IINSPIRE LSAMP Career Development Study Design & Piloting:
How Using Social Cognitive Career Theory Can Improve STEM Experiences for URMs

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As a result of the heightened demand for a larger and more capable science, technology, engineering, and mathematics (STEM) labor force, policy discussions around the STEM education pipeline have become increasingly prevalent. In order to further our understanding of STEM success and the IINSPIRE Student Experience Model, the Iowa-Illinois-Nebraska LSAMP (IINSPIRE LSAMP) research teams have launched a mixed methods research study. Consisting of both qualitative and quantitative approaches, these studies explore both micro- and macro-level influences to understand how IINSPIRE students thrive and persist in STEM disciplines. Focused on transitions from high school and community college to undergraduate studies, this research will examine micro-level influences related to how students move within the STEM disciplines and access resources. It will also examine macro-level influences related to program interventions that influence STEM success.

Quantitative Study on Career Development

For the quantitative study on career development, data will be collected at all 16 institutions participating in IINSPIRE LSAMP by using a biannual survey including several Social Cognitive Career Theory (SCCT) related measures that have demonstrated utility in understanding STEM career persistence. The study is framed by the following research questions:

1. Using SCCT, how is engagement in IINSPIRE activities associated with URM students' persistence, performance, and career choice behavior?

2. Are there differences among the SCCT variables moderated by institution type, gender, race, social class, and/or the interaction of gender, social class, and race?

Social Cognitive Career Theory

SCCT (Lent, Brown, & Hackett, 1994), which describes processes by which students select careers and majors in academia, serves as the framework for the quantitative study. Originating from social constructivism, SCCT theorizes career choices as outcomes of career-related value in social interactions and experiential activities
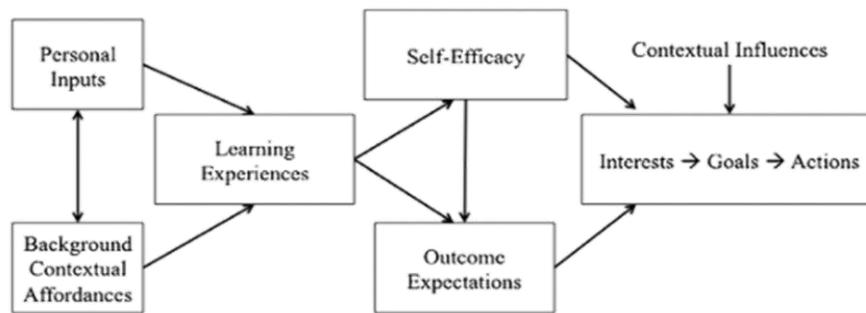
Figure 1. Model of social cognitive influences on career choice behavior. Adapted from "Toward a UnifyingSocial Cognitive Theory of Career and Academic Interest, Choice, and Performance." [Monograph] R.W. Lent, S.D. Brown, and G. Hackett, 1994, Journal of Vocational Behavior, 45, p. 93. Copyright 1994 by R.W. Lent, S.D. Brown, and G. Hackett.

for adolescents and young adults. This learning process is a function of the individuals' environments, their individual characteristics and personal inputs (e.g., race/ethnicity, gender, social class), and socialization processes. Through continued exposure to the aforementioned learning processes, individuals develop self-efficacy for specific activities and tasks, while simultaneously forming expectations about future outcomes of their performance (outcome expectations). Over time, individuals are able to develop specific vocational and education interests through these mechanisms, and leads to choices and goal actions of further activities towards vocational decisions and persistence.

Survey Design & Items

To understand the factors influencing student persistence in STEM majors, the quantitative team worked to develop a survey to collect data at all 16 institutions participating in IINSPIRE-LSAMP Alliance programming and experiences. Beginning January of 2017 through March of 2017, the team compiled SCCT-related measures that have been validated for utility in understanding STEM career persistence. Item development focused on measuring research/academic self-efficacy, research/academic outcome expectations, ethnic identity and other group representation, and science identity.

For measuring research and academic self-efficacy, the survey included items from the Research Self-Efficacy (RSES; Bieschke, Bishop, & Garcia, 1996), which is used to predict interest in research involvement through examination of students' *Early Tasks*, skills in *Conceptualization*, and abilities for *Implementation* of the skills obtained. To examine students' outcome expectations from engaging in research activities, items from the Research Outcome Expectations Questions (ROEQ; Bieschke, 2000) was included in the survey. To examine students' STEM and science identity and development, the Science Identity Measure (SIM; Deemer, Smith, Thoman, & Chase, 2014) was used to measure students' general science motivation, intrinsic science interest, science career identity, and science self-efficacy. Through interest items, the survey included items to measure perceptions of campus climate, grades in STEM courses and GPA, learning experiences (i.e., IINSPIRE activity participation, STEM course taking patterns, number and types of research experiences), and persistence in STEM disciplines.

Survey Piloting & Launch

Prior to employing a cohort-sequential, longitudinal, group comparison design that will allow the quantitative team with understanding the changes in variables over time, as well as, identify and assess for differences between institutions and individual group membership (e.g., race/ethnicity, gender, social class), the quantitative team piloted the developed survey in April of 2017. To represent the plans for cohort-sequential group, the pilot survey was administered with 14 undergraduate students in the Iowa Biosciences Academy (IBA) at University of Iowa. The IBA program is a National Institutes of Health NIH) funded program to identify academically talented undergraduate underrepresented students with aspirations for a research career and provide them with first-rate training that will facilitate their entry into Ph.D. programs in biomedical, behavioral, and biophysical sciences. The pilot group consisted of seven males and 7 females with ages 18 to 23.

Following the pilot administration, a focus group identified feedback for improvements in the survey administration and development. The feedback was incorporated into developing the survey, and submitted for IRB approval in the summer of 2017. The changes and updates on the survey development, proposed research activities, schedule for survey administration, findings, and advising for evaluation and continuous improvement processes were communicated with the Steering Council, qualitative research team, and the alliance office in June of 2017.

The annual survey was recently distributed in September of 2017 to IINSPIRE LSAMP participants at all 16 institutions. Collection and preliminary analysis of survey data will continue through the fall and winter of 2017. Findings from the survey will be shared with Students, faculty, staff, and other professionals at the IINSPIRE LSAMP 2017-2018 Annual Conference in February of 2018. In order to utilize findings to improve URM STEM policy and practice, the researchers will collaborate with IINSPIRE LSAMP leadership to disseminate findings, encourage discussion, and promote action among campus directors and beyond. In addition, the researchers intend to offer insight and suggestions for best practices as informed by the research to facilitate effective practices that support students their STEM educational pathways and transitions.

References

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