I. Cover Sheet

The HumAn Learning Project

Mitigating Grade Surprise: A Study of Students’ Grade Expectations Using Learning Analytics and Assignment Performance in General Education Courses at Indiana University

A Collaborative Research Proposal Submitted by:

Jennifer Meta Robinson (Anthropology, jenmetar@indiana.edu)
Jill K. Robinson (Chemistry, jirobins@indiana.edu)
John Arthos (English, jarthos@indiana.edu)
Nina Onesti (Informatics, nonesti@indiana.edu)
Logan Paul (Informatics, lopaul@indiana.edu)
Chung-chieh (Ken) Shan (Computer Science, ccshan@indiana.edu)
Sam Tobin-Hochstadt (Computer Science, samth@cs.indiana.edu)

College of Arts and Sciences
School of Informatics, Computing, and Engineering

for the

Learning Analytics Collaborative Grant 2017
Indiana University
classiub@indiana.edu
January 4, 2018
II. Abstract (300/300 words)
This project investigates grade surprise—the unrealistic expectations students have for their grades, the subsequent consequences of surprise, and the factors that can mitigate it—in large classes across the general education curriculum. In prior studies, we found 50% of general chemistry, 38% of anthropology, and 36% of public speaking students in very large IUB courses (enrolling more than 400 students each) were surprised or very surprised by their grade on their first major assignment. Because most IUB students ranked in the top 10% of their high school classes where they were accustomed to getting mostly As, grade surprise in college can shake their forward momentum toward course completion and graduation, as well as impact their sense of self-concept, self-efficacy, and motivation. By scaling up with two more large courses, we can study more than 6300 students annually in the face-to-face, general education curriculum—in natural sciences, technology, mathematical sciences, social sciences, and humanities courses. We will use analytics on student demographics, preparation, performance, and choice to understand this pivotal first assignment, plus survey results revealing student affective states and decisionmaking. We hypothesize that, by better understanding grade surprise, we can devise strategies to mitigate it, including intervening to teach effective study skills and other productive strategies. We believe the outcomes will include improved engagement and retention at course, program, and institutional levels. We expect to identify behavioral patterns among student populations that can help retain and improve the learning of certain at risk groups, including underrepresented, minority, and first-generation college students. Our focus on GenEd grade surprise offers a potentially new and important window on student success—bringing together student demographics and success indicators with assignment-based performance and student perceptions. Outcomes should advance learning analytic theory, impact the GenEd and majors curricula, and improve success among diverse student groups.
III. Project Description

1. The purpose of the investigation is to understand the role of grade surprise—the unrealistic expectations students have for their grades, the subsequent consequences of surprise, and the factors that can mitigate it—in large classes across the general education curriculum at IU Bloomington. Our prior research indicates that grade surprise is prevalent in first-year courses and has the potential to derail student progress toward completion of the first semester and, subsequently, the degree. We found that, in large GenEd courses, 50% of general chemistry students, 38% of anthropology students, and 36% of public speaking students were surprised or very surprised by the grade they received on their first major assignment. Such surprise may be prompted by comparison of outcomes to various reference points, including high school GPA, personal aspirations, or social desires (Mellers et al 2013). Our project investigates students’ perceptions of their grade on their first major assignment in a course and their subsequent study strategies and educational success. We consider learning analytic data, course performance data, and student perceptions to find patterns of behavior among students that can be helpful for designing classroom-based and curriculum-wide interventions. Our hypothesis is that, by studying grade surprise in five large courses that span the general education curriculum, we will be able to (1) discern patterns and (2) initiate interventions that mitigate grade surprise and teach strategies correlated with educational success, thereby (3) improving learning in the course and (4) retaining students in the semester and subsequently.

Research objectives. The overall objective of this research is to improve student success in very large, general education courses in the humanities, sciences, technology, engineering, and social sciences by understanding and intervening in the phenomenon of grade surprise, using a new synthesis of institutionally generated learning analytics, expertise-based instruction, and student experience. The specific research objectives include these major moves:

- Extend preliminary learning analytic research on grade surprise to include a representative range of fields across the general education curriculum: ANTH-A122, COLL-P155, CHEM-C117, INFO-I101, and CSCI-C211.
- Develop rich, multivariate models of student learning performance relative to grade surprise in these courses.
- Design and test interventions that address group-based learning gaps.
- Build on current learning analytics theory to incorporate faculty expertise and student affective experience.
- Test our research model for scalability, whereby we have added two new courses that include five new faculty members and 800 additional student “data sets” (an increase of 1/3).
- Disseminate results through publications and presentations.

