The Louisiana State University HHMI Professors Program

-Program Manager Lisa Batiste-Evans and Assistant Manager Karin deGravelles

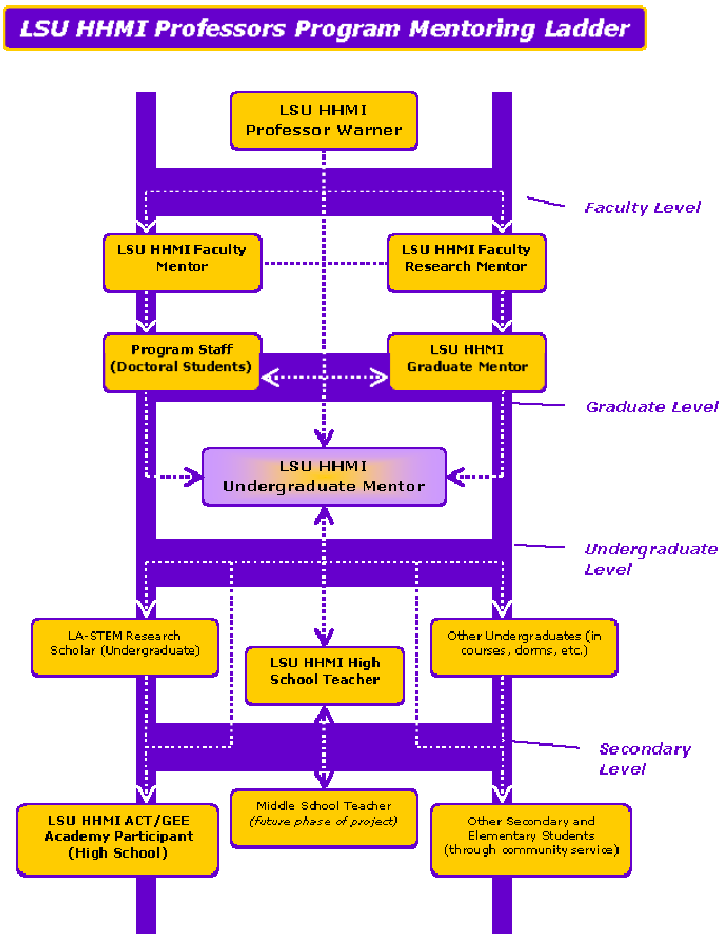
In his thirty-plus years in academics, Louisiana State University Howard Hughes Medical Institute (HHMI) Professor Isiah M. Warner has found many students who, by natural ability, interest, and work ethic, should have performed well in the sciences, but performed poorly. The LSU HHMI program is focused on understanding and providing the special needs of these students such they are able achieve their full potential in the sciences. In this program, the undergraduate participants, called LSU HHMI Undergraduate Mentors, are taught the fundamental principles of mentoring, education, and research through classes and interactions with their peers, graduate students, high school students, program staff, and faculty at the college, high school, and elementary school levels. The goal of these exercises is to empower these students to develop individual strategies for their own success in science careers and to help others do the same.

By targeting students in the undergraduate GPA range of 2.5 to 3.0, the LSU HHMI Professors Program works with a population of students often overlooked as potential scientists. When these students do advance, they have the power to mentor and inspire other students who have not consistently performed at high levels to reach their goals. Professor Warner's plan is to develop a new model for undergraduate training that creates a self-perpetuating atmosphere for encouraging students to advance into science, technology, engineering, and mathematics, ultimately increasing the number and diversity of students going on to terminal (Ph.D. or M.D./Ph.D.) degrees in these fields.

Mentoring

"I hope my mentees and everyone else has learned as much as I have this semester, but this has really helped me. I feel that I am more concentrated on what I have to do to get to where I want to be. […] It is my hope that new students as well as the older students see peer mentoring as an eye opening experience. I had reservations about it at first because I did not know how it would work in addition to my schoolwork, and if I would actually bond with my mentee. Once I got over that and realized how all of that would work itself out I was more relaxed about it and was able to get to know them and really enjoy myself. […] I would like [mentors] to have an open mind about mentoring and remember that mentees are not the only ones that need help and that mentors are not the only ones that can help. It is a two way street and it will only work if you see it that way." – Alicia, LSU HHMI Undergraduate Mentor, Fall 2004

The mentoring aspect of the LSU HHMI Professors Program is based in the idea of the mentoring ladder. This ladder not only encourages collaboration and multi-directional mentoring between people at different levels of education, but also looks to multiply the activities of a few mentors at the graduate and faculty levels, extending their influence to reach many undergraduates and secondary students.



