Report on PTAS Project Analysing the Effects of Embedded Study Skills on First Year UG Attainment

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Co-Investigators: Prof. Andrew Thompson (Politics and International Relations, School of Social and Political Science) and Alice Dias-Lopez (Research Assistant, Moray House of Education)

Summary
This project was inspired by a learning and teaching intervention made by Philip Cook during the academic year 2014-15. This intervention focused on delivering an innovative programme of embedded study skills for first-year undergraduate students on the course 'Fundamentals of Politics and International Relations' which Philip convened.

The primary goal of the research was to design a measurement for the effect of this intervention. We gathered appropriate data a designed a model for measuring the effect of this intervention. We found a statistically significant interaction between participation in the study skills programme and student grades in their essays from more socially disadvantaged backgrounds: e.g. female students from SSPS in Quintile 3 of the Scottish Index of Multiple Deprivation who participated in the study skills programme scored 7.76 points higher than female students from SSPS in Quintile 5 of the SIMD who participated in the study skills programme. There were indications of a positive effect on attainment in students from SMID 1, 2 and 4 also, but these indications were within margins of error.

We presented these findings at the Political Studies Association Annual Conference (panel on Teaching and Learning) in Brighton 2016, and at the PTAS Annual Forum, also in 2016. We now plan to work these findings up into a paper to for publication in a suitable academic journal. The grant money was spent on funding Alice Dias-Lopez as Research Assistant for the project

Introduction to the Project

When first appointed in 2013 Philip Cook was asked to convene new study skills course for first year students. In its initial form, it was a zero credit yet compulsory, and free standing from any substantive course. Students were taught in a large-group setting (around 80-150 student per group) for one-hour per week. Student engagement was low, and Philip redesigned the course in light of wider reading in the pedagogical literature regarding study skills and large group teaching. Philip reformed the course in the second year it ran (2014-15). This time, Philip pursued an embedded approach, and aligned the course with a compulsory credit bearing course 'Introduction to Politics and International Relations'. This meant that the skills were designed to support the assessment in IPIR (essay and exam), and the skills and exercises were conducted in the context of the reading materials on the course (e.g. student were asked perform practice exercises using articles from IPIR).

In 2014-15, the course was made voluntary for all students on IPIR. Given the constraints of one-hour sessions and large-group teaching, Philip used a blended learning approach, using the VLE extensively to post weekly audio 'help chats' providing extra guidance prior to

session, and then feedback afterwards. Philip made screen-casts going through examples of students' work; wrote exemplars/templates of exercises and made screen-casts around these; used GradeCentre in Learn for the submission of weekly exercises, and trained the two tutors on how to use the technology to provide feedback. The techniques around flipped and blended learning were informed in large part by Philip's learning on the MSc in Digital Education, and also a MOOC in Blended Learning Philip studied to support his development in this area.

Most important though were the exercises and the pedagogical principles on which they were based. The exercises themselves were based on the principle that study skills must be embedded in substantive teaching and learning materials/experiences.[1] Philip also aligned the activities with the assessment following the principles of constructive alignment.[2] This approach was very influenced by David Nicol and Debra Macfarlane-Dick, "Formative Assessment and Self-regulated Learning: A Model and Seven Principles of Good Feedback Practice."[3] Central to this approach were the following principles: that practice is crucial; students need to be able to learn from feedback by reattempting the exercise; that students need timely feedback; that students need lots of formative feedback; that formative feedback increases motivation; that feedback should be feed-forward oriented. The programme was also very influenced by the work of Carol Dweck and the 'mindset' research.[4] The work of John Hattie, John Biggs, and Nola Purdie helped underping the role of students' self-understanding in motivation and openness to learning: in particular whether students attribute improvements in attainment to their innate abilities or their application and effort.[5] Finally, this programme was informed by reflections on the nature of the essay as a first-year, first-semester assessment. The programme Philip developed focussed on disaggregating the cognitive elements of the essay writing process, and breaking them down into discrete tasks with simple 'rules' to follow (e.g. 'write an introductory paragraph in which the first sentence is your thesis statement/answer to the question').[6] Students were presented with activities around writing summaries, evaluative criticisms, introductions/conclusions etc. Each activity was prepared by an audio 'help chat' ahead of the session; explained further in class; students would practice in class and Philip would select some randomly for feedback to the group; then they were asked to complete a short version, submitted online, and they would receive short individual 'flash-feedback' (2-3 sentences) within 2-3 days and a pass or fail mark (this was iterated at least twice for each activity). Philip held several training sessions with the tutors on how to approach this type of feedback exercise. Philip then selected samples of the