The data to be gathered and analyzed to address these objectives will include:

- Student Demographics, including characteristics such as gender, ethnicity, citizenship, race, and class standing
- Student Preparation, such as transfer credits, prerequisites, curriculum requirements, pre-college classes and remedial educational programs
- Student Performance, as understood by grades (assignments, interventions, and course), GPA, persistence, retention, engagement indicators, graduation rates, along with self-reported experience (via survey).
- Student Choice, as understood by selection of major and pathways toward graduation

2. Student populations under study will include all students in the five large, target courses, totaling about 6300 students per year. The majority of these students comes from the first and second year student populations. With such large numbers, we expect to be able to get a good sense of patterns that prevail among the entire student body, including by demographic characteristics, preparation, performance, and choice. We have a special interest in (1) closing the achievement gap that persists between underrepresented students and majority students, particularly within majors, such as women and minorities in the sciences and (2) recruiting and retaining majors and minors in our departments.
3. How past SLA research results are connected to this work. The proposed project builds on work begun in 2015, with the support of a SLA Fellowship. Beginning in that year, progressively nuanced research methods have revealed persistent and troubling gaps in student performance that can be correlated with demographic categories. For example, despite numerous course and institutional interventions, the bald facts of institutional data reveal that first-generation, male, African-American, and nonresident alien students tended to have lower GPAs in the courses first under study than students who describe themselves as white, Hispanic, Asian, two or more races, or having at least one parent with a bachelor of arts degree. The new research proposed here builds on several years of our findings:

Phase 1 of the project, completed in 2015, uncovered important demographic trends in success among 2719 students and 30 AIs involved in a single, multi-section, general education course at Indiana University Bloomington.

Phase 2, completed in 2016, (1) refined description of these trends within a single course using multivariate modeling, (2) assessed variability of student success across sections of the course, (3) analyzed student performance over time, and (4) piloted a discipline-based intervention, Cultures of College.

Phase 3, completed in 2017, extended this research, based in a social science course, to other multi-section, general education courses in the humanities and natural sciences. Our analysis of longitudinal learning analytics data focused us on the first major assignment of first-year courses and grade surprise as important opportunities in improving student success across the general education curriculum. We designed and issued a survey to gauge grade surprise among approximately 2500 students enrolled in three courses during the fall 2017 semester. The results indicate the grade surprise is a significant factor among first-year students, affecting 50% of Chemistry C117 students, 38% of Anthropology A122 students, and 36% of College P155 students.

Phase 4 extends this research to attempt an approximate mapping of the entire other general education curriculum, by including one course each representative of the humanities, social sciences, natural sciences, and technological/mathematical sciences: College P155, Anthropology A122, Chemistry C117, Informatics I101, and Computer Science C211. Each of these courses is a large gateway or required course enrolling hundreds or even thousands of students. Altogether they can enroll a total of 3167 students per semester, giving us a substantial lens on the entire general education curriculum of a large research institution. Our prior work has allowed us to focus on a pivotal juncture in undergraduate education: the first major assignment of a general education course that functions as a gateway into majors, retention, and success in learning. While each course offers interesting variations on the large class theme (in staffing, format, and pedagogy), the potential large-scale impact is impressive: for recruiting and retaining majors, fostering success among traditionally underrepresented student groups, for impacting retention to the third semester. Moreover, this project offers a unique way to link institutional data, classroom data, and students’ affective and behavioral experience across the general education curriculum.

4. Significance and impact on undergraduate learning. There are several key dimensions that impact learning among undergraduates, the graduate students that teach them in sections, and the faculty members who are responsible for their learning.

