

Crisis in Higher Education: The Need for New Understanding and New Leadership

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Rice University School Mathematics Project
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Outline

- ◆ Some Introductory Comments
- ◆ My Story: Part I
- ◆ Four Paradoxes in Representation Theory
 - Separate but Equal
 - The Mismatch Theory
 - The Role of Foreign Minorities
 - The Loss of the Precious Few
- ◆ Some Successes in Representation Theory
- ◆ My Story: Part II

- 
- ◆ Are we the underrepresented minority (URM) different?

Answer: Yes.

Growing up in America we are certainly made to feel different, and we are treated differently with lower expectations.

- ◆ Today's racism is not the overt access denial demonstrated by mathematician R.L. Moore, it is much more subtle and consists of maintaining lower expectations for URM, and activities that promote this belief, e.g. a “sink or swim” mentality.
- ◆ An example from the Rice Mathematics Department: “I try to discourage those who should not be in mathematics.”

One Story – My Story

Challenges
Successes
Frustrations
Awareness



MY STORY

Parents From Mexico: They came in search of Education

High School: AMS Award story

Community College: Jim

UCLA: Frisch and Friedman

Professoriate: Dave Sanchez

Characteristic: Monotone increasing and
multidimensional. (NPR Story)



WHO AM I?



I am a Chicano, Tejano
Mathematician

Society for Advancement of Chicanos and Native Americans in Science

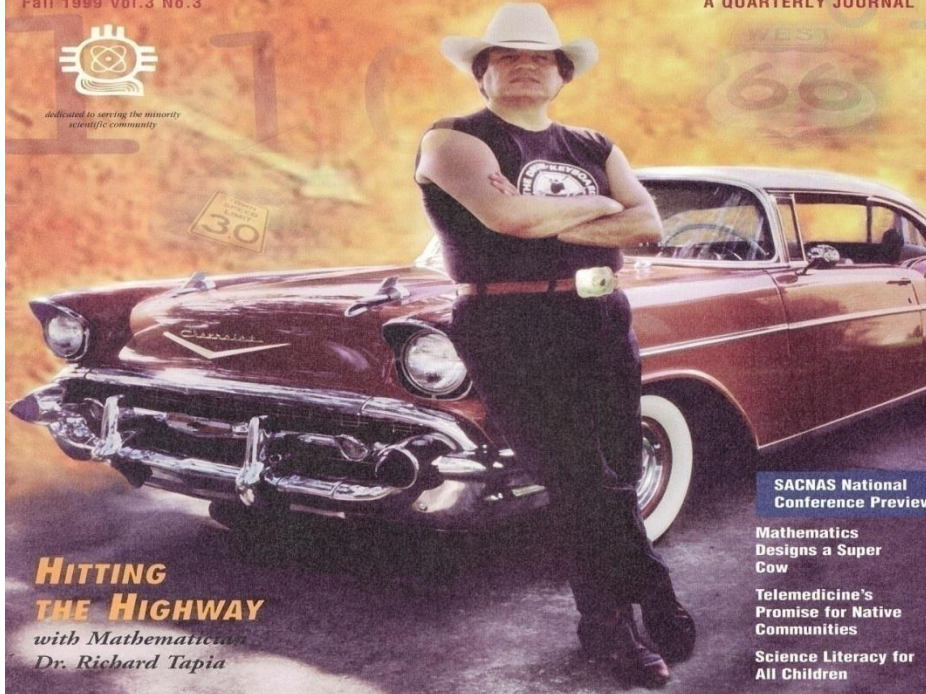
SACNAS NEWS

Fall 1999 Vol.3 No.3

A QUARTERLY JOURNAL



*dedicated to serving the minority
scientific community*



**HITTING
THE HIGHWAY**
*with Mathematician
Dr. Richard Tupia*

SACNAS National Conference Preview

**Mathematics
Designs a Super
Cow**

**Telemedicine's
Promise for Native
Communities**

**Science Literacy for
All Children**

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My Struggle for Identity

There is an identity crisis for underrepresented minorities growing up in the United States, and especially if you are good in science, engineering or mathematics.

My Struggle for Identity

- In the United States I am called Mexican, and in Mexico I am called gringo.
- **Los Angeles** - negative image with the term Mexican American.
 - your kind is not quality, and you do not belong in quality activity
- Coping with failure
- **My Mother:** Be proud of who you are.
- **Rat:** But mom, they won't let me be proud

My Struggle for Identity

- ◆ But it gets worse, enter the “True” Latino
 - How sad, you are neither Mexican nor American, you do not fit and have no real culture.
 - **My Answer:** I am Mexican American, indeed Chicano if you wish, I am fortunate to be able to chose the best of both worlds
 - I can contrast Jose Alfredo Jimenez with Hank Williams
 - I can contrast Lola Beltran with Patsy Cline.
 - You say that you do not know who Hank Williams and Patsy Cline are? How about Elvis or Miles Davis?
 - It's sad that you know so little about the country that you live in, that you teach in, and that you expect to mentor in.
 - I am American, I am cars, and I am Rock 'n' Roll

MY Parents



MY MOTHER'S TEACHINGS

- Pride.
- Belief that you can: Si se puede.
- Good work habits.
- Global excellence.

Brother Bobby Sets World Record

WINTERNAIONALS WRAPUP

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NATIONAL

DRAGSTER

FEBRUARY 16, 1968 *** JOURNAL OF THE NATIONAL HOT ROD ASSOCIATION *** 25c VOL. VIII - NO. 50

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6.54 CLOCKED BY STELLINGS-TAPIA

Orange County Meet Boasts Quickest Yet

STELLINGS-6.54 E.T.
NATIONAL RACEWAY, Orange County, Calif. Feb. 11, Bobby Tapia drove Larry Stellings' "Silver Fox" to an unprecedented 6.54 elapsed time during qualifying trials today at Orange County International Raceway.

John Mitchell captured Top Fuel Eliminator with a winning time of 7.28 seconds.

Ed Schartman put together three decisive victories to defeat Jungle Jim Liberman in today's featured funny car match. And Bill Showersberg debuted his new supercharged 1968 wheelstander.

QUALIFYING
 Twenty AA-Fuel dragsters rolled through the pit gate this morning with one thought in mind: "Will it take to qualify? 6.00, 7.00, or maybe a 'ceper'." But only one cut through in a better than average performance—the full-bodied Silver Fox of Larry Stellings. The Ed Pink topped '68 Chrysler rounded sharp as Tapia warmed the engine this morning. Stellings mentioned that he expected to cut a fat one today—but 6.54! The "Silver Fox" (the car's new name) was carrying a super low point and the latest M & H's. The combination worked as Tapia was in all time low red in drag racing. Stellings time was recorded on dual clocks and will stand as the track record. Victory of the short race was seen

as the car recorded a top speed of 215.86 mph.

The "Red Mountain Boys" were next in the program. John Mitchell qualified the Crower equipped car in a short 7.10 seconds at 218.56 mph.

