.e., years covered by the survey).

Mixed-level random intercept regression models are used to estimate effects on cognitive growth at the end of the undergraduate experience and to control for the nested effect of academic major as students progress from freshmen standing through graduation. A mixed level approach, with 45 categorized program majors at level 2, is deemed more appropriate than standard OLS regression due to the proximate 'environmental' effect of academic discipline on grades and variation in racial distribution across major (Lambert et al., 2007). Mixed-level models have been used in other studies on diversity effects in higher education (Chang et al., 2006; Umbach, 2006). They offer testing of covariance effects associated with diversity across program major, where the assumption of fixed effects may not hold, and they allow for greater reduction in standard error via pooled variance estimation across differently sized level-2 groups (i.e., small versus large size cohorts across program majors) (Porter, 2005; Raudenbush and Bryk, 2002). Statistically significant variables are identified via the t-ratio to get a sense of the relative importance of diversity-related factors compared to other control variables. Since the focus is on how diversity impacts *individual* students, regardless of their academic major, student level variables remain non-centered around the program major mean (average), as recommended by Paccagnella (2006). Also, no other level-2 variables at the program major are tested, obviating the need for centering. Parameter coefficients are generated through restricted maximum likelihood estimation, as uncertainty in fixed effects occurs more often in smaller data samples, which may affect results in the GRE models that exclude graduates who transferred in from other institutions (Ferron et al., 2004). The covariance structure to estimate random effects is unstructured due to the lack of existing research on how diversity may influence cognitive growth across academic discipline in the presence of the selected control variables.

Temporally more distant outcomes of graduate school enrollment and alumni ratings of intellectual growth and satisfaction with the undergraduate experience are estimated based on multinomial, non-ordered logistic regression to account for the categorical outcome associated

with the probability of enrolling in graduate programs at a tier-1 institution versus a tier-2 or lower ranked institution, using relevant-year *US News &World Report* (USNWR) rankings (the reference category being non-enrollment). The graduating major is grouped into 9 disciplinary areas (with social sciences as the reference area) to control for the likely variation in admission selectivity across academic disciplines. Alumni satisfaction responses are contrasted on a categorical scale of 'very positive' versus 'somewhat positive' ('neutral' or 'negative' being the reference category). Statistical tables identify α-level significance (.05, .01, .001) and percentage change in outcome probability, using a linear transformation of the log odds ($p*[1-p]*\beta$) per Morgan and Teachman (1988). Multinomial logit models are typically used for non-linear categorical outcomes and found to yield more accurate standard error estimates over sequential binomial logit analysis (Herzog, 2005; Porter, 2002; Weiler, 1987).

Data quality for both mixed-level and logistic regression models is confirmed through deletion of statistical outliers based on studentized residuals and Cook's D, following proposed cutoff values and visual data point separation in Cohen et al. (2003).[2] Final variable selection is governed by results from collinearity diagnostics to ensure acceptable variance inflation factors and values across the variance decomposition matrix, according to established criteria (Pedhazur, 1997; Belsley, 1991). Cross tabulation with outcome variables were performed to obviate data sparseness across all predictor variables in order to ensure a representative sample in small-N models (i.e., GRE/GMAT score models) was used based on the percentage distribution of student demographics (including student ethnicity/race).

Effects of diversity variables are estimated with coefficient changes associated with different sets of control variables. Accordingly, results from restricted models with pre-college covariates only are compared with findings from full models that account for students' undergraduate experience. Also, significant interaction effects and random-intercept effects (for mixed level models) are listed in the statistical tables. The effect of classroom compositional diversity is measured both on a continuous metric (percentage of minority students) and a categorical metric. The latter compares the effect of students having taken classes with more than 12.5% minority students on average to those whose classes comprised of 7.5% to 12.5% minorities, with the reference category being students whose classes had less than 7.5% minority students on average. This grouping reflects the view that on a predominantly white campus, as in this case, an educationally beneficial critical mass of minority students requires that they make up at least 11%

[2] Outliers are identified based on standard residuals of > 3 and Cook's *D* visual separation in scatter diagrams.

of the learning community, according to court testimony from admissions officials in affirmative action cases (Coleman and Palmer, 2006).

Linking Structural Diversity with Academic Development and Cognitive Growth

Research on diversity in higher education has been catalyzed by court rulings on the role of student ethnicity and race in university admission policies. In the 2003 University of Michigan ruling, the Supreme Court reaffirmed the diversity rational first articulated in the late seventies by Justice Powell in the *Bakke* opinion, namely that a diverse student body is critical to the "robust exchange of ideas," which translates into core educational benefits for all (Coleman and Palmer, 2006). Instrumental in demonstrating the compelling interest of the University of Michigan in a diverse student body (and hence legitimizing the use of student ethnicity and race in its admission evaluation) was the evidence submitted in the Gurin expert report (Gurin, 1999). That evidence hinged on findings from a series of regression analyses using data from three sources (i.e., CIRP, the Michigan Student Study [MSS], and the Intergroup Relations, Community, and Conflict [IGRCC] Program). Of these three sets of data, only the CIRP data include a measure of compositional (referred to as "structural") diversity that reflects the proportion of ethnic/racial minority students on a campus (Appendix C in Gurin, 1999). Both the CIRP and MSS data include indicators of "classroom diversity," which actually measure a student's engagement with curricular diversity (e.g., enrolled in an ethnic studies course, took a course focused on race) or interaction with others from different ethnic/racial background. The IGRCC data derive from student enrollment in a university-sponsored diversity program, but, again, do not indicate compositional diversity of participating students.

Results from the CIRP data show that curricular diversity and interaction with someone from another ethnic/racial group is associated with growth in GPA, and better writing, listening, and overall academic skills (Appendix D in Gurin, 1999). But no main effects are listed for compositional diversity, and no interaction effects are contained in the results that would indicate whether or not effects associated with curricular diversity (or students' interaction with others) vary with the level of compositional diversity—a campus may be diverse, but racially clustered due to internal self-segregation.[3] Reported improvements in "active thinking processes," "engagement and motivation" in the learning process, and positive "democratic outcomes" (including citizenship and racial/cultural engagement) are based on student self-reported data collected through non-randomized survey responses with a limited participation rate (e.g., the

[3] In a similar critique, Lerner and Nagai (p. 28, no date) state that results of structural diversity are listed only on the study's original computer printouts, which are not available to this author.

CIRP four-year follow-up questionnaire to gauge learning gains had a 28% participation rate; Gurin, 1999). None of the results from the three datasets separate the diversity effect of Asian Americans, which are counted as part of the minority student proportion, even though Asians are known to exhibit on average significantly different academic profiles and scholastic achievements compared to other minority students (Adelman, 2004a, 2004b).

Recognizing the dearth of evidence linking compositional diversity, either on a campus or in classrooms, to gains in students' cognitive skills, Terenzini et al. (2001) conducted a study of 1,200 engineering student at seven institutions that correlated ethnic/racial diversity in 49 classrooms to "problem-solving skills," a factor construct consisting of 12 student responses to a multiple-choice questionnaire that was administered at the end of the course. The three hierarchical-entry regression models tested showed no statistically significant positive effect associated with any of four levels of diversity. A level of 33% to 38% minorities exhibited a *non-significant* positive direction in all three models, and curve-linearity in the categorical diversity measure and lack of any interaction effect associated with greater classmate collaborative learning together produced no convincing findings on the cognitive benefits of diversity. Also, all variables were constructed from non-randomized student self-reported data from a single course, while the compositional diversity measure collapsed Asian Americans with all other minority students. Unlike student ethnic/racial diversity, what reportedly *happened* in the classroom (such as interaction with the instructor and classmates) yielded the strongest correlation with students' assessment of their gains in cognitive skills (Terenzini et al., 2001).

The lack of positive effects in the previous study was cited as impetus by Hu and Kuh (2003) to examine the effects of interaction among students from diverse backgrounds (e.g., ethnicity and race) on their self-assessed educational progress. The latter drew on Likert-scale scores to 25 questions that were reduced to constructs in five areas, including general education (e.g., "enjoyment of literature" or "knowledge of history"), intellectual development (e.g., "writing" or "analytical thinking"), and science and technology (e.g., "science and experimentation"). In turn, an "interactional diversity scale" consisting of student responses to seven questions on interaction with others of different ethnicity/race, nationality, religion, or political view served as the study's outcome variable. The over 50,000 undergraduate records from 124 four-year institutions yielded significant positive correlations between student-reported "interactional diversity" and perceived educational gains. But apart from weak correlations with the three specified educational outcomes (R^2 range: 0.032 to 0.086) and reliance on self-reported data for all key variables, the study did not control for a student's curricular experience and academic performance. Grades received in core subjects are known to strongly correlate with a student's subsequent academic

self-concept and perception of general cognitive gain (Möller et al., 2006; Marsh et al., 2005; Shim and Ryan, 2005; Cokley, 2002; Molden and Dweck, 2000; Dweck, 1999). Self-reported levels of studying time and major field—both included in the analysis by Hu and Kuh (2003)—are unlikely to accurately gauge the impact of core curricular experiences on perceived cognitive gains. Cumulative research shows that field of study is too broad of a measure to link to growth in cognitive skills. And omission of academic performance, likely the best predictor of early and long-term student success (Pascarella and Terenzini, 2005), may have significantly skewed the study's findings. For example, compared to freshmen students, second-year-and-up students reported significantly lower interaction with people from other races, but they did indicate higher levels of engagement with those of different political opinion (Hu and Kuh, 2003). Antonio et al. (2004), referenced earlier, also found diversity in *opinion* to be more important than diversity in *race* when estimating longitudinal effects. The cumulative effect of curricular experiences in Hu and Kuh (2003), as reflected in class standing and grades, suggests that the level and type of diversity effects on educational outcomes varies as students progress through college. Given the absence of any significant correlation between class standing and level of *overall* diversity interaction, the finding of opposite correlation with different race versus different opinion raises the need for testing of interaction effects in the full model between class standing and these two items on the diversity scale. Although correlation of the scale items with student and institutional characteristics were invariably very weak (R^2 range: 0.044 to 0.079), an estimation of such interaction effects may offer a better understanding of how varied types of diversity relate to cognitive outcomes.

Following Astin's (1993) finding that experiences with diversity-related activities can affect educational outcomes—although he found no direct effects due to compositional diversity—Chang (1999) attempted to establish more conclusively the link between ethnic/racial student diversity and educational benefits. Using a weighted sample to approximate the national population of freshmen at four-year institutions, the study relied on entry and follow-up surveys from the CIRP database to estimate four-year longitudinal effects for 11,688 students from 371 institutions. After replicating Astin's stepwise variable-block entry to discern direct effects (those persisting in presence of all control variables) from indirect effects (those disappearing after controlling for other variables), Chang identified racial diversity in the student body as a positive predictor of both student interaction across racial lines and discussion of racial issues. However, like Gurin (1999), Chang omitted the structural diversity measure from his final model that gauged the effect of the two diversity experience variables on retention and student intellectual and social self-concept. Doing so would have required a mixed-level analysis to

account for the (nested) effects of racial diversity at each of the 371 campuses on student-level retention and self-concept. A mixed-level approach could illuminate more directly whether or not the impact of diversity experiences (i.e., interaction across racial lines and discussion or racial issues) varies with the level of racial diversity in the study body. Results are further limited in that all key variables are based on very narrow institutional samples (on average 31 students per institution) of student self-assessed impressions, without controlling for college curricular experience and academic performance. Also, structural diversity contributed little to the overall explained variance (a 1.1% increase in the R^2) of the two diversity experience measures that served as "intermediate outcomes" in this study.

More recently, Pike and Kuh (2006), responding to the earlier cited criticism by Wood and Sherman (2001) that structural diversity is not related to positive educational outcomes, reported that ethnic/racial diversity among students leads to greater informal interaction between students from different ethnic/racial groups, which in turn fosters more diversity in "viewpoints." The latter, as defined in the study, goes beyond ethnic/racial identity and includes students' religious and political position as well as perceived institutional promotion of broadly defined diversity. However, as acknowledged by the authors, the study's findings are based on institutional-level data that were derived from cross-sectional survey responses of seniors, thereby limiting inferences about the effect of structural diversity on *individual student gains* in having broader viewpoints. Also, it is not clear to what extent the study's modeling of ethnicity/race as endogenous to viewpoint diversity—a construct comprised of "conversing" with other ethnic/racial students—yielded a spurious relationship with structural diversity.[4] At issue is not whether student interaction across ethnic/racial lines is associated with having "serious conversations with students of a different race or ethnicity"—the latter merely a subset of the former—but whether or not structural diversity contributes, even indirectly, to broadened, more diverse student viewpoints. Moreover, the study found no link between both structural and interactional diversity and student perception of academic and social support on campus. Conceivably, institutional support for interactional diversity may not be related to level of support in other areas, as the study discovered. In that case, cultivating viewpoint diversity via interactional diversity would do little to enhance a student's perception of a positive campus academic climate.

Notwithstanding limitations of survey data and insufficient statistical control over factors known to affect student outcomes, many student surveys in higher education suggest that

[4] The problem of statistical endogeneity is nicely illustrated in a re-examination of the abortion-crime link by Kahane, Paton, and Simmons (2006).

interactions across ethnic/racial lines correlate positively with student self-confidence, social and cultural harmony, and democratic values (Saenz et al., 2007; Lee and Coulehan, 2006; Zŭniga et al., 2005; Laird, 2005; Duncan et al., 2003; Antonio, 2001). However, these are affective outcomes anchored in how students feel at the time of questioning, not cognitive ones that reflect actual growth in mastery of intellectual tasks, such as critical thinking or solving of an analytical problem. Moreover, such surveys are often based on small samples of no more than 100 students from an ethnic/racial group, where only a tiny amount of the variation in the affective outcome is explained (e.g., Muthuswamy et al, 2006; Gurin et al., 2004). For example, of the thirty models that Gurin et al. (2004) tested, nineteen explained less than 10% of the variation in students' self-reported "democractic sentiments" and "civic activities," and only two reached at least the 20% mark. By social science standards, these are models of low explanatory power. Thus, findings that directly link ethnic/racial diversity among college students to objectively based gains in cognitive skills remain elusive.

Tam and Bassett (2004) took a promising approach in estimating the correlation between high school ethnic/racial diversity and college freshmen GPA. Having used an objective measure of academic achievement, the study found that greater student diversity in high schools correlates with higher first-semester grades for women (though not men), net of a student's level of preparation (ACT score), high school rank, and a school's location and average student preparation. Unfortunately, the study failed to control for curricular experience in the first semester and attached school level factors (location and average ACT) to individual students in violation of key assumptions governing use of ordinary least-squares regression (Ethington, 1997). Typically, college GPA is influenced significantly by the type of courses completed and withdrawn from (Adelman, 2004a, 1999), while mixed-level regression should have been used to estimate the influence of school attributes on individual student grades.

Peer Effects at the Pre-College Level

To date, randomized studies linking peer effects of college students to objective cognitive gains are few and thus far say little about the role of ethnic/racial composition other than the tendency for students to attain better grades when surrounded by higher-ability peers (Hoel et al., 2006; Zimmerman, 2003; Sacerdote, 2001). More tangible results emanate from peer effects studies conducted at the pre-college level, where the research corpus is substantially larger. Using National Education Longitudinal Study (NELS) data on nearly 10,000 graduates from over 1,000 high schools in 1992, Perna and Titus (2005) found the proportion of Blacks or Hispanics at a given high school, used as one measure of diversity interaction, to be inconsequential in

estimating to probability of a graduate to enroll at a four-year college—net of a student's socio-demographic attributes and the average level of parental involvement and college aspirations at a given high school. In contrast, a student's high school math experience was by far the strongest predictor in the large set of control variables that was used to gauge the chance for enrollment at both a two-year and a four-year college. Rumberger and Palardy (2005), extracting over 14,000 students from more than 900 high schools out of the NELS, found that socioeconomic composition, not ethnic/racial makeup, of schools correlated with student achievement after accounting for student demographics, pre-high school academic ability, college aspirations, and school size and structure. However, the socioeconomic effect vanished after controlling for teacher expectations for student learning, student homework effort, curricular experience, and students' perceived level of school safety. Campbell (2007) discovered that the level of classroom racial diversity was inversely related to student engagement in political discussions in high school civic courses. Though his use of a national sample from over 100 schools was not tied to cognitive growth, student engagement in the classroom reflects on the contribution of interactional diversity to educational benefits. Marginal impact of ethnic/racial composition on cognitive growth also dominated the findings by Peetsma et al. (2006) in a longitudinal study of 8,700 students in Dutch middle schools, where characteristics of individual students, rather than the proportion of Asian immigrants in classes, explained differences in the development of educational achievement. The importance of individual malleable factors over ethnic/racial composition is reflected also in a study by Burke and Sass (2006) that relied on matched panel data on cognitive growth of middle-school students at the classroom level.

In contrast, Hoxby (2002, 2000), employing a similar longitudinal approach to control for student self-selection bias into classes, found that peer effects varied among ethnic/racial groups—with intra-group effects stronger than between-group effects—while negative effects were associated with greater proportions of Black and Hispanic classmates. Although control studies on peer effects may not fully account for the reciprocal nature of peer interactions (i.e., student-to-group causal direction), average academic ability of the peer group is believed to have significant effects on a student's cognitive development (Hanushek et al., 2003; Hochschild & Scovronik, 2003). It may not be surprising, therefore, that Massey (2006) identified significant indirect negative effects associated with the proportion of Blacks and Hispanics in a student's neighborhood and high school. Accordingly, the first and second-year college GPA of students at 28 selective, mostly Ivy League, institutions was negatively influenced if the student hailed from a neighborhood that was at least 70% Black or Hispanic. That influence was mediated, however, primarily via a student's academic performance in high school (GPA) and self-reported social and

psychological peer effect. The latter reflected the extent to which one would pursue peer-driven social activities at the expense of educational efforts. Massey (2006) also found that Blacks and Hispanics from 70%-or-plus minority environments exhibited higher levels of self-esteem and self-efficacy than those from largely White neighborhoods, though that did not impact their college GPA.