1. The members of the research are all faculty members teaching large-enrollment courses with direct impact on student learning within their courses, students’ progress toward degree, and students’ multi-disciplinary experience of the institution in the first two years:
   - ANTH-A122 Interpersonal Communication enrolls 432 students per semester and supports 9-10 Anthropology graduate student teaching assistantships per semester. (J.M. Robinson)
   - COLL-P155 Public Oral Communication enrolls about 1300 IU students per semester and supports 20-23 graduate student assistantships in 15-18 departments each semester. In addition, 1000 high school students take the course through ACP. (Arthos)
• CHEM-C117 Principles of Chemistry and Biochemistry I (General Chemistry) enrolls about 615 students per semester and supports 6 graduate student assistantships each semester. In Fall 2016, the instructor added 14 undergrad TAs to facilitate problem solving in discussion sections, reducing the ratio of instructor to student from 40:1 to 13:1. (J.K. Robinson)
• INFO-I101 Introduction to Informatics enrolls about 600 students per semester, taught by two faculty members, serves as a major gateway course into the School of ICE. (Onesti and Paul)
• CSCI-C211 Introduction to Computer Science enrolls about 220 students per semester. It is a key foundational course in the Computer Science major. (Shan and Tobin-Hochstadt)

2. Intervention around the first assignment in a general education, first-year course has the potential to calibrate student confidence so that students prepare for class more appropriately (Baron, 2008; Lichtenstein et al., 1982; Phillips and Wright, 1977; Yates, 1990) and to address cross-cultural and transitional misconceptions about the work required for success at IU (Mellers et al 2013). Although most of our students are in the top 10% of their high school classes and expect to continue to excel in college using familiar study and social strategies, many are surprised by their lack of success relative to their peers in their first semester and may despair of their plans to, for example, become pre-med, enroll in the Kelley School, or launch a computer science career. Thus, understanding grade expectations and mitigating grade surprise can have significant impact on students’ progress and retention. Multivariate data analysis will allow us to map such factors as student demographics, high school and college g.p.a., and intended major against grade surprise results.

5. Anticipated outcomes and their contribution to the success of student learning at IU.

1. The grade surprise questionnaire we have designed, itself, functions as an intervention. The questions help students reflect on their preparation and performance after the first major assignment of a course and therefore does some work toward helping them take agency for their own study habits and practices. One possible outcome is that we could add this questionnaire in a course regularly for those pedagogical reasons alone.

2. The development of an activity or instructional protocol before the first assignment (in these courses and potentially others) to mitigate surprise or its negative effects, depending on results.

3. Training for instructors, associate instructors, and peer instructors on how to talk to students after their grades are received to build on this reflective awareness and rehearse best-practices with them. Given the culture-change students experience in these introductory courses as they pass from high school to college, some grade surprise would be normal and presents an important learning opportunity. Indeed, graduate students are already requesting this innovation.

4. Concrete pedagogical recommendations for facilitating diverse student success throughout these departments and in similarly large, general-education courses across campus.

5. We expect our research on grade surprise will add to the general literature on higher education. While our analysis will engage with theories on the role of confidence, hindsight, and cross-cultural differences (Mellers et al 2013; Jansen, Scherer, and Schroeders 2015), our study is unusually holistic and thus offers the potential for actionable solutions. Our study brings together student demographics, preparation, and success indicators with assignment-based performance and student processing about their performance. It engages with the student as well as the faculty experience within an institutional context. The results could have implications for recruiting and retaining majors, fostering success among diverse student groups, and orienting faculty to the mitigation of grade surprise.

6. Research methodology. This research has exempt IRB approval and will be amended as needed. It relies largely on quantitative data—from the Registrar and BAR, course evaluations, and learning outcomes data—supplemented with survey research of undergraduate enrollees. We have been in close contact with BAR Director Linda Shepard during the development of this research method.

7. Measures of success. Success will mean we have (1) refined our understanding of demographic trends in learning and teaching in general education courses, (2) identified important patterns within and across courses, (3) designed and begun to implement scalable interventions to address areas of concern, and (4) disseminated research findings, particularly exploring opportunities for transfer to other courses.
Appendix A: A sample of earlier work by the PIs, establishing performance differentials to be studied.

Figure 1. Similar performance gaps occur in a third target course, complicated by how students qualify for the course, suggesting that other large courses under study will also reflect campus performance gaps while also introducing new or unique complications.

