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Flipping a graduate level course on Modern Electrodynamics

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Based on the findings from decades of Physics Education research (PER), many physics instructors today use student-centered teaching methods to support active or inquiry based learning. One method that is getting increasingly popular is the flipped classroom, where students watch the "lecture" on video, at their own pace, and use the valuable class time to work on problems together.

For graduate students, however, classes are typically taught in a traditional lecture style, perhaps because it is assumed that they have the motivation and skills to learn from a lecture and do not need extra "support". Even if this is true, we suspect that the lecture-only model does not make the best use of class time and is not the most efficient method to support student learning. Therefore, one of us (SJD) decided to flip his graduate level Electrodynamics class (with readings and pre-class questions instead of videos), the other (DA) observed and collected feedback from students and the instructor. The findings were used to improve the ongoing course, a method often called "action research" or "reflective practice".

We will present how the course was first designed, including the goals and the findings from PER that shaped the decisions. Then, we will share selected feedback – some anticipated, much of it surprising - and how it was used to iteratively improve the course. We find the results to be valuable not only for this course, but for teaching grad students in general, and will conclude with some suggestions for good practices for this audience.

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