THE STEM EDUCATION RESEARCH INSTITUTE (SERI)
ANNUAL REPORT

JUNE 2015
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Letter from the Co-Directors

In its third year of existence, the STEM Education Research Institute (SERI) has substantially built upon previous successes and further positioned itself as a STEM education research leader on campus. SERI has increased its involvement in the academic trajectories of various campus institutes, faculty members, and outside organizations throughout Indiana and the nation.

By identifying and nurturing synergistic activities and leveraging the successes of our campus’ many prestigious initiatives, SERI is continually seeking to advance IUPUI’s already accomplished reputation as an internationally recognized research university. This past year SERI has strengthened its collaborative relationship with the School of Engineering and Technology by co-sponsoring the hiring of a new faculty member, Dr. Brandon Sorge, who will be SERI’s first Faculty Fellow.

During this past year, SERI and IUPUI’s Integrated Nanotechnology Development Institute were awarded funding from NSF for their Research Experiences for Teacher Advancement in Nanotechnology (RETAIN) project, which begins June 2015. Additionally, as part of a partnership with EmployIndy, SERI has created and implemented a workforce development program that incorporates a modified version of Project Lead the Way curriculum. SERI also currently manages nine STEM program evaluations.

In the upcoming year, our institute will be planning the next installment of the SERI Speaker Series. We will also be finalizing the process by which new SERI Fellows will be named and what their responsibilities will be.

On behalf of everyone at SERI, we would like to express our genuine excitement as we set out to expand our role in the promotion of research excellence at IUPUI.

Sincerely,

Charlie Feldhaus
School of Engineering and Technology

Andy Gavrin
School of Science

Jomo Mutegi
School of Education
SERI Faculty, Staff, and Students

SERI is overseen by the Office of the Vice Chancellor for Research, and is led by a Leadership Team, representing a partnership between the School of Education, the School of Engineering and Technology, and the School of Science.

Vice Chancellor for Research
Kody Varahramyan

Co-Directors
Charles Feldhaus (Engineering and Technology)
Andy Gavrin (Science)
Jomo Mutegi (Education)

SERI Fellow
Brandon Sorge (Engineering and Technology)

Post-Doctoral Fellow
Justin Hess (January 2016)

Research Associates
John Buckwalter
Grant Fore

Graduate Researchers
Christina Chapman (Anthropology)
Louis Escobar (Engineering and Technology)
Laura Green (Engineering and Technology)
Caitlin Sheesley (SPEA)
Tiffany Whinery (Engineering and Technology)
Undergraduate Researchers
Melanie Scheive (Neuroscience)
Joseph Bondi (Pre-Med)
Qurat-ul-Ann Mirza (Physics)

External Worker
Courtney Perry (TechPoint Foundation for Youth)

Hourly Consultant
David Byron
Vision and Mission

SERI’s **Vision** is to be a nationally and internationally recognized center of excellence for STEM education research, contributing to the advancement of STEM education in Indiana and the nation.

SERI’s **Mission** is to …

1. Promote research on STEM education at all levels, including:
   - Evaluating the effectiveness of existing and proposed educational practices in STEM
   - Investigating fundamental questions of how people learn STEM
   - Encouraging STEM faculty to participate in the scholarship of STEM teaching and learning.

2. Promote and coordinate STEM education research initiatives pursued through the institute and in collaboration with external partners.
Awarded and Submitted Grant Proposals

An overarching concern for producing excellent scholarship and attaining needed funding has informed much of SERI’s recent activities. Proposals for the following programs either have been submitted or awarded. SERI activities have also emphasized the need to identify and organize STEM-related RFPs and Solicitations for both future submission and dissemination to appropriate IUPUI faculty.

**CURRENTLY AWARDED**


Ward, R., Agarwal, M., Rubens, E., & **Sorge, B.** STEMCorp Research Team: Increasing Diversity and Participation In High School Stem Education. 2013-2015 ($38,100).