Massey's (2006) findings corroborate earlier works on the role of peer effects during adolescence and how they shape the academic potential of students in college. Looking at high school students across Louisiana, Caldas and Bankston (2005) noticed similar negative peer effects in majority Black schools, with teachers identifying disciplinary problems as the key limitation in nurturing academic excellence. More notably, Steinberg (1996; also see Kao, 2001), who studied over 20,000 high school students across California and Wisconsin, found that, compared to White students, Asian Americans excelled academically, while Black and Hispanic students did less well, *after* controlling for the type of school attended (e.g., private vs. public), curricular tracking within a school, parental income, and parents' marital status. Steinberg noticed significant differences associated with the educational orientation between ethnic/racial groups both at the individual and peer group level—differences that persisted between schools and *within* schools. Specifically, Asian Americans are decidedly more engaged in scholastic activities, including time spent on homework, preparing for tests, showing up in class, and staying mentally focused on the material presented during instruction—traits identified in a large-scale study by Wahlberg and Shanahan (1983) decades ago as crucial to cognitive development. And the Asian academic focus is derived not from superior offerings of rigorous courses, compared to schools attended by Blacks and Hispanics; instead, better preparation of students, regardless of race, generates the demand that accounts for any observed difference in the number of advanced courses offered across schools (Betts et al., 2000).

Steinberg (1996) also discovered that Asians were far more likely to have friends who stressed the importance of excelling academically and who structured their social and extra-curricular lives accordingly. The response scale indicated that Blacks and Hispanics typically scored the lowest on these metrics of educational orientation, with White students somewhere in between. An identical ethnic/racial ordering appeared in response to level of acceptable academic performance—as seen by both the student and his or her parents—again, with Asians emerging at the top. Similarly, Asian students were more likely to fear serious consequences due academic failure, whereas Blacks and Hispanics were far more cavalier about the potential for negative effects—but they did not lack in self-confidence, as both Massey (2006) and Steinberg (1996) found. As a result, Black and Hispanic students bent on academic success will find it harder to

join an educationally supportive peer group (Steinberg, 1996). In contrast, Asian Americans—including more recent immigrants of Korean, Filipino, Vietnamese, and Indian-subcontinent origin—benefit from a culture conducive to high academic achievement that acts as the principal vehicle to account for their superior academic achievement vis-à-vis other ethnic/racial groups, including Whites. However, as Thernstrom and Thernstrom (2003) argue in great detail, culture is not immutable and the set of behaviors and dispositions that exemplify an orientation for education are eminently transferable from one group to another.[5] Hence, it is not the ethnic/racial mix in the classroom or school, but rather the prevailing academic culture that largely accounts for differences in learning, according to the Thernstroms.[6]

The more negative academic peer influence among Black and Hispanic students may be partly explained by what Fordham and Ogbu (1986) originally identified as "oppositional culture" that sees academic striving as white people's prerogative and a trait to be discouraged within their communities.[7] Ferguson (2001) discovered that the impact of being perceived as "acting white" transcended socioeconomic status based on the seminal "Shaker Heights" study of black students from an upper-class, racially integrated neighborhood. After compiling extensive feedback from interviews with Black students, Ogbu (2003) identified a "norm of minimum effort" that often coexisted with low teacher expectations. Fryer (2006) further corroborated the existence of opposition to academic striving in the peer groups of Blacks and Hispanics after examining the friendship patterns of a nationally representative sample of over 90,000 students from 175 high schools (via the National Longitudinal Study of Adolescent Health database). For black students, however, the peer group opposition effect was limited to those attending racially *more diverse* schools with a higher degree of internal integration based on reported cross-ethnic friendships (Fryer, 2006).[8] Fryer's findings align also with studies by Flowers (1999) and Allen (1992) at the

[5] This view is supported also by Kingston (2001) in an incisive review of cultural capital theory. Accordingly, educationally beneficial practices are not the exclusive domain of a certain social class, nor are they limited to others "because socially biased gatekeepers accord them value." Kingston's position is applicable beyond U.S. society based on an empirical study by DeGraaf et al. (2000).

[6] This insight corroborates in part the seminal finding by Coleman (1966) forty years ago, and replicated more recently by Burtless (1996), that academic achievement is most strongly correlated with a student's socio-cultural background, not routinely debated characteristics of schools, such as funding per pupil, class size, or teacher level of education. Quality of teaching, however, does account for significant differences in learning and indirectly affects differences in cognitive growth among ethnic/racial groups, at least in elementary and middle schools, as highlighted in Hanushek and Rivkin (2006).

[7] For an extended treatment of the role of culture in influencing the achievement of African Americans, see McWhorter (2000), Patterson (1998), and Thernstrom and Thernstrom (1997).

[8] Cook and Ludwig (1997) failed to confirm the "acting white" phenomenon after studying peer effects of some 25,000 eight graders via a nationally representative sample from the National Education Longitudinal Study (NELS) of 1988. Unlike Ferguson (2001) and Fryer (2006), Cook and Ludwig gauged the peer effect from the interaction with, or disposition of, other students in general, not those specifically belonging

college level, whereby black students at historically black colleges experienced greater cognitive gains vis-à-vis those attending predominantly white schools.

Peer effects research is also informed by studies that examined the effect of desegregation in public schools. Gerard and Miller (1975) conducted a six-year analysis of a desegregated school district and found that standardized reading scores changed little for black and Hispanic students. In a review of 37 quasi-experimental studies that looked at the effect of desegregation on black achievement, St. John (1975) failed to assemble a sufficiently strong positive pattern. More recently, Schofield (1995) gauged the long-term effects of desegregation based on a review of over 250 studies. On average, she noticed a modest positive effect on Black students' reading skills, but not on their mathematics skills. Summarizing historical findings on the impact of desegregation in public schools, the U.S. Commission on Civil Rights (2006) concluded that the racial composition of schools shows no clear and consistent relationship to the level of cognitive gains in students, although greater diversity is typically associated with the promotion of racial harmony. Armor et al. (2006) caution, however, that failure to compare educational outcomes of students in desegregated schools with a comparable control group of students from racially isolated schools renders an accurate impact assessment of racial balancing largely impossible.

Results from peer effect studies at the pre-college level may not easily translate into insights relevant to gauge the impact of diversity in higher education. Those moving on to college are not a random selection of high school students, the college learning environment differs from pre-collegiate schooling, peer groups may exert more complex influences, and motivation to succeed academically may be unlike that experienced during adolescent years of mandatory schooling. Likely, the rate of learning underpinning cognitive growth may therefore differ at the college level. Still, if peer effect studies at the pre-college level are of any indication, ethnic/racial diversity on a campus may not relate to cognitive growth. Or if so, ethnic/racial groups are likely to exert differential effects, with Asian American students expected to enhance learning gains among students, while the proportion of Black and Hispanic students would be inversely related to cognitive gains.

A further reason why ethnic/racial groups may not benefit equally from diversity (or any other experience) stems from research on the *rate* of cognitive growth prior and during formal schooling. Carneiro et al. (2003) showed that racial gaps in learning are manifest well before children enter kindergarten. Gaps continue to widen during adolescence, after accounting for teacher effects and a number of socioeconomic and parental inputs (Fryer and Levitt, 2005, 2004;

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to one's friendship circle, i.e., those from which the peer effect principally emanates. This crucial difference is apparent from the extracted NELS questions listed by Cook and Ludwig (p. 270).

Rowe and Cleveland, 1996; de Frias et al., 2006; Watkins et al., 2007; Rohde and Thompson, 2007). Recent research indicates a difference may exist also across gender (Jackson and Rushton, 2006; Dee, 2006). Whether differences in the rate of learning are immutable continues to be debated in the research (Dickens and Flynn, 2006a, 2006b; Rushton and Jensen, 2006; Murray, 2006). But the mere existence of such differences suggests that the average rate of learning across ethnic/racial groups is another, still unexplored source of influence on the link between diversity and cognitive growth in college.

Findings

To estimate the correlation between diversity and student academic development on a campus, the study first examined the degree of racial clustering to determine whether students self-segregate in ways that may affect the potential for interaction across ethnic/racial lines. Graph 3 shows that minority graduates (i.e., Blacks, Hispanics, and Native Americans) took classes that on average enrolled a greater proportion of fellow minority students compared to other students. Similarly, both Asian and foreign students clustered together in classes at levels greater than their proportion of the general student body. This clustering yielded an average classroom representation of non-white and foreign students (i.e., from 12% for Asian to 18% for foreign students) that meets the educationally meaningful "critical mass," as previously referenced in Coleman and Palmer (2006). However, average exposure to minority students for whites was below the lower limit of the critical mass range (8.3% vs. 11%). On average, non-white and foreign students were slightly more exposed to non-white faculty, as depicted in Graph 4; no notable differences exist across other faculty types. This classroom distribution occurred at an institution that considers the promotion of diversity a strategic mission, is a member and sponsor of the College Board Access and Diversity Collaborative, and maintains an extensive network of on-campus organizations that provide programs and services to students under direction of its Center for Student Cultural Diversity. Given this environment, how significant was the diversity experience of graduated students to their academic development and post-graduate satisfaction?

Cumulative GPA

Using GPA as a cognitive outcome measure in the presence of specified sets of covariates parallels Astin's (1993) approach to studying the influence of certain aspects of the college environment. The first model estimates the influence of diversity on a student's final GPA after controlling for demographic attributes, pre-collegiate preparation, financial aid, and both general and core curriculum experiences. A two-level mixed model with student program major as the

level-2 grouping variable was retained after dropping high school origin, to control for pre-college diversity exposure, as a level-3 grouping factor due to insignificance as a covariate (α = .34, Wald Z = .956). Compared to the baseline null model, inclusion of the student-level variables reduced the unexplained variance in GPA *within* a program major by 72% and *between* program major by 96% (Table 4, Model 1). Since program major accounted for over 10% of the total unexplained variance in GPA before accounting for student attributes and academic experience (intraclass correlation = 0.123), and unexplained variance both within and between major remains significant *after* inclusion of covariates, using program major as a random intercept is considered appropriate. Of the eight variables that measure a graduate's diversity experience, only the extent of exposure to full professors (a proxy for faculty age and experience) exerted a significant effect on final GPA. Full professors typically teach upper-division, advanced courses that demand greater academic effort and expect higher cognitive skills from students, which likely explain the negative correlation with attained GPA. Neither the number of diversity courses taken nor ethnic/racial identity of classmates and instructors exhibit significant correlation with overall academic performance. In contrast, academic experience in both general and core curriculum areas show largely consistent links to final GPA, with negative effects associated with course grades below B and positive effects associated with grades of B or higher. Noteworthy are the strong positive correlations with average grade awarded in courses taken, incompletes and class withdrawals, and stopout time. Accordingly, high-GPA students enrolled, on average, in classes with similarly well performing classmates; they were more likely to take an incomplete or withdraw from a class (perhaps to avoid an unacceptably low grade); and they accumulated more semesters without enrollment on the way to graduation; but when enrolled, they were more likely to take a full load of classes, given the positive effect associated with average credit load per semester. Beyond curricular experiences, negative correlations are associated with failed class registration attempts and on-campus living. The former may indicate failure to complete courses in proper sequence (e.g., prerequisites and lower-division core courses) or interference with student attempts to balance their schedules (e.g., school vs. work). Either way, these are challenges with adverse impact on student learning. The negative influence of on-campus living is difficult to interpret, as the cumulative research on graduated students in this area shows no consistent outcomes (Pascarella and Terenzini, 2005). The negative impact on final GPA associated with ethnic/racial minorities (vis-à-vis Whites) corroborates existing research on differences in cognitive growth during undergraduate years (Pascarella and Terenzini, 2005).

To ensure that results are not a function of the level of diversity exposure within the program major, the same model was run with the share of minority classmates as a random covariate (Table 4, Model 2). Results show that the general lack of significant diversity effects on final GPA occurs independently of the degree of exposure to ethnic/racial minority classmates for graduates *within* a program major. Statistical independence within program major was established also for level of exposure to the other diversity experiences in separate single-variable random coefficient tests.[9] Thus, interpretation of the effects of diversity on final GPA is unrelated to the average diversity experience of students within a program major. To probe for diversity effects that may have been mediated with the inclusion of the other college-experience variables, a restricted model was tested that regressed GPA against all diversity-related variables, while only controlling for demographics, low-income status (i.e., Pell grant recipients), and pre-collegiate academic ability (Table 4, Model 3). Parameter estimates of the restricted model suggest final GPA is positively correlated with exposure to female faculty, and female and Asian classmates. Conversely, the number of diversity courses taken correlates negatively with a student's final GPA. Whether these effects are truly mediated in a causal sense by the college experiences captured in the full model is difficult to establish, however, since the diversity indicators capture attributes of the learning environment that are endogenous to the student's academic experience.

So far, the analysis examined largely aspects of compositional diversity, addressing curricular diversity only in terms of the number of diversity courses taken and its correlation with final GPA. To gain a better sense of the influence of curricular diversity on cognitive growth, the study looked at student experience in the diversity courses taken, including grades received, grades awarded to classmates, ethnic/racial composition of classmates, percentage of foreigners among classmates, class size, and average time to graduation since completion of the diversity course(s). These metrics probe for the synergistic effect between compositional and curricular diversity on cognitive growth, while taking into account timing and critical mass of the classroom experience. Controlling for all the variables in the previously tested full model, exposure to both minority and full professor faculty is inversely associated with final GPA (see Table 5, Model 1). Also, the proportion of foreign students in diversity courses completed and average grades awarded to classmates in these courses are both inversely related to a student's graduating GPA. However, a student's personal academic performance in diversity courses positively correlated with overall grades.

[9] Results not listed in tables due to limited space, but discussed in the analysis, are available from the author.

Additional significant correlations emerged in the restricted model (see Table 5, Model 2), including negative estimate of the course-timing variable and positive estimates with the proportion of both female and Asian students in diversity courses. These three variables disappear as significant factors, however, when accounting for all tested college experiences. The proportion of minority students exposed to in diversity courses did not exhibit any significant correlation with final GPA, except when limiting the analysis to Asian students only (N=310) for whom a greater level of minority classmates in *all* courses taken is negatively associated with final GPA. However, the opposite is true when limited to diversity courses, where greater exposure to minority classmates correlates positively with Asian students' final GPA.

Since the curricular effects measured here reflect the potential impact from exposure to diversity courses of *any type*, the study proceeded to separately examine the 2,269 graduates who took at least one diversity course focused on ethnicity, race, gender, or aspects of multiculturalism, as exemplified in Table 1. Results from this subset are remarkably similar to those from models that included all graduates (Table 6). Again, a student's personal grade related positively to final GPA, while those awarded to classmates showed a negative association. Possibly mediated effects emanate from exposure to female and Asian classmates in all courses taken, both positively linked to final grade average. These results hold when tested separately for each ethnic/racial group, except—as with diversity courses in general—Asian students' final GPA correlated positively with greater exposure to minority student in courses focused on race, gender, or culture.

Lastly, to gauge the correlation of interactional diversity in the classroom with student cognitive growth, the impact of students' experience in capstone diversity courses was examined. Capstone courses typically require greater interaction among classmates (e.g., through team projects, interactive classroom presentations) and probe for mastery of critical thinking skills. Though these courses are usually taken near the end of the degree program, only 50% of graduates took them within one year of graduation, about 20% took them at least two years before graduation. Controlling for this variance in timing, results for the 1,437 graduates who completed a capstone diversity course centered on race, gender, or culture are listed in Table 7. As with diversity courses in general, those taken as capstones with the most popular diversity themes appear to positively correlate with final GPA in terms of individual student performance, but negatively in terms of classmate performance. Neither compositional diversity nor time of enrollment was significantly related to overall GPA. Perhaps more importantly, exposure to diversity courses did not correlate with overall grades for those who had a capstone experience in the study of race, gender, or some aspect of multiculturalism. As before, a positive effect

associated with general exposure to female classmates (i.e., in all courses) may have been mediated by other college experiences, given the coefficient from the restricted model. Results are consistent for each ethnic/racial group of graduates based on separately run models.

Preparation for Graduate School

Another way to gauge the cognitive growth of students is to examine their performance on the GRE and GMAT test (hereafter referred to as GRE), which most schools use to determine admissibility and academic readiness of applicants. Use of the GRE in conjunction with pre-collegiate preparation indicators follows Astin's (1993) approach to assess the influence of the college experience on cognitive growth. According to results from the first model that tested correlations with scores on the math section of the GRE test (Table 8, Model 1), the factors that weighted in most positively include a student's level of preparation at college entry (ACT/SAT score), the number of college math credits earned, and the level of classroom exposure to foreign students. Average credit load per semester, being male, and final GPA are other positive factors. Negative influences are associated with marginal performance in entry-level college math courses, except for those who took at least Calculus 1. None of the diversity-related variables exhibited any significant correlation, except for borderline negative correlation associated with the number of diversity courses taken. The only possibly mediated effect noticed in the restricted model is the level of exposure to female classmates, which was negatively correlated with the GRE math score (Table 8, Model 2). The significance of both borderline negative estimate for number of diversity courses taken and the positive estimate for level of classroom exposure to foreign students is underscored in that their influence remained unaffected by the other college-experience covariates.

