

The impact of quantitative teaching on student performance

Joint Q-Step and British Academy Quantitative Skills Teaching and Learning Symposium

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Me

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- Affiliated with the Q-Step Centre
- Teaches 'Introduction to Political Science', 'How to Win Arguments with Numbers' and 'Quantitative Research Dissertation'

Research context

- What we know:
 - (Lack of) quantitative skills amongst British social scientists (MacInness 2009)
 - Need to embed quantitative methods in substantive courses (Adeney and Carey 2009; Adriaensen et al. 2014; Buckley et al. 2015)
 - Important how quantitative methods are taught (Wilder 2010; King and Sen 2013)

- What we do not know:
 - The implications of quantitative teaching on general study skills

Research question

- What is the impact of quantitative teaching on student performance?
- Specifically, is Q-Step making students perform better?
 - In general, not only in quantitative modules
 - Why?
 - (Good) quantitative teaching is not only about knowing how to collect and use quantitative data
 - Analytical and critical thinking - transferable skills

Kent Self-Study

- Longitudinal survey
- Initiated with Q-Step in 2015
- Annual responses from about 4,000 students across all years and schools at Kent
- Compatible with national evaluation
- Serves quantitative teaching and evaluation beyond Q-Step
- Links to admin data: performance and background data, non-response weights
- First step: Using the admin data
 - Data on student performance

Do you *agree or disagree* with the following statements?

	Agree	Disagree	Not sure
I found school maths easy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In my university work I would rather write an essay than use statistics	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
On the whole you can't trust statistics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident about learning statistics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good numeric skills will help me get a job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoyed maths at school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
One of the reasons I chose this degree is because I don't like maths	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Method and data

- Focus: Students within Q-Step Schools
 - Comparability and meaningful inferences (ATT)
- Challenge: *All* politics and sociology students are affected by Q-Step (everybody is treated)
- We study the effect of having *at least one optional* Q-Step module in addition to the mandatory ones
- Matching to create balance on a series of covariates (including gender, age, parents' education level and nationality)

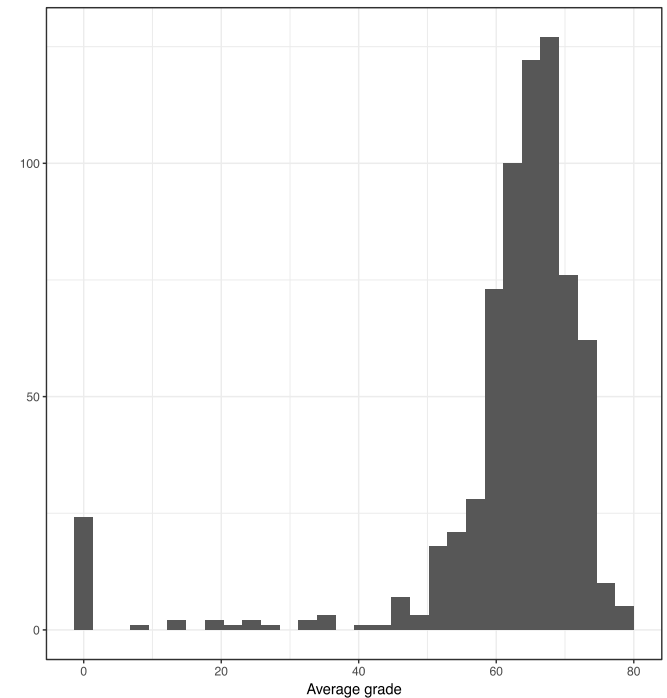
Method and data

<p>Programme:</p>	<p>BA Sociology with Quantitative Research BA Social Policy with Quantitative Research BA Criminology with Quantitative Research BA Politics and International Relations with Quantitative Research LLB Law with Quantitative Research</p>	<p>BBA Business Administration with Business Analytics</p>
<p>Year 1:</p>	<p><u>Quant GROUP Summer School</u></p>	
<p>Year 2:</p>	<p><u>How to Win Arguments with Numbers</u> AND <u>The Power and Limits of Causal Analysis</u></p>	<p><u>How to Win Arguments with Numbers</u> AND a choice of: <u>The Power and Limits of Causal Analysis</u> OR <u>Introduction to Big Data</u></p>
<p>Year 3:</p>	<p>Advanced Quantitative Dissertation (30 credits) OR Quantitative Placement Module (30 credits)</p>	

