

Partnership Composition and Student Performance in an Introductory Computer Science Course



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Research Questions

- What kinds of partnerships form? Are they balanced?
- How do different partnerships perform? Do balanced partnerships perform better or worse than unbalanced ones? Does partnership work ethic affect performance?

Methods

- Examined partnerships and partnership performance from CS2 course (EECS 280), not individual performance
- Because partnerships could vary in duration, we measured project performance as the average project score for partnership
- Exam performance was measured as the average exam score of a partnership
- Partnership duration was measured as the number of projects (up to 4) that a partnership worked on together

Dataset

1434 records of students enrolled in CS2 (EECS 280)

Filtering out W's, I's, etc.

1343 records after filtering students who withdrew, audited, etc.

Grouping into partnerships

509 distinct partnerships, or 869 unique individuals who partnered

Results

Independent variables

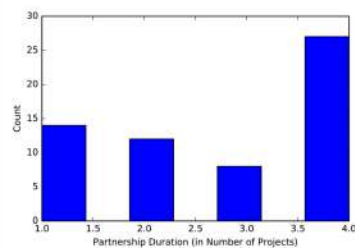
- Parity, measured as the difference in partnership GPA (z-score)
- Work Ethic, measured as the number of days between a partnership's first submission to the autograder and the project deadline (z-score)
- Gender Composition, measured as 2 women, 2 men, or mixed gender

Dependent variables

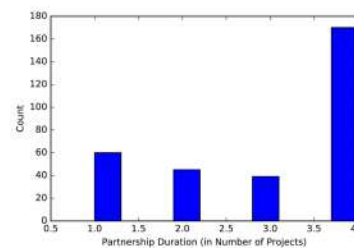
- Project score (partnership average)
- Exam score (partnership average)

Independent Variables:	Dependent Variables:							
	Average Exam Score				Average Project Score			
	Sum of Squares	df	F	PR(>F)	Sum of Squares	df	F	PR(>F)
Gender Composition	4.158	2	8.546	0.000	0.158	2	0.306	0.737
Parity	0.00	1	0.000	0.996	0.558	1	2.154	0.143
Work Ethic	2.205	1	9.063	0.003	3.106	1	11.985	0.001
Average GPA	58.710	1	241.322	0.000	29.422	1	113.532	0.000
Parity:Gender Composition	2.309	2	4.746	0.009	1.135	2	2.190	0.113
Gender Composition:Average GPA	1.517	2	3.119	0.045	0.234	2	0.451	0.637
Work Ethic:Gender Composition	0.281	2	0.578	0.561	0.187	2	0.362	0.697
Work Ethic:Parity	0.037	1	0.152	0.697	0.197	1	0.760	0.384
Work Ethic:Average GPA	0.041	1	0.167	0.683	0.108	1	0.415	0.520
Parity:Average GPA	0.151	1	0.619	0.432	0.593	1	2.289	0.131
Parity:Gender Composition:Average GPA	0.823	2	1.691	0.185	1.516	2	2.925	0.055
Parity:Gender Composition:Work Ethic	0.042	2	0.086	0.917	1.520	2	2.933	0.054
Work Ethic:Gender Composition:Average GPA	0.042	2	0.086	0.917	1.709	2	3.297	0.038
Parity:Work Ethic:Average GPA	0.281	1	1.154	0.283	0.287	1	1.108	0.293
Parity:Gender Composition:GPA:Work Ethic	0.301	2	0.618	0.540	0.208	2	0.401	0.670
Residual	115.561	475.0	-	-	123.097	475.0	-	-

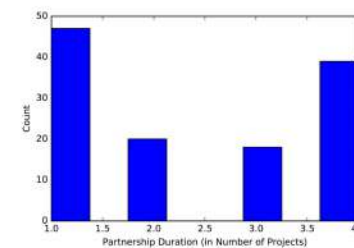
Partnership Duration and Gender Composition



Duration of Partnerships of Two Men



Duration of Partnerships of Two Women



Duration of Partnerships of Mixed Gender

Discussion

- Partnerships with higher work ethic tended to perform better on both projects and exams, even after controlling for other factors such as GPA and parity.
- Partnerships of differing gender composition tended to perform differently on exams, with significance. Also, we observed that same gender partnerships tended to last for 4 projects, while mixed gender partnerships tended to last for 1 project or for 4 projects.
- While partnerships with higher parity tended to perform better than those with lower parity, this is not significant after controlling for other factors like GPA and work ethic.

Limitations

- Students had the choice to partner on projects; furthermore, they had their choice of partners.
- Parity metric could be affected by class standing.
- Data set is compiled from multiple semesters, and there could be some variation in lecture presentation, exam questions, etc..

Conclusions

- Observed a relationship between work ethic and course performance. Specifically, partnerships that began working on projects earlier were associated with higher project AND exam scores.
- Observed a relationship between gender composition and partnership duration. Same gender partnerships tended to span the entire semester, while mixed gender partnerships tended to span either only one project or the entire semester.