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

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My Unlikely Journey:
From the Barrios of Los Angeles
to The White House and
The National Medal of Science
Growing up in America we are certainly made to feel different, and we are treated differently with lower expectations.
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. Where do I belong?

• **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, maybe they were right.

• **My Mother:** Be proud of who you are.

• **Me:** But mom, they won’t let me be proud.
Issues Related to Race that Hurt Me

• High school AMS Award
• Rental house in Madison
• Madison neighbor’s comment to our late daughter Circee
• CAAM Chair’s comments on my awards to faculty and graduate students in organizational meeting
WHO AM I?
Words That I Identify With That Make Me Happy:

- Chicano
- Tejano
- Mathematician
How I See Myself
Yes, my culture is American, perhaps with a twist.
American Culture

“The Legendary Back Seat of a ‘57 Chevy”
My Story

Parents from Mexico: They came in search of Education.

Community College: Jim

UCLA: Frisch and Friedman

Professoriate: Dave Sanchez

Characteristic: Monotone increasing and multidimensional. (NPR Story)
My Parents
My Mother’s Teaching

• Pride.
• Belief that you can: Si se puede.
• Good work habits.
• Global excellence.
Bobby Sets World Elapsed Time Record

February 1968
My Mother’s Teachings

Global Excellence
Jean and Richard’s Car

2005-2008

Heavy Metal

Three Times National Show Car Champion
My Mother’s Teachings

Global Excellence
What Do We Latinos Do Better Than Any Other Ethnic Group?

We reproduce quite well
### U.S. Population

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</thead>
<tbody>
<tr>
<td>White</td>
<td>80%</td>
<td>76%</td>
<td>69%</td>
<td>64%</td>
<td>60%</td>
<td>56%</td>
<td>51%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>6%</td>
<td>9%</td>
<td>13%</td>
<td>16%</td>
<td>19%</td>
<td>23%</td>
<td>27%</td>
</tr>
<tr>
<td>Black</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
<td>13%</td>
<td>12%</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>Asian</td>
<td>2%</td>
<td>3%</td>
<td>4%</td>
<td>5%</td>
<td>5%</td>
<td>6%</td>
<td>7%</td>
</tr>
</tbody>
</table>

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

**A Profile of Our Great Nation**
The Browning of America

<table>
<thead>
<tr>
<th>Population</th>
<th>Per Decade</th>
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</thead>
<tbody>
<tr>
<td>White</td>
<td>↓ 4%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>↑ 4%</td>
</tr>
</tbody>
</table>

Consequence

Linear extrapolation tells us that in 160 years
- There will be no Whites in America.
- Hispanics will be 80% of the population.
The Mexican American Boom:
For the first time in history births overtake immigration.
What Do We Latinos Do Better Than Any Other Ethnic Group?

We drop out of high school

The Paradox: Yet, we say that we value education.
Cultural Values

• 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.
What Do Blacks Do Better Than Any Other Ethnic Group?

High school and no more
• Blacks and Browns strongly avoid STEM areas in favor of things like sociology

• Asians go into STEM areas, as workers, not as administrators or other national leaders
## Blacks and Hispanics In the Academic Pipeline*

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Top 100 Departments 2007</th>
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<tbody>
<tr>
<td></td>
<td>Blacks</td>
</tr>
<tr>
<td>Chemistry</td>
<td>1.5%</td>
</tr>
<tr>
<td>Math</td>
<td>1.5%</td>
</tr>
<tr>
<td>Computer Science</td>
<td>0.9%</td>
</tr>
<tr>
<td>Physics</td>
<td>0.7%</td>
</tr>
<tr>
<td>Chemical Engr</td>
<td>2.1%</td>
</tr>
<tr>
<td>Civil Engr</td>
<td>1.8%</td>
</tr>
<tr>
<td>Electrical Engr</td>
<td>1.7%</td>
</tr>
<tr>
<td>Mechanical Engr</td>
<td>1.9%</td>
</tr>
<tr>
<td>Biological Sci</td>
<td>1.4%</td>
</tr>
<tr>
<td>Earth Sciences</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

