

Investigating the Gender Gap in Introductory Physics ^[1]

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Recently, there has been great interest in the physics community in what is referred to as a "gender gap," the performance difference between men and women in physics classes. Several studies have suggested that both men and women learn more in interactive and engaging (IE) educational environments, but these techniques may particularly benefit women [1,2]. Researchers at Harvard were able to show that a pre-instruction gender gap was eliminated when fully interactive engagement techniques were employed [3].

In our previous work [4,5] attempting to replicate the Harvard study, we found that engaging students in interactive educational environments did not always reduce the gender gap – IE techniques alone are not sufficient to reduce the gender gap. Our results suggest that a variety of factors are likely to contribute to men and women's differential performance. Not only which practices are used but how they are enacted appears to be critical. Furthermore, we hypothesize that content background (physics and math) of the students plays a significant role [6,7], and this will be the subject of my proposed investigations.

As a first step, we will gather background and demographic data on students in our introductory physics classes, and use this data as the basis for a multiple regression analysis to establish the links between e.g. gender, SAT scores, high school physics background or physics pretest scores, with course grades and learning gains on conceptual surveys. A physics graduate student in the PER group (Lauren Kost) is involved in this effort as part of her Ph.D. research. Our preliminary studies already indicate that the "gender gap" we measure may be due in part to a gap in measured background and preparation between men and women. Women come in with lower pretest scores on our physics diagnostic, and because of the significant correlation between pre- and post-test scores, women have lower post-test scores. Establishing this (or alternatively, finding that it does not adequately account for the post-test gaps) with a richer set of demographic and background data will be the goal of this first, data analysis component of our proposed work.

This will then lead to the second stage of this study, in which we hope to make systematic observations of classroom practice in our introductory lectures and recitations to characterize differences among faculty practices, and correlations with learning gains.

This work couples nicely with ongoing work in the PER group on faculty practice; such classroom observations are already underway as part of an investigation of the impact of clickers and Tutorials on faculty development.

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