Doug Walton and Vern Anderson were on hand with their new Don Long car. The Minneapolis, Minnesota duo were looking good in the yellow-painted car posting a qualifying time of 7.17 seconds, coasting through the lights at 190.26 mph.

Mike Salvetti had no trouble qualifying Ronald Long's beautiful "Hawaiian" 7.18-213.76 mph.

Bob Meyer qualified the "Speedmasters' Special" with a tire-smoking, 7.27 e.t. at 203.78 mph.

Not to be left out, Larry Dixon was in with a 7.28-212.76 clocking. The same roadster was carrying a full nose which makes the car look 50 feet long.

The "Atlas Oil Tool Special" rounded out the show with a 7.31 e.t. John Martin was at the wheel of John Bateman's old blue car. Luckily, John was giving his new full bodied machine a rest this weekend.

ROUND 1
 Mike Salvetti brought the Keith Black charger to the line waiting for Stellings' Silver Fox. Tapia was staged, as was Salvetti, and the tree started the count—Tapia left first hoping to get the




It's not his helmet size pul! After a record breaking 6.54, Bobby Tapia may just need a new lid, as everyone from our owner, Larry Stellings down, wishes him well earned congratulations. Photo by Jim Kelly

February 1968



MY MOTHER'S TEACHINGS

GLOBAL EXCELLENCE



2005-2008

“Heavy Metal”

(Three Times National Show Car Champion)





Blackie Gervin & Paul Scott's R.T.
47th Annual Fresno Autorama
May 12-14, 1994

BUFFALO WILD WINGS

SUGARHILL

Highway Star
Looks That Kill
Paranoid
You've Got Another
Thing Comin'
Whole Lotta Rosie
Supercharger Heaven
Seek and Destroy
Blat the Technicolor
Number of the Beast
Ace of Spades
Hot for Teacher
We After Midnight
Dr. Feelgood
Deep Purple
Mötley Crüe
Black Sabbath
Judas Priest
AC/DC
Vince Zombie
Metallica
White Zombi
Iron Maiden
Motörhead
Van Halen
Judas Priest
Mötley Crüe

MY MOTHER'S TEACHINGS

GLOBAL EXCELLENCE



Yes, my culture is American,
perhaps with a twist.

American Culture

“The Legendary Back Seat of a ‘57 Chevy”





The Status Quo

A Profile of the Great State of Texas

Demography: Who are we today, and who will we be tomorrow?

Texas Population

Year	1980	1990	2000	2010	2020	2030	2040
White	66%	61%	53%	47%	43%	37%	32%
Hispanic	21%	25%	32%	37%	43%	47%	53%
Black	12%	12%	11%	12%	11%	10%	9%
Other	1%	2%	3%	4%	5%	5%	6%

The Browning of Texas

Population	Per Decade
White	↓ 5%
Hispanic	↑ 5%
Black	↓ 1%
Other (Asian)	↑ 1%

Consequence

In a little over 100 years

There will be no Whites in Texas

There will be no Blacks in Texas

Hispanics will be 85% of the population

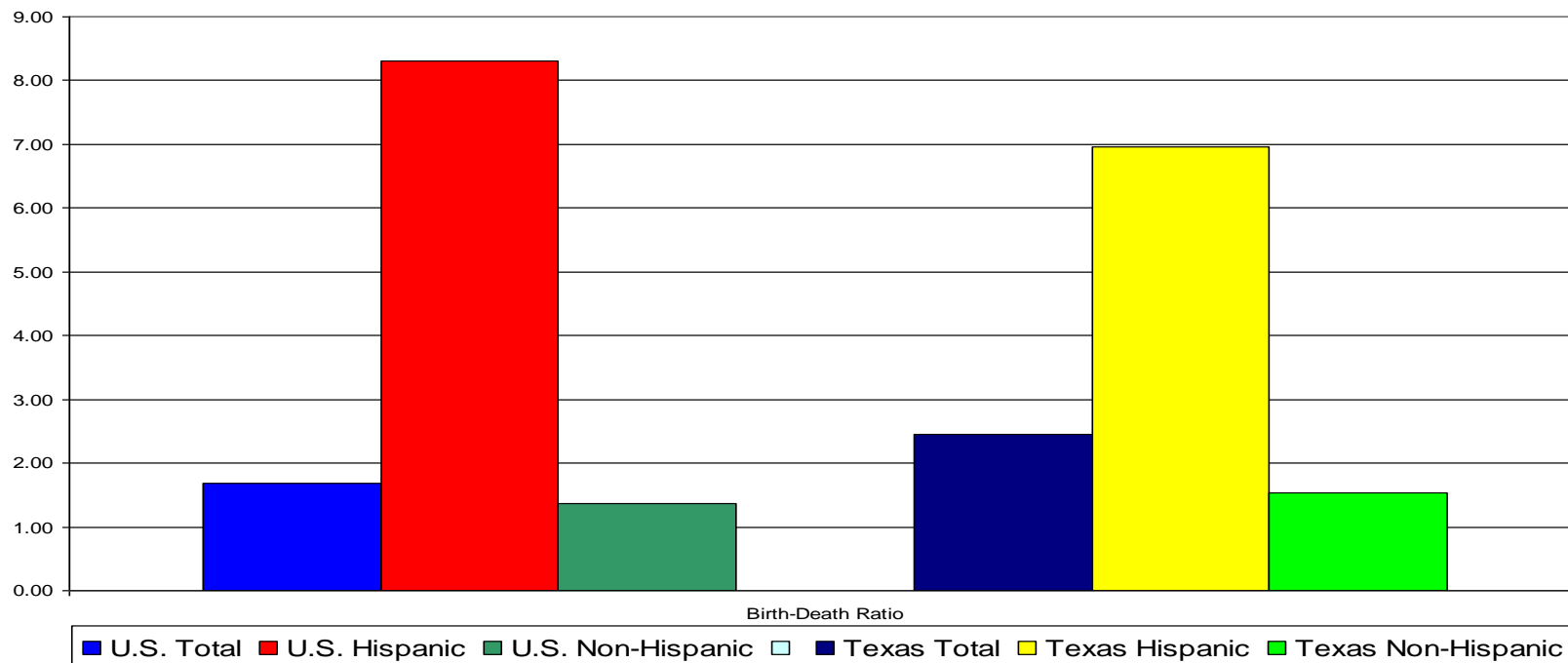
Other (Asians) will be 15% of the population

The Browning of America

Press Release: Pew Hispanic Center July 2011

The Mexican American Boom: For the first time in history births overtake immigration.

Birth-Death Ratios by Hispanic Origin, United States and Texas, 2000-2006



Source: U.S. data from U.S. Census Bureau. Texas data from Texas State Data Center

Déjà Vu

A Reflection Back in Time

In 1968 with a fresh Ph.D. in mathematics from UCLA, Richard Tapia and family travel to Madison, Wisconsin for a post-doctoral position at the University of Wisconsin.