*Hispanics were 14.8% of the 2006 US population

**Asians were 4.4% of the 2006 US population

WE ARE HERE, BUT WE ARE NOT THERE
Change in STEM Faculty Demographics Over Time (Nelson Diversity Surveys "Top 50"

- Civil Engineering
- Sociology
- Sociology
- Political Science
- Sociology
- Psychology
White Males

Everything but Sociology
Asians

- Electrical Engineering
- Mechanical Engineering
- Computer Science
There are good jobs, but we URM tend not to train in the areas where there are jobs
Historically “white people” have done a great job as STEM workers and leaders. For years we the United States have been the envy of the scientific world.

As our nation becomes brown and yellow; will our scientific workforce and scientific leadership be replenished?

Or will historians write about “the rise and fall of the United States”
Why Worry About Underrepresentation?

- Our representation in the population is exploding.
- Our representation in STEM discipline is not improving.

“AN UNHEALTHY NATIONAL SITUATION”
“Our concern with STEM underrepresentation today does not come from moral or ethical issues as it did in the 1960’s. Indeed, today 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 the discipline.”
Four Significant Factors in Underrepresentation

- Faulty Evaluation by Mathematicians
- The Mismatch Theory
- The Role of Foreign Minorities
- The Loss of the Precious Few
A major obstacle to improving representation for minorities.

- Mathematicians as self-proclaimed gatekeepers of quality.
Fact: We URM have poorer preparation at all levels.

Fact: Mathematics faculty do not differentiate between poor preparation and poor talent.

Hence in entry level courses they interpret poor performance as poor talent and discourage the URM from continuing in STEM disciplines.
Racism: Lower Expectations

- Rice Math: The Pedro Story

“\textquote{I try to discourage those that do not belong in Mathematics.}”
According to at Least One Rice Mathematician One of the Following Does Not Belong in Mathematics, Which One?
## How Faculty View Underrepresented Minority Graduate Students

<table>
<thead>
<tr>
<th>Items related to underrepresented minority students</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Preparation depends on quality of the undergraduate institution</td>
<td>63%</td>
</tr>
<tr>
<td>Requiring a lot of time and effort</td>
<td>34%</td>
</tr>
<tr>
<td>Prepared for graduate work</td>
<td>27%</td>
</tr>
<tr>
<td>Lacking in research experience</td>
<td>27%</td>
</tr>
<tr>
<td>Under-prepared for graduate work</td>
<td>26%</td>
</tr>
<tr>
<td>Hard workers</td>
<td>20%</td>
</tr>
<tr>
<td>Possessing talent in the field of study</td>
<td>6%</td>
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</tbody>
</table>
Sanders 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 Minority Serving Institutions where they can succeed.

The correct conclusion: Must build support programs so that students that have preparation deficiencies but talent succeed.
Outside: Majority schools say minorities do better at minority schools, therefore this is where they should go.

Inside: 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.
The Mismatch Theory

The Danger: Establishment of two-tiered Ph.D. structures Separate, But Not Equal.

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

Top research universities choose faculty from Ph.D.s produced at top research universities.

If we URMs 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 URMs alone is not a good measure of success. Degrees must be competitive with overall productivity.
An Obstacle to Improving Faculty Representation

The recent replacement of “underrepresentation” with “diversity”

True Diversity Doesn’t Come From Abroad
An Obstacle to Improving Faculty Representation

- 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
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.
Today’s Promotion of diversity has replaced concerns for improving domestic representation.

In what sense are Argentine mathematicians underrepresented?

Can we Chicanos compete with the very best these foreign countries have to offer?