Figure 2. Preliminary learning analytics show that two courses under study reflect campus-wide achievement gaps based on student demographics.

Figure 3. Indications of grade surprise, by percentage of class, in 3 target courses. Further work with multivariate analysis and intervention will build on these patterns.

Figure 4. An example of “drilling down” to understand grade surprise. This graph indicates the discrepancy between high school GPA and college grades in a sample target course.
Appendix B: The grade surprise survey (fall 2017).

<table>
<thead>
<tr>
<th>Survey Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What grade did you expect on this assignment before you completed it?</td>
</tr>
<tr>
<td>2. What grade did you expect right after you completed the assignment?</td>
</tr>
<tr>
<td>3. What was the final grade on the assignment?</td>
</tr>
<tr>
<td>4. Are you surprised about the final grade your assignment received?</td>
</tr>
<tr>
<td>5. If your grade did not match your before prediction, how do you account for the difference? Why do you think the grade was different than you expected before the assignment? Give as many reasons as you can think of.</td>
</tr>
<tr>
<td>6. If your grade did not match your immediately after prediction, how do you account for the difference? Why do you think the grade was different from what you expected immediately after the assignment? Give as many reasons as you can think of.</td>
</tr>
<tr>
<td>7. What change could you make to reduce your surprise on the next assignment? Give as many changes as you can think of.</td>
</tr>
</tbody>
</table>

Bibliography
4. **Short CVs** for PIs - maximum of 4 pages, see below. (Please note: We received permission to submit CVs for PIs only: J. M. Robinson, J. K. Robinson, and J. Arthos.)

5. **Nominating letters**, under separate cover, articulate how the proposed project helps both the faculty fellow and the department further student success and learning at IUB:

   1. Jeanne Sept, Chair of the Anthropology Department
   2. Patricia Ingram, Chair of the English Department
   3. Stephen C. Jacobson, Chair of the Chemistry Department
   4. Esfandiar Haghverdi, Executive Associate Dean for Academic Affairs of the School of Informatics, Computer Science, and Engineering (Please note: We received permission to submit a collective letter for SICE team members.)
ACADEMIC AND PROFESSIONAL APPOINTMENTS, selected

INDIANA UNIVERSITY, BLOOMINGTON

Professor of Practice, Department of Anthropology, 2015-present.
  Co-Director, Graduate Certificate on College Pedagogy, 2016-present.
  Course Director, Interpersonal Communication, 2015-present.
  Affiliated Faculty, Campus Farm, Office of Sustainability and Office of the Provost, 2017-present.
  Professor of Practice, Department of Communication and Culture, 2013-2015.
  Senior Lecturer, Department of Communication and Culture, 2008-2013.

Director, Campus Instructional Consulting, Indiana University, 2002-2008.

EDUCATION

Ph.D. in English, Doctoral Minor in Folklore. Indiana University 2001.
Bachelor of Arts, Magna Cum Laude in English. Western Kentucky University 1988.

PUBLICATIONS, selected

BOOKS


ARTICLES AND CHAPTERS, selected

Food and Environment Scholarship—redacted for short CV

Teaching and Pedagogy Scholarship—selected


In-Progress

GRANTS (Successful)
Food and Environment Scholarship—redacted for short CV
Teaching and Pedagogy Scholarship—selected


2015  **Robinson, J. M., (PI), C. Hostetter, D. Pace, and G. Rehrey.** “Planning Grant for Networking Advanced Research Collaborations on Teaching, Learning, and Student Success.” Vice Provost for Undergraduate Education. Indiana University. $12,500. PI.

2015  **O’Loughlin, V., Sherwood-Laughlin, C., and J. M. Robinson.** “A Multidisciplinary Evaluation of Pedagogy Courses’ Influence on Graduate Student Development as Teacher-Scholars”. Indiana University Scholarship of Teaching and Learning Program. $5,000. Co-PI.


---

**AWARDS and HONORS--selected Major Leadership**

President and Vice-President, International Society for the Scholarship of Teaching and Learning, 2005-2011.

---

**Teaching and Pedagogy**

2017 P.A. Mack Award for Distinguished Service to Teaching. Faculty Academy on Teaching Excellence. Indiana University $2500.

