SOSICENTER
Louis Stokes Regional CENTER
of Excellence for the STUDY of STEM INTERVENTIONS

2021 SOSI CENTER
VIRTUAL SUMMER INSTITUTE
JUNE 17-19

TRANSLATING CRITICAL, STRENGTHS-BASED CONCEPTUAL FRAMEWORKS TO STEM PROGRAMMING & DESIGN

PROGRAM HANDBOOK

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INTRODUCTION

The Louis Stokes Regional Center of Excellence for the Study of STEM Interventions (SOSI Center) is an NSF-funded initiative that enhances postsecondary STEM programming and advances the generation and dissemination of scholarship related to these endeavors. SOSI offers training and development for STEM program administrators, faculty, and other key stakeholders in critical, strengths-based theories and evidence-based practices. These concepts focus on facilitating underrepresented students' success in STEM through mechanisms that center students' identities, cultures, and experiences, in meaningful ways, within STEM programming, teaching, mentoring, and research.

The SOSI Center is under the leadership and direction of STEM and STEM Education Scholars and Program Administrators from the University of Missouri-Columbia, Understanding Interventions, Inc., and the University of Michigan.

SOSI CENTER OBJECTIVES

The SOSI Center strives to enhance the perspectives and practices of postsecondary STEM program administrators, faculty, and key stakeholders regarding the construction and implementation of learning environments, support mechanisms, and research that facilitates the success of underrepresented students in STEM by:

1. Challenging and changing deficit-based approaches to supporting underrepresented students in STEM by teaching critical, strengths-based frameworks.
2. Demonstrating the capacity of critical, strengths-based frameworks to create and evaluate STEM learning spaces that foster student success in ways that embrace and build upon students' social identities and cultural experiences.
3. Offering a repository of resources specific to designing, implementing, researching, and evaluating STEM programming.
4. Increasing STEM programming research production and dissemination by teaching strategies for publishing and presenting opportunities to publish.

SOSI CENTER ACTIVITIES

- Recurrent Educational Institutes
- Workshops During the Academic Year
- Supporting the Understanding Interventions Index (Repository)
- Supporting the Understanding Interventions Journal

2021 SOSI CENTER VIRTUAL SUMMER INSTITUTE

"Translating Critical, Strengths-Based Conceptual Frameworks to STEM Programming Design & Dissemination"

Although there has been a growth in recent years in the dissemination of evidence-based practices related to STEM training, practitioners, often trained in the basic sciences, have found the need for training in the relevant social and behavioral sciences not only for implementation but for the generation of scholarship in a translational context, useful for dissemination and adoption.

The SOSI Center Virtual Summer Institute is designed to provide program leaders with training relevant to the understanding and implementation of strength-based frameworks for STEM interventions and the production of scholarship generated from program outcomes. Through our workshops, panel discussions, and individual coaching, the SOSI Center Virtual Summer Institute will provide training for its participants to:

- Develop a critical-ecological understanding of the "problem" regarding facilitating underrepresented students' success and matriculation in postsecondary STEM.
- Learn about strengths-based theoretical frameworks, specifically Community Cultural Wealth (CCW), Phenomenological Variant of Ecological Systems (PVEST), and Social Cognitive Career Theory (SCCT), and how they can be used to design, implement, evaluate, and research STEM programming.
- To foster an environment where participants can reflect on how to implement the theories of change and measurements into their practice.

1. DAY 1 – JUNE 17: DEFINE

10:30 – 11:00		**Check-in/Open Networking**
11:00 11:30 am	Natalie Downer Shanta Outlaw	**Introduction and Orientation**
11:30– 1:00 pm	NaTashua Davis Anthony DePass Terrell Morton Angela Ebreo Michael Garcia Al Dabiri	**How We (STEM Programs) Got Here.** This session introduces the SOSI Center and provides an overview of the history of STEM programs focused on broadening participation, including strengths and weaknesses of existing program designs, enhancing effectiveness through evaluation and community building, and existing challenges with generating and disseminating scholarship.
1:00 – 1:50 pm		**Lunch Break**
2:00 – 3:30 pm	Michael Garcia Shanta Outlaw Anthony DePass Angela Ebreo NaTashua Davis	**Where We (SOSI Institute Attendees) Are!** Round Robin Individuals introduce the status of their existing or planned program objectives, theories of change, measures, and activities related to publications.
3:30 – 4:00 pm		**Break**
4:00 – 5:30 pm	Michele Randolph- Session 1 Lisa Flores - Session 2	**Theoretical Frames I SCCT** (Interactive Workshop) **Concurrent Session 1:** This session provides a general understanding of Social Cognitive Career Theory and yields a broad overview of its core components specific to how this framework can be used to support STEM programming design, as well as generate and disseminate research in ways that view student identities as assets for their STEM engagement.

