Introduction - I have always had a deep curiosity and drive to discover how everything works. At an early age, this led to a love of science in an ever-present quest to find deeper knowledge and understanding. After earning a bachelor's degree in chemistry with a minor in physics, I continued with my education and earned a masters and PhD in chemistry. After completing my graduate work, I accepted an industrial position and spent 4 years at Thermo Fisher Scientific. After 2 years as a research scientist, I was promoted to a R&D Management position, where I led my research group in the development of new products and materials for the medical diagnostics industry. My time in industry has given me a unique perspective that I can offer my students. I am able to speak with more authority about what employers look for when they hire a scientist or engineer because I have been on the other side of that process. I coach all of my senior students and research assistants on resume writing and ways to present their skills and credentials that employers find appealing and respond favorably to. I feel that my past experience in industry is a significant asset to my students, and I leverage that experience whenever possible to highlight course concepts that will undoubtedly be useful in their future careers.

UW-Stout - I joined the faculty at UW-Stout as an assistant professor at the beginning of fall semester in 2010. Although I did have some experience with teaching labs and recitation sections in graduate school and experience with employee training and technical presentations while in the industrial workforce, I would say that my ability to teach large numbers of students on a regular basis was relatively untested. I had an excellent knowledge base in chemistry and strong technical background, but having been away from academia for several years, I had to rapidly develop my pedagogical approach for content delivery, assessment, and the laboratory experience.

Workshops – To assist in this process, in my first two months of teaching in 2010, I attended the New Instructor Workshop here at Stout as well as the UW System Women and Science Opening Workshop for New STEM Educators. These sessions opened my eyes to the Scholarship of Teaching and Learning and the wealth of methodologies and best practices available to enhance my effectiveness as a faculty member. I immediately began implementing what I had learned and have been continuously refining my pedagogy ever since.

Learning Community – I took part in starting an Engineering Living Learning Community in which a cohort of 24 freshmen lived in the same dorm and took my College Chemistry I (CHEM-135) and an engineering course, Introduction to Engineering Materials (MFGT-150) together. I attended annual Learning Community Summer Workshops throughout the three-year project (2012–2014), where we explored best practices and planned activities for the upcoming academic year. Because of the caliber of the students enrolled, the support network available to them, and an obvious sense of comradery within the group, the learning community significantly outperformed my other sections of CHEM-135. I found working with this group of students to be very rewarding!

Innovative Labs - I attended the UW System Office of Professional and Instructional Development (OPID) 2014 Spring Conference and presented a poster on a new ***"Synthesize, Characterize, Utilize"*** approach I developed for undergraduate chemistry labs. The poster (which is shown in the attached CV on page 8) presents a lab sequence from my Chemistry of Polymers course in which the students *synthesize* multiple batches of polymers in pilot scale reactors, fully *characterize* their product, and finally *utilize* their synthesized polymer to manufacture a part. The injection molded product at the end of the semester is a molecule shaped keychain that is a model of the monomer molecule they started with at the beginning of the semester. By completing this conceptual loop, students are reminded of where their polymer came from, and the chemical concepts learned at the beginning of the semester are significantly reinforced. This was the first of several similar multi-week lab sequences I have added to my courses.

SoTL Research – During the 2018-19 academic year, I was a member of the full year Community of Practice (CoP) sponsored through UW-Stout's Nakatani Teaching and Learning Center (NTLC). The topic of our CoP was, *Classroom Undergraduate Research Experiences (CUREs): Integrating Original Research*. The title of my SoTL investigation was: ***Implementation of Course-based Undergraduate Research Experiences (CUREs): A Polymer Chemistry and Materials Science Strategy***. The goal of this research work was to determine if increasing the level of student *autonomy* in laboratory experiments would correlate to higher levels of engagement, curiosity, demonstrated ability, and understanding. In my Chemistry of Materials class, students choose their ingredients to make glass, and in Chemistry of Polymers, students make their own custom acrylic paints and adhesives. Students

were given the guiding equations for the lab experiment and suggested typical ranges for the reactants used and allowed to choose what to put into their crucible or reactor. During lab, an online spreadsheet that all groups can edit is projected on screen. As individual lab groups deliberate and enter their batch formulation, they can see on screen what each group in the class is choosing to do in real time! After running their experiments, the entire class is interested and involved in what all the other lab groups produce because the batches are always new and different (even I do not know exactly how their experiments will turn out!). Students commented, "It's cool that we got to choose what to put into the crucible." This autonomous research-based approach was shown to increase student engagement and understanding.

Curriculum Design - I fully developed the lecture and designed matching lab experiments for Chemistry of Materials, Chemistry of Polymers, Industrial Chemistry, and Physical Chemistry. The populations of students that I most frequently interact with are from the following programs: Mechanical Engineering, Manufacturing Engineering, Plastics Engineering, Applied Science, Industrial Chemistry Concentration, Materials and Nanoscience Concentration, Materials Minor. I teach the second semester chemistry course for all engineering students in the Mechanical, Manufacturing, and Plastics Programs. I periodically meet with members of the engineering faculty to discuss how the topics covered in my courses fit into the larger curriculum. I want to make sure that what I teach fully prepares students for what comes next.

On occasion, I receive unsolicited feedback from unexpected sources. The following email was received on October 5, 2018:

> *"Dr. Ray,*
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> *I am the Engineering Manager at ITW Deltar Fasteners. I was recently at UW Stout to conduct interviews for our summer intern position. One of my interview questions was "Tell us about the best professor or supervisor you have had and what made them the best?". Your name was mentioned numerous times by the students we were interviewing. I was intrigued by the common responses. Students are impacted by numerous teachers and coaches through their life so I was surprised to hear such common responses.*
>
> *One of our main goals at ITW is employee recognition. It is a great program where we personally recognize employees for their contributions to our organization. Other employees have a chance to see "What good looks like". I wanted to take a moment to recognize the positive impact you have had on these students. They described a professor that cared about his students on a personal level, challenged them and made learning fun.*
>
> *Congratulations on making a positive impact on our future engineers and leaders in our businesses and communities."*

Research Group – In addition to these teaching activities, I have maintained an active undergraduate research group and mentored 28 students in multi-semester independent research projects on many topics in materials science including fluorescent glass, temperature resistance of concrete, emulsion and suspension polymerization, tensile strength of hair, and low melt-temperature alloys, just to name a few. Students in my research group have presented their research work at national and regional conferences as well as here at UW-Stout. Many methods developed from these research projects have been incorporated back into the lab curriculum and repeated across many sections of students.

Service - I have also served for many years on the Plastics Engineering and Manufacturing Engineering Advisory boards and the Applied Science Program Advisory board. In this role, we annually meet with members from industry to evaluate and update the curriculum to identify gaps and keep the students up-to-date on current trends and changes in the needs of industry. I have served on Faculty Senate and various other committees at the department and university level. I currently serve as Chair for the Department of Chemistry and Physics.

Outreach – I have also been heavily involved in community outreach through Science Olympiad and Summer STEM camps and Science Festivals. I have authored competitive exams and experiments as event supervisor for the Chem Lab Event in Science Olympiad at the state and national level. I have taught chemistry camp activities to over 1200 campers though STEPS and other summer STEM camps help at UW-Stout.