Madison Sunday Paper, Late 1968

“For the first time in history there are more people in Wisconsin than there are cows”

“The trouble with the country today is that there are too many Mexicans and not enough cows.”

Yesterday



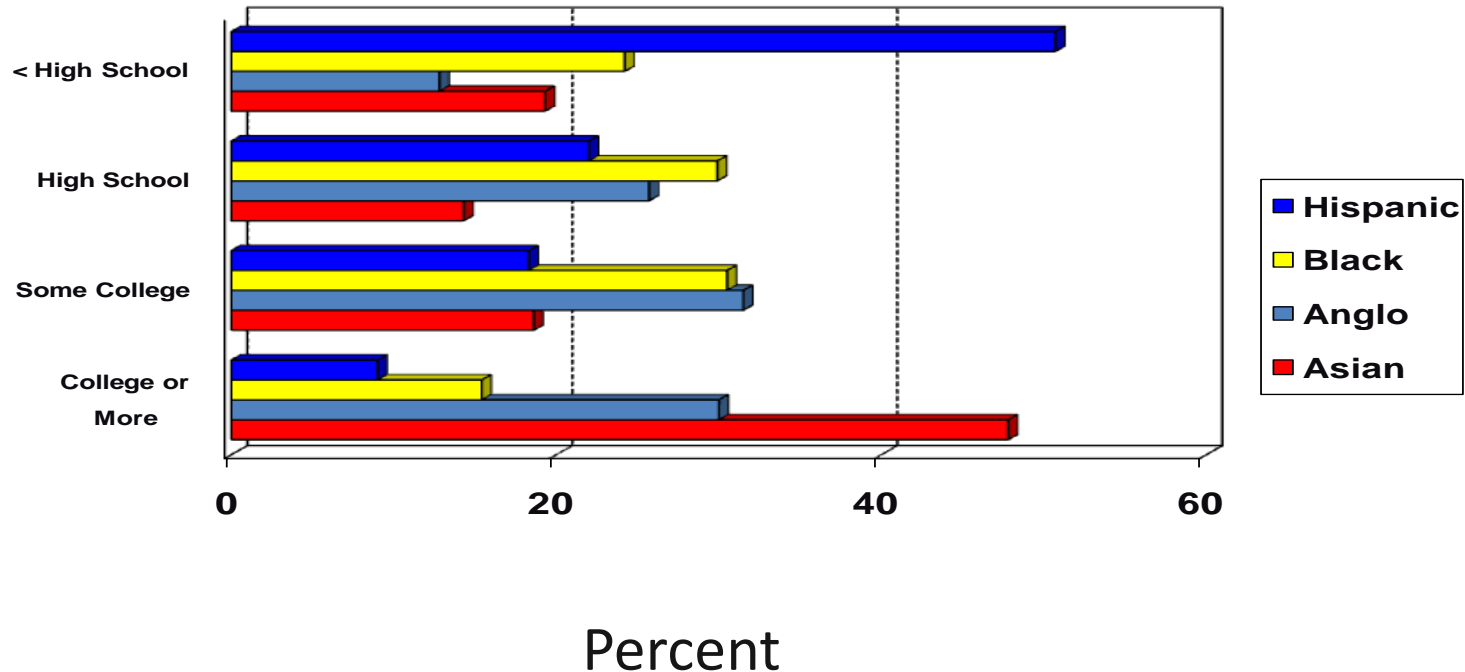
Today





How are URM doing?

Educational Attainment in 2000 in Texas for Persons 25+ Years of Age By Race/Ethnicity





For good reason the nation uses representation in
the areas of

Mathematics

Computer Science

Electrical Engineering

as indicators of health of STEM representation.

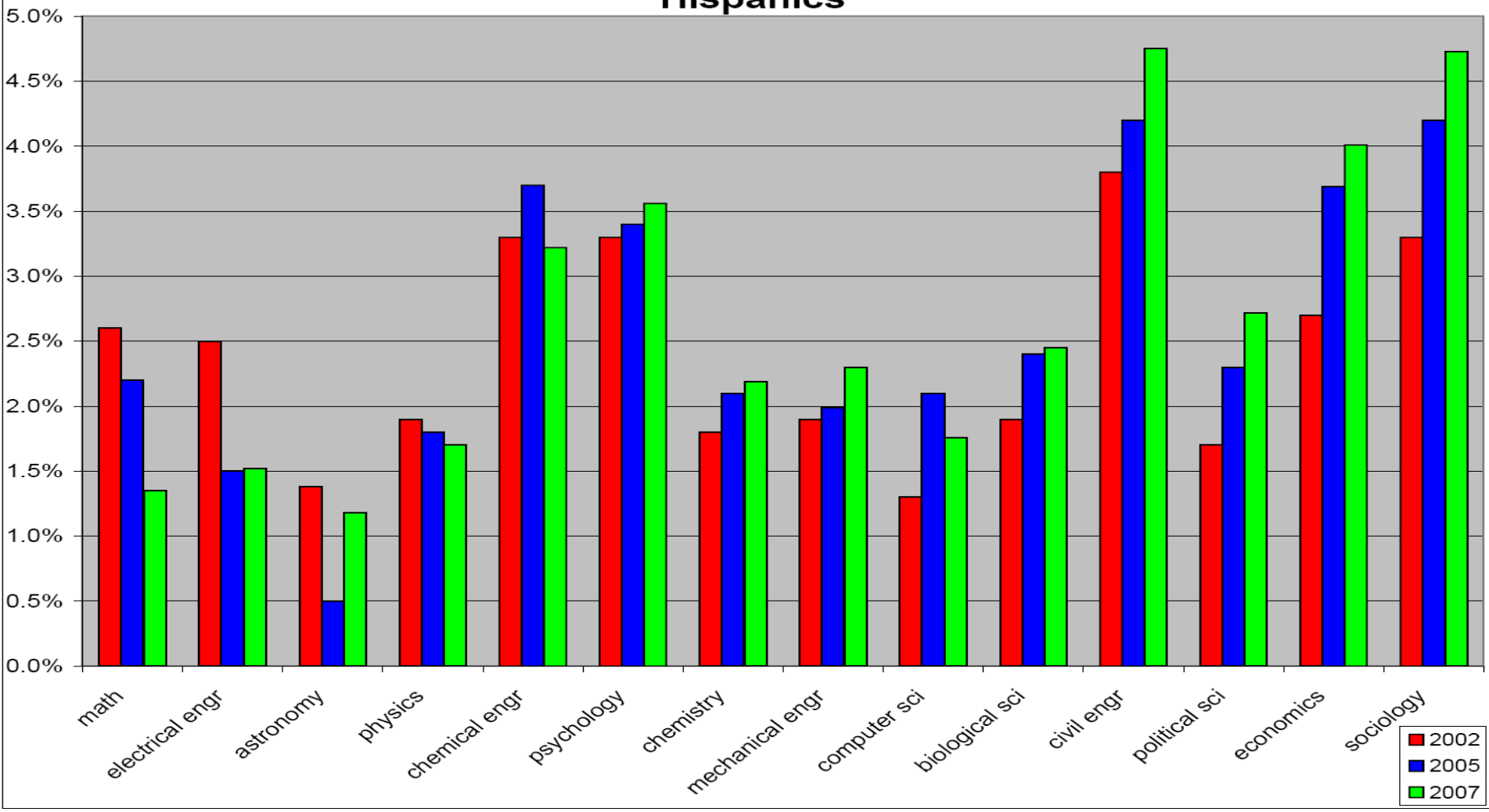
Blacks and Hispanics in the Academic Pipeline*