[1] Ursula Wingate, 'Doing Away with "study Skills"', *Teaching in Higher Education* 11, no. 4 (2006): 457–69, doi:10.1080/13562510600874268.
[2] John B. Biggs, *Teaching for Quality Learning at University: What the Student Does* (Maidenhead: McGraw-Hill Education (UK), 2011).
[3] David Nicol and Debra Macfarlane-Dick, 'Formative Assessment and Self-regulated Learning: A Model and Seven Principles of Good Feedback Practice', *Studies in Higher Education* 31, no. 2 (2006): 199–218, doi:10.1080/03075070600572090.
[4] Carol S. Dweck, *Self-Theories: Their Role in Motivation, Personality, and Development* (Psychology Press, 2000).
[5] John Hattie, John Biggs, and Nola Purdie, 'Effects of Learning Skills Interventions on Student Learning: A Meta-Analysis', *Review of Educational Research* 66, no. 2 (1996): 99–136, doi:10.2307/1170605.
[6] Susan Toohey, *Designing Courses for Higher Education* (Buckingham: Society for Research into Higher Education & Open University Press, 1999).

tutor feedback, and provided either audio or video feedback, and discussed further in the class.

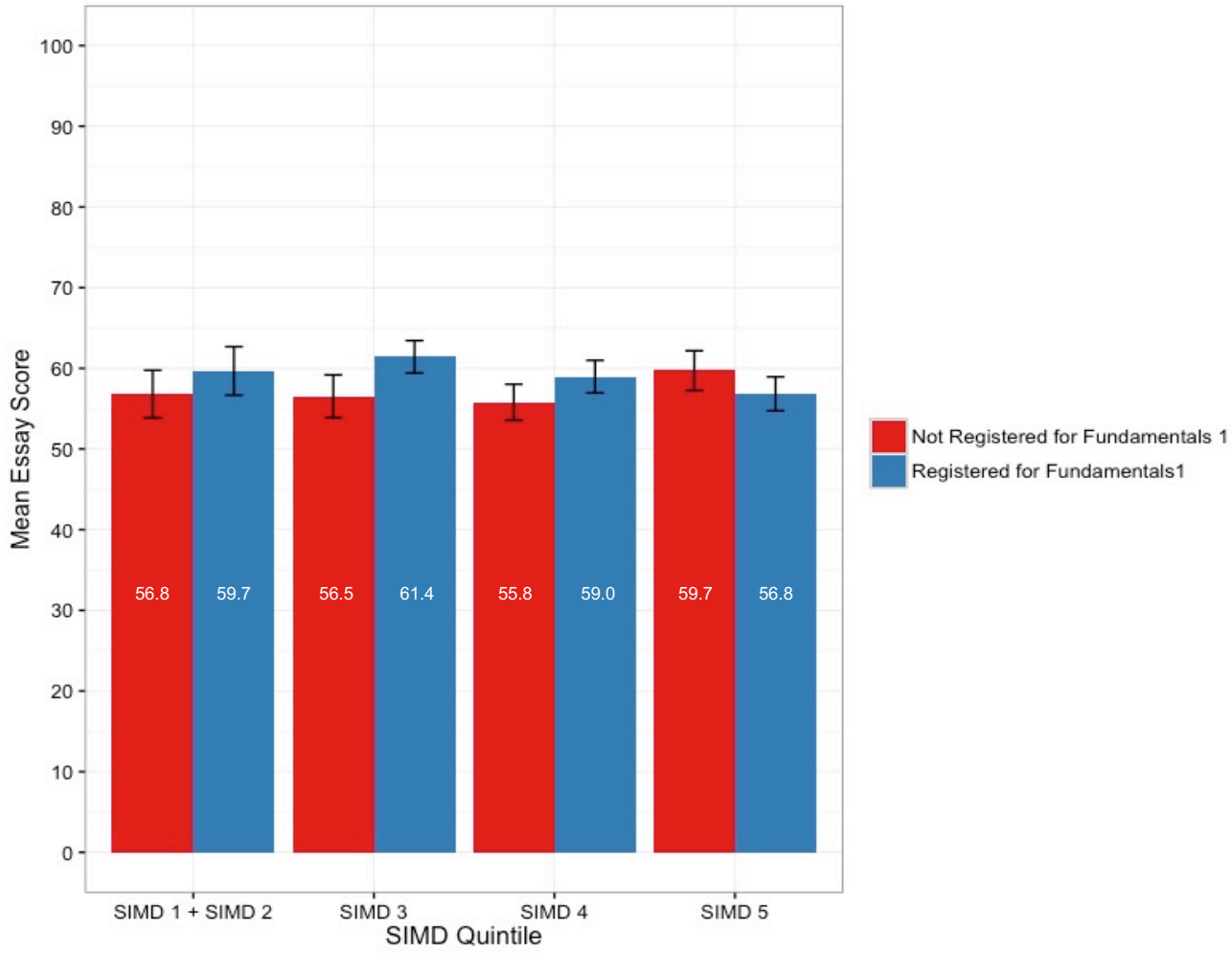
The response was overwhelming: we had around 100 students voluntarily completing these activities each week. Philip took regular evaluations, and also did some basic learning analytics on the viewing/listening to the online resources: students were using these resources in vast quantities (e.g. a single audio recording might have over 1000 'listens' from around 200 students, some students would listen more than 10-15 times). While discussing this with Prof. Andrew Thompson informally at an away day, Andy suggested a proper empirical analysis of the effect of this programme on attainment. We subsequently submitted and were awarded a small PTAS Grant.