2017  Honorary lifetime member. Faculty Academy on Teaching Excellence. Indiana University.

2016  Distinguished Service Award, International Society for Scholarship of Teaching and Learning.

2016  Honorary Lifetime Member, International Society for Scholarship of Teaching and Learning.

2012  Trustees Teaching Award, $2500. Indiana University.

---

**PRESENTATIONS AND CONFERENCE PAPERS, selected**


Plenary Panel with Mary Taylor Huber and Jacqueline Dewar. International Institute for SOTL Scholars and Mentors, Loyola Marymount University, Los Angeles, June 1, 2012.

“Faculty Inquiry Networks in the Scholarship of Teaching and Learning” SOTL Commons Conference, Statesboro, GA, March, 2011.
“Building Faculty Development Networks.” International Symposium, Future of Faculty Development in Japan: Building the Core in Faculty Development, Kyoto University. January, 2009.

Professional Presentations, Invited
Food and Environment Scholarship, redacted
Teaching and Pedagogy Scholarship, selected


Conference Papers and Presentations, Peer Reviewed
Food and Environment Scholarship—redacted
Teaching and Pedagogy Scholarship—selected


2016 Robinson, J. M. et al. “How graduate students are taught to tell the story of their teaching and what that has to do with SOTL: Results from a multidisciplinary, multinational comparison of pedagogy courses.” International Society for the Scholarship of Teaching and Learning, Los Angeles. October.


JOHN ARTHOS
Associate Professor

Ballantine Hall 416 827 W. 17th St.
Department of English Bloomington, IN 47404
Indiana University Bloomington (812) 679-8175
Bloomington, IN 47405 jarthos@indiana.edu

Education

Ph.D. in Communication, specialization in rhetoric, Wayne State University Department of Communication, Spring, 1995.


B.A. in Languages and Literatures, University of Michigan, 1978, Charles Angell Scholar.

Employment

Associate Professor, Department of English, Indiana University Bloomington, July 2015-present.


Associate Professor, John and Christine Warner Chair, Department of Communication, Denison University, August 2000–May 2014.

Assistant Professor, Communication Department, SUNY at Fredonia, August, 1995-July 2000.

Book Monographs


Research in Professional Journals/Books [single-author] (selected)


Courses taught (selected)

ENG-R340 Rhetoric of Social Movements (Indiana University, Fall 2016)
ENG-L756 Symbolism of Evil, (graduate seminar, Indiana University, Spring 2016)
ENG-R397 Visual Rhetoric (Indiana University, Fall 2015)
CMCL C513 Rhetorical Judgment (graduate seminar, Indiana University, Spring 2015)
COLL P155 Public Oral Communication (Indiana University, Fall 2014-present)
COMM-401 Narrative Truth (Denison, Fall 2013)
COMM-227 The New Literacy Lab (Denison, Spring 2012)
COMM-223 Rhetoric (Denison, Fall 2011)
COMM-406 Rhetoric and Social Movement (Denison, Fall 2011)
QS-406 Rhetoric and Social Movement (cross-listed) (Denison Fall 2011)
HNRS-283 Humanist Hermeneutics (Denison, Fall 2009)
COMM-101 Public Address (Denison, Fall 2008)
COMM-208 Theorizing Communication (Denison, Spring 2008)

Service (selected)

Liberal Arts and Management Program Task Force, The College of Liberal Arts, Indiana University, Summer 2016.


Department of English Graduate Admissions Committee, member, Fall 2015/Spring 2014.

Indiana University General Education Arts and Humanities Subcommittee member, 2016-present.

Indiana University General Education Arts and Humanities committee member, 2016-present.

Rhetoric Tenure-Line Search Committee, Department of English, member, Fall 2015.

Writing & Rhetorical Studies Committee, IU Department of English, member, Fall 2015-present.

Rhetoric Program Committee, IU Department of English, member, Fall 2015-present.

