


Factors Involved in Failure of Underrepresented Students in Statistics

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The Factors Involved in the Learning of Probability and Statistics for Underrepresented Minority College Students



Reason for Research

- ⌘ The Demand for Probability and Statistics
 - ⌘ The Curriculum and Evaluation Standards for School Mathematics Recommends Increase
 - ⌘ 73% of Business Schools Require Two Semesters (The American Assembly of Collegiate Schools of Business)
 - ⌘ People of Color Underrepresented in Mathematical Intensive Careers
- ⌘ Contributing to Society
- ⌘ Understanding Published Research

The Achievement Gap

"There's tremendous implications for the future of race relations in the nation. If something isn't done, we'll end up with a bifurcated society."


- Dr. Ronald Ferguson

1998 ACT Scores

	Math	Pre-Elem Algebra	Alg/Coord Geometry	Plane Geom/Trig
African American	16.9	8.3	8.3	8.3
Native American	18.6	9.4	9.0	9.5
Caucasian	21.4	11.4	10.5	11.0
Mexican American	18.6	9.5	9.1	9.5
Asian	23.4	12.3	11.7	12.1

Factors

- ⌘ Language
- ⌘ Lack of Role Models
- ⌘ Low Expectations
- ⌘ Self-Esteem
- ⌘ Self-Efficacy and Stress
- ⌘ Parental Involvement



Language & Reading

"Our culture [African -Americans] emphasizes the oral transmission of information," ... "White people emphasize literacy, and their children are emerged in literacy at a younger age."

- Janice E. Hale
Education Professor
Wayne State University

Lack of Role Models

“Many African -American’s have become disillusioned about their future job prospects and the actual value of schooling and have developed a disinterested attitude leading to depressed cognitive performance and scholastic underachievement.”

-John Ogbu

Low Expectations

“The devalued status and overarching presumption of inferiority that society holds regarding African -Americans permeates the walls of academia, often limiting teachers’ support for and expectations of African -American students.”

-Claude Steele

Self-esteem

Ogbu’s Factor

- Initial Terms of the Minority Group Members’ Incorporation and Response
- Strong Racial Identity + Futility + High Levels of Ogbu Factor in African -American Males = low GPA
- Strong Racial Identity + High Levels of Ogbu Factor + Low Futility + High Saliency in African -American Females = High Achievement
- Acting “White”

Self-esteem(cont’d)

Steele’s Stereotype Threat

- Judged Negatively for Academic Performance
- Devalue School and Underperformance

Self-efficacy and Stress

High Risk Neighborhoods

“This state of condition is linked to self - efficacy ” (Cunningham et al., 2002).

Products of Their Environments

“Contextual stress influences self -esteem which is related to academic outcomes” (Cunningham et al., 2002).

Parental Involvement

“Since the 1960s...the percentage of African -American children living with one parent has risen to 63 percent, with 92 percent of these families headed by a female.”

-Battle & Scott

Inadequate Enrollment of Minorities in Mathematics

"The course taking patterns show a disproportionate number of African American students taking lower level mathematics classes as compared to their White peers."

-J.D. House



Inadequate Enrollment of Minorities in Mathematics

- ⌘ Recruitment
- ⌘ Eurocentric Elitism and Social Stratification
- ⌘ Teacher Expectations
- ⌘ Course Taking and Curriculum
- ⌘ Tracking
- ⌘ Teaching Methods
- ⌘ Isolation from Other Minorities

Common Difficulties in Mathematics

- ⌘ Rational Numbers (Fractions, Decimals, & Percentages)
- ⌘ Verbal Problem to Mathematical Models
- ⌘ Fear and Anxiety (Roberts & Saxe, 1982)

Teaching Methods for Probability and Statistics

- ⌘ Cognitively Guided Instruction (CGI)
- ⌘ Cooperative Learning
- ⌘ Question Posing
- ⌘ Simulations
- ⌘ Real Life Problems
- ⌘ Visual
- ⌘ Remove Irrelevant Information
- ⌘ Exploratory Data Analysis
- ⌘ Descriptive Statistics
- ⌘ Common Misuses
- ⌘ Strategies for Rational Numbers
- ⌘ Confront Common Errors
- ⌘ World Views

References

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- ⌘ Roberts, D. M. & Saxe, J. E. (1982). Validity of a statistics attitude survey: a follow -up study. *Educational and Psychological Measurement*, 42, 907-911.