The Research Project

Subsequent to award of the grant, we appointed a research assistant to help with gathering and analysing the data (Alice Dias-Lopez, a PhD student in the School of Education). We gained Level Two ethics approval for the data gathering. We liaised with a range of colleagues in different parts of the university to acquire the relevant data, including colleagues from the School Information Officer, School Undergraduate Administration, the University Student Records team, and the University Admissions and Widening Access team. Happily, colleagues from the University Central Administration have been keen to participate as they are working on develop better and more coherent systems for gathering student data in part to help with things like proper empirical pedagogical research into teaching interventions.

Our Research Findings

The data we gathered included student entry grades into the University, data on their gender, age, country of domicile, programmes of study, their socio-economic background, attainment on the course and attainment on cognate subsequent courses (to see if there was a 'carry-over' effect of the intervention on their performance). The main goal of the analysis was to ascertain if the study skills programme had an effect on students' attainment (focusing on their performance in the assessed essay). We worked together to understand the data we obtained, and develop appropriate statistical models to carry out the analysis. We found we had to restrict our analysis to Scottish students and the data on students from other parts of the UK and the rest of the world was so incomparable (e.g. different measurements of socio-economic background, no common metric for entrance grades etc.). Thus we concentrated on the Scottish Index of Multiple Deprivation (SIMD) measurement for socio-economic background. We developed multiple regression models that took participation in the Fundamentals 1 study skills programme as a variable. We found that Fundamentals 1 did have a statistically significant effect on student attainment, concentrated in those students from a more socio-economically disadvantaged background (SIMD quintile 3). Though there were indications that the programme had a positive effect on students from other socio-economic groups, the data did not allow us to establish this to a statistically significant extent. The graph and table below provide a representation of this findings.



Graph 1: Representation of average marks per quintile, for those who took Fundamentals 1 and those who did not.

