Teaching Statement
Adam Eck

At the undergraduate and graduate levels, teaching requires more than just imparting knowledge about course content to students. Instead, collegiate teaching is responsible for developing young learners with (1) the critical thinking and problem solving skills necessary to tackle real-world problems outside of the classroom and (2) the capability to independently learn new material whenever necessary to enable students to continually grow and adapt to changing environments and responsibilities later in life as professionals.

To develop such learners, my teaching philosophy is to instruct using several collaborative, participatory learning experiences in the classroom. I believe that students should play a primary role in their education, whereas my role as an instructor is more like that of a narrator – guiding students along and filling in knowledge gaps while allowing them to live out the experience. My approach (1) exposes students to many opportunities to practice critical thinking as they share and adopt different problem solving techniques from their peers, (2) encourages greater engagement from students, as they are active participants in the learning process, increasing the likelihood that they assimilate course content, and (3) increases students’ accountability to the learning process, since they are now responsible not only for their own learning and classroom performance, but also that of their peers. By working together, students also develop cooperation and teamwork skills necessary for success after college.

I put this philosophy into practice within a new graduate-level course I developed and instructed for the Fall 2015 semester at the University of Nebraska-Lincoln called Survey Informatics, where I taught data science within the context of survey-based data collection, management, and analysis to an interdisciplinary (computer science, social science, and statistics) group of students. Leveraging the different perspectives provided by students from different disciplines, I assigned collaborative writing assignments where students work together to summarize key topics covered in the course (e.g., Introduction to Big Data, Relational and NoSQL Databases, Data Analysis with Data Mining and Machine Learning Algorithms) and discuss the advantages and disadvantages of different techniques and methods within each topic from the perspectives of their individual experiences and discipline. This exposes students to different perspectives on the same topic, inspiring new insights and deeper understanding of the course material.

As someone with degrees in both engineering (BS) and science (MS, Ph.D.), I also believe strongly in learning through applying course concepts to real-world problems. In my Survey Informatics course, I assigned a semester-long group project in place of exams so that students could explore self-chosen topics more deeply and gain additional hands-on practice with methods and techniques discussed in class. For example, one group designed a project to build a relational database combining and linking several years of past surveys administered by the Political Science department both to create a long term archival of those surveys, as well as to facilitate analysis of the survey results. Another group designed a project to extract information and analyze large volumes of session logs (called paradata) describing user interactions with the survey webpages (e.g., scrolling, radio button selections, text field edits) that were collected during previously deployed web surveys from a corporate partner in order to better understand user behavior within the survey instrument, especially users utilizing smartphones.

I also believe strongly in the benefit of exercise-based group assignments, especially to reinforce advanced concepts. For example, in an upper level multiagent systems (MAS) course, I would
instruct using several “game days” where the students split into groups and act out different algorithms and protocols that determine how agents cooperatively solve problems in their MAS societies. For instance, students act out particular exploration algorithms to search for hidden items throughout a building to better understand the challenges associated with search and rescue behavior in agent-based robotics, or they act out different voting protocols to understand how agents reach consensus given different beliefs and opinions. My advisor has pioneered such activities in his own teaching to much success, as these “game days” are the students’ most anticipated and enjoyed activities and also actively teach students the associated content. Together, we have run these games days within an upper-level MAS class for many years, where I have served as both a graduate teaching assistant and a volunteer assistant. Similar exercises could also be designed for other upper-level courses I am interested in teaching, such as machine learning, pattern recognition, robotics, and artificial intelligence courses.

Finally, I am also passionate about teaching introductory, undergraduate courses (CS1, CS2, Discrete Math, Data Structures) because these courses form the broad base of student knowledge and offer the greatest opportunity to set students on the right path to achieve later success. At this level, I would employ collaborative assignments where students work together to discuss a given small problem to jointly develop a solution and determine how to apply that solution to the problem. For example, I might ask students to collaboratively articulate how to design algorithms or develop programs to transform a set of inputs into a desired set of outputs (e.g., sorting a list of numbers). Students would then work together to find the appropriate steps and set of methods to solve the given problem (e.g., compare each number to its neighbor and locally sort, then repeat until the list is globally sorted). This approach allows students to bounce ideas off one another as they design their solution to the assignment, benefiting all students as they are exposed to problem solving techniques outside of their own repertoire. More advanced students further benefit as they reinforce their knowledge by helping other students work through the thought process behind solving the assignment. Struggling students, on the other hand, benefit as they receive additional instruction and have a starting point from which to begin later assignments, leading to greater success. Also, each student is enabled to participate in all aspects of the assignment, preventing students from falling behind their peers.

However, I do not advocate supplanting lecture-based instruction with collaborative, participatory learning. Instead, I employ the above in combination with frequent lectures to impart and later reinforce knowledge. In my Survey Informatics course, I had students individually complete short reflective essays each week where they relate the topics discussed in lecture with their own experiences, discipline, and research activities. These essays not only (1) help students better connect with the course material, evaluating the strengths and weaknesses of different methods within their own practice, but also (2) provide me as an instructor with feedback about how well they are understanding the lecture, as well as what they enjoy or dislike, so that I know how to adapt my teaching throughout the semester. These reflective essays then provided a starting point for their aforementioned collaborative writing assignments.

By combining lecture-based instruction with collaborative, participatory learning, I believe that students learn not only the course content, but also how to (1) think critically when evaluating problems and expressing ideas, (2) develop new problem solving techniques based on observation and collaboration with others, (3) how to learn independently and within groups beyond lecture to develop good learning habits useful later in life, and (4) how to collaborate and work well in teams, which are necessary skills for success in today’s professional world.