Discipline	Top 100 Departments 2007		
	Blacks	Hispanics	Asians (all)**
Chemistry	1.5%	2.1%	10.5%
Math	1.5%	1.7%	16.6%
Computer Science	0.9%	1.8%	27.1%
Physics	0.7%	1.8%	13.0%
Chemical Engr	2.1%	3.3%	17.8%
Civil Engr	1.8%	4.3%	17.3%
Electrical Engr	1.7%	1.7%	28.4%
Mechanical Engr	1.9%	2.0%	26.0%
Biological Sci	1.4%	2.5%	12.3%
Earth Sciences	0.9%	2.3%	6.6%

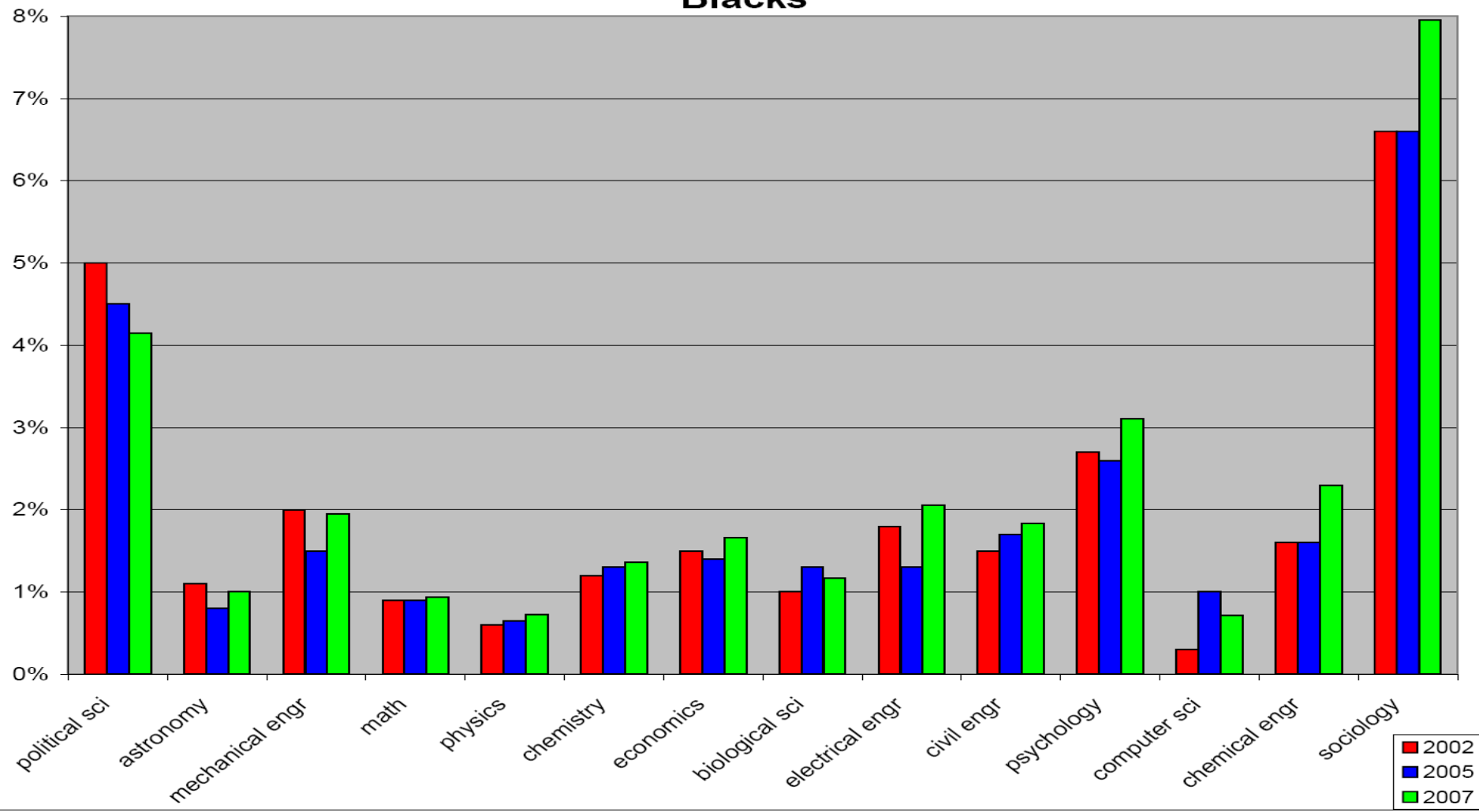
*Hispanics were 14.8% of the 2006 US population

