

Diversity and Educational Benefits

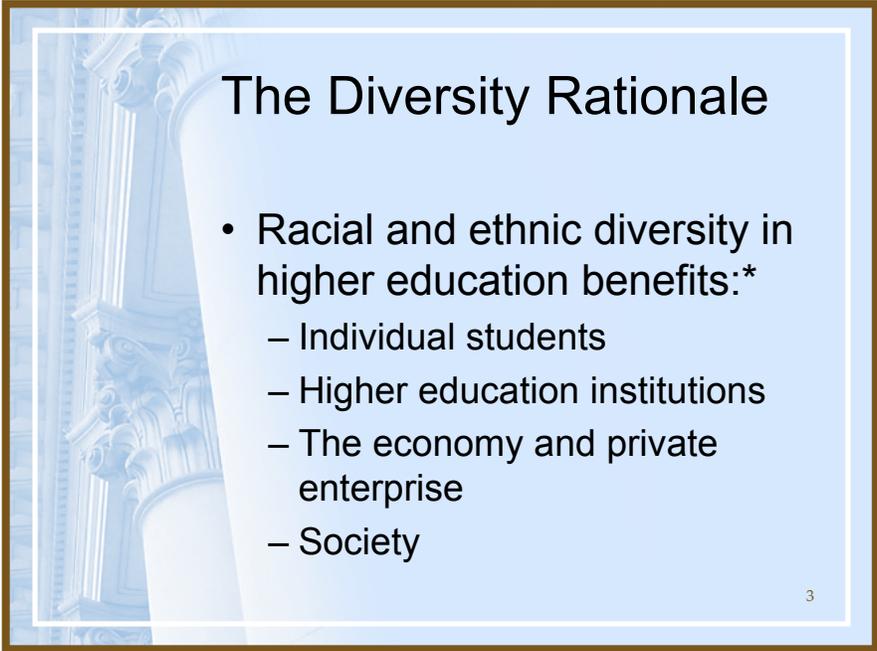
Moving Beyond Subjective Survey-Based Data

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Purpose of Study

- Estimate the impact of diversity on educational outcomes
- Use of objective measures of diversity and educational outcomes
- Inform theory on effects of diversity in higher education
 - Inform curriculum development

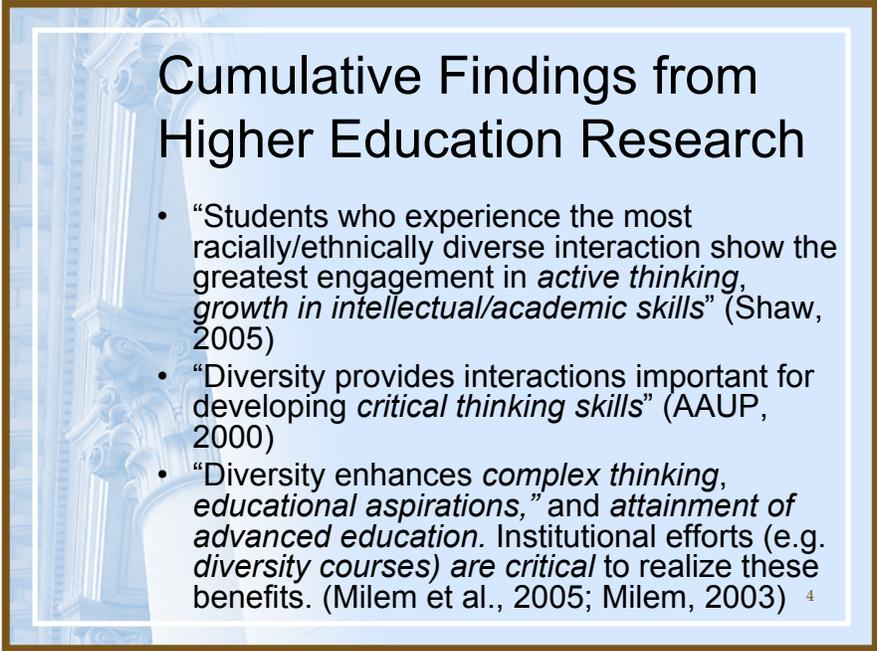


The Diversity Rationale

- Racial and ethnic diversity in higher education benefits:*
 - Individual students
 - Higher education institutions
 - The economy and private enterprise
 - Society

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*(Milem, 2003)



Cumulative Findings from Higher Education Research

- “Students who experience the most racially/ethnically diverse interaction show the greatest engagement in *active thinking*, *growth in intellectual/academic skills*” (Shaw, 2005)
- “Diversity provides interactions important for developing *critical thinking skills*” (AAUP, 2000)
- “Diversity enhances *complex thinking*, *educational aspirations*,” and *attainment of advanced education*. Institutional efforts (e.g. *diversity courses*) are *critical* to realize these benefits. (Milem et al., 2005; Milem, 2003) ⁴

Cumulative Findings from Higher Education Research

- Individual benefits include:
 - Enhanced critical, complex thinking ability
 - Enhanced classroom discussions
 - Greater satisfaction with the college experience
 - Enhanced ability to understand diverse perspectives

From *Compelling Interest: Examining the Evidence on Racial Dynamics in Colleges and Universities* (Eds. Chang et al., 2003, p. 130)

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Limitations in Findings from Higher Education Research

- “[A]ll the findings are based solely on student self-reports.” (Pascarella and Terenzini, 2005, p. 130)
 - E.g., attended racial awareness workshop, interacted with racially/ethnically different students, perception of diversity focus in curriculum)
- Lack of randomized studies
- Lack of meta-analysis based on campus-level assessments. (Friedl, 1999)
- Lack of empirical research linking cognitive growth to diversity in the classroom. (Perloff and Bryant, 2000)

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Limitations with Survey-Based, Self-Reported Data

- *Attitudinal questions*: Responses are subjective, impressionistic (e.g., growth in critical thinking, racial understanding)
- *Lack of conceptual/operational definition*: what is 'critical thinking', person from 'different background' (Banta, 1991).
- *Social desirability bias*: Over-reporting of socially desirable behavior (e.g., interacting with person from different background) Marlowe-Crowne Social Desirability Scale?! (Gonyea, 2005)

Limitations with Survey-Based, Self-Reported Data

- *Halo Error*: Responders tend to ignore specific evaluation criteria associated with specific questions due to general perception
 - Halo effect may account for significant variation in perceived learning (Gonyea, 2005)
 - Modest correlation between self-reported and objective measures of learning (Pascarella, 2001)

Limitations with Survey-Based, Self-Reported Data

- Recommendations by *New Directions for Institutional Research* (Gonyea, 2005):
 - Back up the accuracy of self-reported data with school records, especially when data are used in *high-stakes decisions*
 - Use multiple data sources or triangulation rather than relying solely on self-reported data

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Limitations with Survey-Based, Self-Reported Data

- High-stakes Supreme Court decision in *Grutter v. Bollinger* (2003 Michigan affirmative action case) based on:
 - Self-reported survey data (CIRP, MSS, IGRCC) only in amicus brief (Gurin expert report)
 - Self-selected, non-randomized convenience samples
 - No direct testing of statistical interaction with compositional diversity
 - No separation of Asian Americans in analyses
 - On Gurin report, see Gurin (1999), Staddon (2003), Zuriff (2002).

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Contradictory Findings

- Hanson, Owan, Pan (2006): No academic gain-group diversity link in randomized study of undergrad management students
- Schoenecker et al. (1997): No positive link between group diversity and group performance in management capstone courses, using structural-equation model
- Antonio et al. (2004): Positive effect of minority *opinion*, but not race, in longitudinal experimental design
- Brehm (2004): No link between diversity course exposure and support for policies to promote racial harmony
- Arcidiacono and Vigdor (2003): No link between college diversity and post-graduate degree attainment, life satisfaction
- Astin (1993): No link with tested outcomes to ethnic/racial diversity (p. 362), few direct effects of small size with curricular diversity
- Peer-effect research at K-12 level shows mixed or mostly negative effects associated with student diversity (Hoxby, 2002; Hanushek et al., 2003; Massey, 2006; Caldas & Bankston, 2005; Steinberg, 1996)
- Research on average rate of learning across ethnic/racial group not considered in higher education diversity studies (Carneiro et al. 2003; Fryer & Levitt, 2005; De Frias et al, 2006)

Beyond Self-Reported Data

- Capturing 'diversity' via direct, objective measures in this study:
 - Minority: $\geq 12.5\%$ *critical-mass* categorized (Hispanic, Black, Native Am)
 - Asian Am
 - Female
 - Foreign
- Average % of enrollees in all regular courses completed by individual student*

Student Compositional Metrics

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Beyond Self-Reported Data

- Capturing 'diversity' via direct, objective measures in this study:

- Minority
(Hispanic, Black, Native Am, Asian)
- Irregular contract
- Female
- Full professor (age)

*Average % of
faculty who taught
all regular courses
completed by
individual student*

Faculty Compositional Metrics

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Beyond Self-Reported Data

- Capturing influence of compositional 'diversity' on curricular 'diversity' via direct, objective measures in this study:

- Minority: critical mass cat.
(Hispanic, Black, Native Am)
- Asian Am
- Female
- Foreign

*Average % of enrollees
in all 'diversity' courses
by type (e.g. capstone)
completed by individual
student*

Metrics for student compositional and *interactional* diversity via capstone diversity courses that stress student *classroom interaction*; at least 1 course is required for graduation ([list of 14 courses](#))

Beyond Self-Reported Data

- Capturing curricular 'diversity' via direct, objective measures in this study:

- Number completed
 - Avg grade for student
 - Avg grade for classmates
 - Avg class size
 - Enrollment timing
- 'Diversity' courses completed by individual student*

Metrics for participation in, and achievement with, curricular 'diversity' at the institution: *55% of graduates took two or more 'diversity courses'*

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Beyond Self-Reported Data

- Capturing educational *outcomes* via direct, objective measures in this study:

- Final cumulative GPA
 - GRE/GMAT Quantitative score
 - GRE/GMAT Verbal score
 - Graduate school enrollment by type of institution
- For graduated bachelor degree recipients*

Metrics for growth in academic skills after controlling for pre-collegiate achievement and ability

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Not Beyond Self-Reported Data

- Capturing self-reported student assessment of their ability:
 - to think critically
 - to think independently
 - to think creatively
 - to understand racial issues
 - to understand other cultures
 - to understand gender issues
 - to understand moral/ethical issues

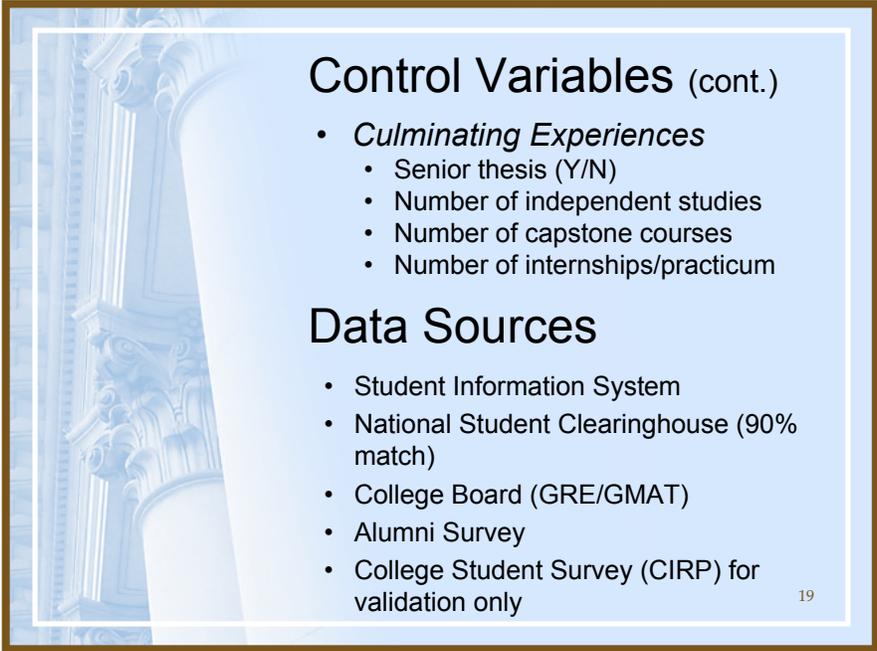
For graduated bachelor degree recipients

