

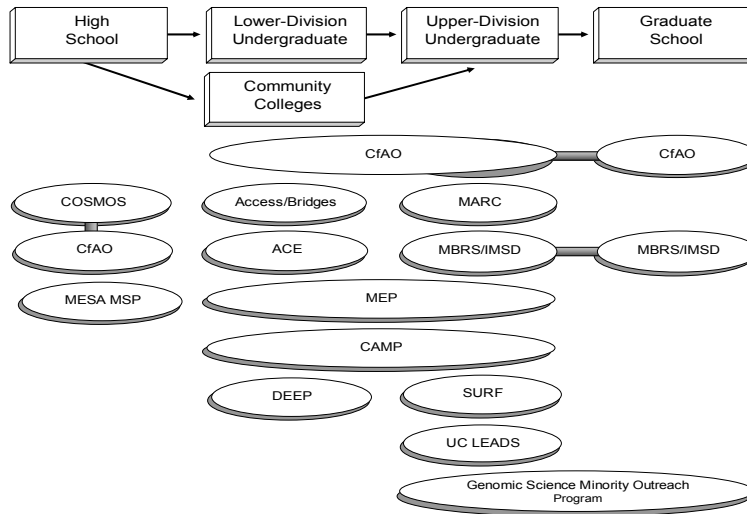
Assessing Science Inquiry and Leadership Skills (AScILS)

An NIH Funded Project:
Martin Chemers, PI
August 2004 – June 2008

The NIH Context: Purposes of Initiative

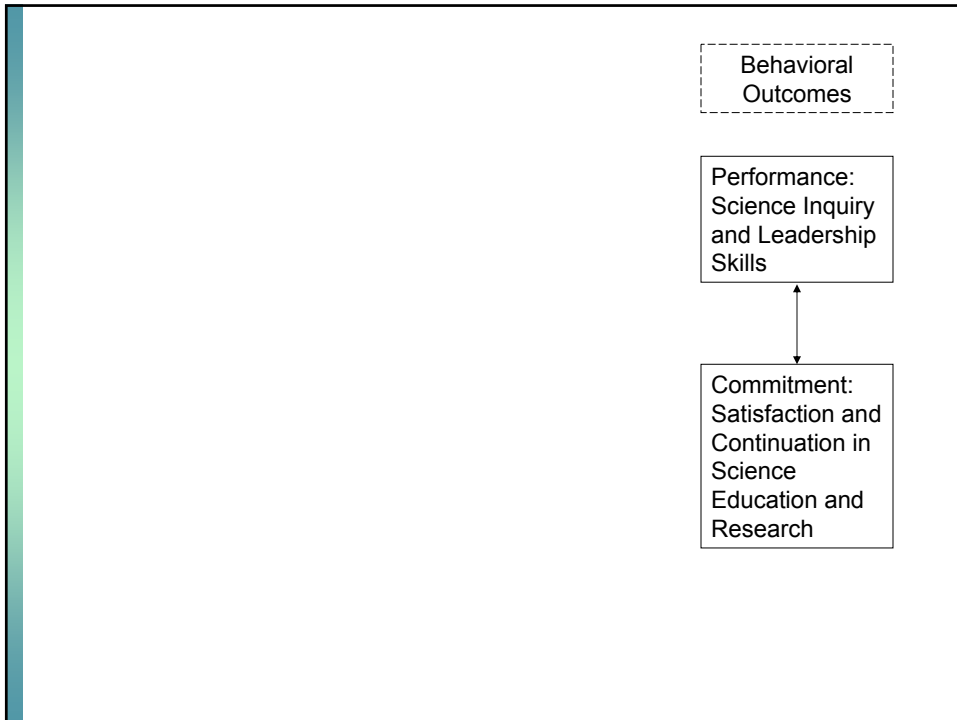
- To optimize strategies that increase students' (particularly underrepresented students') entry and success in biomedical research careers
- To test assumptions re how interventions work
 - Engaging in research with appropriate support and mentorship motivates students
 - This leads to improved academic and career skills
- To make evidence-based recommendations to reinforce and/or improve practice

The UCSC Context: A Rich Array of Student Support



Research Questions

- How do activities implemented by biomedical research career support programs (especially research and mentoring) influence:
 - skills in science inquiry and scientific team leadership and membership,
 - beliefs in efficacy and collective efficacy regarding these skills, and
 - stage-appropriate educational and career outcomes?
- Are these influences similar for minority and non-minority students?