**Asians were 4.4% of the 2006 US population

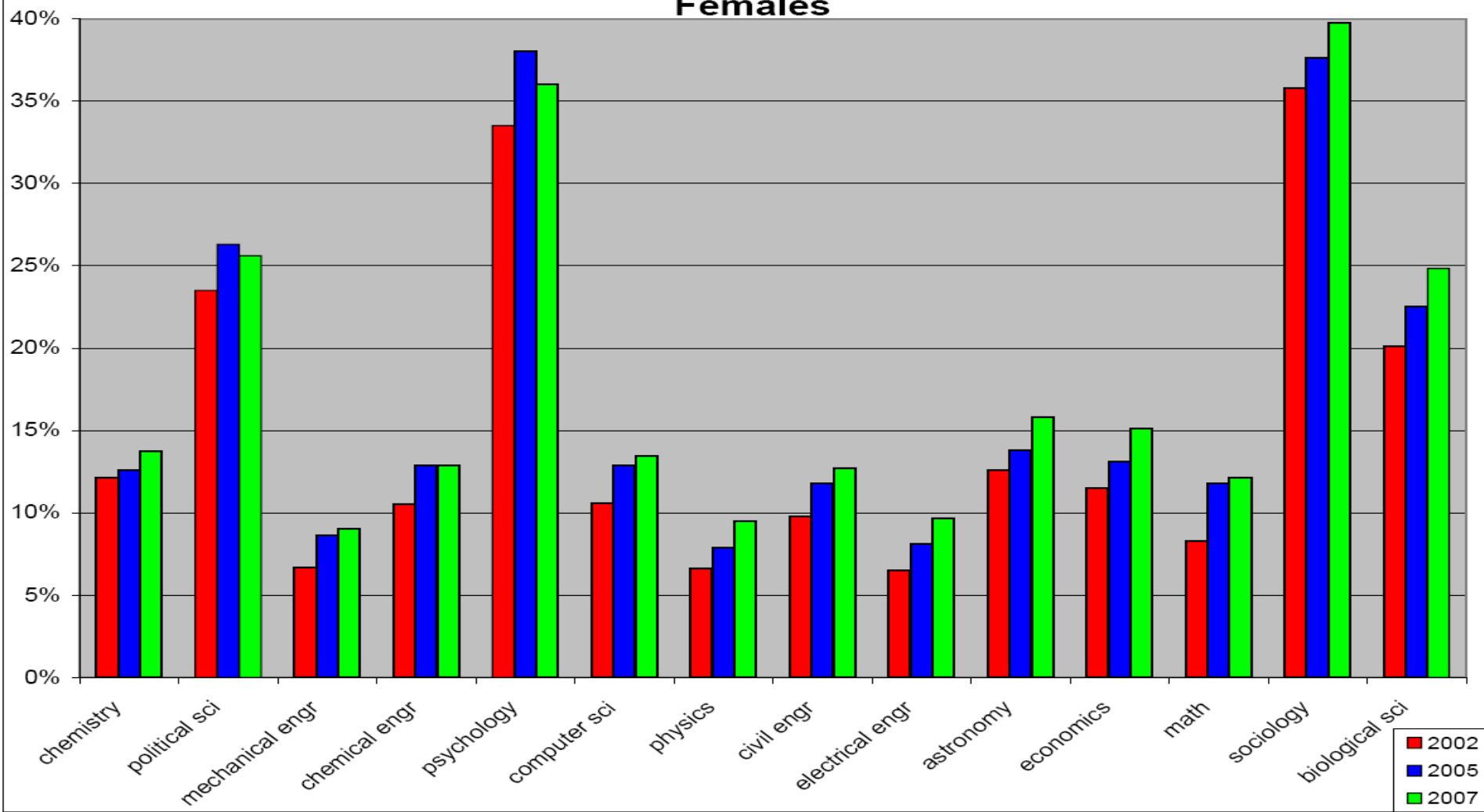
Hispanics



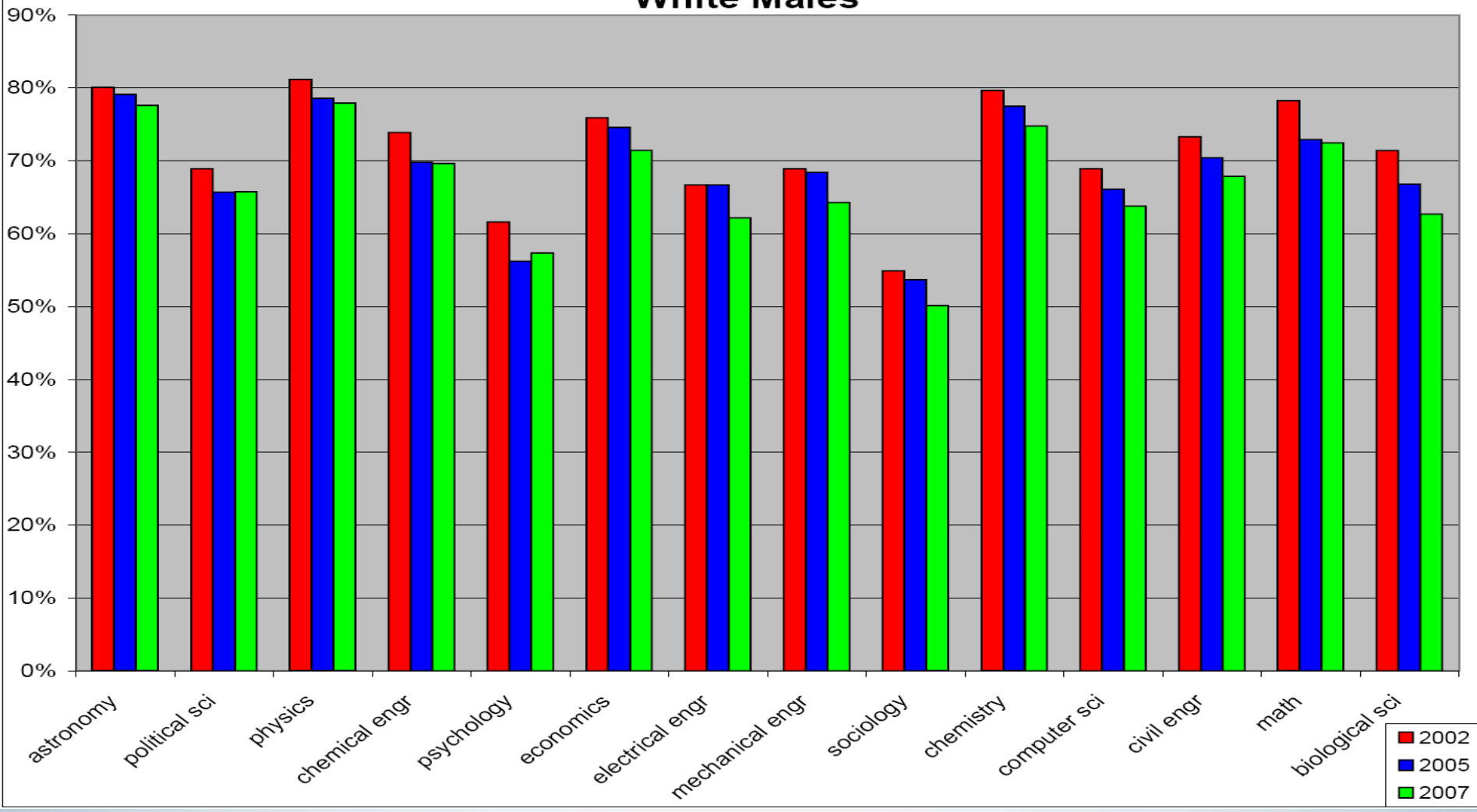
Blacks



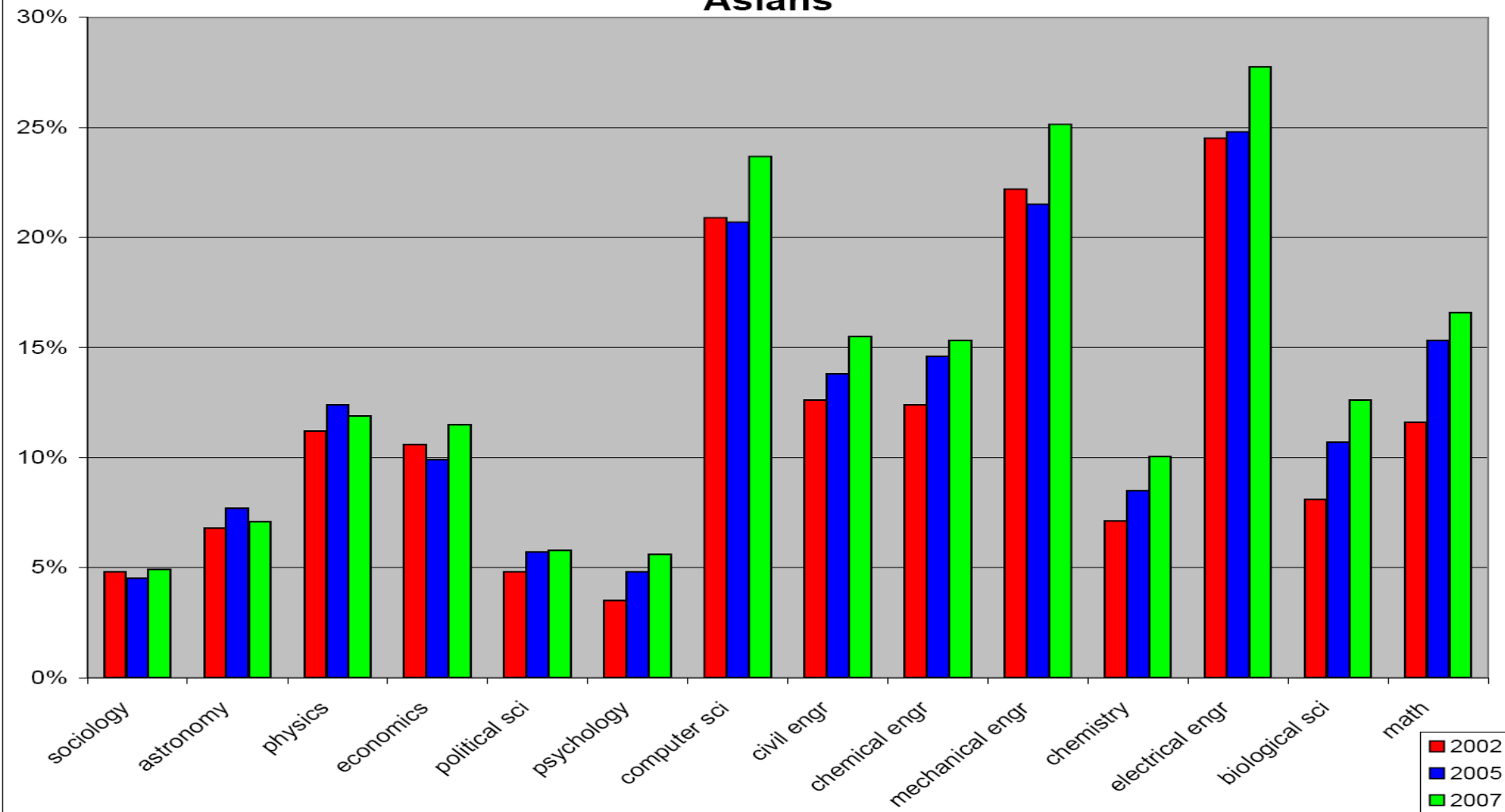
Females



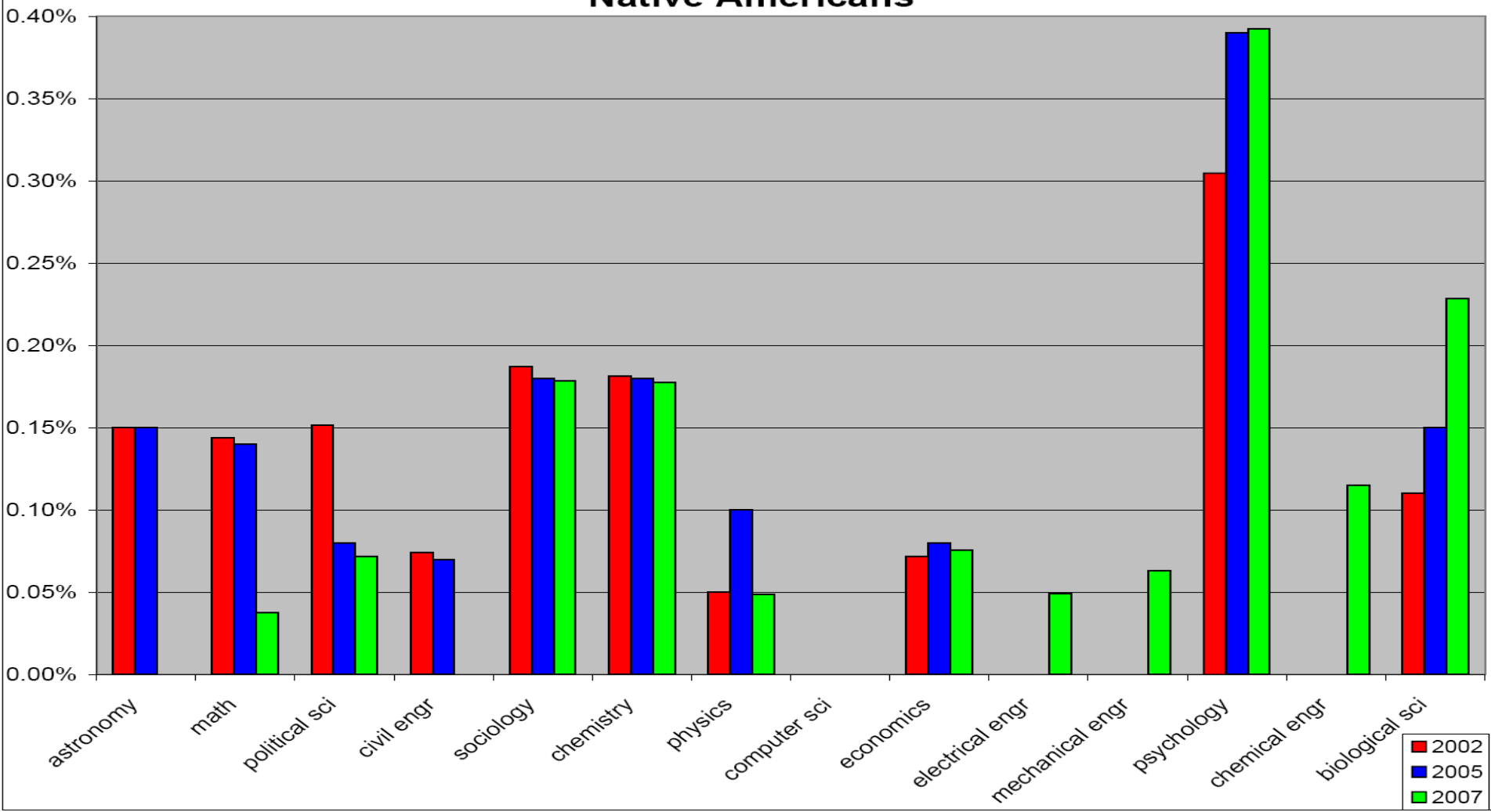
White Males



Asians




Native Americans





Thoughts to Ponder



There are good jobs, but we
URM tend not to train in the
areas where there are jobs

“Where have all the URM men gone”

- ◆ Less than 1% of K-12 teachers in this country are black males
- ◆ 80% of students at HBCU's are female
- ◆ 70% of students in universities in Puerto Rico are female



STEM Faculty Shortfall:
Non-Asian Domestics

STEM Faculty Longfall:
Foreign Asians



STEM minority student asks:

Will I be taught by someone who looks like me?