Attitudinal metrics for post-graduate satisfaction with undergraduate experience and correlation with **objective** 'diversity' indicators ¹⁷

Control Variables

- *Demographic*
 - Gender
 - Ethnicity/race
 - Age (Time-to-degree)
 - Parent income (via financial aid)
- *Academic Growth*
 - ACT/SAT
 - AP credits
 - Probation status (Y/N)
 - New vs. transfer-in
- *Campus Experience*
 - On-campus living (length)
 - Varsity athlete (Y/N)
- *Financial Aid*
 - Merit-based \$ received
 - Need-based \$ received
 - Remaining need (avg/year)
- *Academic Experience*
 - Program major
 - Remedial English/math
 - Math credits earned
 - Upper div. science credits
 - Earned/attempted credits ratio
 - Avg grade awarded in classes taken (grading eff)
 - Avg size of classes taken
- *Core Curriculum Grades*
 - English/math gateway courses for major
 - Core humanities

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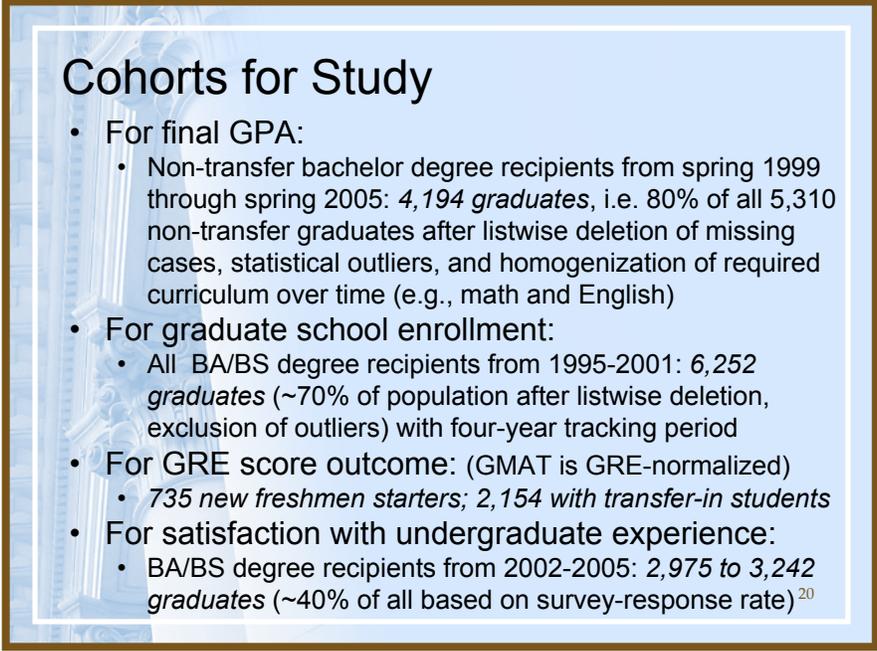
Control Variables (cont.)

- *Culminating Experiences*
 - Senior thesis (Y/N)
 - Number of independent studies
 - Number of capstone courses
 - Number of internships/practicum

Data Sources

- Student Information System
- National Student Clearinghouse (90% match)
- College Board (GRE/GMAT)
- Alumni Survey
- College Student Survey (CIRP) for validation only

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Cohorts for Study

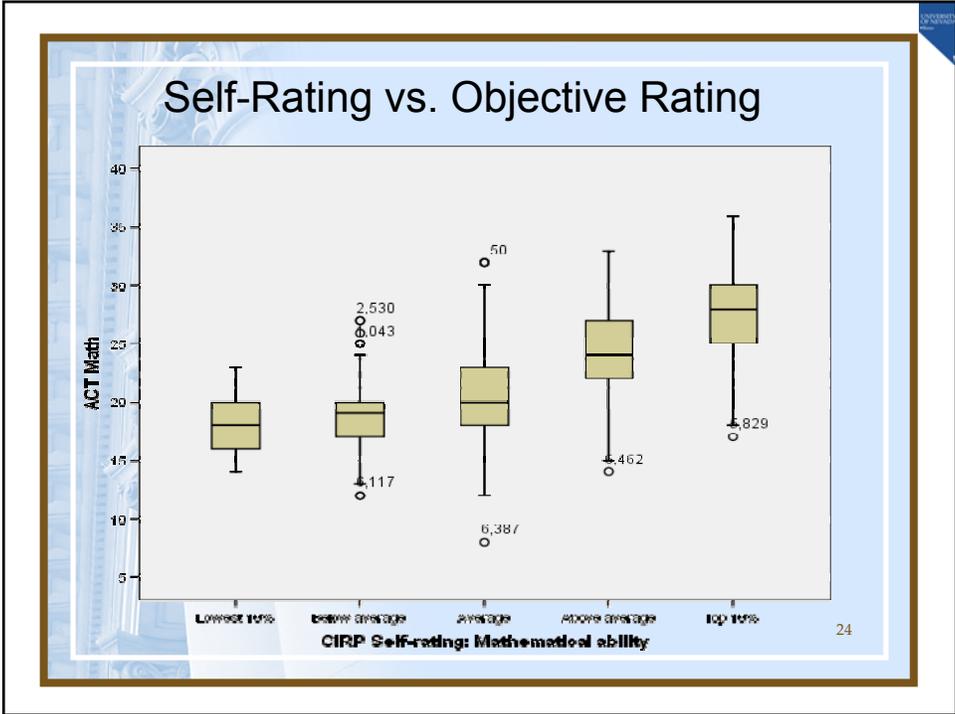
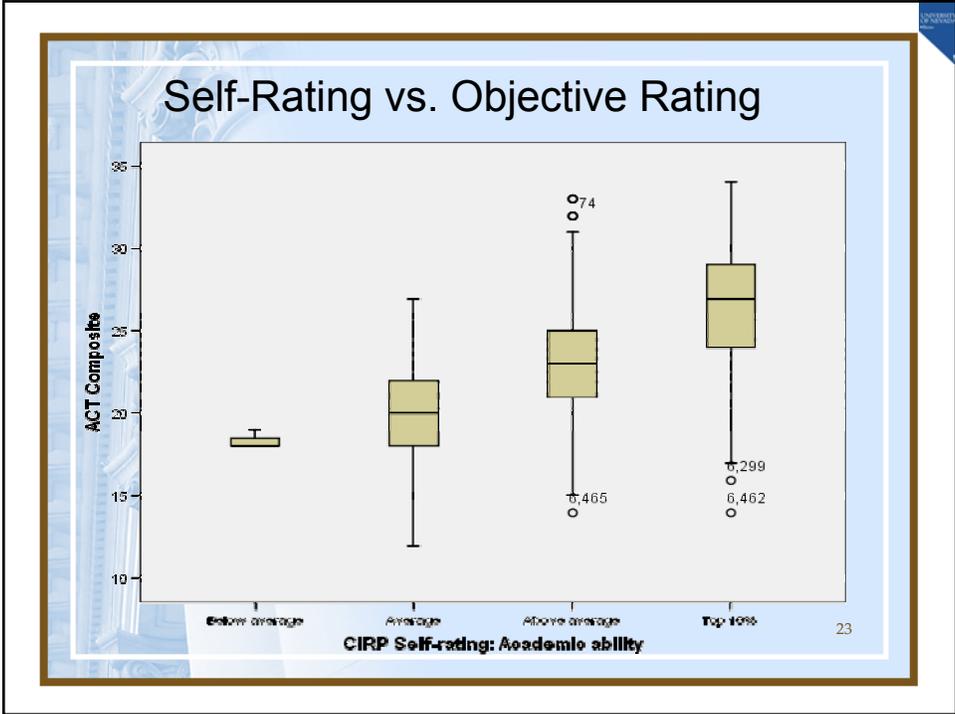
- For final GPA:
 - Non-transfer bachelor degree recipients from spring 1999 through spring 2005: *4,194 graduates*, i.e. 80% of all 5,310 non-transfer graduates after listwise deletion of missing cases, statistical outliers, and homogenization of required curriculum over time (e.g., math and English)
- For graduate school enrollment:
 - All BA/BS degree recipients from 1995-2001: *6,252 graduates* (~70% of population after listwise deletion, exclusion of outliers) with four-year tracking period
- For GRE score outcome: (GMAT is GRE-normalized)
 - *735 new freshmen starters; 2,154 with transfer-in students*
- For satisfaction with undergraduate experience:
 - BA/BS degree recipients from 2002-2005: *2,975 to 3,242 graduates* (~40% of all based on survey-response rate)²⁰

Statistical Methods

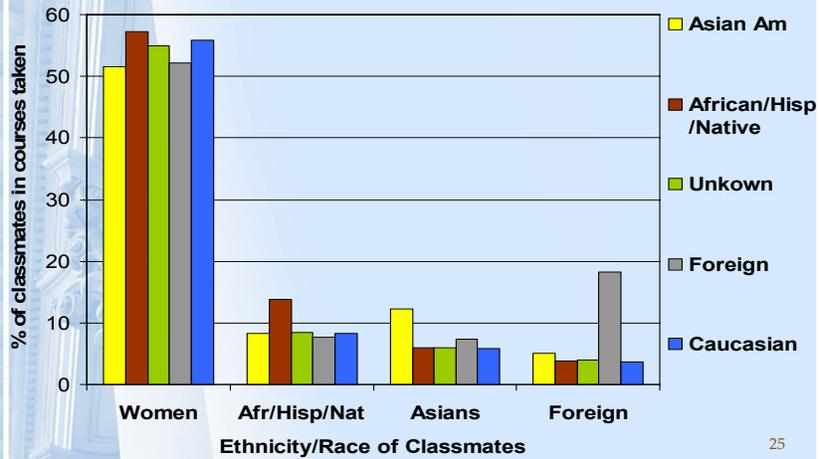
- Undergraduate Achievement (final GPA, GRE scores): *Mixed-level regression models* (HLM) with 45 categorized program majors at level-2 to estimate proximate effect with random intercept
- Graduate school enrollment and post-graduate satisfaction: *Multinomial, non-ordered logit models*
- Data quality confirmed via:
 - Collinearity diagnostics (VIF < 3, variance decomp. < 0.7)
 - Regression diagnostics (std residuals < 3, Cook's *D* no visual separation)
 - Cross-tabulation with program major variable to obviate data sparseness in logit models
 - % distribution on student demographics for small-N models)
- Model fit based on intraclass correlation, deviation chi-square, explained residual/intergroup variance, AIC, -2 log likelihood, Nagelkerke R²
- No centering of level-1 variables due to focus on individual effects (see Paccagnella, 2006) 21

Statistical Methods

- Determination of statistical significance
 - HLM models: t-ratio (no effect size measure)
 - Logit models: percentage change in outcome probability associated with unit change in predictor at $\alpha \leq .05$, using linear transformation for log odds ($p*[1-p]*\beta$) (slightly larger than Peterson's *p*, but more intuitive, see Morgan & Teachman, 1988; Aldrich & Nelson, 1984) 22

