

**Table 1***Examples of Projects Aims at Uniting STEM+SED in Research and Practice*

Focus	Project Goal	Project Description
Literature & Knowledge	Consolidate existing knowledge of STEM+SED	Our team at ISRY, in partnership with a skilled librarian and external expert advisory board (including several conference participants), is conducting a systematic review of STEM+SED (NSF# 2115868). This rigorous and unbiased review of research, evaluation, and practice at the interface of STEM+SED is guided by the following questions: (1) How are skills at the overlap of STEM and SED (STEM+SED) conceptualized, implemented, and measured among K–12 youth in out-of-school time (OST) STEM programs? (2) Does the conceptualization, implementation, or measurement of STEM+SED vary over time (i.e., publication year), by student background (i.e., age, gender, race/ethnicity), or by formality of the learning environment (e.g., informal compared to formal/classroom-based learning)? The conference frame (Active Engagement, Agency, Belonging, and Reflection, plus related skills identified through Harvard’s Explore SEL Taxonomy) is guiding the selection of search terms and setting boundaries on the extensive STEM and SED literature. Data from eligible literature will be mapped to our synthesis model, which includes phenomenon (what the field “knows” about STEM+SED, i.e., theories, frameworks, models, and classifications); implementation (how the field “does” STEM+SED, i.e., trainings, programs, and curricula/r materials); and assessment (expectations for change and results of STEM+SED, i.e., methods, measures, and outcomes). Beginning to build conceptual coherence of STEM+SED through this systematic review and synthesis of literature will lead to greater understanding of STEM+SED in practice, highlight the most important content and skills to focus on, and identify when and how youth should learn specific content and skills at the interface of STEM+SED.
Program & Curriculum	Trial STEM+SED strategies and activities in OST	In partnership with Dr. Pendred Noyce (Tumblehome Books), ISRY is developing and testing “Project Brainy,” a new out-of-school time curriculum to support science learning, mental health, and social-emotional development for middle school students (Grades 6 to 8). The three elements of this 10-week (90 min/week) curriculum are: (1) read and discuss <i>The Case of the Baffling Brain</i> , an adventure novel that follows two middle schoolers who travel through time visiting different doctors and scientists to learn about the brain after one character suffers a concussion; (2) participate in hands-on/minds-on STEM activities on the topic of the brain; (3) engage in activities linking social-emotional development, mental health, and the brain, with an emphasis on skills that map to the domains of agency (e.g., making decisions for oneself), belonging (communicating effectively to work together), engagement (thriving and interacting with one’s environment), and

reflection (making meaning of one's emotions and experiences). As an example of the first session, students read about the book character's experience getting a concussion, discuss the connections between the STEM concepts (causes and symptoms of a concussion) and SED themes (relationships/peer pressure, decision-making), and applying these SED skills while experimenting with balance, concentration, and memory tests used to screen for concussions, ultimately to learn the signs, symptoms, and short-term effects of concussions on the brain and physical/cognitive functions.

Measurement & Data	Validate tool to "see" and "hear" STEM+SED evidence	In partnership with Dr. Drew Gitomer (Rutgers University), our team at ISRY is conducting a four-year, nationwide study (NSF# 2101554) to create a classroom observation and feedback system to support middle school STEM teachers. Known as the Dimensions of Success (DoS) for Middle School Science and Engineering (DoS-MSSE), the observation tool provides qualitative and quantitative evidence of "high quality" STEM teaching and learning, which are organized across four domains and 12 dimensions. In defining different levels of STEM quality, all dimensions consider different aspects of SED that align to Active Engagement, Agency, Belonging, and Reflection. For example, observers look for evidence of emotional engagement, which may include cues like smiling and laughing, gasps of surprise, or excited chatter in reaction to STEM phenomenon. As another example, observers look for evidence of agency (part of the definition of high-quality STEM practices), which may include signs that students are taking the lead in deciding what questions to ask or problems to solve, or what tools and materials are needed to construct a solution (this represents Agency, via STEM practices). The tool goes a step further by making equity and inclusion more concrete in the definition of high-quality STEM. As an example, observers consider evidence of access, such as any signs that one or more students are consistently being left out or pushed out, such as by a more dominant group of students. This observation tool complements student and educator self-surveys focused on STEM attitudes and SED skills known as [tool names] to support the triangulation of data. A version of the DoS tool and training on the tool and framework are already available for the OST field. This version of middle school will be made available upon completion of this NSF-sponsored study.
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Planning & Training	Expand STEM+SED focus from youth to families	In partnership with Dr. Linda Kekelis and the STEM Next Opportunity fund, our team at ISRY has developed a new framework for family engagement in STEM known as CARE: Connect, Act, Reflect, and Empower, which was also inspired by conference framing. CARE is a simple way of organizing familiar ideas from family engagement research and practice to provide a shared and equitable vision for family engagement in STEM. CARE infuses SED principles to guide programs to empower families as partners in STEM learning and pathways. Briefly, Connect focuses on intentional outreach to diverse families and fostering a sense of belonging among youth, families
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and staff; Act focuses on bringing parents/caregivers directly into the learning action by engaging with STEM “hands-on” with their children; Reflect focuses on providing youth and parents/caregivers opportunities to reflect together “minds-on” to deepen STEM learning, and encouraging staff to listen and learn continuously with youth and families through thoughtful reflection and analysis; and Empower focuses on putting parents/caregivers in the driver’s seat, by making them partners or leaders in their children’s STEM learning and pathways. CARE is embedded in the STEM Family Engagement Planning Tool, which provides strategies, examples, and links to resources and references, all organized around the CARE domains and attributes, with each domain and attribute focusing on creating diverse, equitable, inclusive, and accessible STEM family engagement experiences. The tool is freely available on ISRY and STEM Next websites.