Similar findings emerged in the models that estimated linkages to scores on the verbal section of the GRE test (Table 9). Again, pre-college academic preparation was a strong positive correlate, while number of earned math credits and being male also weighed in positively. But none of the diversity-related measures showed statistical significance, other than borderline negative association with exposure to female faculty and borderline significance on the positive side for exposure to female classmates. In contrast to results from the GRE math analysis, completion of a general capstone course—a requirement that can be substituted with a capstone course within the program major—seemingly benefited a student's score on the verbal section of the GRE. The combination of negative association with success in entry-level English (101) and positive association with success in entry-level math (120) is due to model specification and variable coding, whereby curricular experience variables reflect a student's highest-level course

within a discipline. Accordingly, those doing well on the GRE verbal test likely completed advanced English courses not included in the analysis. Observed correlations with both math and verbal performance on the GRE are not a function of the level of classroom exposure to minority students within a student's program major based on the covariance estimate.

Due to the relatively small number of graduates with available GRE records that entered the institution as new freshmen (N = 735), the previous analysis was extended to include graduates with test scores that entered the institution as transfer students. This allowed for the testing of GRE correlates based on over 2,100 students with a slightly altered model to account for the difference in longitudinal curricular experience between new and transfer-in students. Specifically, curricular experiences at the lower-division level were dropped and variables added to better control for students' course transfer record and time to degree completion, which typically varies between new and transfer students. Tables 10 and 11 list results for diversity-related variables derived from both the full model, with control over academic experience covariates, as well as those from the restricted model that did not include any covariates except for student gender, ethnic/racial identity, and low-income status. Other than a positive correlation associated with exposure to Asian American classmates and a negative association with exposure to minority faculty, significant in both full and restricted models, there were no statistically robust results that linked diversity-related factors to scores on the test's verbal section (Table 10). Exposure to minority classmates exerted a borderline negative influence, which disappeared after controlling for the college experience, and exposure to foreign students had a borderline negative correlation, after controlling for all covariates.

Both the curricular and compositional diversity experience mattered more in estimating performance on the math section (Table 11). Exposure to Asian Americans and foreign students yielded a positive correlation, while frequency of enrollment in diversity courses and greater exposure to female and minority classmates correlated negatively with math scores. These results are robust in both the restricted and full model, and are not a function of the level of exposure to minority students within a student's program major (i.e., no significant random effect at the program major level). Similarly, the results hold up when calculated separately for newly entered vs. transfer-in students. Lastly, addition of variables to measure the influence of interactional diversity for the 839 graduates who completed a capstone courses on gender, race, and culture changed neither the findings in the baseline model (as in Tables 10 and 11) nor did it confirm any significant correlation associated with enrollment in such courses (Table 12). Together, results from the GRE score models provide insight into the role of compositional, curricular, and

interactional diversity in shaping student cognitive growth and readiness to take on graduate-level work.

Reaching Graduate School

Enrollment in graduate school by type of selectivity is considered a behavioral measure of cognitive outcome that can be used to assess the influence of environmental factors during undergraduate education (Astin, 1993). In contrast to previous analyses, probability estimates for graduate school enrollment excluded low-income status of students due to model over-specification in presence of undergraduate financial aid indicators. The latter reflect on total need-based aid received and average unmet need per semester at the time of graduation, two variables that strongly correlate with income background. Lower-division course experiences were dropped and transfer-credit variables were added to account for inclusion of transfer-in graduates in the analysis. A number of culminating undergraduate experiences were included that may have influenced a student's decision to pursue graduate work. They include having spent a semester overseas, completion of an internship or practicum, and graduation with a senior thesis. Models configured accordingly yielded the following results (Table 13): Among diversity-related experiences, the number of diversity courses completed and exposure to both foreign students and female classmates showed a positive correlation of small size with enrolling at moderately selective graduate schools. In turn, exposure to ethnic/racial minority classmates had a negative association of medium size, while exposure to Asian American classmates also lowered the probability of enrollment at moderately selective graduate schools, though by a much smaller amount.

A largely opposite picture emerged for enrollment at more selective institutions (Table 13). Here, undergraduate exposure to female and foreign student classmates had a very small negative effect; conversely, exposure to Asian American classmates exerted a marginal positive effect. Neither the level of exposure to minority classmates, nor the number of diversity courses completed, exhibited a significant correlation with enrollment at selective institutions.

Zooming in on the influence of experiences limited to diversity courses (Table 13), the average academic performance of classmates in diversity courses completed by a graduate had an inverse impact of medium size on that student's probability to enroll at a moderately selective institution. The earlier a student took diversity courses on the way to graduation, the greater the negative impact on that student's odds for graduate school enrollment. However, neither of these factors influenced the probability for graduate-level enrollment at a selective institution. The positive correlation with exposure to female and ethnical/racial minority classmates is significant,

but of miniscule effect size (i.e., a change of less than one tenth of one percent in enrollment probability). All results were replicated when limited to white students only (Table 14, top section), though a separate model for minority students (excluding Asians) did not converge due to the relatively small number of records (N = 547) that prompted singularities in the Hessian matrix.

The analysis also separately examined the subset of the 3,933 graduates who took at least one diversity course focused strictly on race, gender, or culture (Table 14, middle section), as well as the 2,476 graduates who took such as course at the capstone level (Table 14, bottom section), where a premium is placed on interactive engagement among classmates. There are no significant effects associated with the measured experiences in such courses other than a small negative correlation with having taken such a course, at any level, early on the way to graduation. There are borderline negative effects on enrollment at selective institutions that are associated with a student's academic performance ($\alpha = .053$) and exposure to ethnic/racial minority classmates ($\alpha = .052$) in such courses when taught at the capstone level. But the criteria for statistical significance might be judged too charitable, given the number of students examined.

To probe for possibly mediated effects that may mask the influence of diversity, a restricted model was run that omitted all college-experience variables, except for first-semester entry status (new vs. transfer-in), and student socio-demographic background (Table 15). One diversity-related experience may have been mediated via the measured college-experiences in the full model, namely exposure to faculty at the full-professor rank, which heightened to probability for enrollment at selective graduate schools. All other significant diversity correlations in the full model were replicated in the restricted model, suggesting robust linkages with a student's odds to proceed with graduate-level education.

Self-Assessed Benefits

Objectively measured experiences that led to completion of the bachelor's degree were correlated also with three responses collected through an alumni survey. The first response reflects on a graduate's assessment of the contribution of the core curriculum to his or her critical thinking ability. Specifically, was the contribution "very positively," "somewhat positively," or "neutral or negative"? The latter served as the reference response in gauging the correlation of core curricular experiences with the two positive-response levels. Since diversity courses make up part of the core curriculum requirement, their perceived contribution relative to other core curriculum requirements (e.g., core humanities courses) can be assessed. Table 16 suggests that a graduate's self-assessed appraisal of the role of the core curriculum experience to his or her

critical thinking skills derives primarily from an overall sense of having attended the 'right' institution, given the strong positive correlation with answers to the question "Would you attend the institution again?" Substitution of that question with "How would you rate the quality of the degree program?" yielded a comparably strong positive correlation. In either case, diversity-related variables failed to emerge as significant correlates of the self-assessed core curriculum contribution to critical thinking skills. To ensure that diversity-related effects were not masked by a student's overall assessment, the question "Would you attend the institution again?" was dropped from the set of covariates. This exclusion rendered largely identical results as those in Table 16, with none of the diversity-related variables exhibiting statistically significant correlations. In contrast, graduates from pre-professional programs (e.g., nursing, pre-medical studies, social work) rated the core curriculum contribution higher than graduates in other field. Conversely, those who spent a semester overseas or took more than one independent study rated the core curriculum contribution lower than graduates who abstained from going overseas or completed only one independent study. There were no significant interaction effects between a student's ethnic/racial background and level of exposure to minority classmates in relation to self-assessed critical thinking skills.

The second student self-reported outcome examined relates to a graduate's response to the question, "What was the core curriculum impact on understanding of racial issues?" Using the same response categories as in the previous question, graduates who had greater exposure to classmates from ethnic/racial minority backgrounds were more likely to attribute a positive impact to the core curriculum experience (Table 17). Similarly, the number of diversity courses completed heightened the odds that a graduate reported a positive link between the core curriculum experience and understanding of racial issues. Greater exposure to female, minority, and full-professor faculty was linked also to the feeling that the core curriculum "somewhat" enhanced a graduate's understanding of racial issues, though the effect size in all cases was minimal. While graduates out of pre-professional programs were more likely to associate the core curriculum with a "very positive" impact on understanding of racial issues, business and economics graduates felt the core curriculum had a negative impact. Also, age correlated positively with the outcome variable, suggesting that older students were more likely to value experience in the core curriculum with enhanced understanding of racial issues. But none of the metrics that reflect on experience in diversity courses emerged as significant variables. Hence, neither ethnic/racial diversity of classmates nor academic performance in diversity courses had any bearing on the outcome variable. Of the various interaction effects tested that probed for differential impacts along a student's diversity experience, one emerged that suggests Asian

Americans who had greater exposure to minority classmates were less likely to report a positive contribution of the core curriculum experience to their understanding of racial issues. The same was true for those whose ethnic/racial background is unknown.

To control for a student's disposition on racial issues at the start of the undergraduate experience, a separate model was run on white students that included their reaction to a statement from the CIRP freshmen survey, namely that "racial discrimination is no longer a problem." Results from this analysis support findings based on students from all ethnic/racial backgrounds that exposure to diversity courses correlated positively with a students' belief that the core curriculum experience enhanced their understanding of racial issues (Table 18). However, the effect size of this relationship was contingent upon a student's level of disagreement with the statement that racial discrimination is no longer a problem. Accordingly, those in agreement with the statement were more likely to benefit from taking diversity courses than those who disagreed (i.e., considered racial discrimination a problem).

The third self-reported outcome measure looked at how graduates assessed "the contribution of the core curriculum to understanding of other cultures." As with the first question, a student's answer was strongly correlated with overall satisfaction of the undergraduate experience (Table 19). Again, exposure to diversity courses enhanced a graduate's view that the core curriculum had a positive impact on understanding of other cultures. But none of the other diversity-related measures showed any statistical significance. Perhaps expectedly, those who spent a semester overseas were most likely to feel that their understanding of other cultures was positively influenced by the core curriculum experience, since overseas courses may fulfill part of the core requirement. As was the case with understanding of racial issues, business and economic majors were less likely to connect their core curriculum experience with a better understanding of other cultures. The same was true for graduates in the natural sciences, though that result is less conclusive, as it occurred only at the medium-response level. A separate model was run for the 350 graduates whose initial level of interest in becoming a more cultured person could be ascertained from the CIRP freshmen survey. The findings paralleled those based on all graduates in the analysis (Table 15), namely a positive impact associated with taking diversity courses and spending a semester overseas, but no significant relations to measures of compositional diversity.

Discussion

In an effort to illuminate the connection between diversity and educational benefits in higher education, this study departs from the routine use of subjective student (and at time faculty) self-reported, impressionistic data that underpin the quantitative evidence of the entire research corpus

in this area. Instead, a range of objective indicators are used that measure directly the level of diversity that has preoccupied higher education research—namely, the ethnic and racial makeup of students on campus. To capture the educational impact of that compositional diversity where it counts most, the study devised a host of metrics that directly gauge a student's exposure to ethnic/racial diversity in the classroom. Unlike out-of-classroom peer interaction over which a student has greater control through self-selection, peer interaction inside the classroom is governed largely by the class scheduling choices of all students that exposes them to others with whom they may not interact otherwise. Not surprisingly, Cabrera and Nora (1994) found that students from all ethnic/racial backgrounds perceived institutional alienation as emanating primarily from their classroom experience, not the general campus climate. According to Milem, Chang, and Antonio (2005), "the classroom is an especially important space for diversity to thrive, and can potentially affect all dimensions of campus climate. Research has demonstrated the positive impact that a classroom engaged with diversity has on student outcomes." Thus, the classroom becomes the epicenter of student encounters with those from different backgrounds that produce the challenge and self-questioning which promotes intellectual development, as argued by Perry (1999).

At the same time, it is a core belief that educational benefits are maximized through the synergistic effect of compositional diversity with curricular and interactional diversity (College Board, 2006; Shaw, 2005; Milem, Chang, and Antonio, 2005; Milem, 2003; Gurin, 1999; Chang, 1999). Hence, this study measures student exposure to diversity courses—both at the general and thematically focused level—and incorporates student experiences in capstone diversity courses where student interaction is believed to be central to the learning process. To ensure that the correlation of diversity with educational benefits is estimated on a timeframe that reflects the cumulative cognitive gain that accrues in college, the study examines key curricular milestones and academic experiences of graduated students, while controlling for their disciplinary track, socio-demographic background, and pre-collegiate academic ability. Several objectively measured cognitive and cognitive-related outcomes are included, plus student self-assessed post-graduate outcomes, to yield a sufficiently broad basis on which to evaluate the contribution of diversity to a student's cognitive enrichment. Given the level of unobserved heterogeneity that accompanies statistical analyses, significant findings must not hinge on a single parameter estimate or one outcome variable, but be steeped in an identifiable pattern that suggests a more robust connection between a student's exposure to diversity and accrued learning gains. Thus, what can be gleaned from the previously discussed results?

General Findings

For one, none of the tested outcomes depend on the level of diversity exposure *within* a student's field of study. While some outcomes are significantly correlated with students in certain majors (e.g., education majors are more likely to go on to less selective graduate schools within four years than physical science majors), such differences are not due to classroom diversity experienced by graduates in a given major. Absence of covariance is based on non-significant random and interaction effects across all mixed-level and logit models. Since covariance patters with academic major have not been examined in other studies that focused on some dimension of the diversity-cognitive growth nexus (Pascarella and Terenzini, 2005; Chang et al., 2006; Massey, 2006; Pike and Kuh, 2006; Reason et al., 2006; Laird, 2005; Chang, 1999; Hu and Kuh, 2003; Terenzini et al., 2001), corroborating evidence has yet to be generated. Moreover, the tiny amount of between-major residual variance, in presence of control variables, points at curricular experiences in core areas that play a significant role in gauging overall learning gains.

Consistently, students' performance in core humanities, math, and capstone courses was positively linked to final GPA. However, the positive influence of classmate grades is likely due to the grading niveau of the instructor, rather than a positive peer effect on learning, as there is no positive correlation with GRE test scores (in fact, there is an inverse relationship with verbal scores). Performance on GRE test scores also suggests that students with graduate school aspirations should be prepared to succeed at the pre-Calculus level or higher, given the correlational pattern of math-related variables. The importance of math to cognitive growth is underlined by the positive correlation of the number of math courses completed with final GPA, performance on both the math *and* verbal section of the GRE, and the probability to enter graduate school. No other curricular experience exhibits this level of consistency across tested outcomes. This finding corroborates the conclusion by others that math is a key indicator of the academic challenge and cognitive progress college students experience (Adelman, 2004a, 1999; Herzog, 2005).

How to interpret the inverse relationship between engaging in independent studies and enrolling at a selective graduate school institution is less clear, given the paucity of relevant research (Pascarella and Terenzini, 2005; Astin, 1993). Perhaps independent studies facilitate post-graduate employment due to acquired practical skills or connections made with potential employers via closer interaction with faculty. This may well explain the lower graduate school enrollment of students who took an internship or practicum. It may also elucidate why those who took only one independent study, as opposed to two or more, were more likely to attribute

enhanced critical thinking skills to the core curriculum experience. Independent studies nurture student-faculty contact, but are not part of the core curriculum. If graduates' self-assessments are accurate, core curriculum impact on critical thinking skills and cultural understanding may be a function also of exposure to studies abroad (which may meet part of the core requirement). Accordingly, those who spent a semester abroad felt the core curriculum had a negative impact on their critical thinking skills compared to graduates that never participated in the study abroad program. Conversely, having spent a semester abroad considerably strengthened the view that the core enhanced one's understanding of other cultures. Reflection on the core curriculum contribution is influenced by the type of experience students went through, which may yield varied cognitive benefits. Unfortunately, a systematic assessment of study abroad programs has yet to occur to better understand their impact on student learning (Gillespie, 2002).

Diversity-Related Findings

There is no scarcity of studies on the purported benefits of ethnic/racial diversity of college students. But, as laid out above, the statistical evidence is limited almost exclusively to survey questionnaire data. Inquiries that go beyond subjective student self-reported indices of college enrichment are virtually absent from the research corpus on diversity. In contrast, this study examined a range of diversity-related correlations, almost all anchored in objectively measured independent and dependent variables. Results from the statistical models examined (Tables 4 through 19) produced several patterns that illuminate the role of diversity in cognitive growth of undergraduate students. First, compositional diversity in terms of classroom exposure to ethnic/racial minority students (excluding Asians) is mostly inconsequential to a student's final GPA, graduate school admission test scores, and likelihood to pursue a graduate education within four years of completion of an undergraduate degree. Though there are exceptions: Asian students appear to respond differently to minority student exposure, with contradictory results based on whether the influence is measured in the aggregate or limited to diversity courses. Due to the relatively small number of Asians in that analysis (N=310), little may be inferred from it.

In contrast, the negative correlation of minority classmate exposure with performance on the GRE math section is based on over 2,100 graduates (Tables 8). The same model shows a positive relationship with classroom exposure to foreign and Asian American students and a negative one with exposure to female classmates. Clearly, if defined more broadly to include foreign and Asian students, compositional diversity may indeed have a positive impact on cognitive growth, at least with reference to math skills. But if defined around minority students that are considered underrepresented and eligible for preferential admission under affirmative action at highly

selective institutions (i.e., Blacks, Hispanics, and Native Americans), compositional diversity appears to exert a negative effect on cognitive gains in math. Considering the well documented research on the superior development of math skills in other countries (Garelick, 2006; Lewin, 2006; Schmidt, 2001), juxtaposed with relatively lower math skills of minority students—though not Asian Americans—in the United States (Rose, 2004; ACT, 2004; Rose and Betts, 2001; Hagedorn et al., 1999), these findings may not be surprising. More importantly, they persist with or without other control variables, irrespective of the level of minority exposure *within* an academic major, and regardless whether a student started as a new freshman or transferred in from another institution. These results also align with previously cited findings by Fryer (2006), Hoxby (2002, 2000), Massey (2006), Caldas and Bankston (2005), and, most importantly, Steinberg (1996), all corroborating the existence of a negative peer effect associated with non-Asian minority students at the pre-collegiate level, which seemingly continues to exert an influence during college.