		Concurrent Session 2: This session provides a deeper dive into Social Cognitive Career Theory, leveraging a critical approach to the framework to demonstrate how it can be used to enhance STEM programming and generate and disseminate research from a perspective that accounts for students' identities as a strength or asset for their engagement.

2. DAY 2 – JUNE 18: FRAME & REFINE

10:00 – 10:10 am	Natalie Downer	**Welcome and Overview of Day 2**
10:10 – 11:30 am	Lydia Bentley - Session 1 Terrell Morton - Session 2	**Theoretical Frames II Community Cultural Wealth Interactive Workshop** **Concurrent Session 1:** This session provides a general understanding of Community Cultural Wealth, yielding an overview of the six forms of capital outlined and how they can support STEM programming design and generate and disseminate research related to these endeavors. **Concurrent Session 2:** This session provides a deeper dive into the core philosophical principles of Community Cultural Wealth to demonstrate how the underlying premises of CCW can be used to enhance STEM programming and generate and disseminate research through processes that focus on re-envisioning the norms and values of STEM and their impact on student engagement.
11:35 am – 1:00 pm	Cheryl Talley - Session 1 Terrell Morton - Session 2	**Theoretical Frames III Phenomenological Variant Ecological System Theory (PVEST) Interactive Workshop** **Concurrent Session 1:** This session provides a general understanding of PVEST and its core components, demonstrating how PVEST can be used to enhance STEM programming as well as generate and disseminate research related to this endeavor. **Concurrent Session 2:** This session provides a deeper dive into PVEST to demonstrate how the relationship between the external ecosystem (environment) and the individual's self-perception can enhance STEM programming and generate and disseminate research

		that positions students' identities as strengths for their STEM engagement.
1:00– 1:50 pm		Lunch Break
2:00 – 3:30 pm	Jason Wiles Angela Ebreo Anthony DePass	**Measures** This session discusses various measurement and evaluation procedures to support participants' understanding of the evaluation process.
3:35 – 4:30 pm	Natalie Downer	**Seeing the Theory in Action - Panel Presentation**
4:35 – 5:30 pm	Anthony DePass Shanta Outlaw NaTashua Davis	**Group Working Session and Reporting Out** Mapping My Program to a Theory of Change using the Frameworks

3. DAY 3- JUNE 19: REFLECTIONS & REPORT OUT

10:00 – 10:10 am	Michael Garcia	**Welcome and Overview of Day 3**
10:15 – 11: 15 am	Zakiya Wilson-Kennedy	**Concept Mapping – Refining Your Manuscript Idea**
11:15 – 12:45 pm	Joseph Whittaker Angela Ebreo Shanta Outlaw	**Transcending Barriers to Publication/ UI Journal** This session discusses strategies for disseminating research and evaluations from STEM programming with a focus on publishing in the UI Journal, among other spaces.
12:50 – 1:25 pm	Anthony DePass	**Working Session - Reflections**
1:25 – 2:00 pm	Natalie Downer Anthony DePass	**Report Out & Adjournment**

2021 SOSI CENTER VIRTUAL SUMMER INSTITUTE FACILITATORS

Facilitators at the 2021 Summer Institute draw on their knowledge of identity-based theories to engage in meaningful conversations with the institute attendees. The facilitators at 2021 Summer Institute will use unique strategies to offer a workable framework for current and future stakeholders in STEM education.

- **Lydia Bentley, PhD:** Associate Director Teaching for Learning Center: Lydia received her doctorate in Development, Learning, and Diversity from Vanderbilt University in 2017. She then spent two years as a principal investigator on a research project funded by a National Science Foundation postdoctoral fellowship. Through her research and teaching, Lydia has focused on understanding the educational experiences of underrepresented minority postsecondary students and on how to nurture inclusive and engaging classroom environments.

- **Mohammadali (Al) Dabiri:** Graduate research assistant at the University of Missouri-Columbia. He is a second-year PhD student of Educational Leadership and Policy Analysis at the University of Missouri-Columbia with a background in performance studies and Theatre of the Oppressed. Currently, he serves as SOSI Center project coordinator and graduate student research assistant.