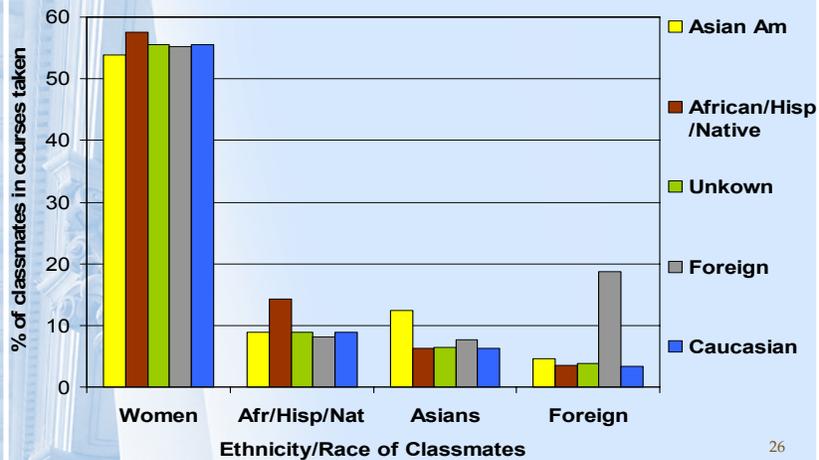


Classroom Ethnic/Racial Composition: Bachelor Degree Recipients, 1995-2005



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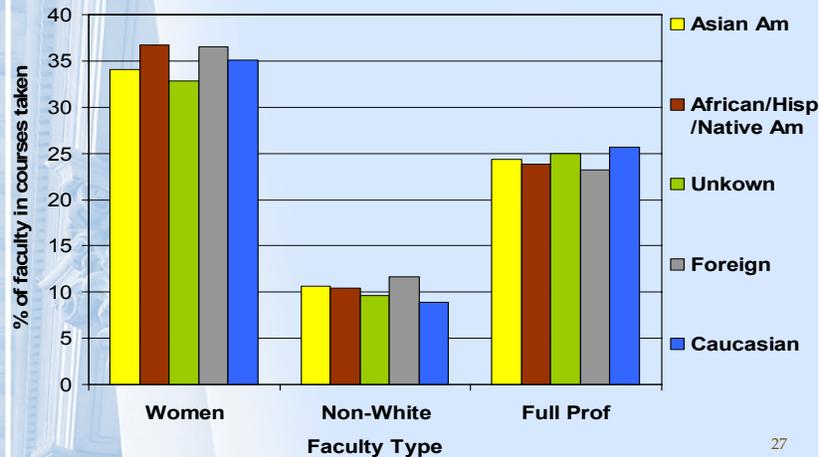
Classroom Ethnic/Racial Composition: Bachelor Degree Recipients, 1995-2005 (Excl. Transfers)



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Exposure to Instructional Faculty Type:

Bachelor Degree Recipients, 1995-2005 (Excl. Transfers)

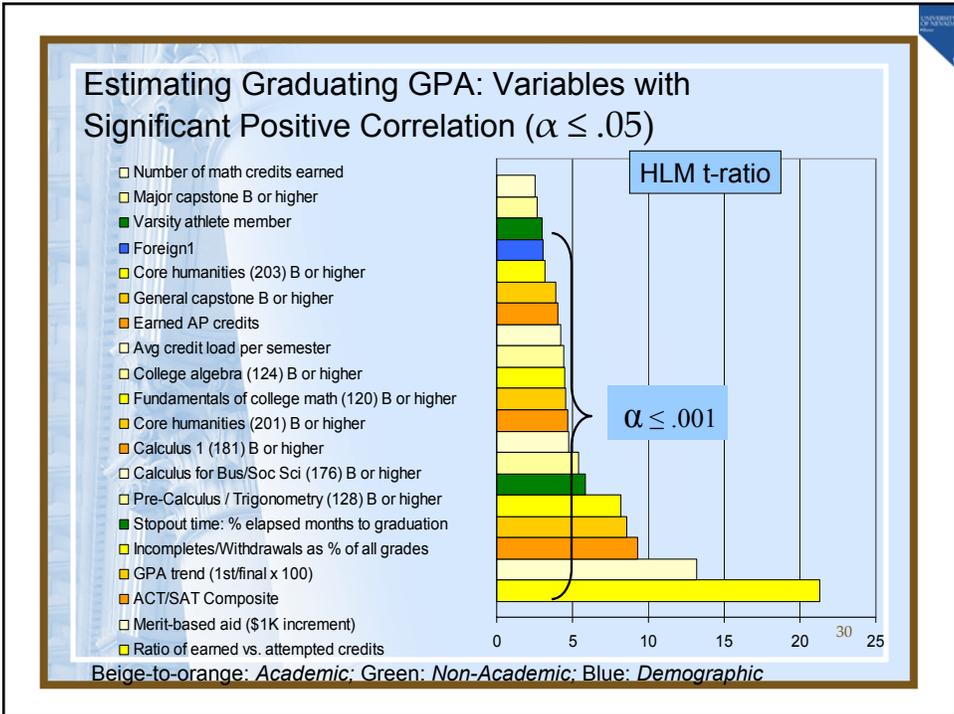
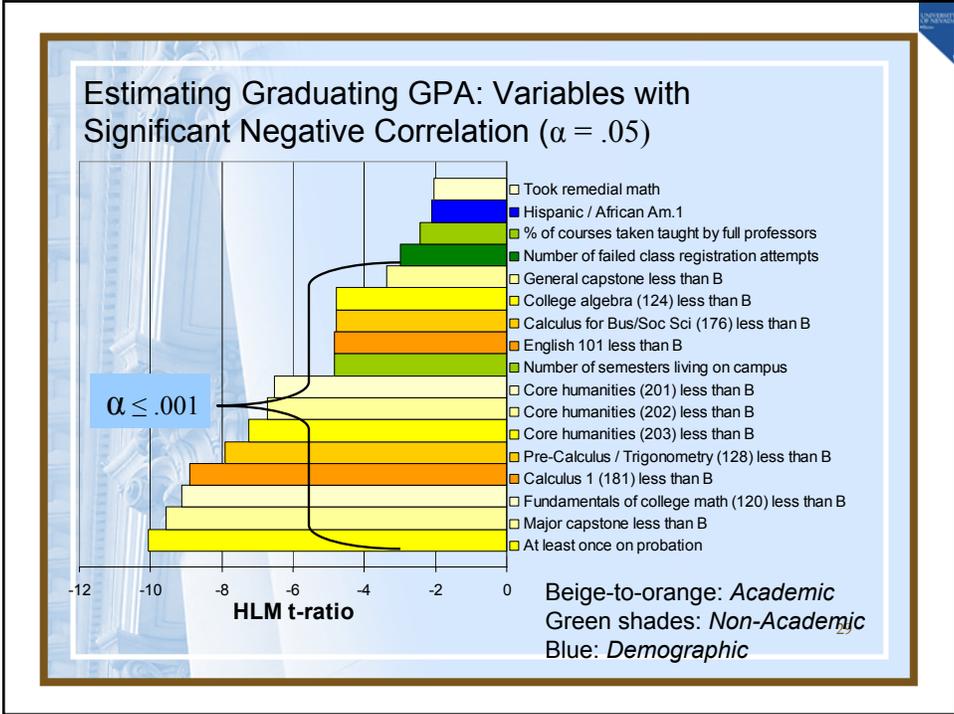


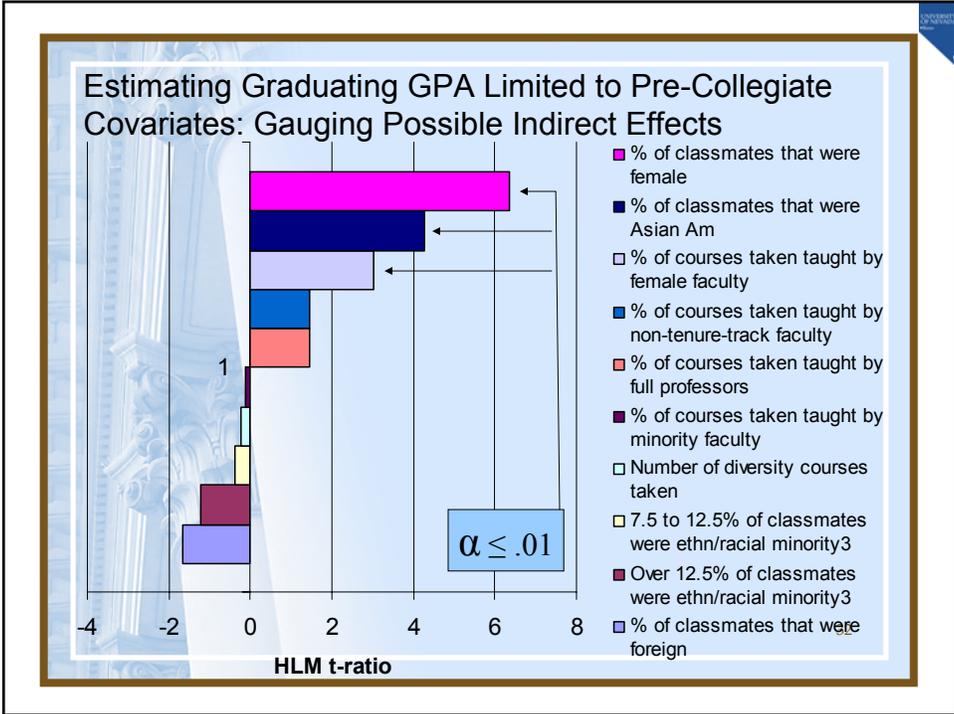
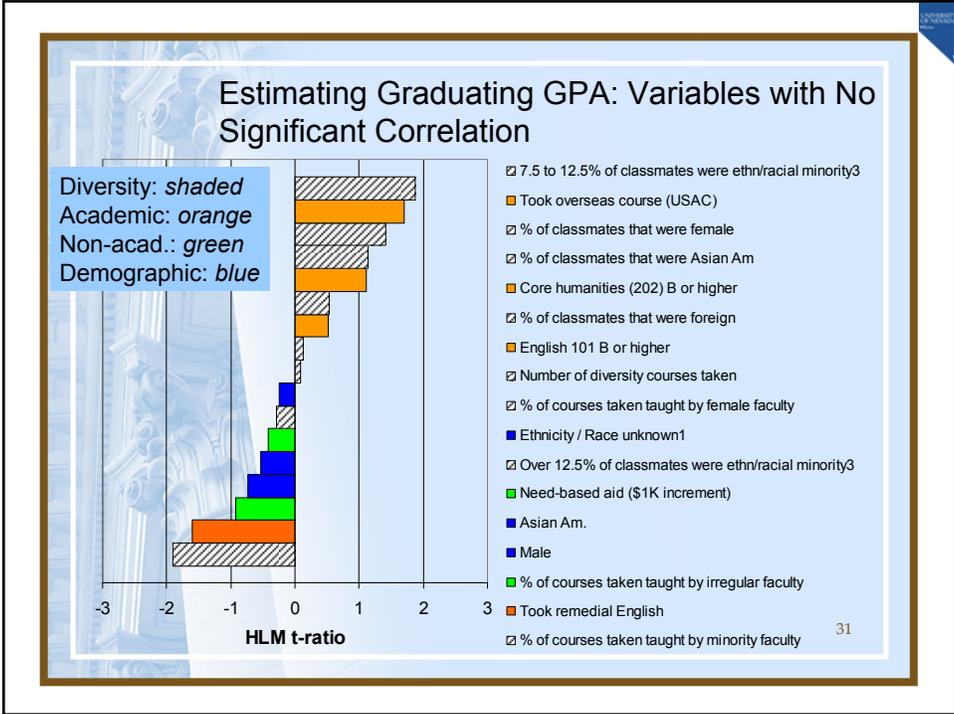
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What's in a Grade? (i.e., final undergrad GPA)

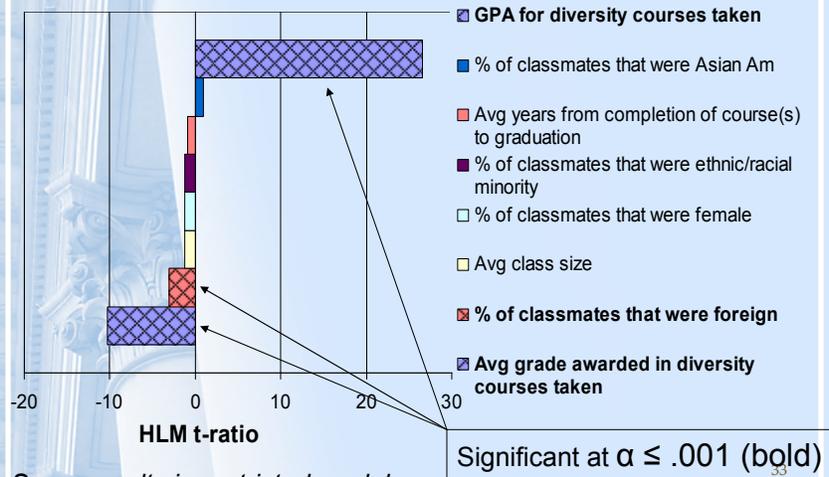
- “One might argue that grades merely reflect the ability to repeat on exams material that has been memorized the night before and forgotten the night after. [G]rades reflect far more. Rather than testing for rote memorization, exams typically call for thoughtful essays, comprehension of reading assignment, displaying more than one perspective on a topic, and organizing and expressing one's thoughts effectively. Grades also depend on papers that plumb the student's ability to research and master a topic, think creatively about it, and write skillfully. Often grades are also determined by independent research, group projects, oral presentations, and lab experiments.”

