Toward a Center of Excellence for Early International Research

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_Hypothesis:_ Socially disadvantaged students - strong learning gains from early authentic research
US has a “critical mass” of talent/experience minority students ready to go abroad

**MODEL**(in green text throughout) _Research as pedagogy_ to accelerate early learning and motivation

_Outcomes:_
- 2 NSF awards ~$1M – 7 yrs (and 15 yrs before this another $2M), EU Erasmus+ award
- Strategic Partnership agreement Grenoble… MOUs Toulouse and Bordeaux
- Peer reviewed publications and presentations at National meetings
- Students thriving in top doctoral programs …… France??
- $5K mentor research initiation awards
- Equivalence of European Masters Degree
- Invitation for multi-year NSF center of excellence
- NSF/NIH/EU/Brazil/Thai Workshop - characteristics enhancing early research success

March 7-8, 2016 - Paris
(example) GRAVITY WAVES!!!

The calculations....

VIGO (Italian-French)

The facility: LIGO – Livingston Louisiana (first...LSU) Hanford WA, (second 7 ms later)
40 years .... $200M detector upgrade – MIT/CalTech NSF

The people: William Parker (technician… NSF LSAMP scholar - a “second chance”), Nutsinee Kijbunchoo LSU undergrad who worked with Gaby Gonzalez

March 7-8, 2016 - Paris
The NSF US/France/Belgium iREU in Translational Chemistry Model: 3-6 month research stays

**Louis Stokes Alliances for Minority Participation (LSAMP)** - NSF program funding 45 “alliances” with multi year awards to increase the participation and success of undergrad students of color in STEM (research - a significant part of this program). Each alliance in turn is comprised of a 6-25 institutions large and small (for example, UC Berkeley and Argonne as well as Little Big Horn College).

Model:
- Authentic research projects: US students get “challenge” of meriting co-authorship
- “Deep” cultural immersion
- 2-4 students per site …… crucial….. scalable to many French cities
Wais Hosseini, Molecular Tectonics, Univ. Strasbourg

“Teach students to translate intuition into formulation of a problem”

I do not need “another pair of hands”… “bring your own ideas, they could be right, they could be wrong”

“Diversity is richness”… “research abroad is not a substitution… it is an addition…. You lose nothing by learning something else”

“Molecular tectonics: From simple tectons to complex molecular networks” Hosseini, MW ACCOUNTS OF CHEMICAL RESEARCH 38 313-323 (2005) 524 citations

Neil Garg, REU , 1999, NYU

Model: solid French researchers at research institutions…. who care…NOT “sensibilization”
Model: Recruiting – Nominations by US mentors – NO student applications
In the summer of 1999, I participated in an UG research opportunity that changed my life. I went from being a student with little direction to a person in charge of my own future. UG research helped prepare me for graduate studies, and ultimately, for my job at UCLA as an assistant professor.

"Embrace the experience and expect to be challenged"


Model: Very long term support essential …..merit-based…3-5 yr renewals
Neil Garg, Strasbourg/UCLA

When you are abroad “be fearless”

“Fearless can be the bungee cord”

“Just as much (more) fearless can be participating in the daily lab coffee break”

Bungee Jumping
Interlaken Summer 1999

Model: Very long term payoff… grows with time

Fine Nathel, et al. ACS Catalysis (2014) 4, 3289; (1 UG)
S D. Ramgren et al Org. Lett. (2013) 15, 3950; (1 UG)
KW Quasdorf et al JACS (2009) 131, 17748. (1 UG)
Table 4 iREU Participants 2013-2015

<table>
<thead>
<tr>
<th>Name</th>
<th>LSAMP</th>
<th>Minority</th>
<th>Grad School</th>
<th>Pub/Presentation</th>
<th>Location</th>
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<td>No - LSU</td>
<td>White</td>
<td>Texas A&amp;M</td>
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<td>Jessica Jones</td>
<td>VA-NC LSAMP</td>
<td>7th Grade Teach</td>
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<td>Rachelle Richardson</td>
<td>LS-LAMP</td>
<td>Af Am</td>
<td>Apply grad sch.</td>
<td>Yes^3/6/7</td>
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<td>Christopher Wills</td>
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<td>Jacinto de la Cruz</td>
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<td>Rosalyn Kent</td>
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<td>Jonathon Watson</td>
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<td>Alexandra Saxx</td>
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**Results: the NSF US/France/Belgium iREU in Translational Chemistry**

- "Design and synthesis of flavonoids as potential inhibitors of Human cytochrome P450s 1A1 and 1A2 enzymes" Mensah, L; McClain, E; Dotson, B; Mensah, L; McClain, E; Dorsey, D; Du, C.; Wessel, J. M. 2013 Annual Research Conference for Medicinal Chemistry, San Francisco, CA, May 2013.

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“Faculty mentors should keep an open mind about how the research their student will do could benefit their own research program”

“US mentors can have an invaluable role in identifying prospective students”

We study bacteria, (Staphylococcus aureus and Mycobacterium tuberculosis) and environmental bacteria which are important in global carbon cycling (cyanobacteria). How these bacteria respond to stress helps reveal new drug targets and helps to reveal how environmental changes will affect organisms (cyanobacteria).


Model: (as possible) connect participant research with US and French mentors for the benefit of all $5K mentor research initiation awards …… France??
Attributes that enhance success in an international setting (to date)

Technical skills
Demonstrated work ethic, reliability, dedication
Adaptable, Good Personality, team player
Good communicator, follow-through to completion
Creative/Fearless

Others that might be less obvious

Time management
Independence
Represents themselves well - not “fussy”
Embraces “norms” in another country
Mindful of personal security

External Factors mentors may miss

Family constraints, “helicopter” parents, Illness, student’s academic status

How to best communicate these attributes to thousands of faculty mentors?
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US “critical mass” of minority students ready to go abroad

MODEL: Research as pedagogy to accelerate early learning and motivation

Outcomes:
- 7 NSF awards ~$3M (20 yrs)
- EU Erasmus+ award
- Strategic Partnerships and MOUs
- Publications and meetings
- US students in PhD programs …… France??
- $5K mentor research initiation awards
- Equivalence of European Masters Degree
- Invited NSF center of excellence
- Apr 2016 Workshop - early research success

Challenges:
- EDUCATIONAL recognition of early research in France …. treated like a “job”…..
“research stage” with Nobel Laureate =“vendeuse a la FNAC”….. not learning experience
- Re-establish Bi-directional and Long-term French support
- “use” US students to Inspire large numbers of socially disadvantaged French youth
(past) French Ministries contribution to iREU ~60K/yr
Contribution to “center” ~120K/yr

March 7-8, 2016 - Paris