Hierarchical Mentoring: An Academic Support System

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**PH.D. PIPELINE FOR PROJECT 2012**

- **Additives**
- **Primary School**
- **Home**
- **Jr. High**
- **High School**
- **College**
- **Graduate School**

**Raw Material**

**Minority Youth**

**Losses**

**Inadequate Parenting and Teaching**

**Inadequate Math Skills and Competition**

**Natural Selection Math Skills Artifacts**

**Product**

James W. Mitchell, Howard University
Comments on some At-Risk Students

• This student’s grades do not reflect his/her true abilities.
• This student has an aptitude for science.
• This student is very interested in science.
• This student is not performing up to their abilities.
• Something is wrong?
An Innovative Hierarchy Model for Integrating Research, Education, and Peer Mentoring
Focus on development of education, research and mentoring

Hierarchical model where students:

- Learn fundamental tools needed to excel in STEM.
- Engage in undergraduate research
- Receive mentoring from faculty
- Assigned peer mentors and mentees in their field of study
- Participate in community service
- Receive academic advising and monitoring from program staff
Bloom’s Taxonomy (Metacognitive Ladder)

- **Evaluation**
  - Make decisions; support views

- **Synthesis**
  - Derive and create original ideas

- **Analysis**
  - Identification of component parts

- **Application**
  - Solve problems; translate abstract to practical

- **Interpretation**
  - Identify connections and relationships

- **Translation**
  - Restate, paraphrase, and summarize

- **Recall**
  - Rote memorization
ELEMENTS OF LSU HHMI/LA-STEM PROGRAMS

- Improved Study and Note Taking Skills
- Development of Group Interaction Skills
- Improved Time Management Skills
- Enhanced Science Comprehension Through Research
- Development of Mentoring Skills
LA–STEM Research Scholars Program

HHMI Professors Program

Success through collaboration

HHMI students whose GPAs qualify them for LA-STEM can transfer from one program to the other

2.5 to 3.0

LA-STEM students who lose eligibility for the program because of the GPA requirement can transfer to HHMI

> 3.5
Summer Bridge Program

- Build community
- Gain tools needed for success in college
- Serve as an intensive orientation to LSU

**Activities**
- Service Learning
- Outside Speakers
- Workshops
- Bonding Activities
- Family Dinners
- Research Site Trips
- Credit and Non-credit courses
Summer Bridge Students
HHMI and LA-STEM
In HHMI and LA-STEM, we provide a supportive, motivating, diverse, learning community for students which promotes academic success through a three-pronged approach:

**ACADEMIC SUCCESS**

- Mentoring
- Education
- Research
Mentoring

Mentors function in four primary roles:

1. **Teacher**
   - imparting knowledge or skill to the mentee by example or experience

2. **Counselor**
   - exchanging opinions and ideas with the mentee to reach a decision or deliberate plan of action

3. **Intervener**
   - influencing the mentee’s attitudes and behaviors

4. **Sponsor**
   - assuming responsibility for assisting the mentee in gaining greater academic success
What all students need to be successful:

- Refined problem-solving skills
- Time management and organization
- Enhanced interdisciplinary learning
- Ability to make connections between coursework and real-world experiences
- Metacognitive abilities (learning how you learn best and monitoring your own learning)
- Writing skills (yes, even for STEM majors)
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<td>AUGUST</td>
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<tr>
<td>Week 2</td>
<td>Classes Begin</td>
<td>Getting On Course to your Success</td>
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<td>Accepting Responsibility &amp; Time Mgmt: Schedules</td>
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<td>SEPTEMBER</td>
<td>Goal Setting &amp; Self Motivation</td>
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<td>Notetaking &amp; Mentoring</td>
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<td>Study Strategies I</td>
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<td>Week 5</td>
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<td>Preferred Learning Styles</td>
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<td>Self Discipline &amp; Interdependence Career Fair</td>
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<td>Week 6</td>
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<td>Grad Student Research Presentation &amp; Grad School Application Overview</td>
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<td>Self Awareness: Are You Off Course?</td>
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<td>Week 7</td>
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<td>Mentor &amp; Review of Midterm Study Schedule</td>
<td>OCTOBER</td>
<td>Fall Holiday</td>
<td>Fall Holiday GAELA</td>
<td>Conference</td>
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<td>Week 8 @ Tulane</td>
<td>Classes resume</td>
<td>Study Strategies II</td>
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<td>Is 24 Hours Enough?</td>
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<td>MIDTERMS</td>
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Our Research students (mentors)

• receive extensive preparation for research during their first semester in program or before (summer bridge)

• work in a research lab by their second semester in program

• have a research mentor to offer guidance and support

• have the opportunity to participate in summer research programs all over the country/world
Demographics of the LSU-HHMI Scholars
By Ethnicity

![Pie chart showing demographic distribution of scholars by ethnicity: Black, Non-Hispanic 52%, White, Non-Hispanic 35%, Asian/Pacific Islander 9%, Hispanic 4%]

**Mentoring**  **Education**  **Research**  **Leadership**  **Service**

**STEM Graduation Rates**

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<th>All</th>
<th>Minorities</th>
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<tr>
<td>LSU / HHMI Professors Program</td>
<td>70.0%</td>
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<td>LSU Non-participating Undergraduates</td>
<td>60.0%</td>
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<td>Nationwide Colleges and Universities</td>
<td>50.0%</td>
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Six-year Graduation Rates for the LSU-HHMI Professors Program Scholars, LSU incoming freshmen in STEM curricular for AY 2002-2003, and national consortium incoming freshmen in STEM curricular as reported by the Center for Institutional Data Exchange and Analysis at the University of Oklahoma.
Six-year Graduation Rates for the LA-STEM Research Scholars Program (NSF Funded), LSU-HHMI Professors Program Scholars, LSU incoming freshmen in STEM curricular for AY 2002-2003, and national consortium incoming freshmen in STEM curricular as reported by the Center for Institutional Data Exchange and Analysis at the University of Oklahoma.
Program Impacts

- Initiated in 2007
- 13 participants thus far
- 85% BRCC participants transferred into 4-year universities as STEM majors
- 77% BRCC participants have transferred to LSU
- Served as spring board for new inter-institutional collaborations

Community College integrated into Hierarchical Mentoring Model

- Students Participate in a course on research basics
- Join a research lab during first summer in program and continue throughout fall and spring semesters
- Engage in multi-level Mentoring
  - HHMI Program Manager
  - LSU HHMI/LA-STEM peer mentors
  - BRCC Faculty
- Strong administrative support at the college and division levels
High School
Fall and Spring Research Academy
& Summer Science and Mathematics

- Math and Science integrated courses (Biology, Calculus, Physics, & Chemistry)
- Teacher facilitated lab projects
  Mentor facilitated computer training
- Mentor facilitated scientific research and exploration projects
- Science Fair/Student Poster presentations on current scientific research for SURF competition
- Weekly field trips and fun activities
- LSU faculty facilitated STEM research in labs

Summer 2010 served 21 rising 9th - 12th graders from Louisiana
LA-STEM/ HHMI Scholars/Mentors
The LA-STEM Research Scholars Program is funded by the National Science Foundation, Research Corporation, and Louisiana State University.

Howard Hughes Medical Institute

Howard Hughes Professors Program

LA-STEM