Since my arrival at WMU I have had the opportunity to teach a wide variety of contexts. For many years I was both instructor and supervisor of BIOS 1700, an introductory biology course taken by future elementary school teachers in small (24 student) sections. The course is intended to reawaken the natural love of the living world all children have that is all too often lost when the natural world becomes the object of formal learning in K-12 settings. Instructors of this course go out of their way to role model best practices when it comes to engaging student interest, out of recognition that people tend to teach the way they were taught. I have also taught on-line graduate level courses taken by area high school science teachers seeking to broaden their skills, and specialized writing intensive courses taken by graduate science education students in the MISE doctoral program. The skills I developed in connection with these previous experiences are all coming to bear on my present teaching assignment. BIOS 1120 Principles of Biology is a non-majors course that is usually offered by means of a traditional large lecture (150-200 students). My version of this class is innovative both in terms of its format and also how I am using it to conduct research.

With regard to format, I am using a “flipped classroom” approach. Students are regularly asked to read a chapter, view an on-line lecture, complete an on-line homework and answer an on-line multiple choice quiz, all before they attend a class session devoted to that chapter. Instead of lectures, class sessions are used as large tutorial sessions. Students are invited to write down questions that arose when doing the outside class work on a pad of paper at the front of the room as they enter the classroom. Attendance and participation is monitored by means of three i-clicker questions that are introduced at the beginning, middle and end of class, for which students get participation points (which is a great way of encouraging attendance in a class that meets MWF at 8 am). The particular challenge one finds when teaching using a flipped classroom approach is that you can’t always count on students to come to class with questions. I address this challenge by using “pre-assessment” activities. These are activities done in small groups of 4-5 students in which they are challenged to think about the next topic and share what they already know about it. In this way, they go into the next chapter with ideas about what they already know and what they still need to learn. For instance, in one activity they list the characteristics of an adult robin and then think through what its characteristics were at earlier and earlier stages, culminating in a discussion of what it was before it was an egg. Occasionally these activities are also used to deepen their understanding of the chapter they have just read, e.g. compare the absorption, movement, and eventual exit of water in the bodies of animals and plants. I am also using the course to conduct research on whether and how stories drawn from the history of science can promote the learning of science. A great deal of research suggests that stories are a particularly powerful way that the human brain has evolved to store and retrieve information. Use of history can humanize the science and make it more relevant, and thus may have particular appeal to non-majors for whom traditional ways of teaching science can be alienating. In one version of the class I introduce units by means of overarching questions (e.g. How do plants move liquids through their bodies if they don’t have hearts?). In the experimental treatment, units are introduced by means of stories drawn from the history of science. The beauty of the flipped classroom is that the “pre-assessment activities” students habitually use to find out what they already know about a topic represent a great source of information that can be used for research purposes.