Pedagogy sharing / outreach

- What could Nuffield centre usefully do?
- What form of information / resource sharing would you use?
- What new things have we learned so far about what works?
- What are unexpected pitfalls?
- What creates sustainability?

'Stats Anxiety' some pilot study results

John MacInnes

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Background

Stats 'anxiety' frames most pedagogical discussion of teaching statistics to social science undergraduates.

See courses as 'humanities'

Prefer essays

Choose degree to avoid numbers / maths / stats May have low /no maths school qual

May have had 'bad experience of maths at school'

In A-Level Sociology may have learned that

science =facts=positivism=statistics=ideology

Background

Maths \neq Stats

'... I have found that among the students now arriving on campus preparation in basic quantitative reasoning skills has declined at an alarming rate. In the 1970s many of our students had not taken calculus in high school; now the vast majority of those we admit have had at least one calculus course. But their ability to use numbers, read graphs, understand basic probability and to distinguish sense from nonsense has declined.'

(David Helfand, Columbia University)

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(<20% of UK soc sci students have studied calculus)

Background

Empirical Evidence for 'stats anxiety'

Weak effect, where it is detected at all Absence of good control variables Very few studies and small Ns Assumption that anxiety is unidimensional and negative

Two pilot studies

- Year 1 Sociology class at RG 'high tarrif' university
- Attitudes only no link to performance grades
- Timing imposed possible selection effect

- Year 1 *elective* Statistical Literacy class
- Surveys intergrated with weekely assessments and to course performance
- Students from all faculties.

Sociology students: good news

Knowing some statistics will help me get a better job	88
Data and statistics are vital nowadays so I want to know more about them	68
Statistics is an exciting intellectual challenge	53
I don't understand tables when they appear in articles or books I read	23
I do not understand why someone in my field needs statistics	10
I do not see why I have to learn statistics. I won't use it in my career	8

Sociology students: less good news

I'd rather write an essay than analyse data	78
The idea of learning statistics makes me feel anxious	38
I had a bad experience of maths at school	38
Probability of two heads if tossing two coins: correct answer	55

Do you see sociology as closer to Arts/Humanities or Science/maths?0mean 7.3 SD 1.8 (min 4 max 10)10Arts/HumanitiesScience/Maths

Trait anxiety (measured on scale 0 thru 18) NOT a good predictor of expectation of stats anxiety

'The idea of learning statistics	Trait anxiety score			
makes me feel anxious'	Mean	SD	Ν	
Agree	9.1	2.9	23	
Disagree	8.0	3.2	36	
Total	8.4	3.1	59	

Stat lit students

it is vital to know some statistics because so much in today's world depends on data	98	68
statistics will help me get an interesting job	89	88
on the whole I'm good at maths	75	
I find statistics quite exciting	68	53
rather write an essay than analyse data	25	78
The idea of learning stats makes me feel anxious	25	38
I had a bad experience of maths at school	25	38

Stat lit students

- Other pre-module measures
 - Exam Anxiety (9 items)
 - Min -9 Max +9 mean -0.5 SD 4.2
 - Trait Anxiety
 - Min 6 Max 24 mean 14.5 SD 3.7

Linear regression of state anxiety taking 3 stats assessments N = 93

	Unstanda	rdized						Collin	earity
	Coefficients		Std Coeff	t	р.	95.0%	6 CI for B	Stati	stics
		Std.							
	В	Error	Beta			Lo	Hi	Tol	VIF
(Constant)	-2.070	.314		-6.582	.000	-2.694	-1.445		
Performance	112	.091	095	-1.224	.224	294	.070	1.0	1.0
Trait anxiety	.217	.071	.250	3.046	.003	.075	.358	.9	1.1
Difficulty	.721	.107	.552	6.744	.000	.508	.933	.9	1.1

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Conclusions I

- Caution: small numbers and *large selection effect* from elective course in high tarrif uni.
- Many 'usual suspects' not significant:
 - Performance
 - Maths qualifications
 - Degree
 - Nationality
 - Individual attitude statements ('bad experience etc...)

Conclusions II

- Difficulty may be the big story
- This is consistent with (but doesn't 'prove') that 'stats anxiety' *may be a normal part of the learning process.*
- This could suggest that it is the *statistics* rather than the *anxiety* that is important
- This doesn't mean that students don't want or like to learn stats, but that *stats are novel*

Conclusions III

- Start with cognitive error: seeing is not believing
- Don't require faith in the ultimate utility of stats
- Introduce data or research design
- How do you measure things that don't exist (the future, counterfactuals) or are too big to measure (most populations)
- What kinds of evidence provide (explore) or 'test' theories /models/fits
- What is the key comparison
- If the data is interesting enough, the motivation to learn techniques of analysis follow

Two instruments

- Research on stats anxiety plagued by small Ns
- Use of standardised instruments can deal with this
 - Attitudes to stats and maths qu'aire
 - 'add on' for any QM assessment
 - How difficult
 - State anxiety measure
 - Trait anxiety measure

Brit. Jour. Soc., Sociological Review & Sociology

	1960-62	1984-86	2000-01*	2008-10	
Non-empirical	34	44	37.7	30	
Qualitative	8	19	40.6	43	
Quantitative	32	23	14.3	16	
Mixed empirics	26	15	7.4	11	
Total	100	101 ⁱⁱⁱ	100	100	
*data from Payne, Williams and Chamberlain (2004)					

HECSU 'Futuretrack' survey: use numerical data



100% 90% 80% 70% 60% 50% 5 Not at all 40% 4 Very little 30% 3 A little 2 Quite a lot 20% 1 Very much 10% 0% Awareness of strengths/weatnesses Enveneren dalfinerine ante ADIN' D WOLL IN a LEAST Desire to 80 on learning Abierrouse numerical data Abiny to apply browledge Witten communication Presentation shifts specialist troomedae Ineroesomishis Spoken communication Time nonagement Problem-Solving stills Independence selfrellance self confidence Research skills selfdiscipline

HECSU 'Futuretrack' survey: skills rank, soc sci

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