- **NaTashua Davis, PhD:** SOSI Center Principal Investigator; Dr. Davis serves as the Associate Vice Chancellor of Access and Leadership Development Unit in the University of Missouri (MU) Division of Diversity & Equity. Within this role, she is responsible for developing and implementing programs and initiatives that support students throughout the entire academic pipeline. Additionally, Dr. Davis directs the McNair Scholars Program, a federally funded project designed to prepare talented undergraduate students from groups underrepresented in graduate education for doctoral study. She also serves as the MU Site Director for the Missouri LSAMP state-wide initiatives.

- **Anthony DePass, Ph.D.:** Anthony DePass, President of DePass Academic Consulting and retired Professor of Biology at Long Island University. He has led efforts at the institutional, regional, and national levels that focus on workforce development in STEM. These include an NIH-T36 MARC program that provided training for individuals from over 140 institutions, and an NSF ADVANCE program. He is currently PI and Director of Understanding Interventions (UI) that Broaden Participation in Science, and the Publisher of the UI Journal. The UI conferences serve as venues for the dissemination of scholarship on

interventions, as well as facilitating training for evaluators, interventions researchers, and program administrators.

- **Natalie Downer Ph.D.:** Natalie Downer serves as the Associate Director of the McNair Scholars Program at the University of Missouri-Columbia. She also serves as the MU site coordinator for the National Science Foundation (NSF)-funded Missouri Louis Stokes Alliance for Minority Participation in Science (MO-LSAMP). Additionally, she serves as an advisory board member for the National Institute of General Medical Sciences (NIGMS) - funded MU Post-Baccalaureate Research Education Program (PREP). Finally, Dr. Downer is the Co-Principal investigator of the Louis Stokes Regional Center of Excellence for the Study of STEM Interventions (LSRCE SOSI).

- **Angela Ebreo, Ph.D.:** Associate Director of the Diversity Research & Policy Program (DRPP); University of Michigan. Angela Ebreo, Ph.D., is the Associate Director of the Diversity Research & Policy Program (DRPP) and an Associate Research Scientist at the University of Michigan's Center for the Study of Higher and Postsecondary Education. From 2007 until 2013, she served as Assistant Director for Research and Training in UM's National Center for Institutional Diversity.

- **Lisa Flores, Ph.D.:** Professor at the University of Missouri Columbia, College of education: Lisa Y. Flores is a full professor and holds the Norman C. Gysbers, Ph.D. Faculty Fellow in Counseling Psychology, in the Department of Educational, School & Counseling Psychology. She has expertise in the career development of women and Latino/as and the integration of Latino/a immigrants in rural communities.

- **Michael Garcia, Ph.D.:** LSRCE SOSI Program Director; Associate Professor of Biological Sciences; University of Missouri-Columbia. Dr. Garcia received his PhD. from Mayo Clinic and is currently teaches at the University of Missouri-Columbia. His interest is in cellular and molecular mechanisms of peripheral nerve postnatal development. Dr. Garcia is also interested in enhancing inclusion in STEM. He is the Co-Director of Mizzou PREP and the Program Director of SOSI.

- **Terrell Morton, Ph.D.:** LSRCE SOSI Co-Principal Investigator; Dr. Terrell Morton is an Assistant Professor of Identity and Justice in STEM Education at the University of Missouri. Dr. Morton identifies as a Scholar-Activist! His research and work focus on identity as it informs the persistence and engagement of racialized and minoritized students in STEM postsecondary education. Dr. Morton identifies as a Scholar-Activist! His research and work focus on identity as it informs the persistence and engagement of racialized and minoritized students in STEM postsecondary education.

- **Shanta Outlaw, MS:** Program Manager, Understanding Interventions Conference and Programs; University of Texas; Health Science Center at San Antonio. Shanta Outlaw is

the program manager for the Understanding Interventions Conference and Programs. She is responsible for the planning, execution, and management of program and conference activities, including the annual meeting, satellite meetings, outreach, and training activities of UI.

- **Michele Randolph, Ph.D.:** Dr. Michele Randolph is an Associate Fellow with the Michigan Louis Stokes Alliance for Minority Participation (MI-LSAMP), based in University of Michigan's College of Engineering and a Research Associate at the Center of Education Design, Evaluation and Research (CEDER), based in UM's School of Education. With MI-LSAMP, she oversees the Alliance's evaluation and research activity investigating effective practices in STEM education. At CEDER, Dr. Randolph provides evaluation expertise for NSF-funded S-STEM projects assessing program implementation, progress towards identified benchmarks, and program outcomes. Her primary research interest is socio-cognitive motivation in the STEM career development for historically underrepresented students.