– G. E. Zuriff, Clinical Psychologist, MIT; Professor of Psychology, Wheaton College (Norton, MA), *World & I*, August 2002.



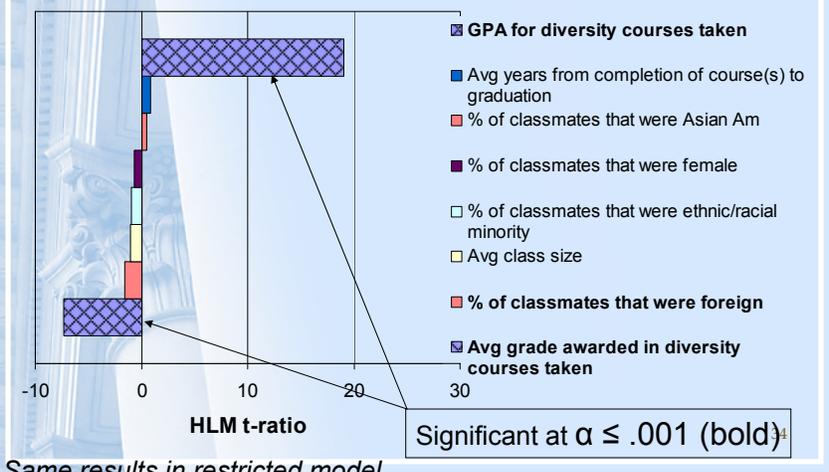


Estimating Graduating GPA: Adding Exposure to 'Diversity' Courses



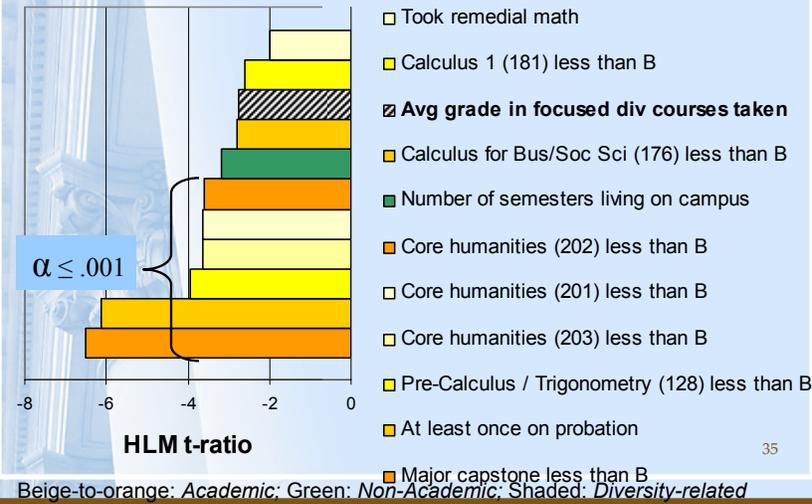
Same results in restricted model

Estimating Graduating GPA: Adding Exposure to 'Diversity' Courses Focused on Ethnicity/Race, Gender, and Culture (N = 2,269)



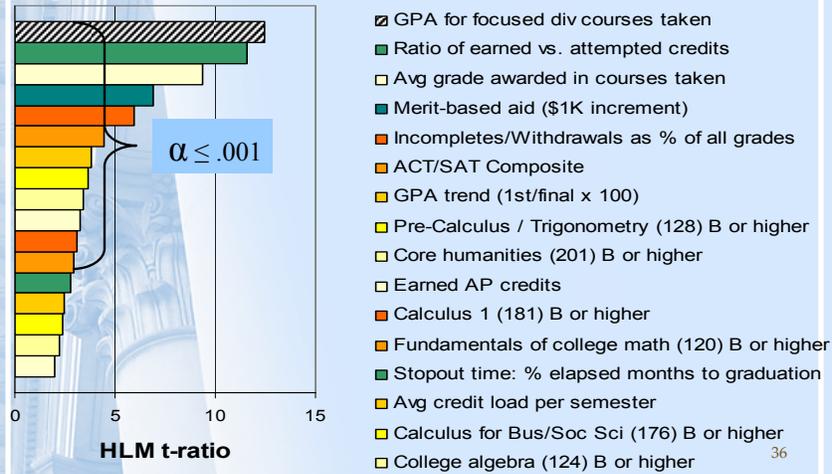
Same results in restricted model

Estimating Graduating GPA for Those Who Took Focused* Diversity Capstone Courses: Variables with Significant Negative Correlation ($\alpha \leq .05$; N = 1,439)



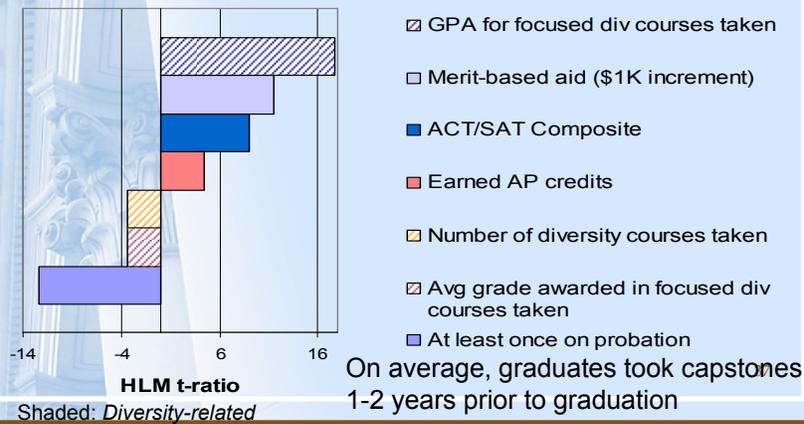
*Ethnicity/race, gender, culture

Estimating Graduating GPA for Those Who Took Focused* Diversity Capstone Courses: Variables with Significant Positive Correlation ($\alpha \leq .05$; N = 1,439)



*Ethnicity/race, gender, culture

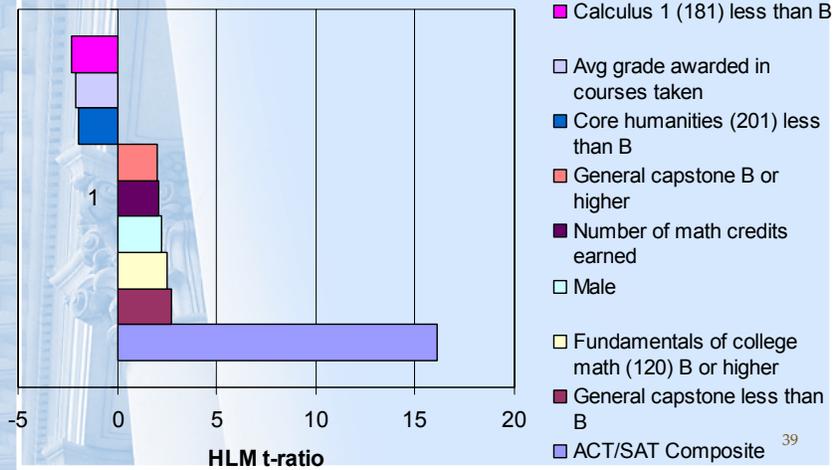
Estimating Graduating GPA for Those Who Took Focused* Diversity Capstone Courses: Variables with Significant Correlation ($\alpha \leq .05$; N = 1,439) *Excluding* Campus Experience, General Academic, and Core Curriculum Variables



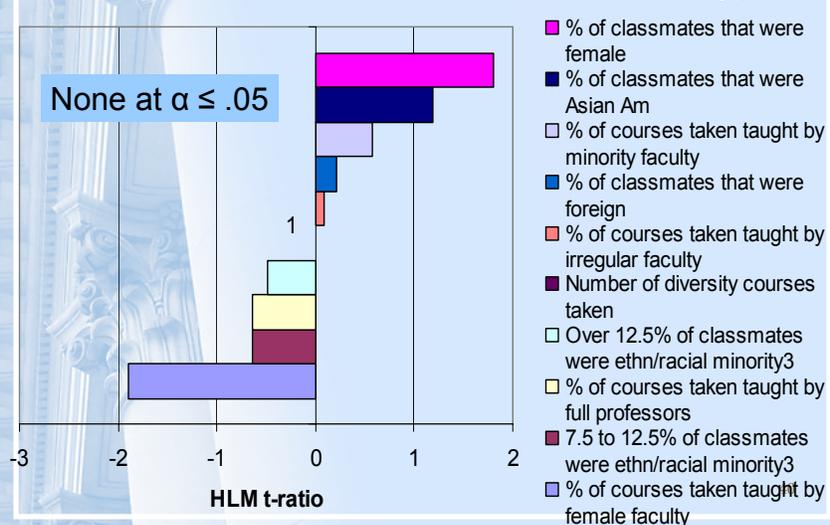
Estimating Graduating GPA: Results

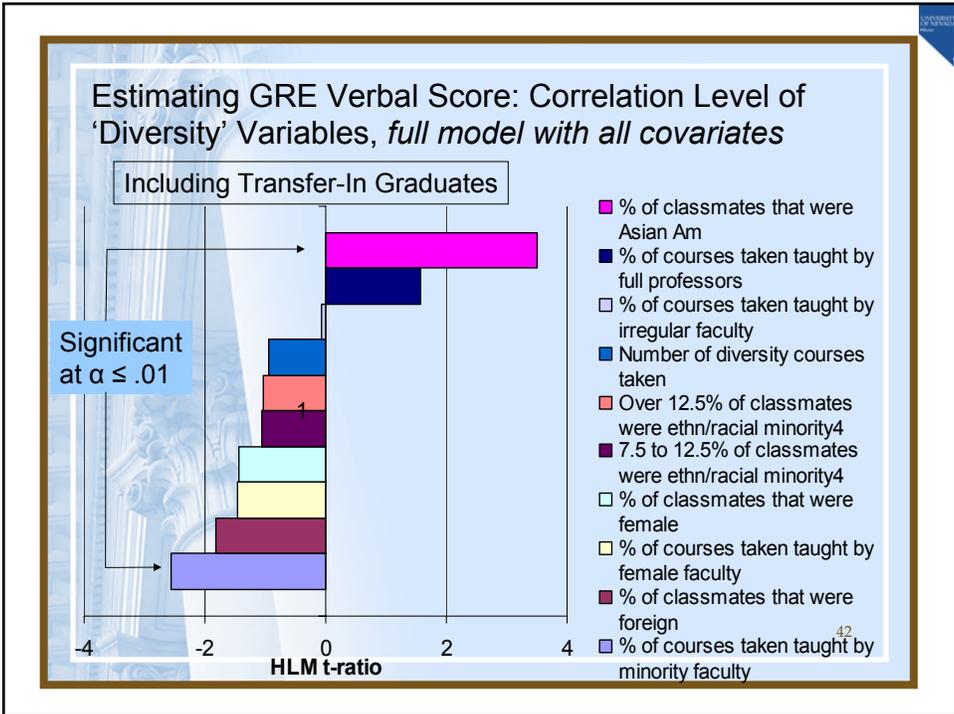
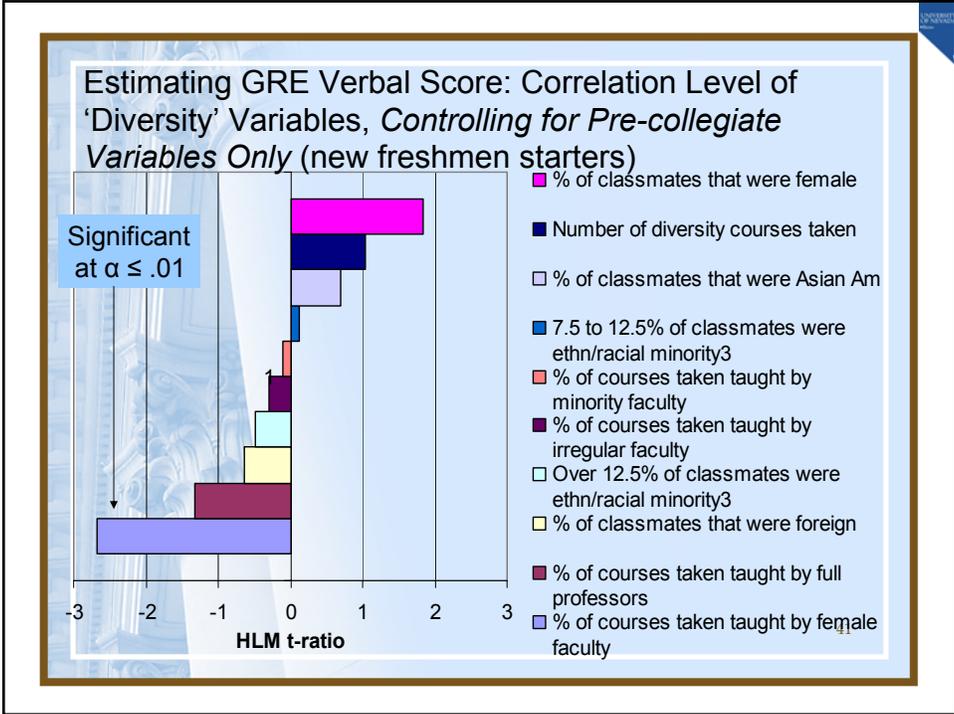
- *No significant* correlation with *compositional* diversity among students or faculty
- *Negative* correlation associated with some aspects of *curricular* diversity (% of foreign students enrolled, grades awarded, number of courses taken)
 - Personal effort (grade), not classroom composition, correlates positively with cumulative GPA
- *No change* in results with separate ethnic/race models, continuous vs. categorical metrics, interaction effects, or single vs. block entry, or race/gender-focused capstone vs. general diversity courses
- *No significant positive* indirect diversity effects
- Model covariates removed significant variance in GPA across program major (Null intraclass corr = .123), regardless of level of classroom exposure to minority students for a given major (*non-sig. random effect*)