The importance of a more nuanced approach to the concept of diversity is underlined also in the correlates that measure the influence of faculty diversity. Exposure to female faculty exerts a negative effect on GRE verbal performance, but one that may largely be mediated by other influences (Table 9). That is not the case, however, with the observed negative correlation associated with minority faculty when estimating GRE verbal scores of graduates that started as either new freshmen or transferred in from somewhere else (Table 10). Here, the effect appears to be more direct and is not affected by the other covariates, variation of exposure to minority classmates for graduates *within* a major, or the influence of interactional diversity in capstone courses. These results fail to corroborate previously cited arguments by Trower and Chait (2003) or the finding by Umbach (2006). Model specification and data selection may account for lack of support; on the other hand, incongruity in results may highlight the need for others to include objective measures of diversity.

The influence of curricular diversity on student cognitive growth was tested both in terms of exposure to courses focused on diversity-related themes (as exemplified in Table 1), as well as compositional diversity and academic performance *within* such courses. A student's cognitive growth, as measured with the overall GPA, is not directly linked to the number of diversity courses completed, once other curricular and college experiences are accounted for. But if tied to cognitive demands of the GRE math test, graduates with greater exposure to diversity courses may have been impacted negatively (see borderline significance in Tables 8 and 11). Conversely, diversity courses slightly raise the odds of students to continue with graduate education, at least at less selective institutions (Table 13).

Student composition and academic performance within diversity courses also exhibited a number of significant correlations. Exposure to foreign students in diversity courses showed a negative correlation with final GPA, while the proportion of minority students in diversity courses—whether general types or those focused specifically on race, gender, and culture—failed to yield a significant connection to a graduate's overall grades. The positive relationship between personal grades in diversity courses—in general, focused, or capstone courses—and final GPA may suggest some contribution of curricular diversity to cognitive growth; conversely, it may simply indicate that academically good students tend to excel across the curriculum. Since the timing variable failed to correlate positively with final GPA (i.e., early course enrollment failed to relate to higher GPA), there is no sign that the effect is cumulative. Moreover, inverse correlation between performance of classmates in diversity courses and a graduate's GPA indicates that graduates, on average, were the better performing students in diversity courses. Alone, that may not mean much, since the correlation compares students who graduated with those that merely attended the same course. However, the data on graduated students also show that the number of diversity courses completed and exposure to minority students in diversity courses at the capstone level exhibit both an inverse *bivariate* correlation ($\alpha < .01$, 2-tailed) vis-à-vis a graduate's final GPA. A similar picture emerged in estimates of graduate school enrollment (Table 14). Together with results from the multivariate analysis above, the statistical evidence suggests that graduates were unlikely to benefit from a positive classmate peer effect in diversity courses, even those taught at the capstone level. Again, this finding did not differ in separate tests for each ethnic/racial group.

Judging by the responses graduates furnished in the alumni survey, the potential for positive effects due to compositional or curricular diversity exists most likely in select areas of students' affective development. Exposure to both diversity courses and ethnic/racial minority classmates strengthened the view among graduates that the curricular experience improved their understanding of racial issues, particularly those who started college thinking race is no longer a source of inequity (Table 18). Even exposure to female and ethnic/racial minority faculty enhanced slightly a graduate's understanding of racial issues. At the same time, the reported gain in understanding of racial issues varied with age and academic discipline—older students and those in pre-professional programs (e.g., Nursing, Social Work, Interior Design) registering greater gains, the opposite being the case for Business students. Equally noteworthy is the absence of a significant linkage to the measured experiences *within* diversity courses. Thus, while the *number* of diversity courses completed mattered, ethnical/racial background of classmates in those courses did not, and neither did the ethnic/racial identity or gender of the

faculty that taught the courses (Table 17). A similar pattern emerged with regard to knowledge of other cultures (Table 19). Surveyed students established a positive correlation between enrollment frequency in diversity courses and their understanding of other cultures, but failed to produce a link that would indicate the ethnic/racial makeup of their classmates (or their teachers) promoted an affective gain in that area. Also, the degree of classroom interaction among students in diversity courses does not appear to be a factor (Table 19). Lastly, graduates' assessment of their critical thinking skills shows no demonstrable connection to their diversity experience (Table 16). None of the three diversity dimensions—compositional, curricular, and interactional—exhibited any statistically significant connection to students' appraisal of their critical thinking skills. Neither was there any variation associated with a graduate's ethnic/racial background or exposure to minority classmates that altered this result, nor was it influenced by overall affection for the institution.

In sum, when tying survey responses of graduated students to objective indicators of their undergraduate experience, the resultant pattern of correlations from the various models supports the view that *curricular* diversity promotes certain affective outcomes in students that are associated with social and cultural harmony. But it does not extend to student assessment of critical thinking skills, and there is no statistical evidence linking objectively derived *compositional* or *interactional* diversity to promotion of any of the three educationally desirable outcomes, based on the post-graduate assessment of students.

Conclusion

Before considering what this study means for diversity research, several limitations in scope, methodology, and data that usually attend this type of inquiry need to be kept in mind. First, the analysis reflects the situation at one, predominantly white, medium-size public university located in an urban area, where the average academic preparation of new freshmen is slightly below the national average (ACT 22 vs. 23; SAT 1047 vs. 1090 for 2005). As such, findings are more representative of the typical college environment than those from prominent other studies that covered only highly selective institutions (e.g., Bown and Bok, 2000; Massey et al., 2003). But they may not transfer to places with a notably different academic mission or study body. As indicated above, there is little evidence of enrollment-based racial clustering in classrooms at the examined institution. Minorities constitute on average a critical mass of students in order to reportedly facilitate their classroom participation and promote learning in others (Coleman and Palmer, 2006). For some institutions, however, cognitive benefits may only set in at much higher levels of minority representation (e.g., Hagedorn, 2007). Second, having placed a premium on

verifiable, objective indicators of curricular experience, academic achievement, and ethnic/racial makeup of students and faculty in the classroom, this study does not control for environmental influences (both academic and social) outside the formal learning setting. This omission is forced by the lack of objectively derived data on out-of-classroom student interactions. Similarly, available survey-based data on student-faculty engagement has been excluded due to paucity of surveyed students and the lack of conclusive results on how such engagement contributes to cognitive gains in students.[10] Third, findings from this study may not furnish inferences on students that have not gone through an entire undergraduate program. While research suggests that most of the cognitive gains occur in the first two years of college (Pascarella and Terenzini, 2005), potentially formative diversity experiences, such as capstone courses on race and culture, occur later in college life. Fourth, the influence of interactional diversity is inferred from the type of courses students completed, the assumption being that capstone courses centered on popular diversity themes generate a distinctly higher level of cross-racial classroom interaction than found in other courses. That assumption may be wrong, however, if courses are conducted in ways that do not ensure student interaction, or where the level of interaction does not differ across the curriculum. Fifth, students' socioeconomic background is inferred from the amount of need-based aid received and whether that aid was made up of a Pell Grant, i.e., federal support that is restricted to those from low-income backgrounds. However, receipt of need-based aid may not linearly correspond to a student's income situation; much less, accurately reflect socio-cultural attributes. Finally, statistical correlations must not be interpreted as causal in nature—notwithstanding the use of terms like "effect" and "influence" here and elsewhere—but merely indicate that some relationship between observed experiences did not happen by chance.

To situate the findings from this study in the body of research on diversity effects in higher education, methodological as well as conceptual differences in this inquiry compared to most others are worth noting. First, the statistical models used here measured all three dimensions of

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[10] E.g., Kuh et al. (2006), using data from the National Survey of Student Engagement (NSSE) on 11,000 students from 18 four-year institutions concluded that minority students benefited more from a range of self-reported educationally purposeful activities than white students in terms of first-year and fourth-year grades (GPA) and second year retention. Yet, the report failed to control for type of academic major or college courses taken during the first and fourth year. Indeed, the study does not include any covariates that reflect on students' specific curricular experience associated with their program major. This omission in model specification casts serious doubt on the study's conclusion. Using GPA as the key metric for student success calls for at least some control over the academic rigor of courses students take. A well prepared student, regardless of race or engagement, who embarks on an engineering program with advanced calculus in the first year, may wind up with a lower GPA than a marginal student who is advised to enroll in general education courses of introductory nature.

diversity *simultaneously* to address a key point advanced by many (Coleman and Palmer, 2006; Shaw, 2005; Milem et al., 2003; Chang et al., 2003; AAUP, 2000), namely that the educational benefits of ethnic/racial diversity on a campus are best realized through synergism with interactional and curricular diversity (or other institutionally sponsored diversity-focused programs). In contrast, no other study could be identified that conducted a comparable analysis. Some explored the dimensions of diversity sequentially, typically examining the impact of one aspect of diversity on another aspect of diversity (e.g., Chang, 1999; Pike and Kuh, 2006, Astin, 1993; Gurin, 1999) in order to establish an indirect effect on student learning. Others tested only one or two of the dimensions to estimate a desired educational outcome (e.g., Chang, 2006; Reason et al., 2006; Hu and Kuh, 2003;Terenzini et al., 2001; Hurtado, 1999; Chang, 1999). Second, unlike previous studies, the findings here are based on objective measures of diversity exposure that reflect a student's individual situation throughout the entire undergraduate classroom experience. The latter is disaggregated to isolate the influence of diversity by individual ethnic/racial group where deemed most influential in promoting educational benefits, namely curricular activities centered on core diversity themes that are offered in a format which capitalizes on student interaction. Third, measures of cognitive growth in this study are tied to indicators that gauge cumulative academic ability at college entry and exit (ACT/SAT, GRE/GMAT, and final GPA) as well as to a measure of post-graduate education opportunity (i.e., enrollment in graduate school by selectivity). "[Though] grades are hardly a perfect measure of learning," to quote Pascarella and Terenzini (2005), "[they] may well be the single best predictors of student persistence, degree completion, and graduate school enrollment," precisely the types of educational benefits believed to be enhanced by diversity (Milem, 2003; Gurin, 1999). Objective metrics of cognitive gain are supplemented with student self-assessment of critical thinking skills and knowledge of both racial and culture issues—outcomes believed to benefit greatly from diversity experiences in college (Chang et al., 2006; Laird, 2005; Zŭniga et al., 2005; Duncan et al., 2003; Antonio, 2001; Gurin, 1999; Bowen and Bok, 1998). Together, these indicators provide a picture to appraise the contribution of diversity to student cognitive enrichment.

The composite picture that emerges from this study resembles the conclusion arrived at by Terenzini et al. (2001) that the statistical evidence scarcely permits a ringing endorsement of the view that racially diverse classrooms produce distinctively greater educational gains. While it may be possible, according to Gurin et al. (2004), that "cognitive growth is fostered when individuals encounter experiences and demands that they cannot completely understand or meet, and thus must work to comprehend and master new (or at least not completely familiar) and discontinuous demands," there is no evidence in this study that associates the ethnic/racial mix of

students or faculty to the type of challenges to which Gurin et al. refer. Hardly any of the many models tested here suggest a positive influence due to compositional diversity. If there is a potential for beneficial effects, it may be limited to the proportion of Asian American and foreign students (e.g., in math) that make up the mosaic. However, these groups are rarely, if ever, identified separately in higher education diversity research, which typically treats non-white students monolithically (Shaw, 2005). Not so with peer effect studies at the pre-collegiate level, where a number of findings echo results in this study. In particular, Hoxby (2000, 2002), Caldas and Bankston (2005), and Massey (2006) corroborate the negative correlation of exposure to minority students (excluding Asians) with lower gains in math; conversely, the salutary peer effect of Asians is documented in Thernstrom and Thernstrom (2003) and Steinberg (2006). Similarly, results on curricular and interactional diversity failed to produce a positive correlation with cognitive outcomes. Neither cumulative grades, nor standardized test scores, nor self-assessments of critical thinking skills showed gains that could be associated with a host of objectively measured diversity experiences. The contradiction with frequently referenced works linking diversity to enhanced cognition (e.g., Chang et al., 2006; Hu and Kuh, 2003; Milem, 2003; Gurin, 1999) suggests the need for greater triangulation of survey data with direct, objective measures of student achievement.

There is an alignment with findings in other studies when the measured outcome is of affective nature and based on the subjective assessment of students. Greater exposure to diversity courses contributed to graduates' understanding of other cultures. Likewise, the positive correlation of exposure to minority classmates with self-reported understanding of racial issues corroborates many of the previously cited survey-based studies (e.g., Duncan, 2003; Antonio, 2001; Hurtado, 1999; Astin, 1993). However, this congruity in results may say more about the capacity of diversity courses to influence a student's affective disposition, and thus cultivate a certain "viewpoint," as some have argued (Bauerlein, 2004; Iannone, 2002). In contrast, actual cognitive growth stems more from gains in traditional areas of skill development, according to results in this study, where performance in core areas (e.g., humanities, and math) is positively linked to objective measures of cumulative academic ability. That ability is influenced also by differences in the average rate of learning (Fryer and Levitt, 2005, 2004; Rowe and Cleveland, 1996; Gottfredson, 2000), a fact never considered in the research on diversity, but which may explain the variation in ethnic/racial group effects observed with some outcomes.

The promotion of diversity based on ethnic/racial identity of both students and faculty has become a central tenet in higher education that permeates everything from curricular development, to student and faculty recruitment, to campus infrastructural planning, to

articulation of an institution's strategic mission. References to diversity on the websites of America's top 100 universities far outnumber the mentioning of freedom, liberty, and democracy (Talkington, 2006)—hallmarks of the open exchange of ideas that traditionally characterize the academy. But, as this study demonstrates, claims of diversity-derived educational benefits are far from substantiated. That does not render diversity inconsequential to the capacity for learning. But it calls into question whether diversity anchored in *ethnic/racial identity* engenders a unique benefit to cognitive growth. Indeed, the concept of ethnic/racial identity has become so amorphous—with a doubling in the number of "mixed race" students between 1991 and 2001 (Boynton, 2006)—that the ethnic/race variable will outgrow its usefulness as a meaningful descriptor. Instead, as the American Council of Trustees and Alumni argues, *intellectual* diversity is at the heart of a robust exchange of ideas that presumably leads to greater learning. But that type of diversity is scarcely guaranteed through a preoccupation with race or ethnicity alone (American Council of Trustees and Alumni, 2005). The need for a broader conceptualization of diversity is laid out in George (2003) and is reflected in a recent statement by the president of Spelman College; a prominent, historically black institution: "Although 97 percent of our students are racially categorized as 'black,' the student body is, in fact, quite diverse. Spelman students come from all regions of the United States and many foreign countries, from white suburban and rural communities as well as urban black ones" (Tatum, 2004).

As universities come under mounting pressure to demonstrate tangible returns on substantial investments for diversity programs (Independence Institute, 2007; Schmidt, 2007), let alone rationalization for ethnic/racial preference in student admissions, a premium is placed on producing hard evidence on the alleged educational benefits. Hopefully, future studies will draw also on objectively based data to illuminate an issue relevant well beyond the education community.