	Estimates	S.E.		
(Intercept)		59.73	***	(2.45)
Fundamentals 1		-2.89		(2.79)
Male		-1.58		(1.60)
SIMD Quintile (ref.: SIMD Quintile 5)				
SIMD Quintile 1 + SIMD Quintile 2	-2.94	(3.20)		
SIMD Quintile 3	-3.19	(2.61)		
SIMD Quintile 4	-3.93	(2.43)		
*Interactions (ref.: Fundamentals 1 * SIMD Quintile 5)*				
Fundamentals 1 * SIMD Quintile 1 + SIMD Quintile 2	5.77	(4.69)		
Fundamentals 1 * SIMD Quintile 3	**7.76**	* (3.80)		
Fundamentals 1 * SIMD Quintile 4	6.06	(3.64)		
Number of cases	93			
Adjusted R^2	**0.06**			

Table 1. Estimates and Standard Errors for the multiple regression models predicting essay marks for IPIR by whether students were registered for Fundamentals 1 for students enrolled in IPIR who were domiciled in Scotland*.

The essence of these findings was that female students in Quintile 3 score 7.76 points higher than female students in the SSPS in Quintile 5, who took Fundamentals 1.

We were also keen to measure engagement and motivation of students who engaged with the programme. We did not take detailed attendance records in the previous year, but we noted that attendance was very low (it was compulsory but non-credit bearing, and so students considered it optional as it had no effect on their over-all grades). Attendance in 2013-14 fell to around 10-20% towards the end of the year. In 2014-15 (the year studied in the PTAS project) attendance and engagement was much higher (see table 2 below). Indeed, we even had two students who were not taking IPIR joining the Fundamentals 1 programme as they felt it would help them in their academic development.

		Did Fundamentals	Submitted more than 3 exercises	Did Not Do Fundamentals
IPIR Students	Compulsory	113	106	2
	Voluntary	39	32	258
IPIR Students who were domiciled in Scotland	Compulsory	29	27	0
	Voluntary	11	8	53

Table 2: Attendance and Engagement in IPIR/Fundamentals 1 2014-15

These findings were very encouraging. It was surprising to find a socio-economic dimension to the effects of the teaching intervention. We presented our findings at a national political science conference (the 2016 Political Studies Association conference in Brighton), and received positive feedback from those involved in the panel. We also presented it at the Annual PTAS Forum which is a University-wide event celebrating and disseminating the findings of PTAS projects. We were pleased that there was strong interest in our project. We are now planning to write up the findings as a research paper, and pursue publication.

Full details of the statistical analysis can be found in Appendix A.

