

## **NSF IGE 2020 PI Meeting: Emerging areas of research**

The expanding knowledge base in learning sciences can inform and be informed by IGE projects. Participants will consider the intersections of STEM graduate education with these emerging areas of research:

### **Transformative teaching, learning, and assessment**

Educational research continues to inform the incorporation of teaching-learning processes and the adoption of evidence-based and discipline-based educational practices in classrooms and laboratories, throughout curricula, and across educational systems. As education becomes more student-centered, research guides approaches for supporting the different roles of learners and educators. Competencies and outcomes expand the focus beyond the acquisition of knowledge to include the development of skills and abilities. Theories and models to guide systemic educational reform continue to evolve, resulting in more effective approaches for leading and sustaining change, as well as for demonstrating impact.

### **Research and practice across disciplines**

Multidisciplinary, interdisciplinary, transdisciplinary, and convergence research are fostering connections and integration among STEM fields and the learning and social sciences. New analytical frameworks and empirical research methods are fostering creativity and innovation. Updated conceptual systems, organizational structures, and educational programs are benefitting the research and professional development of graduate students.

### **Digital learning**

Research on online and combined online/in-person courses and programs is facilitating the development of interactive and adaptive courseware that provides timely feedback and individual support. Technology is enhancing and expanding the ways that people learn, such as visualization and virtual/augmented/mixed reality. Increased monitoring and analytics are informing assessment and evaluation. Improving the access, outcomes, and economics of digital learning is maximizing its potential to achieve impact on a larger scale.

### **Inclusiveness and adaptivity**

Research on broadening participation incorporates key aspects from the learning and social sciences. It is informing the use of effective practices for recruitment, admissions, socialization, and retention in higher education and is informed by assessments and evaluations of these practices. Studies on socio-emotional mentoring and role modeling are expanding understanding of mentoring functions and mechanisms. Adaptivity, the capacity to address unique needs, is being developed in areas such as counseling and academic advising, often informed by data analytics. One-size-fits-all approaches are shifting to those involving more holistic considerations and providing just-in-time feedback, pathways, and resources.

### **Professional development**

Research on the acquisition of knowledge, skills, abilities, understanding, and attitudes that facilitate progress toward goals is informing career and professional development. Definitions, development, and assessment of competencies, combined with theories and models, such as social cognitive career theory, organizational career theory, person–environment interaction models, are guiding the development of career and professional development processes and programs. Studies of such processes and programs are informing the adaptation of tools such as individual development plans (IDPs), development of skills such as decision-making and leadership, and career mentoring in academic contexts. Research on career pathways and progressions are improving talent management.