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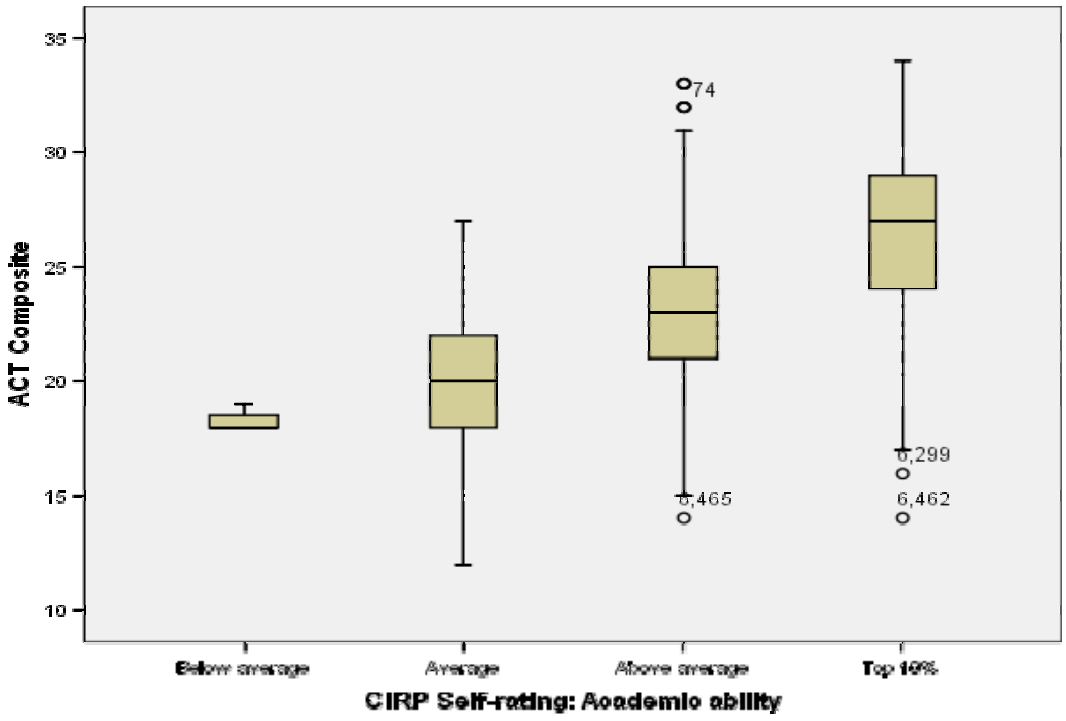
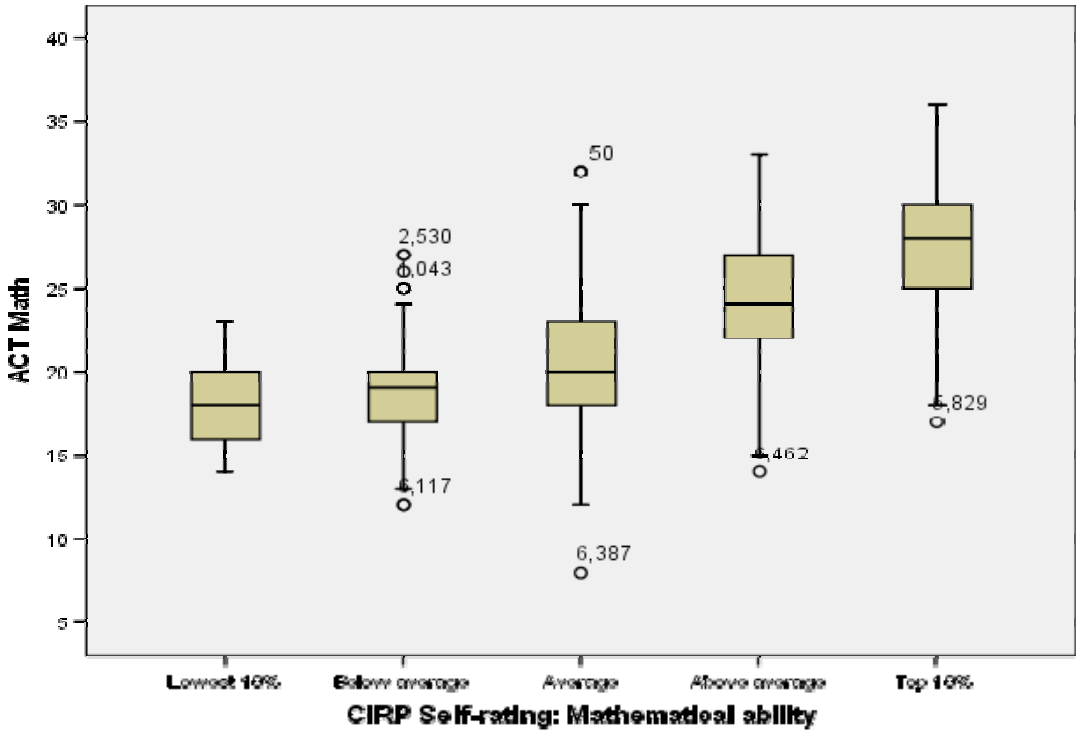
Table 1: Examples of Diversity Courses

- General
  - Dance in Ancient Civilization (Dan 467)
  - American Literature & Culture (Eng 304)
  - History of East Asia (Hist 243)
  - International Mangement/Marketing (Mgt/Mkt 480/456)
  - World Religions (Phil 210)
- Race, Gender, Culture Focused
  - Identity Across Borders (Anth 378, WS 378)
  - Ethnic/Race Relations (Soc 379)
  - Identity Politics in the US (Psc 353)
  - Introduction to Women's Studies (WS 101)

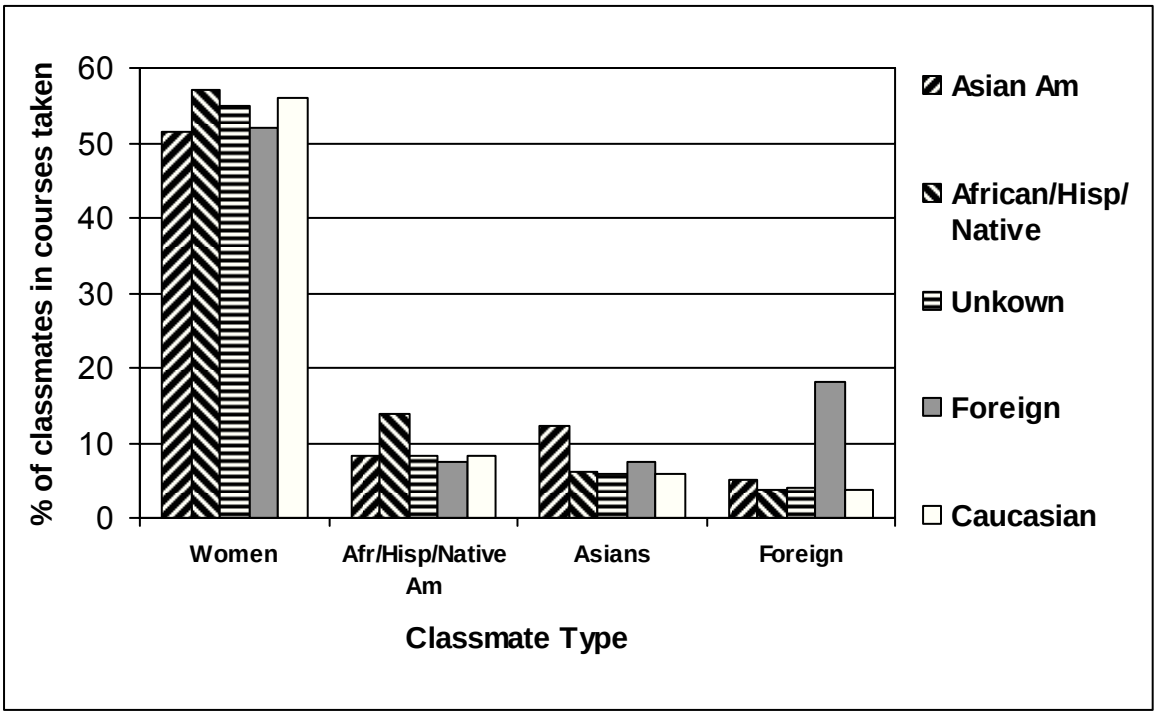
Graph 1: Self-Rating vs. Objective Rating of Overall Academic Ability



Graph 2: Self-Rating vs. Objective Rating of Mathematical Ability



Graph 3: Classroom Ethnic/Racial Composition: Bachelor Degree Recipients, 1995-2005



Graph 4: Exposure to Instructional Faculty Type: Bachelor Degree Recipients, 1995-2005

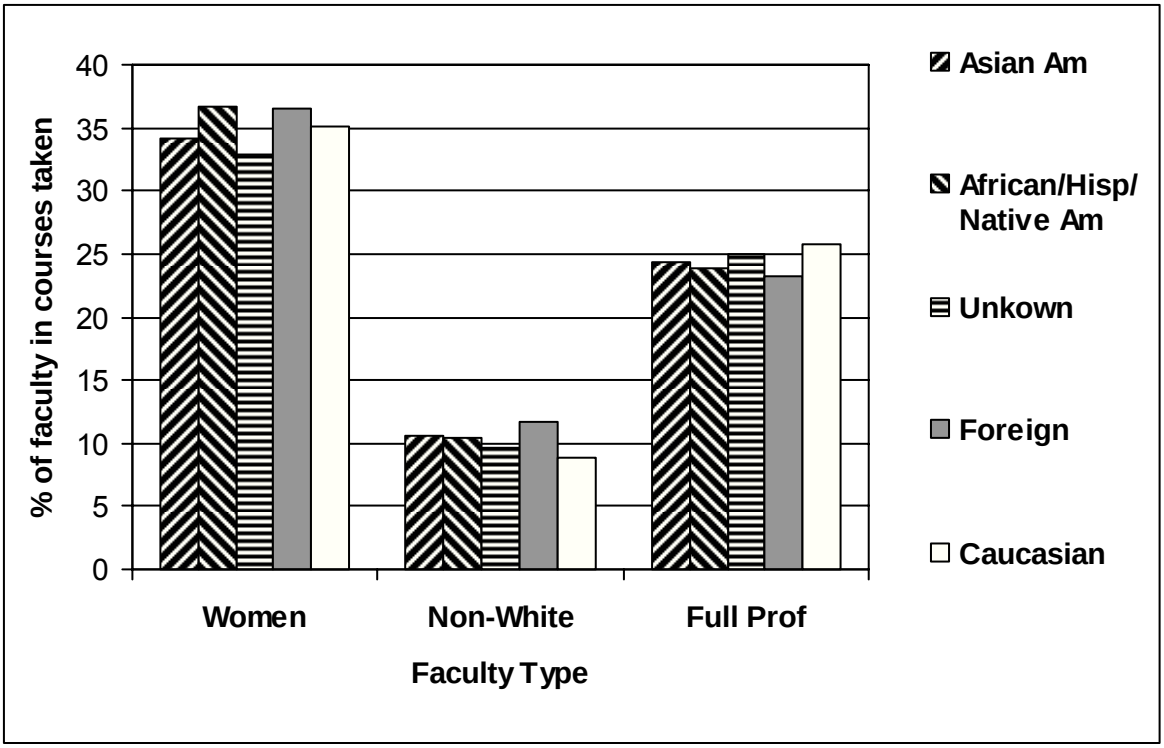


Table 2: Descriptive Statistics for Estimating Graduating GPA and GRE/GMAT Scores

		Count	Marginal Percentage
Program Major (Level 2) final	ACC	52	1.2%
	AEST	24	0.6%
	ANTH	31	0.7%
	ART	71	1.7%
	BADM	43	1.0%
	BCH	110	2.6%
	BGSD	70	1.7%
	BIOL	260	6.2%
	CE	110	2.6%
	CRJ	158	3.8%
	CS	68	1.6%
	DMAJ	168	4.0%
	EC	35	0.8%
	EDS	99	2.4%
	EDU	190	4.5%
	EE	65	1.5%
	ELED	213	5.1%
	ENGI	27	0.6%
	ENGL	125	3.0%
	ERS	70	1.7%
	FIN	75	1.8%
	FLL	54	1.3%
	GEOG	29	0.7%
	HDFS	66	1.6%
	HS	307	7.3%
	INDP	68	1.6%
	INFOSYS	91	2.2%
	INTD	20	0.5%
	JOUR	254	6.1%
	LOGMGT	77	1.8%
	MATH	18	0.4%
	MECH	85	2.0%
	MGRS	141	3.4%
	MINE	11	0.3%
	MKT	133	3.2%
	MUS	51	1.2%
	NURS	114	2.7%
	NUTR	41	1.0%
	PSC	121	2.9%
	PSY	182	4.3%
	RPED	22	0.5%
	SCI	45	1.1%
	SOSCI*	75	1.8%
	SPA	81	1.9%
	SW	44	1.0%
Reference category below: no			
On academic probation	yes	317	7.6%
	no	3,877	92.4%
Gender	Male	1,680	40.1%
	Female	2,514	59.9%
AP credits earned	yes	717	17.1%
	no	3,477	82.9%
Varsity Athlete	yes	124	3.0%
	no	4,070	97.0%
Took remedial math	yes	460	11.0%
	no	3,734	89.0%
Took remedial English	yes	527	12.6%
	no	3,667	87.4%
Took overseas course	yes	407	9.7%
	no	3,787	90.3%

Table 2 (cont.): Descriptive Statistics for Estimating Graduating GPA and GRE/GMAT Scores

Reference category: did not take course, i.e., transferred in or placed higher/lower			
Math120 B or higher	yes	3,111	74.2%
	no	1,083	25.8%
Math120 < B	yes	3,599	85.8%
	no	595	14.2%
Math 124 B or higher	yes	3,677	87.7%
	no	517	12.3%
Math 124 < B	yes	3,764	89.7%
	no	430	10.3%
Math128 B or higher	yes	3,357	80.0%
	no	837	20.0%
Math128 < B	yes	3,534	84.3%
	no	660	15.7%
Math176 B or higher	yes	3,715	88.6%
	no	479	11.4%
Math176 < B	yes	3,866	92.2%
	no	328	7.8%
Math181 B or higher	yes	3,436	81.9%
	no	758	18.1%
Math181 < B	yes	3,663	87.3%
	no	531	12.7%
Engl101 B or higher	yes	1,577	37.6%
	no	2,617	62.4%
Engl101 < B	yes	3,883	92.6%
	no	311	7.4%
CH201 B or higher	yes	2,355	56.2%
	no	1,839	43.8%
CH201 < B	yes	3,041	72.5%
	no	1,153	27.5%
CH202 B or higher	yes	2,138	51.0%
	no	2,056	49.0%
CH202 < B	yes	3,396	81.0%
	no	798	19.0%
CH203 B or higher	yes	2,091	49.9%
	no	2,103	50.1%
CH203 < B	yes	3,487	83.1%
	no	707	16.9%
CapGen B or higher	yes	645	15.4%
	no	3,549	84.6%
CapGen < B	yes	3,909	93.2%
	no	285	6.8%
CapMaj B or higher	yes	1,890	45.1%
	no	2,304	54.9%
CapMaj < B	yes	3,869	92.3%
	no	325	7.7%
Asian American	yes	316	7.5%
	no^	3,878	92.5%
African/Hispanic/Native American	yes	352	8.4%
	no^	3,842	91.6%
Ethnicity/race Unknown	yes	149	3.6%
	no^	4,045	96.4%
Foreign student	yes	17	0.4%
	no^	4,177	99.6%
Average % minority classmates (excl. Asians) in courses taken: 7.5 to 12.5	yes	2,945	70.2%
	no*^	1,249	29.8%
Average % minority classmates (excl. Asians) in courses taken: over 12.5	yes	425	10.1%
	no*^	3,769	89.9%
Total cases		4,194	100.0%

Reference category: * social science; ^ Caucasian; *^ less than 7.5%

Table 3: Descriptive Statistics for Post-Graduation Enrollment and Self-Reported Satisfaction			
		N	Marginal Percentage
Post-Graduation Enrollment	No enrollment at 4-year institution*	3,248	52.0%
	4-year institution in 2nd tier or lower	2,749	44.0%
	4-year institution in 1st tier or Med/Law school	255	4.1%
Gender	Male	2,519	40.3%
	Female*	3,733	59.7%
Initial Enrollment status	New freshmen	3,301	52.8%
	Transferred in from other institution*	2,951	47.2%
# of math courses transferred in	one	1,364	21.8%
	two or more	538	8.6%
	none*	4,350	69.6%
# of Core Humanities courses transferred in	one or two	1,351	21.6%
	three or more	993	15.9%
	none*	3,908	62.5%
Internship/Practicum taken	one	1,622	25.9%
	two or more	748	12.0%
	none*	3,882	62.1%
Independent studies taken	one	1,225	19.6%
	two or more	532	8.5%
	three*	4,495	71.9%
General capstone performance	B or higher grade	5,341	85.4%
	Less than B grade	479	7.7%
	Didn't take course on campus*	432	6.9%
Graduated with a thesis	no	3,194	51.1%
	yes*	3,058	48.9%
Graduated with Minor	yes	2,329	37.3%
	no*	3,923	62.7%
Took overseas (USAC) course	yes	322	5.2%
	no*	5,930	94.8%
Ethnicity/race	Asian American	357	5.7%
	African/Hispanic/Native American	490	7.8%
	Unknown	230	3.7%
	White Caucasian*	5,175	82.8%
Core Hum 201 performance	B or higher grade	2,382	38.1%
	Less than B grade	1,703	27.2%
	Didn't take course on campus*	2,167	34.7%
Core Hum 202 performance	B or higher grade	2,706	43.3%
	Less than B grade	1,326	21.2%
	Didn't take Core Hum 202 on campus*	2,220	35.5%
Core Hum 203 performance	B or higher grade	2,605	41.7%
	Less than B grade	996	15.9%
	Didn't take Core Hum 203 on campus*	2,651	42.4%
Academic program major type	Business/Economics	826	13.2%
	Education	1,051	16.8%
	Health sciences	673	10.8%
	Arts/Humanities	639	10.2%
	Pre-Professional	485	7.8%
	Natural sciences	709	11.3%
	Physical sciences	469	7.5%
	Double major	176	2.8%
	Social sciences*	1,224	19.6%
Total cases		6,252	100.0%

* Reference category

Table 4: Parameter Estimates of Cumulative GPA(x10), Bachelor Degree Recipients 1999-2005 (N=4,194)

