The Model Institutions for Excellence (MIE) Model
The Model Institutions for Excellence (MIE) are minority-serving intuitions (MSIs) that through a concentrated effort over 11 years, funded both by NSF and NASA, defined a seven component model for MSIs or others to follow to increase the enrollment, retention, graduation and advancement of students in STEM. The MIEs include three Historically Black Colleges and Universities (HBCUs) (Spelman, Xavier and Bowie), two Hispanic-Serving Institutions (HSIs) (University of Texas at El Paso and Universidad Metropolizana), and a collaboration of three Tribal Colleges and Universities (TCUs), the Oyate Consortium (Oglala Lakota College, Sitting Bull College and Sisseton-Wahpeton College). MSIs provide an efficient mechanism to increase the number of minorities in STEM fields due to their large proportion of minority students. For example, HSIs are defined by having at least 25% Hispanic student enrollment, and educate nearly 50% of all Hispanic college students (NCES, 2002) while being less than 10% of U.S. institutions of higher education. The MIE institutions demonstrated effectiveness by increased STEM enrollments that out paced general campus enrollment increases (Kim, et al, 2007; Rodriguez, et al, 2005) and rose faster than national increases in STEM (IHEP, 2007; Kim, et al, 2007). Similarly, STEM degrees conferred by MIE institutions increased by 46% while nationally they rose by 19% (IHEP, 2007).

The seven components of the MIE Model include Recruitment and Transition Initiatives, Student Support, Undergraduate Research, Faculty Development, Curriculum Development, Physical Infrastructure, and Graduate and Science Career Initiatives (Rodriguez, et al, 2005). These are not a set of activities followed lockstep by each institution. No single component, but rather the coordinated combination of components is producing the desired outcomes in STEM recruitment and retention. Financial student support and hiring faculty of color are particularly important for increasing minorities in STEM (Rodriguez et al, 2005). The MIE PIs coordinated the efforts, and acted as change agents and MIE champions on the campuses (IHEP, 2007) in collaboration with the leadership of the campus president and administrators as well as faculty peer groups and support staff. Student peer tutors and mentors also are integral to the model acting as a team with a common vision. The MIE model represents a cyclic process from Investment, including strategic planning and campus mission alignment; Distribution, including physical infrastructure, curriculum and faculty development as well as student financial awards and pre-college activities; Integration when the impact of the Investment and Distribution can start to be seen; Production where the student, faculty and institutional results are obtained as well as measured and analyzed and strategies reconsidered; to finally, Reinvestment where what knowledge has been gained can be put into refining the strategies and restarting the process building the institutional capacity with each cycle (IHEP, 2007).

The MIE program has been evaluated extensively by the American Institutes for Research (AIR), Systemic Research, Inc., and the Institute for Higher Education Policy (IHEP). AIR (Rodriquez, et al, 2005) identified the common model across institutions. This was based upon extensive data gathered and presented by Systemic Research (Kim, et al, 2007), and an independent evaluation which included in-depth field studies. Another independent evaluation completed by IHEP (2007) built upon the earlier work of AIR and Systemic Research and identified the cyclical process. This rich collection of data and analysis can greatly assist the adoption or adaptation of the model by other institutions.

The CAHSI interventions of Peer-Lead Team Learning (PLTL), CS-0, Affinity Research Groups (ARG), and the graduate student workshops (see http://cahsi.fiu.edu for descriptions) fit well into the Student Support, Curriculum Development, Faculty Development, Undergraduate Research and Gradute and Science Career Initiatives components of the MIE model (Examples of the types of activities follow.)

References
Recruitment and Transition Initiatives: Activities to prepare matriculating students to succeed in college and to introduce students to STEM disciplines and careers. These initiatives include such activities as:
- Training elementary, middle, and high-school teachers to improve their content knowledge and teaching ability
- Introducing young students to the STEM world through hands-on activities (e.g., science fairs, Geographic Information Systems (GIS) mapping)
- Bridging the transition from high school or community college into college or university (e.g., summer orientation programs)

Student Support: Social, financial, and academic assistance to students. This includes such activities as:
- Supporting peer and/or teacher/student mentoring programs
- Tutoring
- Providing and/or advising on opportunities for financial aid
- Starting each course at the point at which most students have sufficient background to understand basic concepts
- Scheduling "cohort" programs in which a small group of students may take some or all core subjects together
- Especially at commuter campuses, establishing a place where groups of students can meet and study with one another
- Scholarships, grants and funding for research and presentations of research projects

Undergraduate Research: Enabling students to become directly involved in on-going research. Associated activities might include:
- Encouraging faculty to include funding for undergraduate researchers in their research proposals
- Student internships
- Having students write and present research findings (both on campus and at conferences)
- Establishing liaisons with businesses and other universities to expand the opportunities for graduate research
- Maintaining a supportive environment in which a student may experiment (and fail) without negative consequences

Faculty Development: Recruitment, retention and professional development of faculty. This includes:
- Funding for research, conferences, and professional development
- Mentoring
- Setting appropriately balanced (and rewarded) teaching and research agendas
- Professional development on interactive classroom methods, mentoring, and integrating student researchers into faculty research activities

Curriculum Development: Alignment of curriculum with accepted content standards and the development of courses that are relevant to the marketplace, the community and the student population. These activities include:
- Providing developmental courses to bring entering students up to a required standard
- Integrating curriculum to help students build connections
- Introducing relevant history and culture into all courses
- Ensuring culturally responsive pedagogy
- Developing new courses and majors

Physical Infrastructure: Upgrading and maintaining facilities and equipment. This includes:
- Renovating classrooms and laboratories
- Purchasing, upgrading and maintaining state-of-the-art equipment
- Designing spaces for students to meet and study

Graduate and Science Career Initiatives: Activities designed to facilitate admission and retention in STEM graduate programs and/or careers. Related activities include:
- Providing graduate school admissions test preparation courses
- Educating students on academic and professional supply and demand trends in STEM fields
- Establishing a bridging program for students transitioning out of college
- Providing job placement services