**Sorge, B., Fore, G., & Feldhaus, C.** *Evaluation of Purdue COS Teacher Quality Grant*. January 1, 2014. ($14,000).

**SUBMITTED RESEARCH**


**EVALUATION**

*SERI is the listed evaluator for the following grants currently in review:*


PREVIOUSLY AWARDED

**Feldhaus, C.R.** *The Indiana Science, Technology, Engineering and Mathematics (I-STEM) Resource Network Grant.* Purdue University, December 2012 – March 2014. ($82,000).


**Fore, G & Sorge, B.** *Undergraduate Nanotechnology Track Evaluation (NSF-NUE).* September 2013 – January 2014. ($10,000).


Scholarship

PUBLICATIONS

2015


**2014**


**2013**


2012


BOOK CHAPTERS

2015


CONFERENCE PROCEEDINGS

2015


2014

Covault, J., & Feldhaus, C. “The Integration of STEM (Science, Technology, Engineering and Math) and Literacy in a Traditional Teacher Preparation Reading Course for Pre-Service Teachers,” United Kingdom Literacy Association 50th International Conference, University of Sussex, UK, July, 2014.


**PRESENTATIONS AND POSTERS**

**2015**


Gavrin, A. (2015, February 6). How to Get Your Students to Prepare for Every Class. IUPUI - Center for Teaching and Learning Teaching Academy, Indianapolis, IN.


Gavrin, A. (2015, June 23). How to Get Your Students to Prepare for Every Class. Invited workshop during the AAPT, APS, AAS sponsored "New Faculty Workshop", College Park, MD.


2014


Covault, J., & Feldhaus, C. (2014, July 4-6) The Integration of STEM (Science, Technology, Engineering and Math) and Literacy in a Traditional Teacher Preparation Reading
Course for Pre-Service Teachers. United Kingdom Literacy Association 50th International Conference. University of Sussex, UK.


Feldhaus, C.R. Ask the Experts: STEM Education Panel. Panel Discussion on STEM Education. Old National Centre – Egyptian Room. March 13, 2014. Panel Moderator: Robert L. Smith, Senior Director, Corporate Responsibility, Eli Lilly and Company and President, Eli Lilly and Company Foundation. Panelists: Erin L. Albert, MBA, PharmD, JD, Director of Continuing Education & Preceptor Development, Butler University College of Pharmacy and Health Sciences Dr. Vince Bertram, President and Chief Executive Officer, Project Lead The Way Charlie Feldhaus, Ed.D., Associate Professor and Chair of Graduate Programs and Co-Director, STEM Education Research Institute (SERI) Wendy Stein, Head of North American IT, Roche Diagnostics


Feldhaus, C.R. & Sorge, B. (2014, September 25). The STEM Education Research Institute: History, Initiatives and Opportunities. Indiana University School of Medicine, Indianapolis, IN.


Gavrin, A. (2014, June 24). *How to Get Your Students to Prepare for Every Class.* Invited workshop during the AAPT, APS, AAS sponsored “New Faculty Workshop”, College Park, MD.

Gavrin, A. (2014, July 25). *Just-in-Time Teaching (JiTT).* Invited workshop during the AAPT, APS, AAS sponsored “Experienced Faculty Workshop”, Minneapolis, MN.

Gavrin, A. (2014, November 14). *How to Get Your Students to Prepare for Every Class.* Invited workshop during the AAPT, APS, AAS sponsored “New Faculty Workshop”, College Park, MD.


2013


Pinder, P. J. (2013, April 5). *Employing a phenomenological inquiry approach to explore a few urban African American math and science teachers’ perspectives on NCLB and assessments*. Poster presented at the Indiana University, Purdue University, Indianapolis (IUPUI) Research Day Symposium, Indianapolis, IN.