Answer:

Do not expect it...



Minority math student:

“I took 8 math classes at UCLA, in just one of the eight I was taught by a domestic professor, let alone a minority.”

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-
- ◆ Four Paradoxes in Representation Theory
 - Separate but Equal
 - The Mismatch Theory
 - The Role of Foreign Minorities
 - The Loss of the Precious Few

Obstacle to Improving Representation

Separate but Equal

- ◆ America's solution technique to correct for denied education has been to propose separate but equal activities.
- ◆ Separate but equal is always separate but never equal.
- ◆ Separate but (not) equal is destroying the country and will continue to do so if we do not change this way of doing business.

Example 1: Separate, But NOT Equal

The Formation of Texas Southern University

In 1946 Heman Sweatt (African American male) denied admission to University of Texas Law School because of race. He filed suit. Texas had no law schools for African Americans. The Texas trial court continued the case for six months, enough time to allow the state to take over Houston colored junior college, under Senate bill 140 of the 50th Texas legislature March 1947, named it Texas State University for Negroes, and built a law school. It later became Texas Southern University.

Example 2: Separate, But NOT Equal

University of Texas Pan American

1987 In *LULAC et al. v. Richards et al.*, MALDEF (Mexican American Legal Defense and Educational Fund) sued the State of Texas for discrimination against Mexican Americans in South Texas because of inadequate funding of colleges. Trial court held that there was discrimination. Texas Supreme Court unanimously reversed the trial courts decision. Border-area legislators continued the fight in Texas legislature. The small institutions in South Texas were admitted into the larger and powerful flagship University of Texas and Texas A&M University System.

Yet we still see separate but not equal.

More Proof of Separate, But NOT Equal

Example : University Funding

	Annual Budget Per Student	Endowment
Texas Southern University	\$9,000.00	23 Million
UT Pan American	\$13,000.00	29 Million
University Texas Austin	\$34,000.00	7.2 Billion
Rice University	\$84,000.00	3.6 Billion
For comparison purposes:		
Stanford University	\$185,000.00	12.6 Billion
Harvard University	\$181,000.00	26 Billion

More on Separate, But NOT Equal

- Blacks: 12 % of Texas population
- TX Tier 1 Institutions: Texas A&M: 3% Black, UT Austin: 5% Black, Rice: 7% Black
- HBCUs are 3% of the nation's institutions of higher learning; yet they produce 43% of Black undergraduate degrees in STEM disciplines
- Extremely low transfer rate from from HBCUs to Tier 1 graduate schools

Things that Cause Us to Fail

The Mismatch Theory

A direct promotion of
Separate, But Not Equal

The Mismatch Theory: Adding Insult to Injury

Sander/ Elliot: Affirmative action at research schools hurts the URM they are trying to help. They do not succeed in STEM and should therefore be directed to MSIs where they can succeed.

The flaw in the Mismatch Theory

- The formulation of a permanent underclass!
- Bad recommendation – flawed!

The Consequence of the Mismatch Theory

I suspect that many faculty and administrators from research universities would breathe a big sigh of relief when they read about the Mismatch Theory. It certainly lets them off the hook, doesn't it? What it does is reduce expectations and set the country's research institutions back to pre-1964. It ignores all that we have learned about educating minorities and guarantees the formation of a permanent science underclass in America. A two-tiered America is certainly not healthy for the country.

Mismatch

Majority schools say minorities do better at minority schools, therefore this is where they should go.

Minority schools say majority schools produce so few minority Ph.D.s in STEM areas, we minority schools will build our own Ph.D. STEM programs, and they are doing so.

Mismatch

Establishment of two-tiered Ph.D. structure.
Separate, But Not Equal.

Pedigree is alive and well. Universities do not hire faculty from lower tier, indeed.

Obstacle to Improving Representation

The recent replacement of
“underrepresentation” with “diversity”

**True Diversity Doesn't
Come from Abroad**

Diversity vs. Underrepresentation

- Diversity: Inclusion of individuals with different backgrounds, characteristics, and attributes.
- Underrepresentation: Traditionally poor representation of minorities born and raised in this country.

i.e., Native Americans

African Americans

Hispanic Americans

Diversity on U.S. Campuses

Today's research universities are very “diverse” in terms of faculty and graduate students. They continue to do what they have always done well.

However, representation of members from underrepresented groups is non-existent.

National Diversity/Underrepresentation Concerns


- Promotion of diversity has replaced concerns for improving domestic representation.
- In what sense are Argentine mathematicians underrepresented? (Alberto Calderon and Ricardo Nirenberg)
- Can we Chicanos compete with the very best these foreign countries have to offer? Negative role models.
- Universities play games in counting foreigners as underrepresented minorities, and to a large degree, this is actually promoted by NSF and other government agencies.

National Diversity/Underrepresentation Concerns

- Diversity is **good**.
- However, improving the participation of members from underrepresented groups is **critical** to the economy and health of this nation.

National Diversity/Underrepresentation Concerns

The two are not the same. Today we stay away from the politically incorrect term “underrepresentation” and use the politically correct term “diversity”. We do this with serious negative consequences for underrepresentation.



Qualifier: Many effective champions of representation were not born in the United States, but they were educated in the United States, for example Rodrigo Bañuelos, Carlos Castillo-Chavez, and Arlie Petters. Foreign minorities can help, and many do, but when dealing with improving representation we can not promote the foreign minority at the expense of the domestic minority.

Obstacle to Improving Representation

Critical concern: Low representation of domestic underrepresented minority graduate students in STEM departments at Tier 1 research universities.

Restricting the Pool of the Precious Few

Two Components:

- Minority Serving Institutions
- Tier 1 Institutions

Restricting the Pool of the Precious Few:

Part 1 Minority Serving Institutions

The good STEM students at a minority serving institution:

- Perform well, maintain confidence and self-esteem
- Are encouraged to go to graduate school at Tier 1 schools
- Find their preparation for demanding graduate school deficient compared to other students
- Leave with masters degree

They are lost to research science.

Restricting the Pool of the Precious Few:

Part 2 Research Universities

Minority STEM students who are accustomed to functioning with self-confidence encounter “sink or swim” culture and no support mechanisms at Tier 1 schools.

Restricting the Pool of the Precious Few: Part 2

Feeling “beat up” and losing confidence they:

- Migrate to non-STEM majors, or
- Continue in STEM, but strongly avoid graduate school.