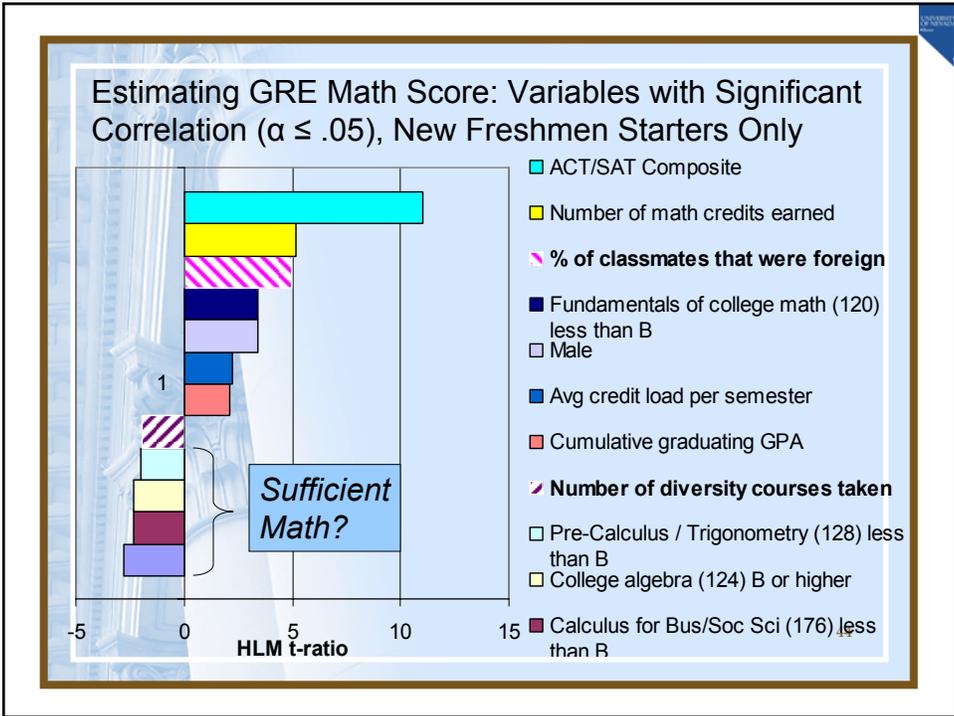
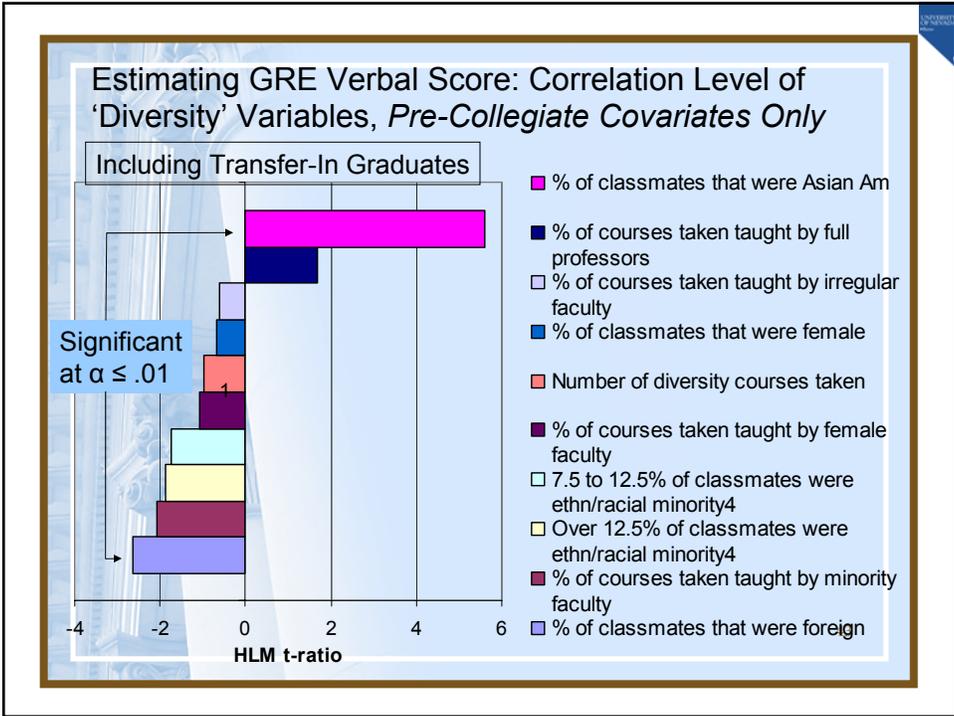
Estimating GRE Verbal Score: Variables with Significant Correlation ($\alpha \leq .05$) for New Freshmen Starters Only



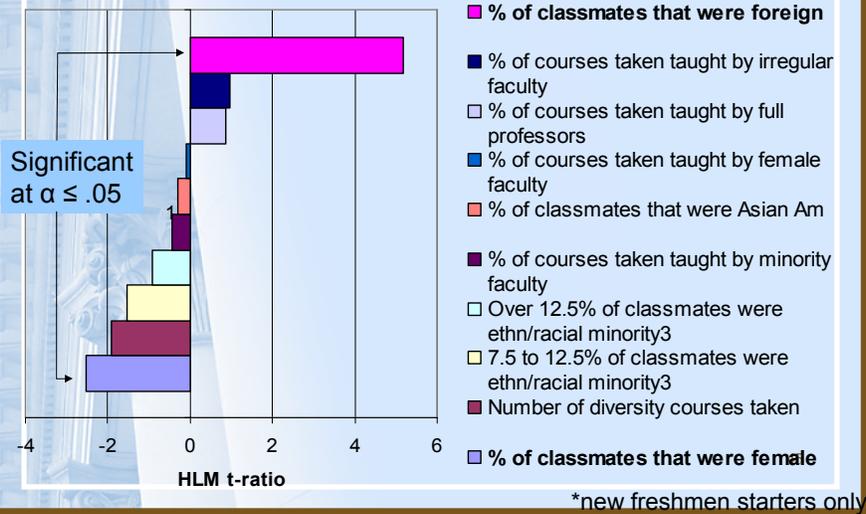
Estimating GRE Verbal Score: Correlation Level of 'Diversity' Variables (New Freshmen Starters Only)