Education

"As I look back on the semester and compare it to previous semesters, I have realized that through my participation in the HHMI Professor's Program, my eyes have been opened to new facets the value of knowledge and higher education. Before entering the program, I had always approached school as something to be conquered; my goals were the grades, not the knowledge. While making the grades and the high GPA are vital for applying to medical or graduate school, what good are the impressive grades without the understanding to back them up? My experiences through the summer and during this school year have taught me that learning a particular subject matter superficially is not enough; it is the why, the how, that are essential parts of the information. We must learn to explore beyond what is taught in the classroom in order to gain a complete understanding and operate at a level in the upper ranks of Bloom's Taxonomy." – Megan, LSU HHMI Undergraduate Mentor, Fall 2004

Because the LSU HHMI Professors Program serves students in all STEM disciplines, its approach has not been to teach science, but to help students learn how to learn science, and to extend what they have learned to mentoring and research. The program offers a series of four "Mentoring, Education, and Research" courses that takes the developing undergraduate from basic metacognitive techniques and learning strategies, preparation for research, and working with a peer mentor, to teaching metacognitive techniques and learning strategies, presenting one's research, and being a mentor to other undergraduates and high school students. By focusing on individual student needs and goals, the courses can accommodate students at various levels of development in mentoring, education, and research.

Metacognition describes the ability to think about thinking, be consciously aware of oneself as a problem solver, and monitor and control one's mental processing (see Center for Academic Success website, below). Many students struggle in science and mathematics because they lack these abilities, and the "Mentoring, Education, and Research" courses hold that developing students' awareness of themselves as learners through metacognition can be a powerful tool not only in their STEM courses, but in their research, mentoring, and career planning.

To this end, the "Mentoring, Education, and Research" series:

- Uses Bloom's Taxonomy of Learning Objectives to show students the different levels of learning expected in most high school and undergraduate courses, as well as graduate-level work. For many students who are struggling because they have not adjusted to the expectations of college-level learning, using Bloom's Taxonomy to analyze the ways in which they are studying versus the way they are being tested can help them see what adjustments they can make.
- Has the students take a series of tests that identify learning preferences, including brain dominance, personality type (based on Meyers-Briggs), and modality, and offers the students information to understand and contextualize what they learn about themselves.
- Encourages students to analyze their learning and study habits frequently and to be aware of the way that material is taught in their classes with regard to learning preferences.
- Suggests learning strategies that are often effective for various types of learners.
- Discusses how students might effectively pass on this information to others.
- Works with students to develop, monitor, and evaluate a plan of action in the form of the "Individual Development Plan."

Research

"The resources and skills I've learned help me excel in my classes and research."- LSU HHMI Undergraduate Mentor, Fall 2003

[…] if you do enjoy working with others, giving and receiving help, and developing relationships, especially with those interested in the STEM disciplines (undergraduate and graduate students, faculty and other researchers on and off campus), this will be an exciting venture you will never forget (or regret)." – Matthew, LSU HHMI Undergraduate Mentor, Fall 2004

Research is an important component of the LSU HHMI Professors Program. Particularly because the students targeted by the program have initial cumulative GPAs between 2.5 and 3.0, research provides a vital connection between the participants' classes and the real world of science. The research component of the LSU HHMI Professors Program stresses preparation and exploration before the students begin research, mentoring relationships with faculty and graduate students, and writing and presentation skills as related to research.

In preparation for research, LSU HHMI Undergraduate Mentors gather information about research in their field at LSU and compile a list of professors that they are interested in working with. During the initial Summer Bridge experience, students go on field trips to research facilities; the 2004 program included trips to Pennington Biomedical Research Center and the Center for Advanced Microstructures and Devices (CAMD). Through their peer mentoring relationships and viewing and analyzing senior participants' research presentations, the Undergraduate Mentors are exposed to the challenges of research before they begin their own research, generally in their second and no later than their third semester of participation in the program. Students generally begin research in the second or, at latest, third semester of participation in the program.

For the six new students entering the program in summer 2005, research opportunities are, on average, the aspect of the program that most influenced their decision to apply to and enter the program.

LSU HHMI Professor Isiah M. Warner

As a Professor of Chemistry, Dr. Warner has received many awards and honors for his innovative teaching and mentoring, including *ACS Encouraging Disadvantaged Students into Careers in the Sciences* (2003), *AAAS Fellow* (2002), *AAAS Lifetime Mentor Award* (2000), and the *Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring* (1997). As the Vice Chancellor of Strategic Initiatives, Dr. Warner is charged with using his expertise in the fields of mentoring, education, and research to create an institutional atmosphere in which all students can thrive. The LSU HHMI Professors Program is an integral part of that effort.

"The program is the best thing that has happened to me since I came to LSU."- LSU HHMI Undergraduate Mentor, Fall 2004