- **Cheryl Talley, Ph.D.:** Associate Professor, University of Virginia: Dr. Cheryl Talley examines factors that lead to lasting behavioral change, specifically those related to high academic achievement. In published studies and projects funded by the National Science Foundation, Dr. Talley and her colleagues have sought to reveal the role that affective factors such as academic identity and emotional regulation play in student success.

- **Joseph Whittaker, Ph.D.:** Dr. Joseph A. Whittaker is the VP for Research & Economic Development and Associate Provost at Jackson State University (JSU). He has primary responsibility for the research enterprise and federal relations. Prior to JSU, Dr. Whittaker served as Dean and Professor of the School of Computer, Mathematical and Natural Sciences at Morgan State University (MSU) and Associate Director of the NASA GESTAR Program at the Goddard Space Flight Center. He also served on a number of review panels for multiple federal agencies and was elected the 73rd President of Sigma Xi Scientific Research and Honor Society. He is also one of the founders of the Morehouse School of Medicine Neuroscience Institute.

- **Jason Wiles, Ph.D.:** Associate Professor Biology Syracuse University. Dr. Jason R. Wiles is a biology professor at Syracuse University, where he also holds appointments in Science Teaching and Earth Sciences. His research deals mainly with how people learn about and interact with science. Dr. Wiles focuses on issues related to evolutionary biology and climate change education and on diversity, equity, and inclusion in STEM fields.

- **Zakiya Wilson-Kennedy, Ph.D.:** Assistant Dean for Diversity & Inclusion at Louisiana State University: Zakiya S. Wilson-Kennedy, Ph.D., is an Associate Professor of Research in Chemistry Education and the Assistant Dean for Diversity and Inclusion within the College of Science at Louisiana State University (LSU). Her research, which investigates

the persistence of individuals from all backgrounds in STEM higher education and careers, has been published in peer-reviewed journals, such as the Journal of Science Education and Technology and the Journal of Chemical Education.

WHAT IS NEXT?

The SOSI Center cultivates the cultural awareness and scholarly productivity of future and existing LSAMP program leaders. LSRCE SOSI will provide a space for community building, training pre-service leaders in STEM education, and offering opportunities to publish in high-impact journals. The center aims to expand the theoretical and conceptual basis of LSAMP programs and increase resources available to the LSAMP and broader academic community by providing an enhanced index of tools and opportunities for dissemination.

To achieve the endeavors mentioned above, the LSRCE SOSI administrative team will coordinate the activities, interactions, and synergies between the following entities:

- **Summer Institute, webinars, and UI regional conference workshops**: LSRCE SOSI will implement future institutes, webinars, and UI conference workshops. Institutes, workshops, and webinar topics will focus on applying research methodologies and theoretical frames to the design, modification, and research of LSAMP programs and their effectiveness in enhancing underrepresented students' experiences and engagement in STEM.
- **UI Index:** LSRCE SOSI will curate a repository of published articles, reports, and book chapters relevant to LSAMP and other interventions that diversify (STEM) fields; broadening participation in STEM; and published instruments of measures relevant to research in broadening participation in STEM. The UI Index will dedicate a sub-portal within its NSF-funded portal for the exclusive population of published LSAMP research.
- **UI Journal:** LSRCE SOSI will integrate the UI Journal that complements the institute, annual UI Conference, and regional UI meetings as centers for discourse, dissemination, and collaboration between LSAMP participants and program leaders as impactful leaders and scholars in the broader UI community.
- **Production of Scholarship:** LSRCE SOSI will seek to add to the literature related to the outcomes surrounding implementing the theories, practices, and methodologies on LSAMP and like programs.

OVERVIEW OF THE FRAMEWORKS

Community Cultural Wealth (CCW)

The cultural practices of those marginalized given their various social identities perceived to be different from the "norm" have been and continue to be positioned as inferior within the larger society. Those in power or who maintain power given their social identities, particularly within the context of education, treat "culture" as something in need of curing. Community Cultural Wealth is a framework that challenges how we as a society perceives and understands the capital associated with people's culture, particularly for those who are marginalized. Community Cultural Wealth was developed by Dr. Tara Yosso and is based on Critical Race Theory and Bourdieu's Cultural Capital. CCW names six forms of capital (wealth) that constitute the cultural capital marginalized people maintain: aspirational, linguistic, familial, social, navigational, and resistance. This designation of six forms of capital comprising cultural capital offers a critique of the existing perspective of cultural capital, noting the various funds of knowledge that influence how people experience and navigate the world.