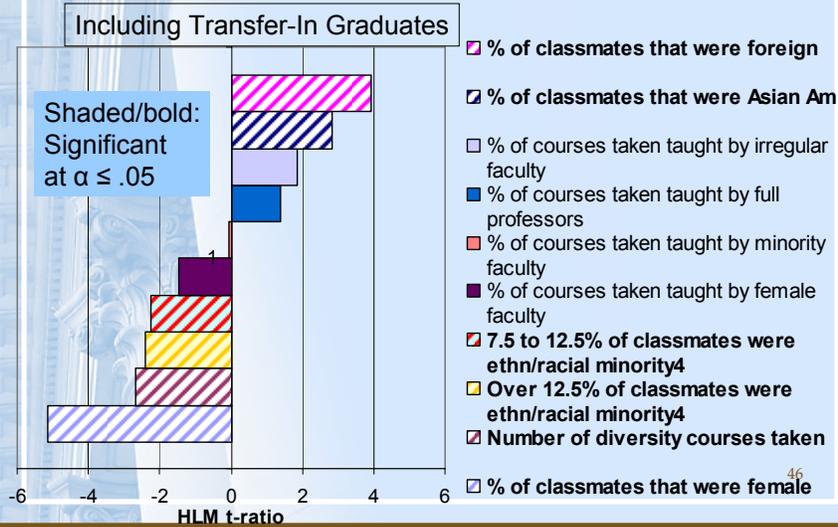


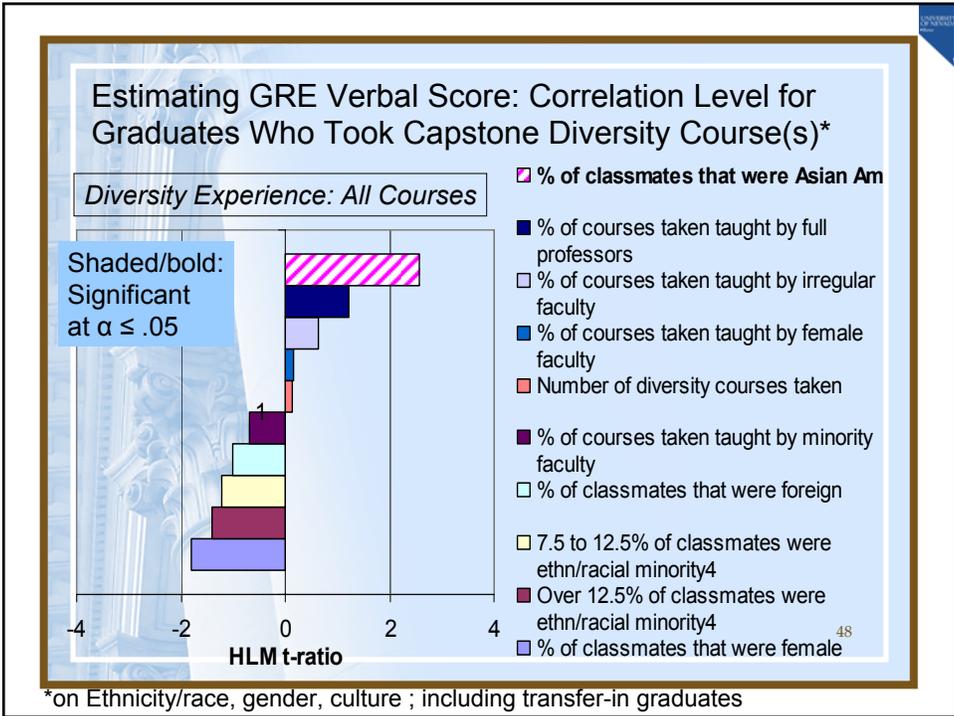
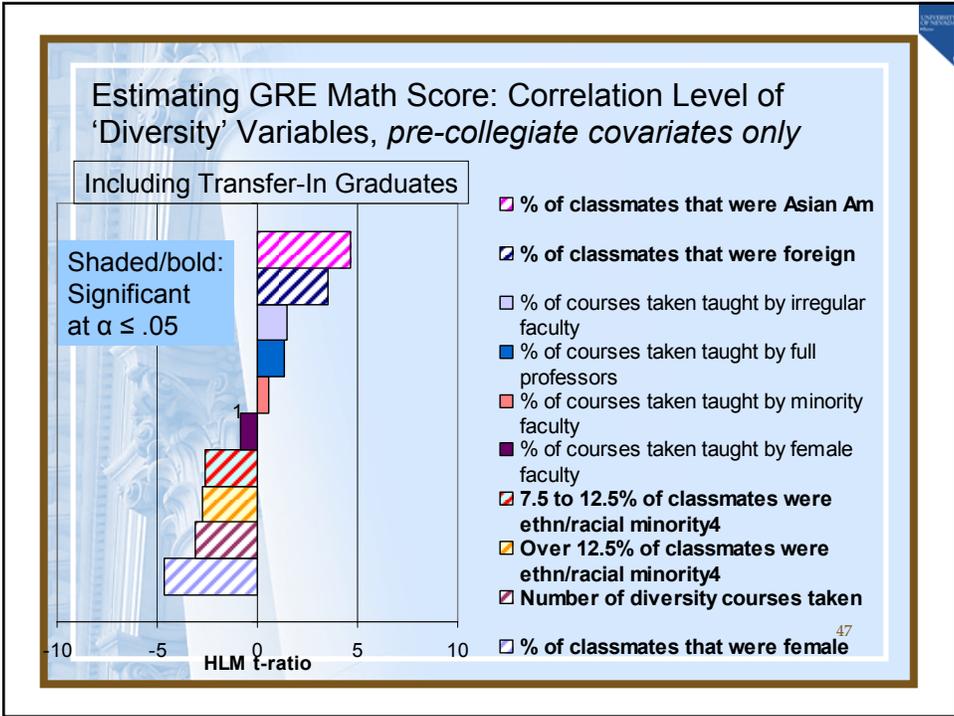


Estimating GRE Math Score: Correlation Level of 'Diversity' Variables, *Pre-Collegiate Covariates Only**



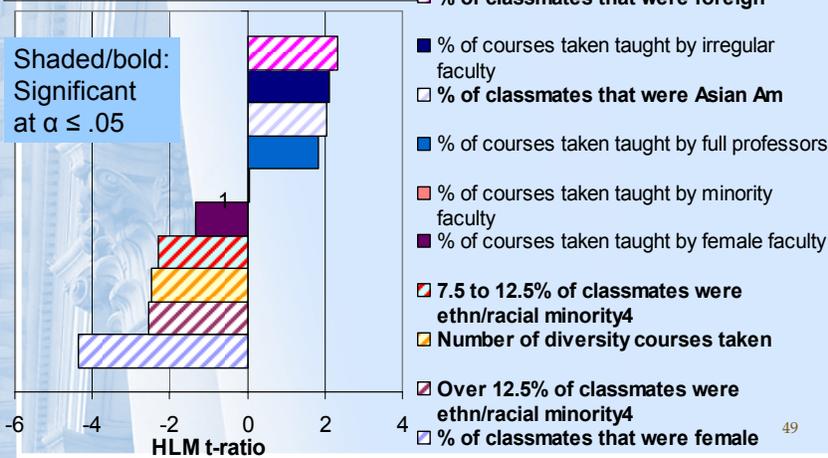
Estimating GRE Math Score: Correlation Level of 'Diversity' Variables, *full model with all covariates*





Estimating GRE Math Score: Correlation Level for Graduates Who Took Capstone Diversity Course(s)*

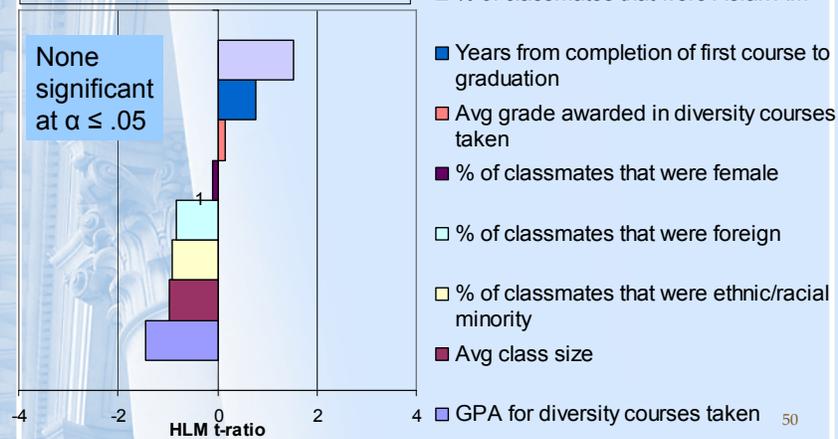
Diversity Experience: All Courses



*on Ethnicity/race, gender, culture ; including transfer-in graduates

Estimating GRE Verbal Score: Correlation Level for Graduates Who Took Capstone Diversity Course(s)*

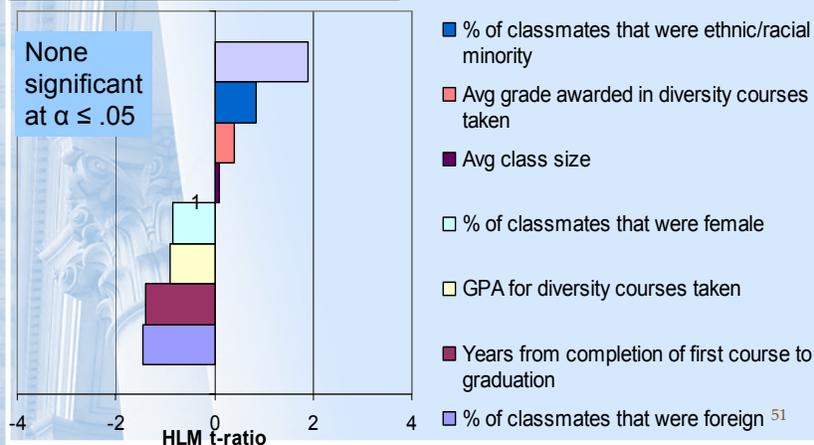
Diversity Experience: Capstone



*on Ethnicity/race, gender, culture ; including transfer-in graduates

Estimating GRE Verbal Score: Correlation Level for Graduates Who Took Capstone Diversity Course(s)*

Diversity Experience: Capstone



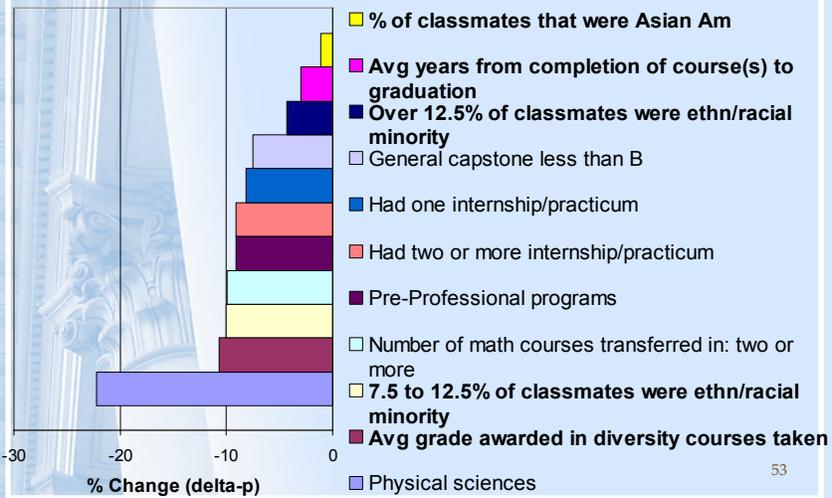
*on Ethnicity/race, gender, culture ; including transfer-in graduates

Estimating GRE Scores: Results

- Initial academic preparation (ACT/SAT), college math/core humanities show strongest positive correlation
- Verbal:
 - No sig. correlation with compositional, curricular, interactional diversity among students
- Math:
 - Mixed results, with positive for foreign/Asian students, negative for ethnic/racial minorities and females
 - Positive impact on GRE score likely derive from personal effort, not student or faculty diversity in classroom (i.e., opposite correlation with individual vs. average grade awarded)
- Results are robust across program major, regardless of level of diversity (*no sig. random effect*)

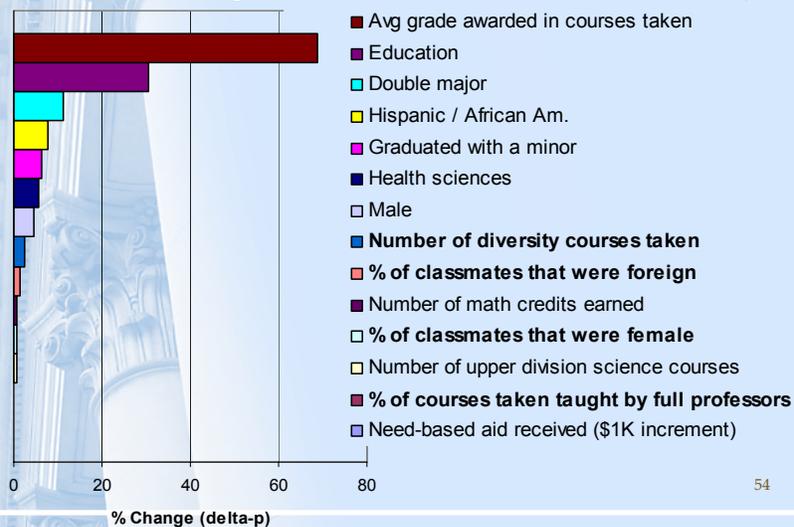
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Estimating Enrollment in 2nd Tier/lower* Graduate School: Variables with Significant *Negative* Correlation ($\alpha \leq .05$)



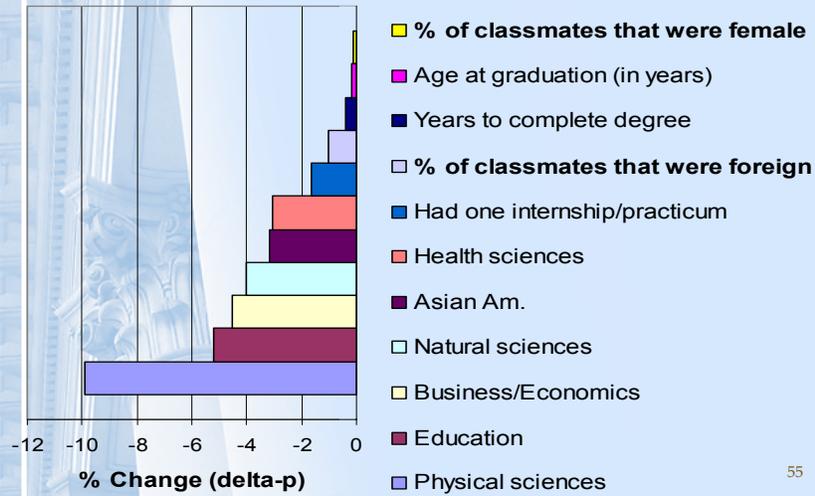
*Reference: did not enroll; Source: USN&WR College Ranking, various issues

Estimating Enrollment in 2nd Tier/lower* Graduate School: Variables with Significant *Positive* Correlation ($\alpha \leq .05$)