EVALUATION REPORTS


BRIEFS

Initiatives and Pilot Studies

IUPUI INTERNAL STEM EDUCATION DATABASE

SERI is developing a project to explore potential synergies among the many STEM education initiatives ongoing at IUPUI. The ultimate goal of this project is to establish best practices for identifying and implementing such synergistic connections among STEM education initiatives within a single large campus or consortium of geographically connected smaller campuses. The project is being implemented through a multiphase process. Initially, SERI researchers tested the feasibility of identifying and categorizing campus STEM education initiatives through IUPUI websites and institutional reports. This proved to be a workable starting point for data collection. An IU system integrated database is currently being developed in conjunction with UITS. Upon completion of this database, current data from these online findings will be entered. Following this, researchers will conduct fact-checking interviews and data sharing with IUPUI faculty/staff/department heads to complete the initial data collection. With this completed, researchers will conduct an analysis of IUPUI’s initiatives using the database and, when needed, additional faculty/staff interviews both to assess internal synergy and cost-saving and to identify the potential for additional synergistic development at IUPUI.

PROJECT LEAD THE WAY/ADULT EDUCATION

The Advanced Manufacturing Industry in Indiana has increased nearly twice as rapidly as most other States. While the demand for high skilled workers increases, the production of trained employees has not.

The STEM Education Research Institute (SERI) has collaborated with Employ Indy, Project Lead the Way (PLTW), and the Excel Center to facilitate a 16-week pilot. This pilot connects competencies from PLTW with five Industry Certifications desired by businesses and colleges surveyed throughout the state. The eighteen week pilot begins the second week of April and has a four week job shadowing component at the eight week mark. The target population is disconnected/discouraged adult learners that have no training in
manufacturing. Industry Certifications include: OSHA 10, Certified Logistic Associate, Certified Logistics Technician, Autodesk Inventor and National Career Readiness Certification. This program also offers the opportunity for students to complete a PLTW course and receive duel credit through Ivy Tech or IUPUI. A mixed methods research evaluation design has been constructed and reviewed. It will be implemented throughout the duration of this pilot. The results will be used formatively to refine the pilot before running a second pilot in the late Fall of 2015.

**RESEARCH EXPERIENCES FOR TEACHER ADVANCEMENT IN NANOTECHNOLOGY**

Funded by the National Science Foundation, the Research Experiences for Teacher Advancement In Nanotechnology (RETAIN) is a six-week (June 15-July 24, 2015) program that provides a unique opportunity for high-school teachers to explore the interdisciplinary field of nanotechnology at IUPUI and its impact on STEM education. This cutting-edge field is rapidly becoming an essential part of science, engineering, medicine, and many other disciplines. Participants in this program will gain research experience and knowledge of career in nanotechnology, experience in constructing nanotechnology-themed teaching modules, a professional network of other teachers and scientists, and professional development and graduate credits. SERI is heading up the mixed methods evaluation of this program.
Collaborations

SERI is dedicated to nurturing current and newly formed collaborations, while concurrently seeking to identify and initiate additional creative partnerships with dynamic people and institutions at IUPUI, in Indiana, and nationally.

INTERNAL COLLABORATIONS

Center for Research and Learning
Center for Service and Learning
Center for Teaching and Learning
Center for Urban and Multicultural Education (CUME)
Department of Adolescent Medicine
Department of Anatomy and Cell Biology
Department of Anthropology
Indiana Business Research Center
Institute for American Thought
IUPUI Arts and Humanities Institute
IUPUI Student Foundation/Timmy Global Health
Great Lakes Equity Center
Integrated Nanosystems Development Institute (INDI)
Indy Learning Centers
Urban Center for the Advancement of STEM Education (UCASE)

EXTERNAL COLLABORATORS

College Acceleration Network
Conexus
Employ Indy
Harvard University Program in Education, Afterschool, and Resiliency (PEAR)
I-STEM Resource Network
Indianapolis Urban League
Indiana After School Network
Lafayette School Corporation
Merrillville School Corporation
Project Lead the Way
Purdue University College of Science Outreach
Purdue Science Express
TechPoint Foundation for Youth
TERC
US2020
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