STEM Language Arts Teaching/learning Ecosystems (SLATE)

College- and career-ready standards for the STEM fields present both opportunities and challenges for English learners (ELs), necessitating that educators at multiple levels and across content areas develop new areas of expertise (National Academies of Science, 2018). As a group, multilingual students continue to be underrepresented in STEM fields in college and in the workforce, despite increasing demands for employees in STEM fields. Three forces thought to shape the future of K–12 STEM education (NASEM, 2018) include: (1) changing demographics of the U.S. student population, with a fast-growing subpopulation of ELs (National Center for Education Statistics, 2018); (2) STEM subjects, especially disciplinary practices (e.g., developing models, arguing from evidence, constructing explanations), are both academically rigorous and language intensive; and (3) computer science, including computational thinking, is increasingly important for all students.

These emerging forces are further complicated by COVID educational disruptions. The purpose of SLATE is to support paired STEM and language enrichment for ELs. We seek to achieve this with a multi-tiered intervention that (1) develops and supports new near-peer mentoring opportunities, realized through the creation of Extended Learning Opportunities and tutoring opportunities for high school students; (2) professional development for teacher teams to deepen teacher knowledge and foster teacher-team-led curricula development in science communication/writing, with a focus on the integration of state-level computer science (CS) standards into STEM and the language arts (both LA and ELL). Ultimately, through these multiple interventions, SLATE aims to improve STEM interests, computer science skills, and language/writing skills of high-needs and multilingual children (gr. 5-8) in the State of New Hampshire (NH). Our proposed activities are timely, with the 2018 roll-out of new state standards for CS/Information and Communication Technologies (ICT) and implementation, originally set for SY20-21 but delayed due to Covid disruptions. One goal of the SLATE program is to address the impact of COVID-19 educational gaps and losses for middle-level students through these interventions and support systems.

Expected outcomes include: (1) Creation of new ELOs integrating environmental sciences, data analytics and computer science and science communication at the high school and middle school level; (2) 136 highly qualified teachers from STEM fields, ELL, and Language Arts that are equipped to meet the STEM (+CS), writing, and literacy skills for high-needs NH students.; (3) Development of innovative STEM/ELA cross-disciplinary curricula with a focus of meeting the STEM/language needs of EL students and supporting incorporation of new CS/ICT standards; (4) We hypothesize that with near-peer mentoring and the SLATE interventions high needs middle and high school students will develop a stronger interest and sense of belonging in STEM and (5) Further we anticipate we will develop a community of practice of teacher teams, from varied disciplines, to serve as mentors for statewide STEM/CS/LA innovation and

content-area CS/ICT Standards implementation. Success and scalability of the SLATE interventions will be assessed through metrics including implementation of instruments; (compared across teaching teams that participate and those who do not) testing data from state-required science, math, language arts, and WIDA ACCESS exams, program participation, and students' success and perseverance in STEM courses.