Method and data

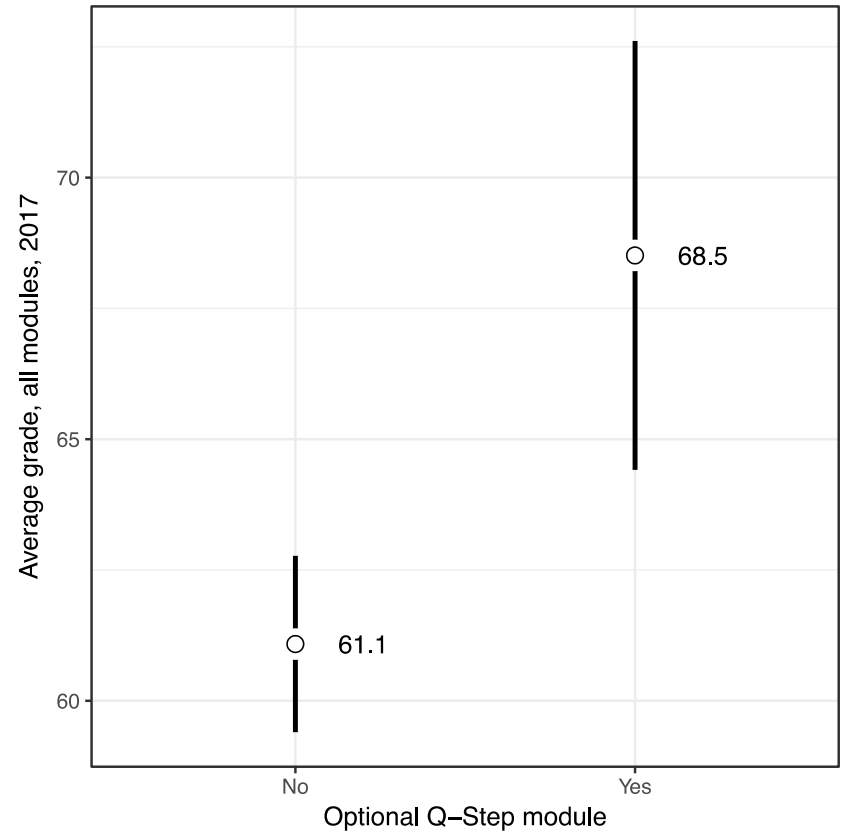
Table 1: Summary statistics

Statistic	N	Mean	St. Dev.	Min	Max
Average grade	692	61.795	14.358	0	78.66
Optional Q-Step module	700	0.079	0.269	0	1
Male	700	0.369	0.483	0	1
Age	700	20.427	1.956	18	30
Parent, HE	632	0.581	0.494	0	1
British nationality	700	0.733	0.443	0	1



Results

- Average effect: **7.4**
- Optional Q-Step module:
 - **68.5**
- No optional Q-Step Module:
 - **61.1**



Results

Table 2: Effect of optional Q-Step module on average grades in 2017, OLS regressions

	Model 1	Model 2	Model 3	Model 4
Optional Q-Step module	7.1*** (2.0)	7.0*** (2.1)	7.4*** (2.3)	8.3*** (2.3)
Constant	61.2*** (0.6)	63.9*** (1.0)	61.1*** (0.9)	63.5*** (1.5)
Observations	692	625	346	346
Individual controls	No	Yes	No	Yes
Matching	No	No	Yes	Yes

* p < 0.1, * p < 0.05, * p < 0.01.

Placebo tests

- Placebo test to ensure that students taking Q-Step modules were not doing better in their studies prior to the Q-Step modules
- No evidence that students taking up optional Q-Step modules do better in *general* modules (first year mandatory modules)
 - In other words: Limited evidence of a self-selection bias

Discussion

- Kent Self-Study is useful to evaluate the Q-Step initiative
- Longitudinal analysis, focus groups, comparisons amongst other Q-Step Centres
- Further empirical work needed to fully understand the impact of Q-Step
- Specific challenges/trade-offs
 - Counterfactuals
 - Causality
 - Data availability
 - Evaluation versus outreach

Bringing together our knowledge of teaching quantitative methods

- **WHAT** **Workshop for Q-step PhDs**
 - » Day 1: Q-step students present their research
 - » Day 2: Towards a curriculum for teaching quantitative methods
- **WHAT FOR** **To give Q-step PhD students the opportunity to exchange their learning and ideas about teaching quantitative methods and to link it to existing pedagogy on teaching HE students**
- **WHEN and WHERE** **13th and 14th of September 2018 – University of Kent**
- **WHAT YOU NEED TO DO NOW:**
 - Let all the PhD students in the participating Q-step centres know
 - Perhaps volunteer to be involved in one of the sessions

Draft programme

- 9.30am Welcome
- 9.45am **Plenary: The first meeting with statistics - best practice**
- 10.30am Workshops: **Dealing with non-attendance, Maths/quants anxiety/ uneven ability levels**
- 11.15am Break
- 11.30am Plenary: **Integration into quants and substantive module**
- 12.15pm Lunch
- 1pm Workshops: **large modules, assessment, advanced methods**
- 1.45pm Plenary: **Placement – preparing students, placement hosts and assessments**
- 2.30pm Final discussion: **Towards a curriculum for teaching quantitative methods**

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