	Model 1			Model 2^			Model 3: Restricted		
Fixed effects	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.
Demographics									
Age	0.04	1.24					n/a	n/a	n/a
Male	-0.09	-0.88					-0.48	-2.88	**
Ethnicity / Race unknown[1]	-0.01	-0.04					-0.25	-0.80	
African/Hispanic/Native American[1]	-0.41	-2.37	*				-0.33	-1.20	
Asian American[1]	-0.12	-0.68					-0.77	-2.63	**
Low-income background (Pell Grant recipient)	0.18	1.41					0.16	1.09	
Precollegiate/Academic Growth									
ACT/SAT Composite	0.12	9.09	***				0.42	24.47	***
Earned Advanced Placement (AP) credits	0.41	3.66	***				1.40	8.42	***
At least once on probation	-1.67	-10.06	***				n/a	n/a	n/a
Financial Aid									
Merit-based aid ($1K increment)	0.09	11.89	***				n/a	n/a	n/a
Need-based aid ($1K increment)	-0.01	-1.18					n/a	n/a	n/a
Campus Experience									
Number of semesters living on campus	-0.13	-4.48	***				n/a	n/a	n/a
Varsity athlete member	0.59	2.64	**				n/a	n/a	n/a
General Academic Experiences									
Took remedial English	-0.27	-0.22	*	-0.49	-4.32	***	n/a	n/a	n/a
Took remedial math	-0.25	-1.97	*				n/a	n/a	n/a
Number of math credits earned	0.02	2.32	*				n/a	n/a	n/a
Ratio of earned vs. attempted credits	0.24	23.83	***				n/a	n/a	n/a
Avg credit load per semester	0.10	4.47	***				n/a	n/a	n/a
Stopout time: % elapsed months to graduation	0.01	5.40	***				n/a	n/a	n/a
Incompletes/Withdrawals as % of all grades	0.11	9.31	***				n/a	n/a	n/a
Number of failed class registration attempts	-0.01	-2.92	**				n/a	n/a	n/a
Took overseas course (USAC)	0.20	1.55					n/a	n/a	n/a
Avg grade awarded in courses taken	6.26	16.77	***				n/a	n/a	n/a
Core Curriculum Performance[2]									
Fundamentals of college math (120) B or higher	0.40	3.68	***				n/a	n/a	n/a
Fundamentals of college math (120) less than B	-0.12	-9.05	***				n/a	n/a	n/a
College algebra (124) B or higher	0.53	4.29	***				n/a	n/a	n/a
College algebra (124) less than B	-0.57	-0.44	***				n/a	n/a	n/a
Pre-Calculus / Trigonometry (128) B or higher	0.53	4.82	***				n/a	n/a	n/a
Pre-Calculus / Trigonometry (128) less than B	-0.85	-7.29	***				n/a	n/a	n/a
Calculus for Bus/Soc Sci (176) B or higher	0.62	4.32	***				n/a	n/a	n/a
Calculus for Bus/Soc Sci (176) less than B	-0.72	-4.47	***				n/a	n/a	n/a
Calculus 1 (181) B or higher	-0.65	-4.54	***				n/a	n/a	n/a
Calculus 1 (181) less than B	-1.18	-8.44	***				n/a	n/a	n/a
English 101 B or higher	-0.05	-0.51					n/a	n/a	n/a
English 101 less than B	-0.85	-5.25	***				n/a	n/a	n/a
Core humanities (201) B or higher	0.53	4.22	***				n/a	n/a	n/a
Core humanities (201) less than B	-0.87	-6.82	***				n/a	n/a	n/a
Core humanities (202) B or higher	0.19	1.37					n/a	n/a	n/a
Core humanities (202) less than B	-0.98	-6.51	***				n/a	n/a	n/a
Core humanities (203) B or higher	0.38	3.19	***				n/a	n/a	n/a
Core humanities (203) less than B	-1.02	-7.60	***				n/a	n/a	n/a
General capstone B or higher	0.73	3.72	***				n/a	n/a	n/a
General capstone less than B	-0.91	-3.95	***				n/a	n/a	n/a
Major capstone B or higher	0.29	2.51	**				n/a	n/a	n/a
Major capstone less than B	-1.68	-10.06	***				n/a	n/a	n/a
Diversity experience									
Number of diversity courses taken	0.00	0.15					-0.11	-0.21	
% of courses taken taught by female faculty	0.00	0.23					0.02	3.04	**
% of courses taken taught by minority faculty	-0.01	-1.90		-0.01	-1.97	*	0.00	-0.13	
% of courses taken taught by non-tenure-track faculty	0.00	-0.50					0.01	1.46	
% of courses taken taught by full professors	-0.01	-2.61	**	-0.01	-1.52		0.01	1.44	
% of classmates that were female	0.01	1.42					0.08	6.34	***
% of classmates that were Asian Am	0.03	1.14					0.16	4.26	***
% of classmates that were foreign	0.01	0.53					-0.07	-1.65	
7.5 to 12.5% of classmates were ethn/racial minority[3]	0.19	1.87		n/a	n/a		-0.06	-0.37	
Over 12.5% of classmates were ethn/racial minority[3]	-0.06	-0.29		n/a	n/a		-0.38	-1.22	
% of classmates were ethnic/racial minority	n/a	n/a	n/a	0.00	-0.04		n/a	n/a	n/a
Model Summary									
Unconditional									
Fixed-effect intercept	31.44	125.06	***						
Random effects									
Residual	18.42		***						
Program major intercept	2.59		***						
Intraclass correlation	0.12								
Variables included *(random effects)*									
Residual	5.16	45.22[c]	***	5.61	45.82[c]	***	13.44	45.46[c]	
Program major intercept variation	0.09	2.24[c]	*	0.15	.805[c]		1.52	3.91[c]	
Covariance with % of ethn/racial min. classmates	n/a	n/a	n/a	0.00	-.137[c]		n/a	n/a	n/a
Program major slope variation	n/a	n/a	n/a	0.00	.265[c]		n/a	n/a	n/a
Deviation fit *(smaller is better)*									
AIC	19004			22594			22988		
Model improvement	yes[a]			no[b]			no[b]		

[a] Compared to unconditional model (p. < .001)

*** p ≤ .001; **p ≤ .01; *p ≤ .05

[b] Compared to Model 1 (p. < .001); [c] Wald Z

^ Only significant changes from Model 1 listed

Reference categories: [1] Caucasian, [2] Did not take course, [3] Less than 7.5%

Table 5: Parameter Estimates of Cumulative GPA(x10), Bachelor Degree Recipients 1999-2005 (N=4,041)

Diversity-related variables listed only	**Model 1: All Control Variables~**			**Model 2: Restricted^**		
Fixed effects	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.
General diversity experience						
Number of diversity courses taken	0.05	1.43		0.06	1.35	
% of courses taken taught by female faculty	0.00	-0.13		0.01	1.93	0.05
% of courses taken taught by minority faculty	-0.01	-2.18	*	0.00	-0.29	
% of courses taken taught by irregular faculty	0.00	-0.22		0.01	1.77	
% of courses taken taught by full professors	-0.01	-2.00	*	0.01	1.61	
% of classmates that were female	0.01	1.60		0.07	6.28	***
% of classmates that were Asian Am	0.03	1.27		0.10	3.05	**
% of classmates that were foreign	0.01	0.26		-0.04	-1.13	
7.5 to 12.5% of classmates were ethn/racial minority[1]	0.15	1.44		-0.13	-0.85	
Over 12.5% of classmates were ethn/racial minority[1]	0.05	0.25		-0.16	-0.60	
Experience in diversity courses taken (any type)						
GPA for diversity courses taken	1.79	23.71	***	3.54	35.54	***
Avg grade awarded in diversity courses taken	-1.20	-9.06	***	-1.81	-9.49	***
% of classmates that were female	0.00	-1.38		-0.01	-1.37	
7.5 to 12.5% of classmates were ethn/racial minority[1]	-0.11	-1.22		0.07	0.51	
Over 12.5% of classmates were ethn/racial minority[1]	0.00	0.02		-0.03	-0.20	
% of classmates that were Asian Am	0.01	0.86		0.00	0.34	
% of classmates that were foreign	-0.02	-2.28	*	-0.04	-3.62	***
Avg class size	0.00	-1.18		0.00	0.33	
Years from completion of first course to graduation	-0.02	-0.72		-0.22	-5.29	***

~ As Table 4, Model 1; ^ As Table 4, Model 3; [1] Reference category: less than 7.5% *** p ≤ .001; **p ≤ .01; *p ≤ .05

Table 6: Parameter Estimates of Cumulative GPA(x10), Bachelor Degree Recipients 1999-2005 Who Took A Diversity Course on Ethnicity/Race, Gender, or Culture (N=2,269)

Diversity-related variables listed only	**Model 1: All Control Variables~**			**Model 2: Restricted^**		
Fixed effects	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.
General diversity experience						
Number of diversity courses taken	0.02	0.68		0.06	1.11	
% of courses taken taught by female faculty	0.01	1.21		0.02	2.53	*
% of courses taken taught by minority faculty	-0.01	-1.51		0.00	0.14	
% of courses taken taught by irregular faculty	0.00	-0.13		0.01	1.40	
% of courses taken taught by full professors	-0.02	-2.49	*	0.00	0.55	
% of classmates that were female	0.01	1.15		0.07	5.06	***
% of classmates that were Asian Am	0.03	0.93		0.13	2.97	**
% of classmates that were foreign	0.01	0.16		-0.05	-1.03	
7.5 to 12.5% of classmates were ethn/racial minority[1]	0.12	0.85		-0.27	-1.31	
Over 12.5% of classmates were ethn/racial minority[1]	-0.01	-0.04		-0.33	-0.89	
Experience in diversity courses focused on ethnicity/race, gender, or culture						
GPA for diversity courses taken	1.70	18.04	***	3.32	27.25	***
Avg grade awarded in diversity courses taken	-1.12	-6.89	***	-1.94	-8.47	***
% of classmates that were female	0.00	-1.09		-0.01	-1.21	
7.5 to 12.5% of classmates were ethn/racial minority[1]	-0.07	-0.56		-0.05	-0.26	
Over 12.5% of classmates were ethn/racial minority[1]	0.08	0.61		0.12	0.68	
% of classmates that were Asian Am	0.01	0.61		0.02	1.09	
% of classmates that were foreign	-0.02	-1.79		-0.04	-2.95	**
Avg class size	0.00	-0.42		0.00	-0.22	
Years from completion of first course to graduation	0.07	1.61		-0.22	-4.04	***

~ As Table 4, Model 1; ^ As Table 4, Model 3; [1] Reference category: less than 7.5% *** p ≤ .001; **p ≤ .01; *p ≤ .05

Table 7: Parameter Estimates of Cumulative GPA(x10), Bachelor Degree Recipients 1999-2005 Who Took A Capstone Diversity Course on Ethnicity/Race, Gender, or Culture (N=1,439)

Diversity-related variables listed only	**Model 1: All Control Variables~**			**Model 2: Restricted^**		
Fixed effects	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.
General diversity experience						
Number of diversity courses taken	-0.07	-1.49		-0.14	-2.01	*
% of courses taken taught by female faculty	0.00	0.66		0.02	1.87	
% of courses taken taught by minority faculty	-0.02	-1.75		0.00	-0.08	
% of courses taken taught by irregular faculty	0.01	1.20		0.02	2.23	*
% of courses taken taught by full professors	-0.01	-1.68		0.01	1.01	
% of classmates that were female	0.01	0.90		0.08	4.24	***
% of classmates that were Asian Am	-0.05	-1.08		0.06	1.06	
% of classmates that were foreign	0.01	0.14		-0.08	-1.17	
7.5 to 12.5% of classmates were ethn/racial minority[1]	0.28	1.33		0.05	0.18	
Over 12.5% of classmates were ethn/racial minority[1]	0.20	0.61		-0.18	-0.39	
Experience in *capstone* diversity courses focused on ethnicity/race, gender, or culture						
GPA for diversity courses taken	1.63	13.00	***	2.94	18.77	***
Avg grade awarded in diversity courses taken	-0.68	-3.10	**	-1.46	-4.46	***
% of classmates that were female	-0.01	-1.37		0.00	-0.37	
7.5 to 12.5% of classmates were ethn/racial minority[1]	0.09	0.53		-0.10	-0.41	
Over 12.5% of classmates were ethn/racial minority[1]	-0.03	-0.16		-0.28	-1.18	
% of classmates that were Asian Am	0.01	0.99		0.01	0.27	
% of classmates that were foreign	-0.01	-1.02		-0.01	-0.62	
Avg class size	0.00	-1.81		-0.01	-1.72	
Years from completion of first course to graduation	0.01	0.18		-0.29	-3.03	**

~ As Table 4, Model 1; ^ As Table 4, Model 3; [1] Reference category: less than 7.5% *** p ≤ .001; **p ≤ .01; *p ≤ .05

Table 8: Parameter Estimates of GRE/GMAT Math Score (/10), Bachelor Degree Recipients 1999-2005 (Entered as New Freshmen; N=735)

	Model 1: All Control Variables			Model 2: Restricted		
Fixed effects	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.
Demographics						
Male	3.22	3.41	***	2.00	2.15	*
Ethnicity / Race unknown[1]	2.57	1.34		-1.91	-0.96	
African/Hispanic/Native American[1]	0.67	0.40		-0.40	-0.23	
Asian American[1]	-0.10	-0.07		-0.14	-0.09	
Low-income background (Pell Grant recipient)	0.80	0.74		0.41	0.49	
Precollegiate/Academic Growth						
ACT/SAT Composite	1.41	11.02	***	1.56	15.44	***
Earned AP credits	-1.20	-1.36		-1.00	-1.18	
Cumulative graduating GPA	3.00	2.09	*			
Financial Aid						
Merit-based aid ($1K increment)	-0.11	-1.72	0.09			
Need-based aid ($1K increment)	0.02	0.43				
Campus Experience						
Number of semesters living on campus	-0.12	-0.49				
Varsity athlete member	0.37	0.18				
General Academic Experiences						
Took remedial English	1.95	1.56				
Took remedial math	-2.12	-1.52				
Number of math credits earned	0.28	5.14	***			
Ratio of earned vs. attempted credits	-0.01	-0.14				
Avg credit load per semester	0.47	2.26	**			
Stopout time: % elapsed months to graduation	-0.01	-0.67				
Incompletes/Withdrawals as % of all grades	0.04	0.32				
Number of failed class registration attempts	0.03	1.09				
Took overseas course (USAC)	-0.28	-0.25				
Avg grade awarded in courses taken	-3.46	-1.07				
Core Curriculum Performance[2]						
Fundamentals of college math (120) B or higher	-0.29	-2.81	**			
Fundamentals of college math (120) less than B	-5.14	-3.422	***			
College algebra (124) B or higher	-2.46	-2.30	*			
College algebra (124) less than B	-1.38	-0.98				
Pre-Calculus / Trigonometry (128) B or higher	0.20	0.22				
Pre-Calculus / Trigonometry (128) less than B	-2.11	-2.01	*			
Calculus for Bus/Soc Sci (176) B or higher	0.85	0.69				
Calculus for Bus/Soc Sci (176) less than B	-4.31	-2.33	*			
Calculus 1 (181) B or higher	0.06	0.06				
Calculus 1 (181) less than B	-1.52	-1.24				
English 101 B or higher	0.47	0.56				
English 101 less than B	0.80	0.46				
Core humanities (201) B or higher	0.62	0.51				
Core humanities (201) less than B	0.41	0.32				
Core humanities (202) B or higher	-0.76	-0.60				
Core humanities (202) less than B	1.18	0.81				
Core humanities (203) B or higher	-0.92	-0.85				
Core humanities (203) less than B	-1.72	-1.22				
General capstone B or higher	0.35	0.24				
General capstone less than B	3.29	1.54				
Major capstone B or higher	-0.79	-0.80				
Major capstone less than B	0.90	0.56				
Diversity experience						
Number of diversity courses taken	-0.53	-1.96	0.05	-0.52	-1.92	0.06
% of courses taken taught by female faculty	0.00	0.00		0.00	-0.10	
% of courses taken taught by minority faculty	-0.01	-0.12		-0.03	-0.43	
% of courses taken taught by irregular faculty	0.04	0.89		0.04	0.96	
% of courses taken taught by full professors	0.06	1.58		0.04	0.88	
% of classmates that were female	0.00	-0.07		-0.14	-2.51	*
% of classmates that were Asian Am	-0.29	-1.71	0.09	-0.05	-0.29	
% of classmates that were foreign	0.83	4.95	***	0.88	5.18	***
7.5 to 12.5% of classmates were ethn/racial minority[3]	-1.13	-1.28		-1.35	-1.53	
Over 12.5% of classmates were ethn/racial minority[3]	-1.65	-0.94		-1.60	-0.91	
Model Covariance						
Residual	70.19	18.05[c]	***			
Program major intercept	3.73	1.86[c]	0.06			
Intraclass correlation	0.05					
Random coefficient covariance estimates^*						
Residual	68.77	17.91[c]	***			
Program major intercept variation	20.13	1.14[c]				
Covariance with % of ethn/racial min. classmates	-2.64	-1.26[c]				
Program major slope variation	0.36	-1.42[c]				

Reference categories: [1] Caucasian, [2] Did not take course, [3] Less than 7.5% *** p ≤ .001; **p ≤ .01; *p ≤ .05

[c] Wald Z; ^* Separately derived with same control variables

Table 9: Parameter Estimates of GRE/GMAT Verbal Score (/10), Bachelor Degree Recipients 1999-2005 (Entered as New Freshmen; N=735)