These are the six capitals:

- Aspirational (the ability to maintain hope and dreams),
- Linguistic (skills obtained through various types of communication),
- Familial (knowledge nurtured through and by kinships ties and relationships),
- Social (networks and community resources),
- Navigational (skills to maneuver through social institutions),
- Resistance (insight gained through opposition).

Phenomenological Variant Ecological System Theory (PVEST)

Phenomenological Variant Ecological System Theory (PVEST) is an identity-focused, cultural ecology frame incorporating phenomenology and cultural ecology to examine the essence of being as it relates to decision-making processes. *Ecology* is the setting, environment, or world that people operate within, recognizing that nested structure of environments (i.e., micro, meso, exo, macro). Phenomenology accounts for how people experience their environments, naming the role people's identities play in determining their stress engagements, coping responses, and subsequent long-term outcomes.

Social Cognitive Career Theory (SCCT)

Social Cognitive Career Theory (SCCT) is a vocational, psychological theory used to describe and predict the career development processes of students. SCCT is a social cognitive framework for understanding interconnected processes of career development: a) the formation and elaboration of career-relevant interests, b) selection of academic and career choice options, and c) performance and persistence in educational and occupational pursuits (Lent et al., 1994). A derivation of Bandura's (1986) general social cognitive theory, SCCT emphasizes the individual's agency and extra-personal factors constraining agency in career development processes. SCCT focuses on personal, environmental, and behavioral aspects contributing to the internalized learning process. SCCT prompts investigation into the personal and environmental variables that orient career decisions. These environmental variables might constrain an individual's agency, inform meaning-making processes, understand their cultures, and affect the various contextual supports and barriers to these students' achievements. SCCT has been applied to many studies in STEM education research, determining mediating variables that contribute to and predict students' STEM self-efficacy and career interests.

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THE SOSI CENTER PARTNERSHIPS

The SOSI Center is a partnership between the University of Missouri (MU), the University of Michigan (UofM), and the not-for-profit Understanding Interventions (UI) Organization.

- **University of Missouri (MU)** is the flagship campus of the University of Missouri System and is one of a select group of land grant public universities that have both a Carnegie Class I Research University designation and are members of the American Association of Universities (AAU). The SOSI Center leaders are STEM, STEM education, and identity scholars who, through existing Lumina Foundation, HHMI, and NSF sponsored endeavors, have designed and implemented various activities and practices to foster inclusion and equity within the teaching and service practices of STEM higher education professionals (e.g., administrators, faculty, and staff).

- **Understanding Interventions (UI)** is a national not-for-profit organization that provides platforms for the support and dissemination of scholarship and training related to STEM interventions, research, and evaluation. UI bore out of concerns of the underutilization of scholarship in the development, administration and outcomes of long-supported programs that target diversity in the scientific workforce. UI supports the bridging of research to practice by providing venues in which the dissemination and exchange related to research, evaluation, and training interventions that foster diversity and inclusion in scientific workplaces is held. The UI conferences (regional and national) represent key in-person opportunities for practitioners to interact, share experiences and solutions, and learn from experts outside their professional domain about innovations in many forms—theories, methods, tools—that could inform interventions with students, faculty, decision makers, and policymakers.

- **The Diversity Research and Policy Program at University of Michigan (DRPP – UofM)** hosts the UI Index, an online set of resources that are publicly available to members of the broadening participation community. The DRPP is led by Drs. Philip Bowman and Angela Ebreo of UofM, and supported by collaborations with the Information Technology department in the College of Engineering and Applied Science at University of Colorado, Colorado Springs.

Instructions for getting started with Underline and Underline Virtual Lounge

Participants will receive notification to register for the Summer Institute via Underline. Once you have set up an account with Underline, you will have access to the 2021 SOSI event reception page, where you can see general meeting information and breaking news.

The main stage and sessions page also offers participants a crisp, high-quality video and front row experience. In addition, real-time chat and Q&A with the speaker are also available.

Underline Virtual Lounge (Gathertown) is a space for participants to chat and discuss collaboration opportunities digitally. Gathertown allows participants to choose and customize an avatar that will function in a highly interactive, fun, and social space.