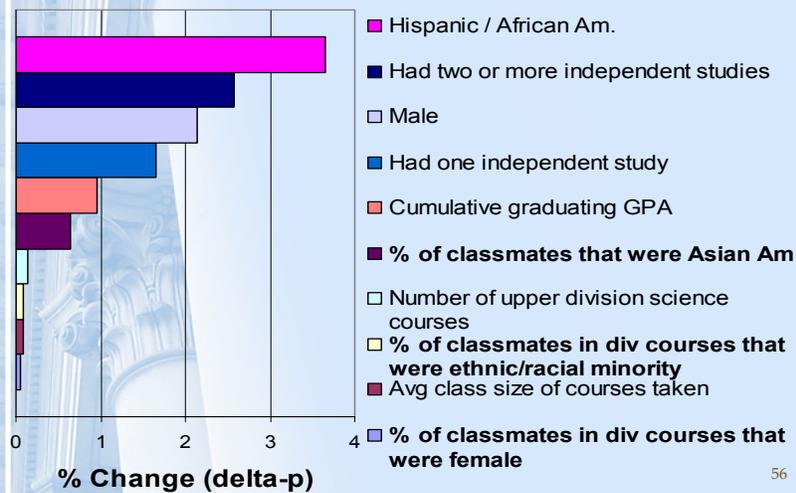
*Source: USN&WR College Ranking, various issues

Estimating Enrollment in 1st Tier/Med/Law* School:
Variables with Significant *Negative* Correlation ($\alpha \leq .05$)



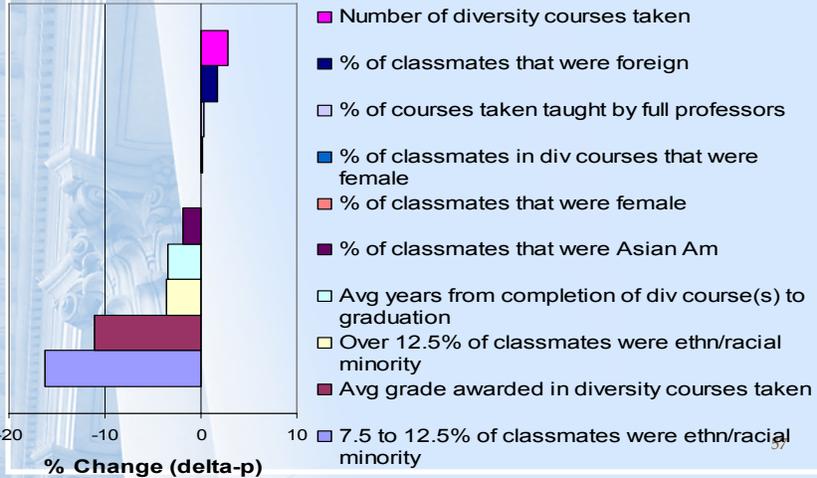
*Source: USN&WR College Ranking, various issues

Estimating Enrollment in 1st Tier/Med/Law* School:
Variables with Significant *Positive* Correlation ($\alpha \leq .05$)



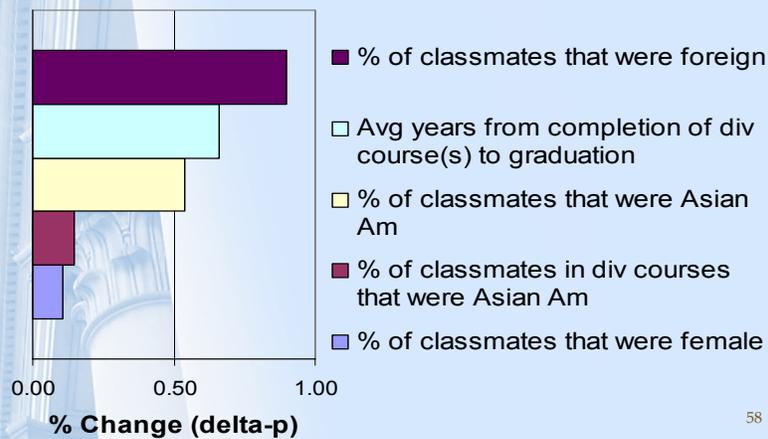
*Source: USN&WR College Ranking, various issues

Estimating Enrollment in 2nd Tier/lower* Graduate School for Caucasian Students Only: Significant Diversity-Related Variables at $\alpha \leq .05$



*Source: USN&WR College Ranking, various issues

Estimating Enrollment in 1st Tier/Law/Med School* for Caucasian Students Only: Significant Diversity-Related Variables at $\alpha \leq .05$



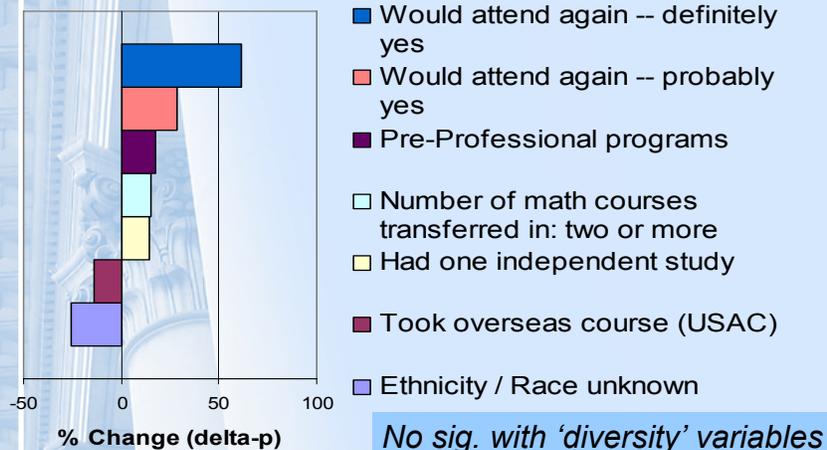
*Source: USN&WR College Ranking, various issues

Estimating Graduate School Enrollment: Results

- Negative correlation with small-to-medium effect size for *compositional* diversity
- Positive correlation with small effect size for *curricular* diversity
- Ethnic/racial minority graduates are more likely to enroll in graduate school than Caucasians
- No correlation with interactional diversity (see Table 14 in attachment)
- Results are consistent across student ethnic/racial background and do not vary with level of compositional diversity (i.e., *no significant interaction effects*)

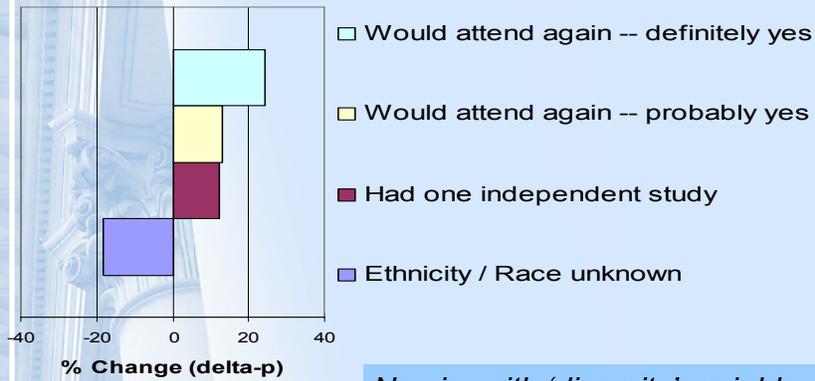
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Estimating Impact of Educational Experience on Critical Thinking Ability: Significant Correlation ($\alpha \leq .05$) with 'Very Positive' Survey Response*



* Reference response: 'neutral or negative'

Estimating Impact of Educational Experience on Critical Thinking Ability: Significant Correlation ($\alpha \leq .05$) with 'Somewhat Positive' Survey Response*



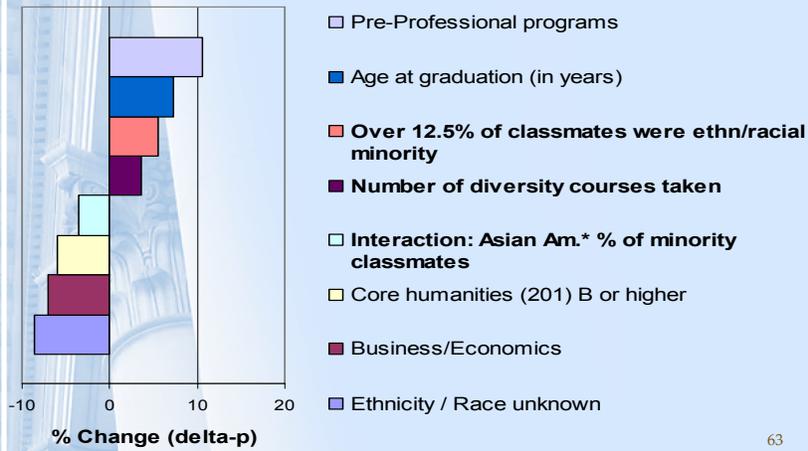
No sig. with 'diversity' variables

* Reference response: 'neutral or negative'

Estimating Growth in Self-Reported Critical Thinking Skills: Results

- No significant correlation associated with compositional or curricular diversity
- Response strongly correlated with overall disposition vis-à-vis institution
- Do independent studies and overseas courses nurture critical thinking skills?

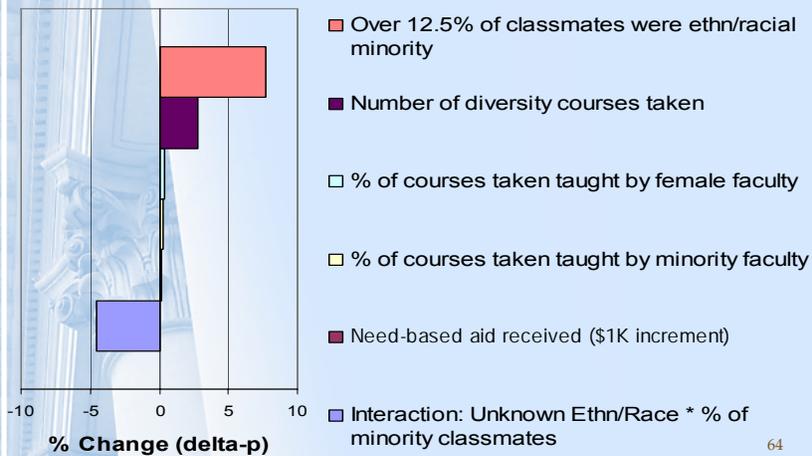
Estimating Impact of Educational Experience on Understanding Racial Issues: Significant Correlation ($\alpha \leq .05$) with 'Very Positive' Survey Response*



* Reference response: 'neutral or negative'

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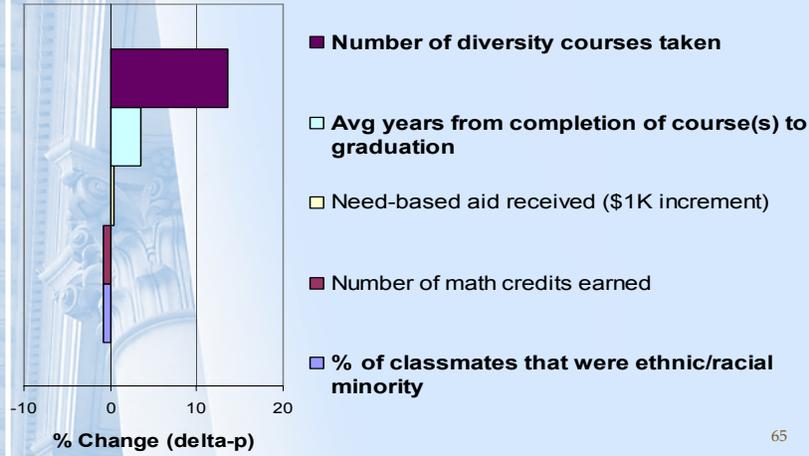
Estimating Impact of Educational Experience on Understanding Racial Issues: Significant Correlation ($\alpha \leq .05$) with 'Somewhat Positive' Survey Response*



* Reference response: 'neutral or negative'