	Model 1: All Control Variables			Model 2: Restricted		
Fixed effects	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.
Demographics						
Male	1.52	2.24	*	1.46	2.21	*
Ethnicity / Race unknown[1]	1.62	1.17		1.91	1.35	
African/Hispanic/Native American[1]	-0.90	-0.74		-0.45	-0.37	
Asian American[1]	-1.91	-1.68		-1.59	-1.39	
Low-income background (Pell Grant recipient)	0.44	0.57		0.99	1.65	
Precollegiate/Academic Growth						
ACT/SAT Composite	1.49	16.12	***	1.53	21.21	***
Earned AP credits	0.41	0.64		1.12	1.86	
Cumulative graduating GPA	0.71	0.68				
Financial Aid						
Merit-based aid ($1K increment)	-0.01	-0.27				
Need-based aid ($1K increment)	0.02	0.65				
Campus Experience						
Number of semesters living on campus	-0.28	-1.56				
Varsity athlete member	-0.22	-0.15				
General Academic Experiences						
Took remedial English	1.73	1.72				
Took remedial math	-1.31	-1.46				
Number of math credits earned	0.08	2.11	*			
Ratio of earned vs. attempted credits	-0.14	-1.78				
Avg credit load per semester	0.05	0.34				
Stopout time: % elapsed months to graduation	-0.02	-1.41				
Incompletes/Withdrawals as % of all grades	0.10	1.24				
Number of failed class registration attempts	-0.01	-0.48				
Took overseas course (USAC)	0.81	0.99				
Avg grade awarded in courses taken	-4.80	-2.07	*			
Core Curriculum Performance[2]						
Fundamentals of college math (120) B or higher	1.84	2.49	*			
Fundamentals of college math (120) less than B	1.83	1.69				
College algebra (124) B or higher	-0.21	-0.28				
College algebra (124) less than B	0.73	0.72				
Pre-Calculus / Trigonometry (128) B or higher	0.56	0.84				
Pre-Calculus / Trigonometry (128) less than B	0.38	0.50				
Calculus for Bus/Soc Sci (176) B or higher	0.95	1.07				
Calculus for Bus/Soc Sci (176) less than B	-0.16	-1.21				
Calculus 1 (181) B or higher	-1.02	-1.36				
Calculus 1 (181) less than B	-2.05	-2.32	*			
English 101 B or higher	-1.26	-2.12	*			
English 101 less than B	-0.75	-0.60				
Core humanities (201) B or higher	0.59	0.68				
Core humanities (201) less than B	-1.81	-1.98	*			
Core humanities (202) B or higher	0.41	0.45				
Core humanities (202) less than B	1.19	1.14				
Core humanities (203) B or higher	0.56	0.73				
Core humanities (203) less than B	-0.36	-0.35				
General capstone B or higher	2.09	1.98	*			
General capstone less than B	4.14	2.71	**			
Major capstone B or higher	1.14	1.64				
Major capstone less than B	0.90	0.80				
Diversity experience						
Number of diversity courses taken	0.00	0.00		0.20	1.05	
% of courses taken taught by female faculty	-0.06	-1.90	0.06	-0.08	-2.67	**
% of courses taken taught by minority faculty	0.03	0.57		0.00	-0.11	
% of courses taken taught by irregular faculty	0.00	0.09		-0.01	-0.30	
% of courses taken taught by full professors	-0.02	-0.63		-0.04	-1.33	
% of classmates that were female	0.08	1.80	0.07	0.08	1.85	0.07
% of classmates that were Asian Am	0.14	1.20		0.08	0.69	
% of classmates that were foreign	0.03	0.21		-0.08	-0.63	
7.5 to 12.5% of classmates were ethn/racial minority[3]	-0.41	-0.64		0.08	0.13	
Over 12.5% of classmates were ethn/racial minority[3]	-0.62	-0.49		-0.61	-0.48	
Model Covariance						
Residual	36.77	18[c]	***			
Program major intercept	1.35	1.37[c]	0.17			
Intraclass correlation	0.04					

Reference categories: [1] Caucasian, [2] Did not take course, [3] Less than 7.5%

*** p ≤ .001; **p ≤ .01; *p ≤ .05

Table 10: Parameter Estimates of GRE/GMAT Verbal Score (/10), Bachelor Degree Recipients 1999-2005 (N=2,154)

	Model 1: All Control Variables			Model 2: Restricted		
Fixed effects	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.
Demographics						
Male	1.23	2.48	*	0.57	1.09	
Ethnicity / Race unknown[1]	0.51	0.55		0.83	0.83	
African/Hispanic/Native American[1]	-2.78	-3.09	**	-3.35	-3.48	***
Asian American[1]	-6.96	-7.84	***	-8.26	-8.70	***
Low-income background (Pell Grant recipient)	-0.01	-0.02		0.41	0.92	
Academic Growth						
Cumulative graduating GPA	0.55	10.70	***			
Financial Aid						
Merit-based aid ($1K increment)	0.14	3.49	***			
Need-based aid ($1K increment)	0.02	0.88				
General Academic Experiences						
Entered as new freshmen[2]	0.61	1.27				
Time to degree completion (years)	0.30	5.09	***			
Core Curriculum Performance[3]						
Number of math courses transferred in: one	0.41	0.84				
Number of math courses transferred in: two or more	1.41	2.04	*			
Number of English courses transferred in: one	2.40	4.55	***			
Number of English courses transferred in: two or more	2.54	4.82	***			
Number of core humanities transferred in: one or two	-1.93	-3.91	***			
Number of core humanities transferred in: 3 or more	-3.52	-6.79	***			
General capstone B or higher	1.22	1.62				
General capstone less than B	1.84	1.65				
Major capstone B or higher	1.53	2.62	**			
Major capstone less than B	3.06	3.38	***			
Diversity experience						
Number of diversity courses taken	-0.13	-0.96		-0.15	-0.97	
% of courses taken taught by female faculty	-0.03	-1.47		-0.03	-1.08	
% of courses taken taught by minority faculty	-0.08	-2.56	**	-0.07	-2.08	
% of courses taken taught by irregular faculty	0.00	-0.07		-0.01	-0.61	
% of courses taken taught by full professors	0.03	1.57		0.04	1.69	
% of classmates that were female	-0.04	-1.44		-0.02	-0.67	
% of classmates that were Asian Am	0.33	3.50	***	0.55	5.60	***
% of classmates that were foreign	-0.13	-1.82	0.07	-0.21	-2.64	**
7.5 to 12.5% of classmates were ethn/racial minority[4]	-0.47	-1.06		-0.83	-1.74	0.08
Over 12.5% of classmates were ethn/racial minority[4]	-0.99	-1.04		-1.92	-1.89	0.06
Model Covariance						
Residual	66.90	32.20[c]	***	78.17	32.40[c]	***
Program major intercept	4.49	3.06[c]	**	5.51	3.25[c]	***
Intraclass correlation	0.06			0.06		
Covariance estimates						
Residual	66.09	31.90[c]	***			
Program major intercept variation	22.93	2.33[c]	*			
Covariance with % of ethn/racial minority classmates	-1.87	-1.87[c]	0.06			
Program major slope variation	0.18	1.61[c]				

Reference categories: [1] Caucasian, [2] Transferred in, [3] Did not take course or transfer in course, [4] less thar *** p ≤ .001; **p ≤ .01; *p ≤ .05
[c] Wald Z

Table 11: Parameter Estimates of GRE/GMAT Math Score (/10), Bachelor Degree Recipients 1999-2005 (N=2,154)

	Model 1: All Control Variables			Model 2: Restricted		
Fixed effects	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.
Demographics						
Male	2.32	3.95	***	1.52	2.48	**
Ethnicity / Race unknown[1]	-0.09	-0.08		0.26	0.23	
African/Hispanic/Native American[1]	-2.08	-1.96	0.05	-2.82	-2.56	***
Asian American[1]	-2.47	-2.35	*	-3.66	-3.35	***
Low-income background (Pell Grant recipient)	-1.11	-1.65		-1.17	-2.29	*
Academic Growth						
Cumulative graduating GPA	0.64	10.53	***			
Financial Aid						
Merit-based aid ($1K increment)	0.14	2.93	**			
Need-based aid ($1K increment)	0.00	-0.13				
General Academic Experiences						
Entered as new freshmen[2]	1.96	3.46	***			
Time to degree completion (years)	0.05	0.68				
Core Curriculum Performance[3]						
Number of math courses transferred in: one	1.01	1.77				
Number of math courses transferred in: two or more	1.55	1.90				
Number of English courses transferred in: one	-0.32	-0.52				
Number of English courses transferred in: two or more	-0.22	-0.35				
Number of core humanities transferred in: one or two	-0.23	-0.39				
Number of core humanities transferred in: 3 or more	-2.20	-3.59	***			
General capstone B or higher	-1.83	-2.05	*			
General capstone less than B	-1.48	-1.12				
Major capstone B or higher	1.55	2.21	*			
Major capstone less than B	3.44	3.21	***			
Diversity experience						
Number of diversity courses taken	-0.45	-2.67	**	-0.54	-3.11	**
% of courses taken taught by female faculty	-0.04	-1.47		-0.02	-0.86	
% of courses taken taught by minority faculty	0.00	-0.04		0.02	0.55	
% of courses taken taught by irregular faculty	0.05	1.86		0.04	1.49	
% of courses taken taught by full professors	0.03	1.37		0.03	1.37	
% of classmates that were female	-0.19	-5.12	***	-0.18	-4.68	***
% of classmates that were Asian Am	0.32	2.83	**	0.54	4.62	***
% of classmates that were foreign	0.34	3.94	***	0.32	3.54	***
7.5 to 12.5% of classmates were ethn/racial minority[4]	-1.18	-2.23	*	-1.44	-2.61	**
Over 12.5% of classmates were ethn/racial minority[4]	-2.70	-2.40	**	-3.25	-2.77	**
Model Covariance						
Residual	93.32	32.08[c]	***	102.11	32.28[c]	***
Program major intercept	7.48	2.82[c]	**	12.89	3.25[c]	***
Intraclass correlation	0.07			0.11		
Covariance estimates						
Residual	92.84	31.92[c]	***			
Program major intercept variation	9.96	1.161[c]				
Covariance with % of ethn/racial minority classmates	-0.31	-.43[c]				
Program major slope variation	0.04	0.59[c]				

Reference categories: [1] Caucasian, [2] Transferred in, [3] Did not take course or transfer in course, [4] less thar *** p ≤ .001; **p ≤ .01; *p ≤ .05

[c] Wald Z

Table12: Parameter Estimates of GRE/GMAT Score (/10), Bachelor Degree Recipients 1999-2005 Who Took a Capstone Course on Ethnicity/Race, Gender, or Culture (N=839)

	Verbal			Math		
Fixed effects for diversity variables only, using same control variables as in Tables 10 and 11	Estimate	t-ratio	Sig.	Estimate	t-ratio	Sig.
Diversity experience						
Number of diversity courses taken	0.03	0.14		-0.62	-2.49	*
% of courses taken taught by female faculty	-0.04	-0.15		-0.05	-1.36	
% of courses taken taught by minority faculty	-0.04	-0.69		0.00	0.05	
% of courses taken taught by irregular faculty	0.02	0.64		0.08	2.11	*
% of courses taken taught by full professors	0.04	1.23		0.07	1.82	0.07
% of classmates that were female	-0.09	-1.80	0.07	-0.25	-4.37	***
% of classmates that were Asian Am	0.41	2.58	**	0.37	2.03	*
% of classmates that were foreign	-0.13	-1.01		0.36	2.31	*
7.5 to 12.5% of classmates were ethn/racial minority[4]	-0.88	-1.21		-2.06	-2.29	*
Over 12.5% of classmates were ethn/racial minority[4]	-1.78	-1.41		-3.99	-2.55	**
Experience in *capstone* diversity courses focused on ethnicity/race, gender, or culture						
GPA for diversity courses taken	-0.85	-1.44		-0.69	-0.91	
Avg grade awarded in diversity courses taken	0.15	0.16		0.49	0.40	
% of classmates that were female	0.00	-0.09		-0.02	-0.85	
% of classmates that were ethnic/racial minority	-0.04	-0.92		0.05	0.84	
% of classmates that were Asian Am	0.10	1.54		0.16	1.90	0.06
% of classmates that were foreign	-0.05	-0.82		-0.11	-1.45	
Avg class size	-0.01	-0.97		0.00	0.09	
Years from completion of first course to graduation	0.25	0.78		-0.58	-1.40	
Model Covariance	64.13			95.74		
Residual	56.78	19.58[c]	***	94.92	19.75[c]	***
Program major intercept	7.35	2.27[c]	*	0.82	.65[c]	
Intraclass correlation	0.11			0.01		

Reference categories: [4] less than 7.5%

*** p ≤ .001; **p ≤ .01; *p ≤ .05

[c] Wald Z

Table 13: Parameter Estimates of Graduate School Enrollment, Bachelor Degree Recipients 1995-2001, 4-Year Tracking, (N=6,252)

USN&WR ranking	**Model 7: 2nd Tier or lower**			**Model 8: 1st Tier or Law/Med School**		
Signficant effects only; all control variables listed	logit (exp β)	Δ - p	Sig.	logit (exp β)	Δ - p	Sig.
Demographics						
Age at graduation (in years)				0.95	-0.19	**
Male	1.21	4.71	**	1.72	2.14	***
Ethnicity / Race unknown[1]						
African/Hispanic/Native American[1]	1.36	7.59	**	2.54	3.66	***
Asian American[1]				0.45	-3.18	**
Financial Aid						
Need-based aid received ($1K increment)	1.01	0.17	**			
Average remaining need per semester ($1K)						
Campus Experience						
Years to complete degree				0.91	-0.39	*
Entered as new student [2]						
Program Major Area [3]						
Business/Economics				0.31	-4.55	***
Education	3.46	30.58	***	0.26	-5.23	**
Health sciences	1.26	5.67	*	0.46	-3.06	**
Arts/Humanities						
Pre-Professional programs	0.69	-9.12	***			
Natural sciences				0.36	-4.00	***
Physical sciences	0.41	-22.23	***	0.08	-9.92	***
Double major	1.59	11.38	**			
Courses Transferred In [4]						
Number of math courses transferred in: one			***			
Number of math courses transferred in: two or more	0.67	-9.91				
Number of core humanities transferred in: one or two						
Number of core humanities transferred in: 3 or more						
General Academic Experiences						
Cumulative graduating GPA				1.28	0.96	***
Graduated with a minor	1.29	6.31	**			
Number of math credits earned	1.03	0.79	***			
Number of upper division science courses	1.03	0.62	***	1.04	0.14	***
Took overseas course (USAC)						
Had one internship/practicum [5]	0.72	-8.18	***	0.66	-1.65	*
Had two or more internship/practicum [5]	0.69	-9.09	***			
Had one independent study [6]				1.52	1.65	**
Had two or more independent studies [6]				1.92	2.57	***
Graduated with no thesis [7]						
Avg class size of courses taken				1.02	0.09	*
Avg grade awarded in courses taken	16.18	68.60	***			
Core Curriculum Performance [8]						
Core humanities (201) B or higher						
Core humanities (201) less than B						
Core humanities (202) B or higher						
Core humanities (202) less than B						
Core humanities (203) B or higher						
Core humanities (203) less than B						
General capstone B or higher						
General capstone less than B	0.74	-7.52	*			
Diversity experience						
Number of diversity courses taken	1.10	2.44	***			
% of courses taken taught by female faculty						
% of courses taken taught by minority faculty						
% of courses taken taught by full professors	1.01	0.22	***			
% of classmates that were female	1.03	0.64	***	0.97	-0.11	*
% of classmates that were Asian Am	0.96	-1.13	**	1.18	0.64	***
% of classmates that were foreign	1.06	1.50	***	0.78	-1.00	***
7.5 to 12.5% of classmates were ethn/racial minority[9]	0.67	-10.08	**			
Over 12.5% of classmates were ethn/racial minority[9]	0.84	-4.29	**			
Experience in diversity courses taken (any type)						
GPA for diversity courses taken						
Avg grade awarded in diversity courses taken	0.65	-10.64	***			
% of classmates that were female				1.01	0.05	*
% of classmates that were ethnic/racial minority				1.02	0.09	*
% of classmates that were Asian Am						
% of classmates that were foreign						
Avg class size						
Avg years from completion of course(s) to graduation	0.88	-3.03	***			
Experience in diversity courses focused on ethnicity/race, gender, or culture^* (N=3,933)						
GPA for diversity courses taken	1.03			1.03		
Avg grade awarded in diversity courses taken	0.79			0.79		
% of classmates that were female	1.00			1.01		
% of classmates that were ethnic/racial minority	1.01			1.01		
% of classmates that were Asian Am	1.00			1.00		
% of classmates that were foreign	1.00			1.01		
Avg class size	1.00			1.00		
Avg years from completion of course(s) to graduation	0.88	-3.23	***	0.90		
No significant interaction between student ethnicity/race and percent of minority students in classes taken						
Caucasian students only model: Compositional and curricular diversity variables^^ (N=5,175)						
Number of diversity courses taken	1.12	2.83	***			
% of courses taken taught by female faculty						
% of courses taken taught by minority faculty						
% of courses taken taught by full professors	1.01	0.24	***			
% of classmates that were female	1.03	0.01	***	0.97	0.11	*
% of classmates that were Asian Am	0.93	-1.85	***	1.16	0.54	***
% of classmates that were foreign	1.07	1.75	***	0.78	0.90	***
7.5 to 12.5% of classmates were ethn/racial minority[9]	0.52	-16.31	***			
Over 12.5% of classmates were ethn/racial minority[9]	0.82	-3.67	**			
GPA for diversity courses taken						
Avg grade awarded in diversity courses taken	0.64	-11.06	***			
% of classmates in div courses that were female	1.00	0.12	*			
% of classmates in div courses that were ethnic/racial minority						
% of classmates in div courses that were Asian Am				0.96	0.15	*
% of classmates in diversity courses that were foreign						
Avg class size of diversity courses taken						
Avg years from completion of div course(s) to graduation	0.87	-3.45	***	0.83	0.66	*
Model Fit						
Deviance Chi-Square alpha-level		>.05				
Nagelkerke pseudo R-square		0.33				
Percent correctly predicted overall		68.70				

*** p ≤ .001; **p ≤ .01; *p ≤ .05

Reference categories: [1] Caucasian, [2] transfer-in student, [3] social science major, [4] no transferred courses, [5] no internship/practicum, [6] three independent studies
[7] graduated with a thesis, [8] did not take course, [9] less than 7.5% of classmates were ethn/racial minority

^^ Separately derived with same control variables for students who took at least one focused diversity course

^* Separately derived with same control variables

Table 14: Parameter Estimates of Graduate School Enrollment, Bachelor Degree Recipients 1995-2001, 4-Year Tracking