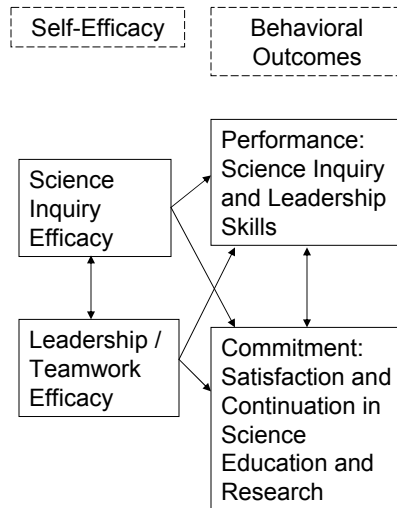


Concepts and Assessment

- Commitment
 - Survey items such as: I intend to continue in education toward a research career
- Science Inquiry Skills
 - Develop research questions, hypotheses, research methods and measures; collect and analyze data; communicate results
- Science Leadership/Teamwork Skills
 - Plan, administer, and carry out research project as leader or responsible member

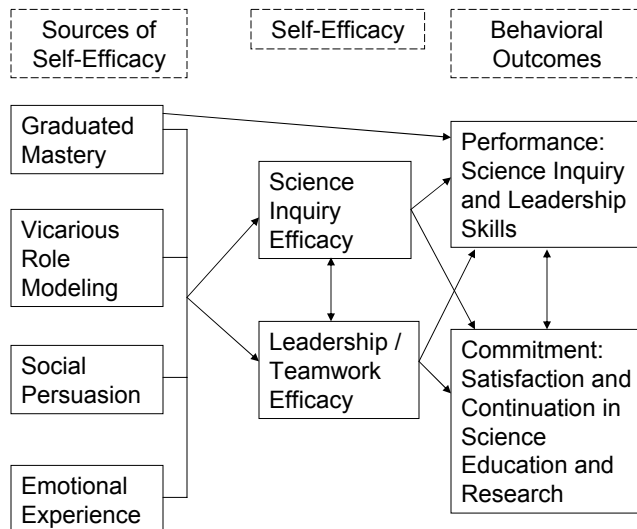
Simulations to Assess Skills

- Problem-solving scenarios
- Individual and group tasks
- Designed to contain key elements of the research process
- Standardized scoring of performance quality



Concepts & Sample Items

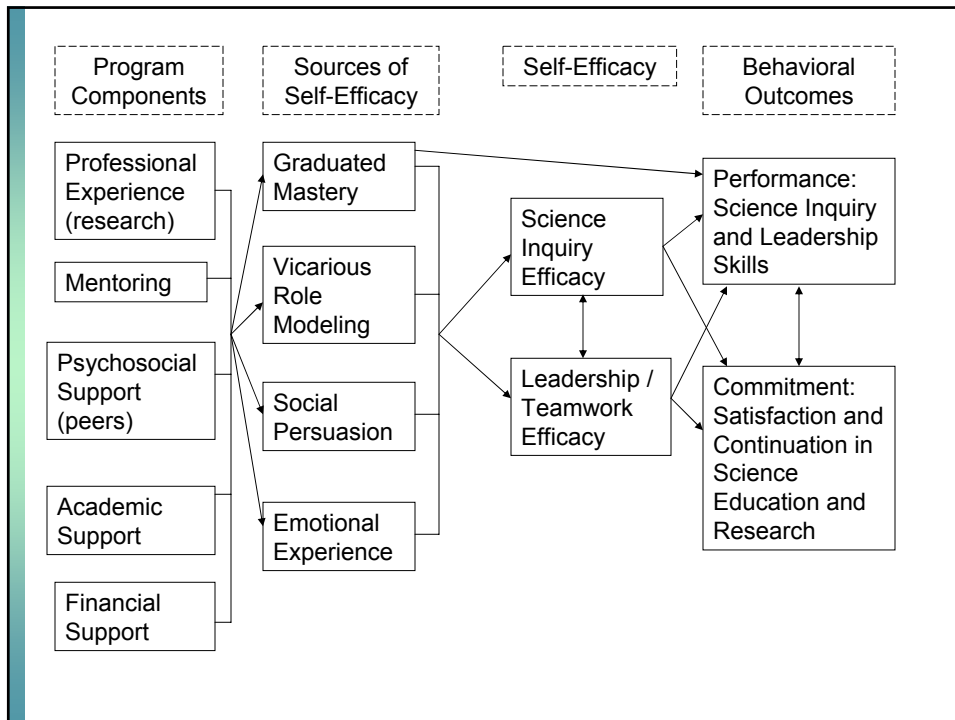
- Science Inquiry Efficacy: Belief in one's ability to design and carry out research studies
 - I am able to define or clarify a research question
 - I know how to use data to develop a scientific explanation
- Science Leadership/Teamwork Efficacy: Belief in one's ability to participate as leader or member of scientific team
 - I know how to encourage good team performance
 - I know a lot more than most about what it takes to be a good leader



Concepts and Sample Items

- Graduated Mastery: Success with gradually-increasing complexity
 - I have been encouraged to be an active participant in the research process
 - I have had many opportunities to learn and practice research skills
- Vicarious Role Modeling: Observing others
 - Teachers and mentors include people with backgrounds similar to mine
 - Researchers I work with are good role models for what I might become