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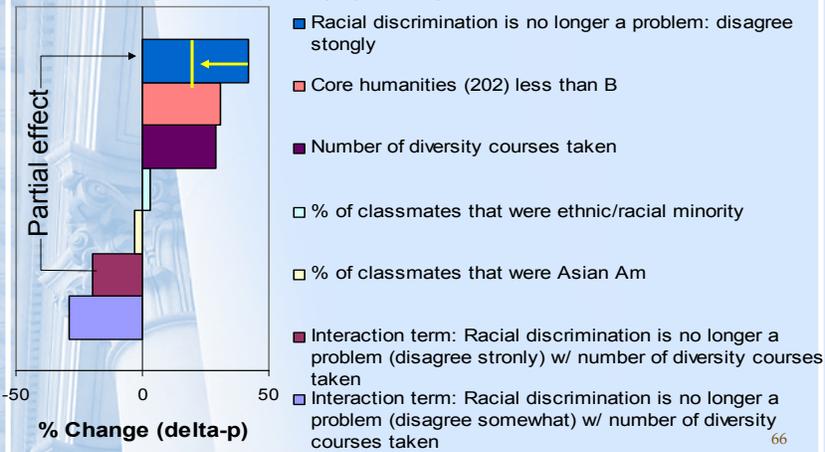
Estimating Impact of Educational Experience on Understanding Racial Issues: Significant Correlation ($\alpha \leq .10$) with 'Very Positive' Survey Response* for **Caucasians Only**, Controlling for Racial Disposition (CIRP), (N=402)



* Reference response: 'neutral or negative'

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Estimating Impact of Educational Experience on Understanding Racial Issues: Significant Correlation ($\alpha \leq .10$) with 'Somewhat Positive' Survey Response* for **Caucasians Only**, Controlling for Racial Disposition (CIRP), (N=402)



* Reference response: 'neutral or negative'

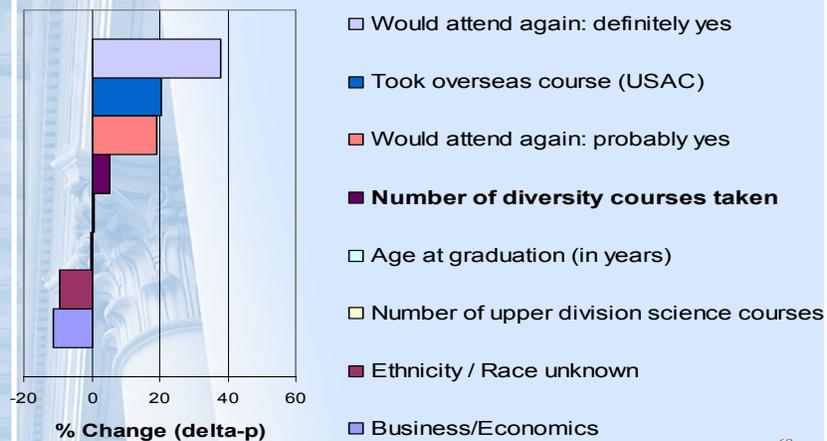
66

Estimating Growth in Self-Reported Understanding of Racial Issues: Results

- Significant positive correlation with small effect size associated with compositional and curricular diversity
 - No significance associated with compositional diversity *within* diversity courses
- Results for Caucasian-only model conditioned by:
 - Initial disposition on racial issues
 - But, results based on relatively small N

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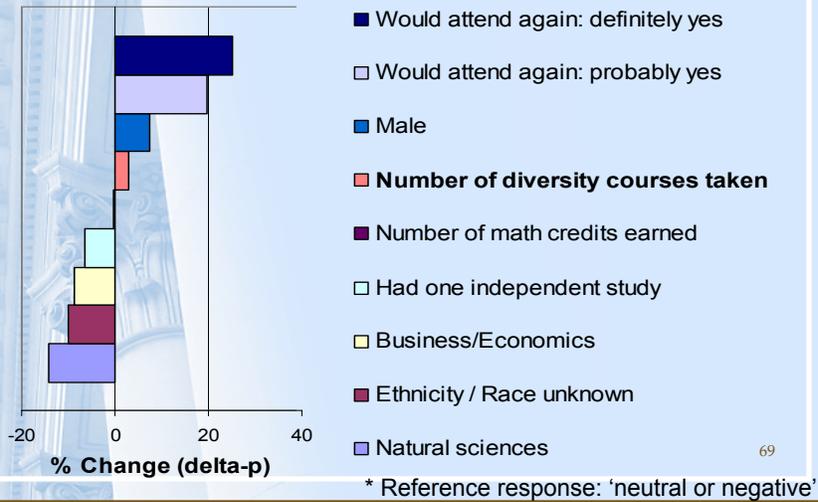
Estimating Impact of Educational Experience on Understanding Cultural Issues: Significant Correlation ($\alpha \leq .05$) with 'Very Positive' Survey Response*



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* Reference response: 'neutral or negative'

Estimating Impact of Educational Experience on Understanding Cultural Issues: Significant Correlation ($\alpha \leq .05$) with 'Somewhat Positive' Survey Response*



Estimating Growth in Self-Reported Understanding of Cultural Issues: Results

- Significant positive correlation with small effect size associated with curricular diversity
- No significance associated with compositional diversity, in general or *within* diversity courses
- Response strongly correlated with overall disposition vis-à-vis institution (i.e., "Would attend again, yes/no?")
- Significant positive correlation with medium effect size associated with taking overseas courses

Limitations of Study

- Findings may not be relevant for other, distinctly different institutions
- No control for diversity engagement outside of classroom
- Freshmen year disposition on racial issues to substitute for lack of pre-collegiate diversity exposure metric (though high school origin showed no significance)
- Socio-economic background is based on financial aid profile of aid applicants (i.e. merit/need-based aid, remaining need), or 70% of tested population

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Conclusion

- **Growth in academic skills**, as reflected in cumulative grades and preparation for graduate school, show *no significant positive* correlation with compositional, curricular, or interactional diversity, independent of
 - level of student or faculty diversity *within* a student's academic discipline
 - interaction between compositional and curricular diversity (i.e., no significant synergistic effect)
 - level of classroom interaction among students (i.e., capstone vs. lower-division courses)
 - type of diversity courses (e.g., race/gender vs. general area)
- **Attainment of advanced education**, as reflected in graduate school enrollment, shows small *positive* correlation with *curricular* diversity, but is *negatively* correlated with *compositional* diversity
 - Ethnic/racial minority students are more likely to enter graduate school (compared to Caucasians)

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Conclusion

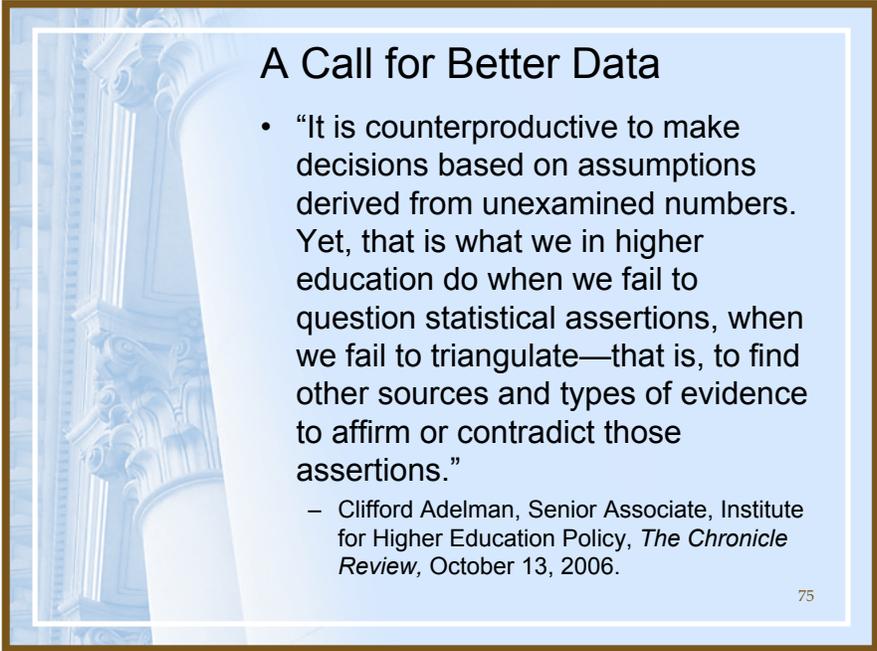
- **Growth in self-reported critical thinking skills** shows *no significant* correlation with compositional or curricular diversity
- **Growth in self-reported understanding of racial issues** shows a *significant positive* correlation with compositional and *general* curricular diversity (*but not focused* 'diversity' courses)
- **Growth in self-reported understanding of cultural issues** shows a significant *positive* correlation with *curricular* diversity, but no correlation with compositional diversity
- **Results are robust** on first-entry of diversity variables into model to gauge *direct* from *indirect* effects, i.e., *little modifier effects* associated with control variables
- Where significant, diversity effects are of small to medium size

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Implications

- Assuming growth in cognitive skills during college is significantly affected by *what happens in the classroom*, **results from this study cast doubt on the validity of the cumulative findings from higher education research on the impact of diversity, but corroborate findings in economic research**
- Results from this study amplify the need to:
 - *go beyond subjective measures* when gauging the effect of diversity in higher education
 - Conduct campus-based assessment of diversity effects to *inductively* inform cumulative findings (as opposed to multi-institution national survey approach, e.g., NSSE, CIRP, with large unobserved campus-specific heterogeneity!)

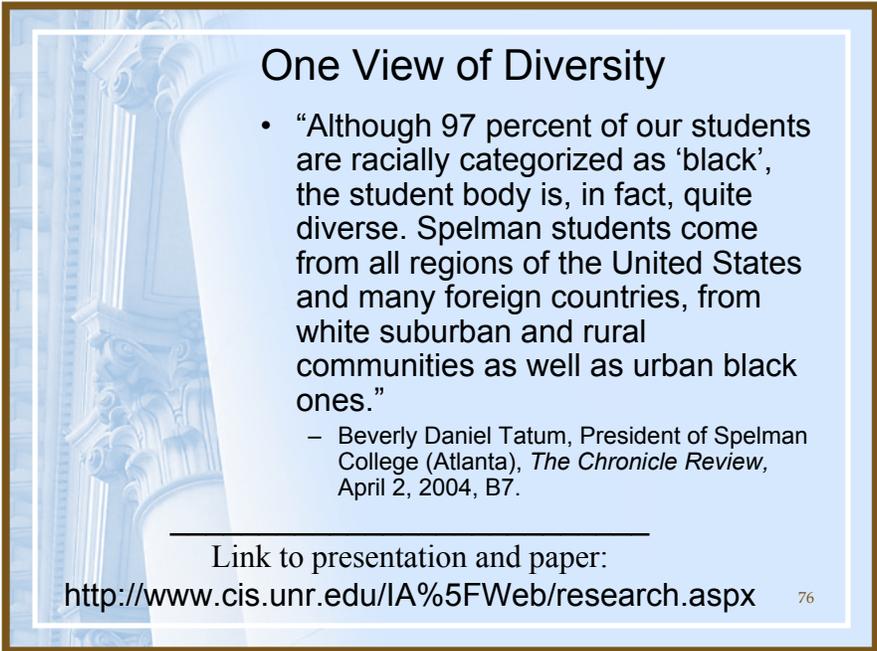
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A Call for Better Data

- “It is counterproductive to make decisions based on assumptions derived from unexamined numbers. Yet, that is what we in higher education do when we fail to question statistical assertions, when we fail to triangulate—that is, to find other sources and types of evidence to affirm or contradict those assertions.”
 - Clifford Adelman, Senior Associate, Institute for Higher Education Policy, *The Chronicle Review*, October 13, 2006.

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One View of Diversity

- “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.”
 - Beverly Daniel Tatum, President of Spelman College (Atlanta), *The Chronicle Review*, April 2, 2004, B7.

Link to presentation and paper:
<http://www.cis.unr.edu/IA%5FWeb/research.aspx>

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Examples of 'Diversity' Courses

- General
 - Dance in Ancient Civilization (Dan 467)
 - American Literature & Culture (Eng 304)
 - History of East Asia (Hist 243)
 - International Management/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)

[return](#)

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