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.
The Loss of the Precious Few

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

Two components

• Minority Serving Institutions
• Tier 1 Research Institutions
The Loss of the Precious Few: Minority Serving Institutions

The good STEM students:
• 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.
Minority STEM students who are accustomed to functioning with self-confidence encounter “sink or swim” culture and no support mechanisms at Tier 1 schools.
The Loss of the Precious Few: Tier 1 Research Institutions

- Feeling “beat up” and losing confidence URM students at Research Universities:
  
  - 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.
Racism: Deficient Understanding

Math Faculty Hiring at Research Universities: Evaluation that Does Not Promote University and National Needs.

Most problematic transition point for URM at research universities is faculty hiring.
Our extra dimensions are not valued at hiring. They are not even frosting on the cake, they are the box that the cake came in and is thrown away.

Yet they are needed.
A Lifetime of Experience Leads Me to the Following Realization

Hiring underrepresented minorities like me is not a lowering of your standards. We bring strengths and understandings that are much needed in the educational mission of the nation and today’s universities, but are not sufficiently valued to enter into faculty hiring criteria in a meaningful way.
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 (The Math Nobel 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.
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.
Never Berkeley, But Almost Stanford

1976

- Interest in RAT on the part of the Stanford Administration.
- Perfect teaching evaluations in 3 classes.
- Faculty advisor to all Hispanic student groups including medical and law.
- **Substandard offer:** I had to reject it (my extra dimensions were of negative value).
At Both Berkeley and Stanford

The Full view:
The pied piper effect
And Yet

1992
Elected to National Academy of Engineering
(First Latino)
But There Is More,
Tapia Receives National Medal of Science
My Mother’s Teachings

GLOBAL EXCELLENCE

THANK YOU MOM!
Jean: We Won A “White” Award
Do I Belong?

Norbert Wiener
Solomon Lefschetz
H. Marston Morse
Oscar Zariski
John Milnor
Paul Cohen
Jerzy Neyman
William Feller
John Tukey
Kurt Gödel
Joseph L. Doob
Peter Lax
The Full Spectrum of Participation

President Obama’s Comments
But There Is More,
Richard Tapia wins NSF’s Prestigious Vannevar Bush Award (First Latino).

But I would not be hired by Berkeley Math.
“I am not the best, but I am Good Enough.”
“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
A Message to Students

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.

We serve as role models in two capacities: Minority youth and majority colleagues. Concerning the latter we want to show them that excellence comes in all flavors.
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.
  ▪ Be aware that there are many paths to the same place.
  ▪ Pay attention to the top, that is where our leaders should be coming from, but they are not!

• University Professors, Students, and Staff
  ▪ Do not push for the acceptance of minority students who are underprepared unless you have active and effective support programs.
  ▪ Promote a culture that supports.
  ▪ Promote the understanding that underrepresentation endangers the economic health of the nation, and that all must play a role in improving representation.
Yes, K-12 is the critical component in improving representation, but we can’t just wait until it is fixed. We in universities must produce the national STEM leadership that will play a lead role in the correction process. Moreover, this leadership can not just come from minority serving institutions.

• Representation at research universities can be improved, but it takes a leader and a supportive environment.

• The underrepresented minority’s worst enemy is poorer preparation at all levels. As such we do not perform as we should on standardized tests and in advanced level STEM classes at research universities. Yet for the health of the nation we must be present at these universities.

• Today’s mathematicians (and other scientists) are elitists, but they are not racists in the traditional sense. However, many believe that underrepresented minorities have less innate talent in STEM fields and have lower expectations for their success. They claim that theses feelings were gained from experience in teaching underrepresented minority students. However, the inconsistency is that they are equating lack of talent with lack of preparation.
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?
What Can we Do

• All university administrators make the politically correct statements with respect to the university’s mission concerning diversity and the promotion of representation. However, what is said is rarely reflected at the level of the STEM departments.

• We must encourage the administration to practice departmental accountability.

• NSF can and should play a strong role here. Departments should be the unit of accountability.
THANK YOU