USN&WR ranking	**2nd Tier or lower**			**1st Tier or Law/Med School**		
Signficant effects listed only, using all control variables as in Table 13	logit (exp β)	Δ - p	Sig.	logit (exp β)	Δ - p	Sig.
Caucasian students only model: Compositional and curricular diversity variables (N=5,175)						
Number of diversity courses taken	1.12	2.83	***			
% of courses taken taught by female faculty						
% of courses taken taught by minority faculty						
% of courses taken taught by full professors	1.01	0.24	***			
% of classmates that were female	1.03	0.01	***	0.97	0.11	*
% of classmates that were Asian Am	0.93	-1.85	***	1.16	0.54	***
% of classmates that were foreign	1.07	1.75	***	0.78	0.90	***
7.5 to 12.5% of classmates were ethn/racial minority[9]	0.52	-16.31	***			
Over 12.5% of classmates were ethn/racial minority[9]	0.82	-3.67	**			
GPA for diversity courses taken						
Avg grade awarded in diversity courses taken	0.64	-11.06	***			
% of classmates in div courses that were female	1.00	0.12	*			
% of classmates in div courses that were ethnic/racial minority						
% of classmates in div courses that were Asian Am				0.96	0.15	*
% of classmates in diversity courses that were foreign						
Avg class size of diversity courses taken						
Avg years from completion of div course(s) to graduation	0.87	-3.45	***	0.83	0.66	*
Graduates who took diversity courses focused on ethnicity/race, gender, or culture (N=3,933)						
Experience in diversity course(s)						
GPA for diversity courses taken	1.03			1.03		
Avg grade awarded in diversity courses taken	0.79			0.79		
% of classmates that were female	1.00			1.01		
% of classmates that were ethnic/racial minority	1.01			1.01		
% of classmates that were Asian Am	1.00			1.00		
% of classmates that were foreign	1.00			1.01		
Avg class size	1.00			1.00		
Avg years from completion of course(s) to graduation	0.88	-3.23	***	0.90		
Graduates who took *capstone* diversity courses focused on ethnicity/race, gender, or culture (N=2,476)						
Experience in capstone diversity course(s)						
GPA for diversity courses taken	0.90	-2.65		0.43	-3.76	0.053
Avg grade awarded in diversity courses taken	1.09	2.03		2.06	3.17	
% of classmates in div courses that were female	1.00	-0.05		0.99	-0.05	
% of classmates in div courses that were ethnic/racial minority	0.98	-0.42		0.94	-0.26	0.052
% of classmates in div courses that were Asian Am	1.04	0.89	*	1.05	0.23	
% of classmates in diversity courses that were foreign	1.02	0.57		0.98	-0.09	
Avg class size of diversity courses taken	0.99	-0.15		1.01	0.04	
Avg years from completion of div course(s) to graduation	0.94	-1.68		0.90	-0.44	
Model Fit						
Deviance Chi-Square alpha-level		>.05				
Nagelkerke pseudo R-square		0.34				
Percent correctly predicted overall		68.10				

*** p ≤ .001; **p ≤ .01; *p ≤ .05

Reference category: [9] less than 7.5% of classmates were ethn/racial minority

Table 15: Parameter Estimates of Graduate School Enrollment, Bachelor Degree Recipients 1995-2001, 4-Year Tracking, Restricted Model (N=7,330)

USN&WR ranking	**2nd Tier or lower**			**1st Tier or Law/Med School**		
Signficant effects only; all control variables listed	logit (exp β)	Δ - p	Sig.	logit (exp β)	Δ - p	Sig.
Demographics						
Low-income background (Pell Grant recipient)	0.82	-4.87	***	0.89	-0.48	
Male	1.20	4.43	***	1.23	0.90	
Ethnicity / Race unknown[1]	1.19	4.28		1.62	2.06	0.055
African/Hispanic/Native American[1]	1.33	7.00	**	1.55	1.87	0.052
Asian American[1]	1.21	4.68		0.31	-5.09	***
Campus Experience		0.00			0.00	
Entered as new student [2]	1.28	6.00	***	1.73	2.36	***
Diversity experience		0.00			0.00	
Took a capstone course on race, gender, or culture	0.92	-2.08		1.19	0.74	
Number of diversity courses taken	1.06	1.47	***	0.97	-0.15	
% of courses taken taught by female faculty	1.00	-0.10		0.99	-0.04	
% of courses taken taught by minority faculty	1.00	-0.02		1.00	-0.02	
% of courses taken taught by full professors	1.02	0.42	***	1.03	0.10	***
% of classmates that were female	1.04	0.95	***	1.00	0.00	
% of classmates that were Asian Am	0.97	-0.81	**	1.30	1.14	***
% of classmates that were foreign	1.00	0.05		0.66	-1.77	***
7.5 to 12.5% of classmates were ethn/racial minority[9]	0.79	-5.92	***	0.81	-0.93	
Over 12.5% of classmates were ethn/racial minority[9]	0.69	-9.11	**	1.28	1.07	
Model Fit						
Deviance Chi-Square alpha-level		>.05				
Nagelkerke pseudo R-square		0.14				
Percent correctly predicted overall		59.60				

*** p ≤ .001; **p ≤ .01; *p ≤ .05

Reference categories: [1] Caucasian, [2] transfer-in student, [9] less than 7.5% of classmates were ethn/racial minority

Table 16: Parameter Estimates of Self-Reported Critical Thinking Ability, Bachelor Degree Recipients 2002-2005 (N=2,975)

	Model 11: Very Positively			Model 12: Somewhat positively		
Signficant effects only; all control variables listed	logit (exp β)	Δ - p	Sig.	logit (exp β)	Δ - p	Sig.
Demographics						
Age at graduation (in years)						
Male						
Ethnicity / Race unknown[1]	0.3630	-25.32	**	0.473	-18.12	*
African/Hispanic/Native American[1]						
Asian American[1]						
Financial Aid						
Need-based aid received ($1K increment)						
Average remaining need per semester ($1K)						
Campus Experience						
Years to complete degree						
Entered as new student [2]						
Program Major Area [3]						
Business/Economics						
Education						
Health sciences						
Arts/Humanities						
Pre-Professional programs	2.0090	17.43	*			
Natural sciences						
Physical sciences						
Double major						
Courses Transferred In [4]						
Number of math courses transferred in: one						
Number of math courses transferred in: two or more	1.8170	14.91	*			
Number of core humanities transferred in: one or two						
Number of core humanities transferred in: 3 or more						
General Academic Experiences						
Cumulative graduating GPA						
Graduated with a minor						
Number of math credits earned						
Number of upper division science courses						
Took overseas course (USAC)	0.5800	-13.61	*			
Had one internship/practicum [5]						
Had two or more internship/practicum [5]						
Had one independent study [6]	1.7720	14.28	**	1.6580	12.26	*
Had two or more independent studies [6]						
Graduated with no thesis [7]						
Avg class size of courses taken						
Avg grade awarded in courses taken						
Core Curriculum Performance [8]						
Core humanities (201) B or higher						
Core humanities (201) less than B						
Core humanities (202) B or higher						
Core humanities (202) less than B						
Core humanities (203) B or higher						
Core humanities (203) less than B						
General capstone B or higher						
General capstone less than B						
Diversity experience						
Number of diversity courses taken						
% of courses taken taught by female faculty						
% of courses taken taught by minority faculty						
% of courses taken taught by full professors						
% of classmates that were female						
% of classmates that were Asian Am						
% of classmates that were foreign						
7.5 to 12.5% of classmates were ethn/racial minority [9]						
Over 12.5% of classmates were ethn/racial minority [9]						
Would you attend institution again? (self-rated)						
definitely yes [10]	11.7450	61.50	***	2.7040	24.13	***
probably yes [10]	3.1290	28.54	***	1.7250	13.20	***
Experience in diversity courses taken, any type^^						
GPA for diversity courses taken						
Avg grade awarded in diversity courses taken						
% of classmates that were female						
% of classmates that were ethnic/racial minority						
% of classmates that were Asian Am						
% of classmates that were foreign						
Avg class size						
Avg years from completion of course(s) to graduation						
No significant interaction between student ethnicity/race and percent of minority students in classes taken						
Model Fit						
Deviance Chi-Square alpha-level		>.05				
Nagelkerke pseudo R-squae		0.15				
Percent correctly predicted overall		55.60				

*** p ≤ .001; **p ≤ .01; *p ≤ .05

Reference categories: [1] Caucasian, [2] transfer-in student, [3] social science major, [4] no transferred courses, [5] no internship/practicum, [6] three independent studies

[7] graduated with a thesis, [8] did not take course, [9] less than 7.5% of classmates were ethn/racial minority, [10] probably not or no

^^ Separately derived with same control variables

Table 17: Parameter Estimates of Self-Reported Understanding of Racial Issues, Bachelor Degree Recipients 2002-2005 (N=3,242)

	Model 13: Very Positively			Model 14: Somewhat positively		
Signficant effects only; all control variables listed	logit (exp β)	Δ - p	Sig.	logit (exp β)	Δ - p	Sig.
Demographics						
Age at graduation (in years)	1.0500	7.29	***			
Male						
Ethnicity / Race unknown[1]	0.5580	-8.68	*			
African/Hispanic/Native American[1]						
Asian American[1]						
Financial Aid						
Need-based aid received ($1K increment)				1.009	0.20	*
Average remaining need per semester ($1K)						
Campus Experience						
Years to complete degree						
Entered as new student [2]						
Program Major Area [3]						
Business/Economics	0.6240	-7.01	*			
Education						
Health sciences						
Arts/Humanities						
Pre-Professional programs	2.0440	10.64	***			
Natural sciences						
Physical sciences						
Double major						
Courses Transferred In [4]						
Number of math courses transferred in: one						
Number of math courses transferred in: two or more						
Number of core humanities transferred in: one or two						
Number of core humanities transferred in: 3 or more						
General Academic Experiences						
Cumulative graduating GPA						
Graduated with a minor						
Number of math credits earned						
Number of upper division science courses						
Took overseas course (USAC)						
Had one internship/practicum [5]						
Had two or more internship/practicum [5]						
Had one independent study [6]						
Had two or more independent studies [6]						
Graduated with no thesis [7]						
Avg class size of courses taken						
Avg grade awarded in courses taken						
Core Curriculum Performance [8]						
Core humanities (201) B or higher	0.6680	-6.00	*			
Core humanities (201) less than B						
Core humanities (202) B or higher						
Core humanities (202) less than B						
Core humanities (203) B or higher						
Core humanities (203) less than B						
General capstone B or higher						
General capstone less than B						
Diversity experience						
Number of diversity courses taken	1.2690	3.54	***	1.1290	2.75	***
% of courses taken taught by female faculty				1.0170	0.39	***
% of courses taken taught by minority faculty				1.0140	0.32	*
% of courses taken taught by full professors						
% of classmates that were female						
% of classmates that were Asian Am						
% of classmates that were foreign						
7.5 to 12.5% of classmates were ethn/racial minority [9]						
Over 12.5% of classmates were ethn/racial minority [9]	1.4460	5.49	*	1.4020	7.68	**
Would you attend institution again? (self-rated)						
definitely yes [10]						
probably yes [10]						
Experience in diversity courses taken, any type^^						
GPA for diversity courses taken						
Avg grade awarded in diversity courses taken						
% of classmates that were female						
% of classmates that were ethnic/racial minority						
% of classmates that were Asian Am						
% of classmates that were foreign						
Avg class size						
Avg years from completion of course(s) to graduation						
Interaction: Asian Am.* % of minority classmates	0.7890	-3.53	*			
Interaction: Unknown Ethn/Race * % of minority classmates				0.8200	-4.50	*
Model Fit						
Deviance Chi-Square alpha-level		>.05				
Nagelkerke pseudo R-squae		0.14				
Percent correctly predicted overall		51.10				

*** p ≤ .001; **p ≤ .01; *p ≤ .05

Reference categories: [1] Caucasian, [2] transfer-in student, [3] social science major, [4] no transferred courses, [5] no internship/practicum, [6] three independent studies
[7] graduated with a thesis, [8] did not take course, [9] less than 7.5% of classmates were ethn/racial minority, [10] probably not or no

^^ Separately derived with same control variables

Table 18: Parameter Estimates of Self-Reported Understanding of Racial Issues, Caucasian Bachelor Degree Recipients 2002-2005 (N=402)

	Model 15: Very Positively			Model 16: Somewhat positively		
Signficant effects only; all control variables listed	logit (exp β)	Δ - p	Sig.	logit (exp β)	Δ - p	Sig.
Demographics						
Age at graduation (in years)						
Male						
Financial Aid						
Need-based aid received ($1K increment)	1.0350	0.38	*			
Campus Experience						
Entered as new student [2]						
Courses Transferred In [4]						
Number of core humanities transferred in: one or two						
Number of core humanities transferred in: 3 or more						
General Academic Experiences						
Cumulative graduating GPA						
Number of math credits earned	0.9310	-0.80	0.0700			
Core Curriculum Performance [8]						
Core humanities (201) B or higher						
Core humanities (201) less than B						
Core humanities (202) B or higher						
Core humanities (202) less than B				3.7190	30.99	*
Core humanities (203) B or higher						
Core humanities (203) less than B						
Diversity experience						
Number of diversity courses taken	3.4010	13.57	**	3.4410	29.15	**
% of courses taken taught by female faculty						
% of courses taken taught by minority faculty						
% of courses taken taught by full professors						
% of classmates that were female						
% of classmates that were Asian Am				0.8690	-3.30	*
% of classmates that were foreign						
% of classmates that were ethnic/racial minority				1.1500	3.30	0.077
Racial discrimination is no longer a problem (CIRP)						
disagree stongly [10]				5.8610	41.70	*
disagree somewhat [10]						
Experience in diversity courses taken, any type						
GPA for diversity courses taken						
Avg grade awarded in diversity courses taken						
% of classmates that were female						
% of classmates that were ethnic/racial minority	0.9230	-0.89	0.0610			
% of classmates that were Asian Am						
% of classmates that were foreign						
Avg class size						
Avg years from completion of course(s) to graduation	1.3790	3.57	0.0520			
Interaction term: Racial discrimination is no longer a problem						
(disagree stronly) w/ number of diversity courses taken				0.4280	-20.00	0.06100
disagree somewhat w/ number of diversity courses taken				0.2950	-28.80	**
Model Fit						
Deviance Chi-Square alpha-level		>.05				
Nagelkerke pseudo R-squae		0.27				
Percent correctly predicted overall		59.50				

*** p ≤ .001; **p ≤ .01; *p ≤ .05

Reference categories: [2] transfer-in student, [4] no transferred courses

[8] did not take course, [10] agree somewhat or strongly

Table 19: Parameter Estimates of Self-Reported Understanding of Other Cultures, Bachelor Degree Recipients 2002-2005 (N=3,243)

	Model 17: Very Positively			Model 18: Somewhat positively		
Signficant effects only; all control variables listed	logit (exp β)	Δ - p	Sig.	logit (exp β)	Δ - p	Sig.
Demographics						
Age at graduation (in years)	1.0390	0.77	***			
Male				1.380	7.55	**
Ethnicity / Race unknown[1]	0.6270	-9.48	*	0.651	-10.08	*
African/Hispanic/Native American[1]						
Asian American[1]						
Financial Aid						
Need-based aid received ($1K increment)						
Average remaining need per semester ($1K)						
Campus Experience						
Years to complete degree						
Entered as new student [2]						
Program Major Area [3]						
Business/Economics	0.5770	-11.16	**	0.686	-8.81	*
Education						
Health sciences						
Arts/Humanities						
Pre-Professional programs						
Natural sciences				0.544	-14.27	**
Physical sciences						
Double major						
Courses Transferred In [4]						
Number of math courses transferred in: one						
Number of math courses transferred in: two or more						
Number of core humanities transferred in: one or two						
Number of core humanities transferred in: 3 or more						
General Academic Experiences						
Cumulative graduating GPA						
Graduated with a minor						
Number of math credits earned				0.9830	-0.40	*
Number of upper division science courses	0.9890	-0.22	*			
Took overseas course (USAC)	2.7390	20.45	***			
Had one internship/practicum [5]						
Had two or more internship/practicum [5]						
Had one independent study [6]				0.7540	-6.61	*
Had two or more independent studies [6]						
Graduated with no thesis [7]						
Avg class size of courses taken						
Avg grade awarded in courses taken						
Core Curriculum Performance [8]						
Core humanities (201) B or higher						
Core humanities (201) less than B						
Core humanities (202) B or higher						
Core humanities (202) less than B						
Core humanities (203) B or higher						
Core humanities (203) less than B						
General capstone B or higher						
General capstone less than B						
Diversity experience						
Number of diversity courses taken	1.3080	5.44	***	1.1280	2.84	**
% of courses taken taught by female faculty						
% of courses taken taught by minority faculty						
% of courses taken taught by full professors						
% of classmates that were female						
% of classmates that were Asian Am						
% of classmates that were foreign						
7.5 to 12.5% of classmates were ethn/racial minority [9]						
Over 12.5% of classmates were ethn/racial minority [9]						
Would you attend institution again? (self-rated)^^						
definitely yes [10]	5.3320	37.78	***	2.9560	25.30	***
probably yes [10]	2.3510	19.29	***	2.3190	19.63	***
Experience in diversity courses taken, focused and any type^^						
GPA for diversity courses taken						
Avg grade awarded in diversity courses taken						
% of classmates that were female						
% of classmates that were ethnic/racial minority						
% of classmates that were Asian Am						
% of classmates that were foreign						
Avg class size						
Avg years from completion of course(s) to graduation						
Model Fit						
Deviance Chi-Square alpha-level		>.05				
Nagelkerke pseudo R-squae		0.15				
Percent correctly predicted overall		46.70				

*** p ≤ .001; **p ≤ .01; *p ≤ .05

Reference categories: [1] Caucasian, [2] transfer-in student, [3] social science major, [4] no transferred courses, [5] no internship/practicum, [6] three independent studies
[7] graduated with a thesis, [8] did not take course, [9] less than 7.5% of classmates were ethn/racial minority, [10] probably not or no

^^ Separately derived with same control variables