**Enhancing Student Achievement and Self-Efficacy in Introductory High School Chemistry: An instructional Application of Self-Regulated Learning Theory**

**Summary**

*Topic: Mathematics and Science Education Goal 2: Development and Innovation*

This proposal describesaproject to determine the impactof a complementary set of classroom interventions on student achievement in high school chemistry. The first intervention is a self-assessment activity designed to promote student monitoring and evaluation of what they are learning and understanding about chemistry as they are learning--a strategy we call “tracking.” The second intervention also promotes student monitoring and evaluation of their understanding of chemistry, but in the specific context of taking a quiz or test. It is designed to allow students to assign weights to responses on quizzes and tests based on their confidence in the correctness of their response to a specific question. We call this strategy “weighting.” We hypothesize that the active self-monitoring and self-evaluating promoted in these interventions will positively impact students’ achievement and self-efficacy in chemistry. Because of their simplicity, the interventions canbeimplementedeasily in anymiddleor highschoolSTEMclassroom andhavethepotentialto impactSTEMeducationnationallyatlittleor nocost.

Self-regulated learning (SRL) is the theory that underlies the complementary interventions.SRL theory focuses on the extent to which learners monitortheirlearningactivities,evaluate their learningperformance,andmakestrategiccontroldecisionstoregulatetheir performance. SRL theory has been studied broadly for more than 70 years, but not in STEM classrooms, nor in the form of the interventions proposed. The power of the interventions to help students’ learn by monitoring and accurately evaluating what they know and understand, we arguecan help all students, but especially students from underrepresented groups learn how to use self-regulation of their learning to improve their achievement and self-efficacy in STEM.

The project will be implemented in the introductory chemistry classrooms of seven high schools located in three suburban St. Louis school districts. All schools have populations of >70% African American students and graduation rates in the 70% range. In Year 1, teachers (N=9) and their district science coordinators (N=3) from three of the high schools will work with project staff and consultants to develop and iteratively refine the complementaryinterventions. In Year 2, N=9 chemistry teachers from the remaining four high schools will serve as a control group in a quasi-experimental pilot study to exploretheimpactoftheinterventions.

Using the prior year state-administered tests in reading and mathematics as a covariate (along with student demographics), multi-level analyses will be conducted to test the effect of the interventionson achievement (measured by chemistry tests common across the school districts) and changes in self-efficacy to monitor and control learning (measuredby two well-establishedsurveysadapted for a chemistry/STEM context). In addition to gathering pre- and post-achievement and self-efficacy data, students will be surveyed during the school year to get a sense of how the interventions are impacting their self-efficacy in learning chemistry. Upon completion, the project will provide evidence of the practical value of the complementary interventions and a basis for future efficacy studies in other STEM courses.