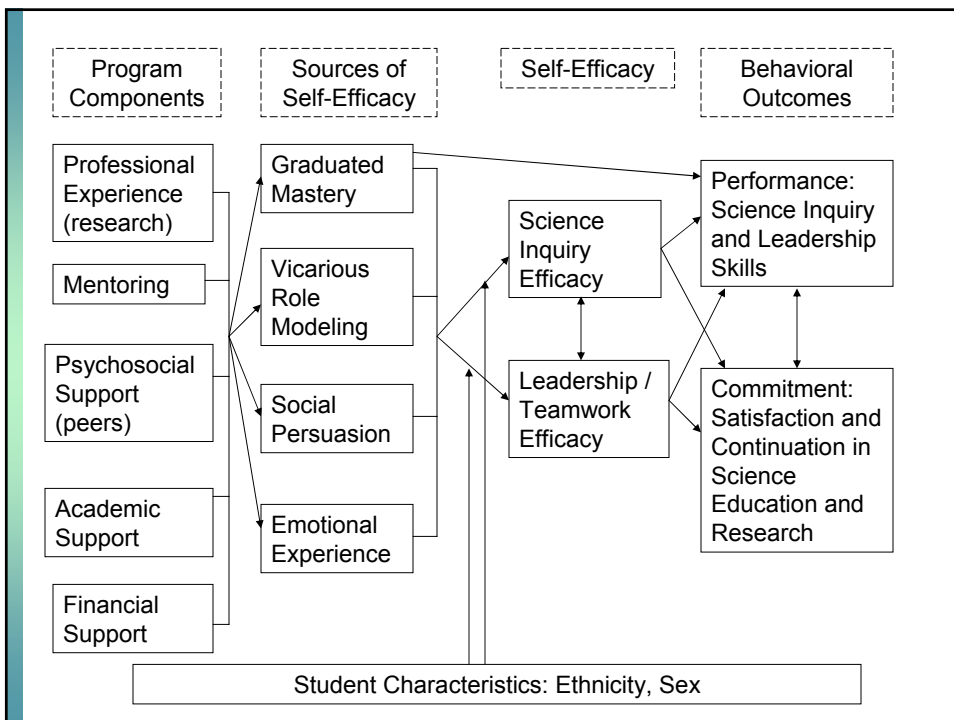
- Social Persuasion: Others express faith in one's ability
 - People tell me I could be a scientist
 - My mentor helps me recognize my progress as a scientist
- Emotional Experience: Internal feedback re physiological and emotional states
 - I look forward to working on the research
 - I feel calm when working in our lab



Concepts and Sample Items

- Professional Experience
 - I completed an independent project in a research environment
 - With colleagues, I gave a technical oral presentation
- Mentoring
 - My mentor gave me assignments that helped me learn new skills
 - My mentor conveyed feelings of respect for me as an individual

- Psychosocial Support
 - My friends and I helped each other study
- Academic Support
 - I got extra help (like tutoring) to make better grades in difficult classes
- Financial Support
 - I had a scholarship or work study to help with college expenses



Methods and Timeframe

- Phase I. Years 1 and 2
 - Refine research design, collect information for assessments (2004-05)
 - Interview program faculty, staff, and participants sample
 - Observe sample of program activities
 - Develop contact lists for program alumni and comparison group
 - Conduct Alumni Retrospective Survey (Spring 2005)
 - How do alumni perceive their science inquiry and leadership skills; the contribution of research, mentoring, and other experiences to those skills?
 - Develop and pilot surveys and simulations for Phase II (2005-06)
 - Begin longitudinal case study (Spring 2005)
 - What specific examples illuminate findings?

- Phase II. Years 3 and 4
 - Conduct High School Simulation and Surveys with COSMOS 2006 and 2007
 - How do COSMOS students' skills and efficacy develop across 4-week program?
 - Conduct Undergraduate Simulation and Surveys 2006-07
 - How do undergraduates' skills and efficacy develop across 1 academic year?
 - Analyze and disseminate (2007-08)

Overview of Timeline

	04-05	05-06	06-07	07-08
Qualitative Assessment of Program Experience & Active Ingredients	→			
Survey of Alumni Perceptions	→			
Case Study of Skills Development	→			
Develop Simulations & Self-Assessments	→			
Study of HS Students' Skills & Efficacy Development	↔ ↔			
Study of Undergrads' Skills & Efficacy Development	↔			
Integration & Final Dissemination	→			

Research Products

- Phase I
 - Development of learning communities
 - UCSC's science support program faculty and staff
 - NIH researchers
 - Design of assessment surveys & simulations
 - Useful in formative and summative evaluation
 - Useful as program interventions to diagnose and develop individuals' skills and attitudes
 - Articles and conference papers re findings

- Phase II
 - Articles and conference papers re:
 - Biomedical research career development
 - Strategies for involving faculty and staff in student support programs
 - Dissemination of benchmarks and guidelines for program designers
 - Effective design of research and complementary experiences
 - Models to build research and complementary experiences into broader educational settings

What We Need from Program Partners

- Initial program information (review matrix)
- Interviews with some faculty, staff, participants re goals, activities, schedules
- Contact information for current and former participants, data sharing agreements
- Continuing participation in project discussions
 - Recommendations re Advisory Council, CSU/UC partner programs, Graduate Student Researcher
 - Research design refinements
 - Interpretation and dissemination of results
 - Cross-program discussions re goals, activities

Program Partners' Hopes and Concerns

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AScILS Research Team

- Lisa Algee, Graduate Student, Education
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