Indiana ACP High School instructors training and support for P155 equivalence courses, assist Course Coordinator, 2014-present.
Jill K. Robinson, Ph.D.
Indiana University
Department of Chemistry
800 E. Kirkwood Ave.
Bloomington, IN 47405
jirobins@indiana.edu

Education:

1999    Ph.D. Analytical and Atmospheric Chemistry, University of Colorado, Boulder, CO
1994    B.S. Chemistry, Truman State University, Kirksville, MO

Academic Positions:

2008-present    Senior Lecturer, Department of Chemistry, Indiana University, Bloomington
2002-2008        Lecturer, Department of Chemistry, Indiana University, Bloomington, IN
1999-2002        Academic Professional Lecturer in Analytical Chemistry, University of Wyoming, Laramie, WY

Courses:

General Chemistry I and II lecture and laboratory
Honors General Chemistry I and II
Preparatory Chemistry lecture and laboratory
Quantitative Analysis
Environmental Chemistry (300 level)
Instrumental Analysis lecture and laboratory
Ethics in Science

Honors and Awards:

2016    Mosaic Fellow for Active Learning Indiana University
2011    Indiana University President’s Award for Distinguished Teaching
2010    Excellence in Teaching Award, Indiana University Board of Trustees
2008    Excellence in Teaching Award, Indiana University Board of Trustees
2003    Excellence in Teaching Award, Indiana University Board of Trustees
2002    Outstanding Service by a Faculty Member, University of Wyoming Chemistry Students
2001    Extraordinary Merit in Teaching, University of Wyoming College of Arts and Sciences
2001    Award for Excellence in Teaching, University of Wyoming Honors Program (Student Choice)
1999    Faculty Growth Award, University of Wyoming
1998    Graduate Fellowship, Cooperative Institute for Research in Environmental Sciences
1998    Graduate Fellowship in Atmospheric Chemistry, National Science Foundation
1995    Graduate Excellence in Teaching Award, University of Colorado
Publications and Patents:

- Analytical Sciences Digital Library Active Learning Modules
  
  Biological Mass Spectrometry: Proteomics, Jill K. Robinson, Michelle Kovarik
  DOI: 10.1007/s00216-012-6473-x

Professional Presentations:

- Harris Teaching Workshop Keynote Speaker, University of Alberta, Canada, 2016
  o Strategies for Effective Active Learning
- Biennial Conference on Chemical Education, Colorado, 2016
  o Learning is Not a Spectator Sport
- Texas Community Colleges Consortium, Houston, 2016
  o Strategies for Effective Active Learning
- ALEKS Symposium, Boston, 2015
  o General Chemistry Placement: A Comparison of Review Courses
- 249th American Chemical Society Meeting, Denver, 2015
  o Using Technology to Facilitate Discussion in an Instrumental Analysis Course
- Biennial Conference on Chemical Education, Aug. 2015
  o Project Based Learning in Analytical Chemistry Laboratory
- Pittcon, Chicago, IL, 2014
  o Analytical Chemistry Students Perform Quality Assurance Tests for a Local Microbrewery
- Pittcon, Philadelphia, PA, 2013
  o Active Learning Strategies for Large Analytical Chemistry Lecture and Laboratory Courses
- 243rd American Chemical Society Meeting, San Diego, 2012
  o “A Tale of Ales: Project Based Learning in Analytical Chemistry Laboratory”
- Biennial Conference on Chemical Education, Bloomington, IN, 2008.
  o “A New Integrated Laboratory and Lecture Course in Bioanalytical Chemistry”
- Indiana University, Summer Enrichment Program, 2007
  o “The Chemistry of Global Warming”
- International Center for First Year Undergraduate Chemistry Education, Boulder, CO, 2007
  o “Strategies to Improve Problem Solving in First Year College Chemistry”
Additional Teaching and Advising:

2016 Faculty Learning Community-Indiana University: Collaborative Learning
2015 New Faculty Orientation: Master class on student engagement for the new faculty at Indiana University.
2015 Science in a Snap: Teacher Professional Development Workshop, Wonderlab Science Museum
2015 Master Class: Using technology to facilitate discussion in the collaborative learning studio.
(Sponsored by Indiana University Center for Innovative Teaching and Learning)
2015 Preparing Future Faculty Panel, Indiana University: Workshop on Student Engagement
2013-present Academic mentor for student athletes
2012 Engaging Students in Scientific Inquiry Faculty Panel Presenter
(Sponsored by Indiana University Center for Innovative Teaching and Learning)
2007, 2010 Master Class: Using clickers to promote discussion in a large lecture hall
(Sponsored by Indiana University Instructional Support Services)
2007 Freshmen Learning Project Fellow-Indiana University
2005-present Indiana University Dance Marathon Faculty Advisory Board
2005-2010 Faculty Advisor: Alpha Chi Sigma Professional Chemistry Fraternity
2002-present AI Training, Indiana University: Assisted in preparing associate instructors (AI’s) for laboratory and discussion sections by developing interactive training sessions such as role playing and microteaching.
2005-2007 Science Education Doctoral Committee Member: Advised chemical education student on curriculum for teacher workshops, created assignments for the purpose of revalidating classes, and served on the committee for the oral exam and doctoral defense.
2005 Service Learning: Developed several hands-on activities for college students in General Chemistry to teach in a 6th grade classroom.
2003-present Study Skills Workshop: Presented a workshop titled “How to Study for College Level Science Courses” for incoming freshmen at Indiana University.
1999-2001 Faculty Advisor: American Chemical Society Student Affiliate Chapter, Univ. Wyoming
2000 Meet the Professors Program: Visited Wyoming high schools for college recruitment.
Professional Activities:

2013-present  Contributor: Development of E-learning Modules for Analytical Chemistry
                National Science Foundation Transforming Undergraduate Education program
2015  Symposium Organizer: Active Learning in the Undergraduate Analytical Chemistry Curriculum
                249th American Chemical Society Meeting
2015  American Chemical Society General Chemistry Exam Committee for 2017 Exam
2014  *Textbook Reviewer:* Reviewed 5 chapters in Quantitative Analysis by Daniel Harris, 9th Ed. W.H. Freeman
2014, 2016  *Active Learning in Analytical Chemistry Workshop*  This workshop was funded by an NSF Transforming Undergraduate Education grant. I was one of twelve analytical chemistry faculty who developed active learning materials and facilitated a workshop for thirty professors from historically black and Hispanic serving universities.

2012  *Faculty Advisory Board Member for Themester:*  Good Behavior/Bad Behavior: Molecules to Morality
2012  *National Science Foundation Reviewer:* Targeted Infusion Projects for Improving STEM education at Historically Black Colleges and Universities.
2011-present  *Peer Reviewer:* Journal of Chemical Education
2009, 2011  *National Science Foundation Review Panel:* Transforming Undergraduate Education (TUES) Grants in Analytical and General Chemistry

Science Outreach:

2008-2012  Outreach Coordinator: Nanoscience Center, Indiana University


  b.  *Nanoscience Projects in Local Schools* (2009-2012): Worked with New Technology High School teachers in Bloomington and Columbus to develop nanoscience projects. During these projects 250 students visited research facilities on the IU campus such as the Cyclotron and Nanocharacterization Facility. A survey developed by the IU Center for Evaluation and Education Policy (CEEP) indicated that the number of students indicating a preference for STEM degrees doubled as a result of this experience.

  c.  *Molecules Matters Teacher Workshop* (2010-2012): Developed and taught a two week workshop which trained middle and high school science teachers in nanoscience and project-based learning.

  d.  *Nanodays at the Louisville Science Center* (2009): Developed three hands-on activities to teach nanoscience concepts to the general public; “Stained Glass Art with Gold and Silver Nanoparticles,” “Lithography,” and “Nanotechnology in Commercial Products.” Recruited and trained 25 Indiana University graduate and undergraduate students to help with the event.

2004-present  *Chemistry Open House Participant:* Present a “Careers in Chemistry” booth, performed demonstrations at the Chemistry Department “Magic Show,” and supervised the various rooms with annual theme set by American Chemistry Society for National Chemistry Week, “Cooking with Chemistry,” “Life Science,” “Nanoscience,” etc.

2009  *Judge for Science Olympiad Finalists,* Indiana University

2009  *Wonderlab Teen Night:* Developed a Crime Scene Investigation Activity Based on DNA Analysis.

2007-2009  *Science in a Snap (A Summer Institute for Teachers):* Developed a one day workshop at Wonderlab Science Museum to help elementary teachers better understand chemistry concepts set by state standards.