They are lost to research science.

This is very much what happens at Rice.

Bitter Sweet

- Sweet: Rice graduates 91% of its athletes
 Rice graduates 90% of its URM
 students
- Bitter: But not in intended major.

The Sad Reality

The Tier 1 minority STEM drop-out is better prepared for graduate school than the entering graduate student from a minority serving institution.



Success Stories

Story Number One

The Carl Hayden High School Story

<http://www.wired.com/wired/archive/13.04/robot.html>





What did we learn from the Carl
Hayden success?

Talking Point

- Underrepresented minorities can be very innovative and successful with good leadership.
- For underrepresented minority youth it is a demand problem, not a supply problem.
(Dean Kamen and First)
- No scholarships for undocumented students

Story Number Two

The Texas Top 10% Rule

An Undergraduate Success

University of Texas Austin – 30% STEM URM in Math
Why?

- The Texas Top 10% Rule (HB 588 – 1997)
- Innovative support programs in mathematics
- A Good from two Bads
 - High schools are de facto segregated
 - UT Austin and the seven dwarfs



What can we learn from the
University of Texas success?

Talking Point

Fine-tuning does not lead to significant changes. Major perturbations can make significant changes.

No self-respecting academician would have initiated or would have endorsed the Texas Top 10% Rule

Faculty commitment to support works

UT Austin is not a success in representation for STEM graduate school or STEM faculty.

Story Number Three

Rice University

Department of Computational and Applied Mathematics (CAAM)



Rice University - CAAM

- American Mathematical Society
Award given to the CAAM department
(2010)
- 35 URMs in the last 25 years 1986:
four at Rice out of eight in the country



Success Story

Arizona State University

“In mathematics and statistics, ASU ranks first in the nation for doctoral degrees awarded to Hispanics.”


Success Story

University of Iowa, Department of Mathematics


Production of URM Ph.D.'s

Ten Year Period 2003 -2012		THIS YEAR
African American	8	3
Latinos	15	2
Native American	1	1
Hawaiian Native	1	1
Total	25	7

10% of National Productivity



What can we learn from the Rice,
Arizona State, and University of
Iowa successes?



Large improvement in representation in departments in Tier 1 institutions is possible, but it takes effort, commitment, and leadership, and a champion.

Rice University: Richard Tapia

Arizona State University: Carlos Castillo-Chavez

University of Iowa: Phil Kutzko



“SOME THINGS THAT I HAVE
LEARNED”

Obstacle to Improving Representation

Mathematicians as self-proclaimed
gate keepers of quality

- ◆ Yes, culture plays a role.
- ◆ From New York Times 11/25/2011:

In New York, Mexicans Lag in Education


- In the past two decades, the Mexican population in New York City has grown more than fivefold, with [immigrants](#) settling across the five boroughs. Many adults have demonstrated remarkable success at finding work, filling restaurant kitchens and construction sites.
- But their children, in one crucial respect, have fared far differently.
- About 41 percent of all Mexicans between ages 16 and 19 in the city have dropped out of school, according to census data.
- No other major immigrant group has a dropout rate higher than 20 percent, and the overall rate for the city is less than 9 percent, the statistics show.
- The problem is specially unsettling because Mexicans are the fastest-growing major immigrant group in the city.

Something that I have learned concerning URM graduate students

“The wetter the lab
The better the fit”

Reality of Domestic STEM Education

- Pedigree is alive and well.
- Top research universities choose faculty from Ph.D.s produced at top research universities.
- If we URM's are to be an effective component in U.S. STEM leadership, then we must have equitable presence as students and faculty at the top research universities.
- Number of degrees obtained by URM's alone is not a good measure of success. Degrees must be competitive with overall productivity.



“Our concern with underrepresentation today does not stem from moral or ethical issues. Indeed, it is a simple matter of the nation’s survival. As such it is an issue of numbers, not of which group suffered the most. Underrepresentation endangers the health of the nation, and not the health of discipline.”

What Must We Do?

Begin by combating THE LOSS OF THE PRECIOUS FEW
at Tier 1 universities

Recall:

- They migrate away from STEM majors.
- They choose not to go to graduate school.

A feasibility point: My Rice AGEP and ELA programs

Rice University

AGEP

(NSF Alliance for Graduate Education and the
Professoriate)

A well-oiled and well-respected machine

65 current students

10 NSF graduate fellowship in past 5 years

75 URM PhDs on past 15years

What Must We Do?

Implement accountability for
activates counter to the accepted
mission.

State and National Shame

- UCLA and Berkeley in math have few minority undergraduate majors, essentially no graduate majors, and no minority faculty. Yet California has the largest minority population in the country.
- If a public flagship university is not responsive to the needs of the state, then both state and national funding should be cut.
- How about other public universities?
- How about private universities?

Some Thoughts

- ◆ Without effective support programs, is Rice (Caltech, MIT) really the best choice in STEM (math) areas for your minority student?
- ◆ My axiom of preparedness in STEM
 - Rice
 - University of Texas
 - University of Houston
- ◆ Would I have a Ph.D. if I had gone to Rice in Mathematics as an undergraduate? (recall my path)
- ◆ Be aware that Nobel Laureates represent a broad spectrum of undergraduate schools, but a very narrow spectrum of graduate schools

What You Can Do

- ◆ Secondary School Teachers
 - Understand the differences between the various paths toward STEM undergraduate education.
 - Motivate, encourage, and direct wisely your minority STEM student.
- ◆ University Professors and Staff
 - Do not push for the acceptance of minority students who are underprepared unless you have active and effective support programs.



My Story Part II



Most problematic transition point for URM at research universities is faculty hiring.



Faculty Hiring

The Narrow View: Why I would not be hired by Berkeley Math Department.

Insufficient Research potential at an early age to be awarded a Fields Medal (Noble Prize)

Many successful hires: can't teach, can't talk to students, can't mentor, do not serve as a role model, don't care about the national picture, don't care about students, and can barely find their way to their offices.

Faculty Hiring

The full view:

I would give in all standard components and beyond. My contributions would be valued.

I would be promoted (tenured), but I would not be hired.

The Full view:

The pied piper effect

1992 Elected to National Academy of Engineering
(First Hispanic)

2011 National Medal of Science awarded by
President Obama
(First Hispanic)



Dr. Richard Tapia Receives National Medal of Science



MY MOTHER'S TEACHINGS

GLOBAL EXCELLENCE

THANK YOU MOM!

The Full Spectrum of Participation

President Obama's Comments

The guiding themes in my life

“I am not the best, but I
am Good Enough.”

My message to Rice Students



“If you sit on the porch with the big dogs, and occasionally bark like a big dog, the world will view you as a big dog.”

-Richard Tapia

Closing Statement

Your credentials precede you. They promote credibility and open doors.

“Tapia can’t be a total turkey.”

Be a professional who happens to be a minority,
not a professional minority.



THANK YOU

