



IU BLOOMINGTON

EMERGING AREAS OF RESEARCH

Abstract Template -- Due June 30, 2017

Title of initiative to be proposed:

Educational Data Science: Precision Learning, Teaching, and Leadership

Name of lead PI, with title, department/school:

Katy Borner, Victor H. Yngve Distinguished Professor of Information Science, Departments of Intelligent Systems Engineering & Information and Library Science, School of Informatics and Computing, Indiana University

Key team member names and departments/schools (up to 10 names):

• Raymond Burke, E.W. Kelley Prof of Marketing, Kelley School of Business • Robert L. Goldstone, Chancellor's Prof, Psychological and Brain Sciences, COAS • Dennis Groth, Vice Provost for Undergraduate Education, IUB • Daniel Hickey, Prof., Learning Sciences Program, School of Education • Michael Kaganovich, Prof of Economics, Department of Economics, COAS • George Rehrey, Director, Indiana University's Center for Learning Analytics and Success • Jennifer M. Robinson, Prof of Practice, Department of Anthropology, COAS • Linda Shepard,

Description of area to be proposed. What constitutes this area of research or creative activity as emerging? (Word limit=500)

This project pioneers a new interdisciplinary field of study, Educational Data Science (EDS). EDS performs research using big data, data modeling, and visual analytics to advance our understanding of the complex, high-stakes environment of higher education. Such scholarship is timely for addressing the dramatic social, financial, and technological challenges confronting the higher education system. The proposed research will position IU as a leader in research of scientific, technological, social, behavioral and ethical aspects of higher education and its practical application to the benefit of students in and after college. Resulting models will support data-driven decision making by students, teachers, and leadership with the overall goal of improved student engagement and performance.

Our ambitious research agenda is made possible by recent advances in educational information systems, data collection, experimental methods, analysis, modeling, and visualization techniques that provide researchers with new tools for studying the student's educational journey and identifying the factors that drive student learning and success in school and in life. IU is well positioned to lead this new research area by capitalizing on existing research strengths, multidisciplinary faculty collaborations, corporate collaborations, superb learning analytic data collections, and new commitments by IU administrative offices, e.g., Office of the Vice Provost for Undergraduate Education (OVPU), Bloomington Assessment & Research (BAR), and Center for Learning Analytics and Success (CLASS).

Specifically, the EDS team will design and build a secure, unique federated data infrastructure of precision data that captures student engagement and performance before, during, and after IU; inside and outside of the classroom. Custom code and tools will be developed to validate and optimize models; analyze data returns; study the utility of different data sources; and understand the impact of policies and interventions. Using this unique infrastructure, we will perform research at the intersection of cognitive science, learning science, data science, economics, and management. While novel research results are anticipated in each of the four research areas, key breakthroughs are expected at the intersection of these areas. "Cognitive Science: Classroom Experiments" research will investigate the cognitive and social variables, patterns, and leverage points in teaching and learning. "Learning Science: Student Support" will investigate the impact of curricular interventions on student success at IU and in life. The "Economics and Management of Higher Education" line of work will investigate the impact of incentives, information sources, and educational product offerings on short-term and long-term student decision making and outcomes. The research will focus on identifying combinations of courses, activities, and individual student characteristics affecting the range of career options available to diverse populations of undergraduates. Research on "Data Science: Learning Analytics" will advance and validate novel methods and tools that render large-scale data into actionable insights and improve the data (visualization) literacy of tool users.

A collaboratory will ensure timely dissemination of results and support close collaboration between faculty, students, staff, and industry partners. Last but not least, EDS will develop academic and corporate partnerships that expand the impact of the proposed R&D.

Please submit to earprogram@indiana.edu