# Role of Assessment Type on Gender Disparity in Undergraduate Physics Performance

**Robyn Donnelly[1], Cait MacPhee[1], Simon Bates[1,2], Judy Hardy[1]**
[1]University of Edinburgh, [2]University of British Columbia

## 1. Motivation

The gender gap in physics participation and performance is well documented. It has been discussed that coursework assignments are designed to be more collaborative, whilst exams are individual and have a greater time constraint, which may favour particular students or even genders.

Research by the University of Colorado analysed gender differences in students' coursework and examination grades to investigate potential gender bias in assessment[1]. Although there was no apparent gender discrepancy in overall course grade, in each of the seven semesters tested males consistently outperformed females on exams, whilst females scored consistently higher than males on coursework.

We have conducted a similar analysis of results from undergraduate physics courses between 2006-2012 at the University of Edinburgh to determine the gender performance profiles in both continually assessed coursework and end-of-course examinations.

## 2. Coursework and Exam Gender Performance

For each of the courses results are presented for weekly tutorial assignments. In the majority of cases the coursework mark was taken as the best 8 of 9 assignments. The questions used in coursework exercises remain the same each year in almost all cases. Exam questions are changed on a yearly basis. There were also small variations in teaching staff.

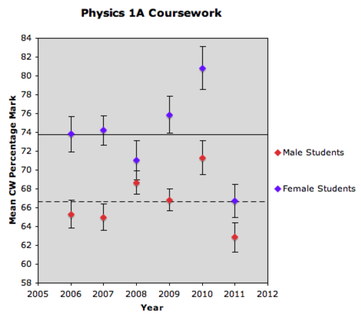
**Proportion of female students between 20-27%.**

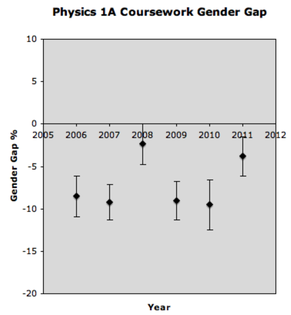
- ***Physics 1A***:First year calculus-based introductory course
  focusing on Newtonian mechanics
  200-300 students (~50% are non-majors)
  End-of-course exam became open book exam in 2011.
  Coursework contributes 30-33% of total course.

- ***Physics 2B***: Second year electromagnetism and waves course
  100-150 students
  Coursework contributes 15% of the total course.

## 3. Coursework Results

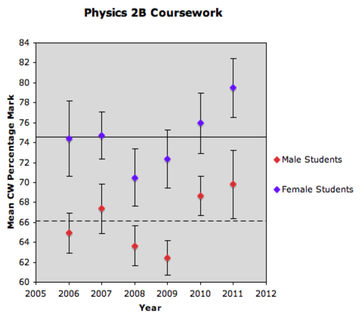
**Females consistently outperformed males in coursework.**

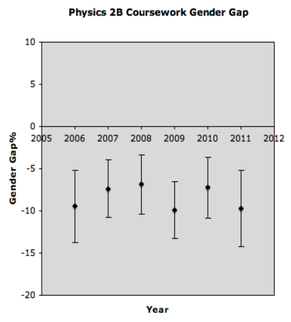



The figures highlight the average female (bold line) and male (dashed line) marks for coursework. For both courses the gender gap is consistently **negative** indicating female students are scoring higher than male students. This is a similar pattern to that seen by Colorado.

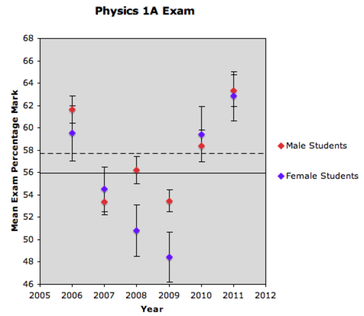
**Gender Gap = Average Male Score - Average Female Score**

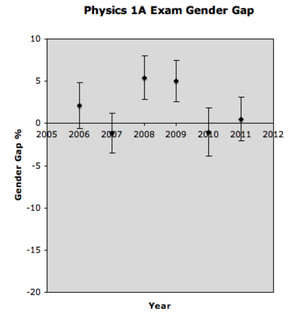


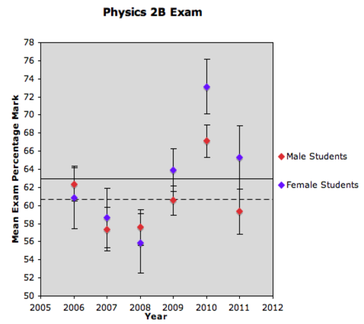

## 4. Examination Results

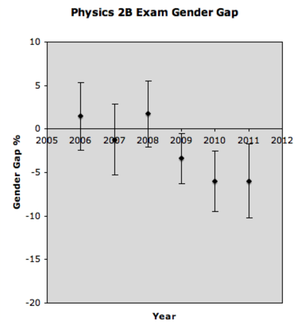
**Much greater variation in exam scores year to year - no distinct gender pattern**




There was a much greater spread of mean exam scores between year groups. Males outperform females in only some years with female students outperforming male students in others. Our results do not show as distinct a pattern as seen by Colorado.




## 5. Conclusions and Future Questions

From these findings there is some evidence to suggest a slight inclination of females towards continually assessed elements of the course in the first two years of the undergraduate programme, although results do not illustrate any trends regarding examination results. This presents several future areas to be investigated:

- **Why do females perform consistently better in continually assessed coursework than males?**
- **Why is the pattern for examination results less consistent?**
- **Are similar trends seen in other STEM subjects with difference gender profiles?**

sites.google.com/site/edpersite/

**References**
Kost, L.E., Pollock S.J., Finkelstein N.D., (2009) *Characterizing the gender gap in introductory physics*, Phys. Rev. ST Phys. Educ. Res., 5(1)