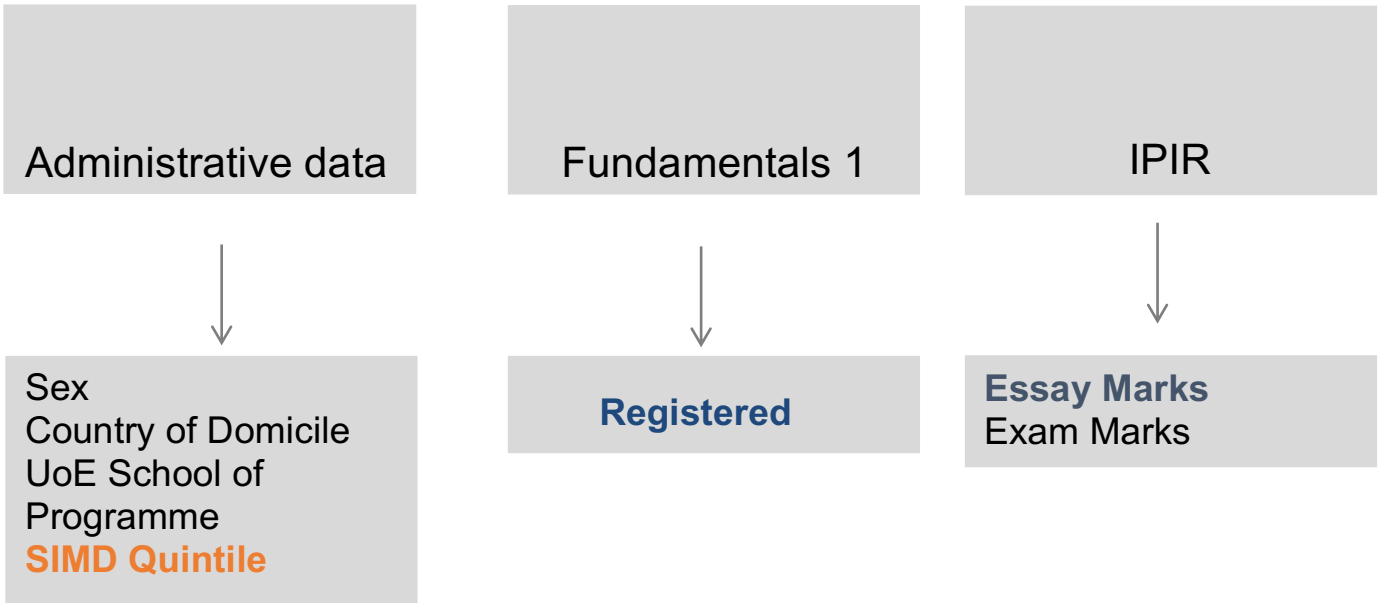
Reflections and Wider Implications

The substantive findings are initially encouraging but also raise complex issues that require further investigation. The findings suggest that there may be differential effects of study skills interventions according to socio-economic background. The effect of socio-economic background of our students on their learning is largely excluded from our general pedagogical training. But our research suggests it may have a significant effect on the receptiveness to academic support. It seems to us that much further work is required here, and there is a prospect for a larger research project that tries to understand the effect of socio-economic background on students' experience of academic support.

We thank the PTAS scheme for funding this work, and will keep you updated as our research develops, and in particular if we are successful in publishing the paper based on this work.

APPENDIX A

1) DATA



PROBLEMS WITH THE DATASET:
Lack of control variables (e.g.: prior qualification, socioeconomic variables);
Impossibility of randomisation.

2) MODELS

First Multiple Regression:

$$y_i = \beta_0 + \beta_1\, Fundamentals\ 1_i + \beta_2\, female_i + \beta_3\, School\ of\ Programme_i + e_i$$

Hypothesis$_1$: there are differences in the essay marks on the IPIR course between students who registered for Fundamentals 1 and students who did not register for Fundamentals 1.

Second Multiple Regression:

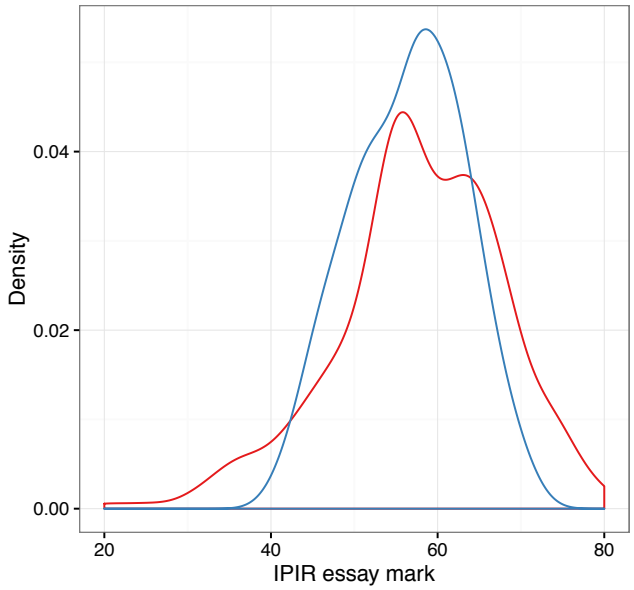
$$y_i = \beta_0 + \beta_1\, Fundamentals\ 1_i + \beta_2\, female_i + \beta_3\, School\ of\ Programme_i + \beta_4\, SIMD_i + \beta_5\, SIMD * Fundamentals\ 1_i + e_i$$

Hypothesis$_1$: there are differences in the essay marks in the IPIR course between students who registered for Fundamentals 1 and students who did not register for Fundamentals 1, ***after considering the Scottish Index of Multiple Deprivation***.

3) FINDINGS: ESSAY MARKS DISTRIBUTION

Findings: Essay Marks Distribution

Graph 1. Distribution of Essay Marks by whether students were domiciled in Scotland.



Mean Essay Mark
Domiciled in Scotland: 56.43
Not domiciled in Scotland: 57.74
T-test: 1.47, p = 0.14

14

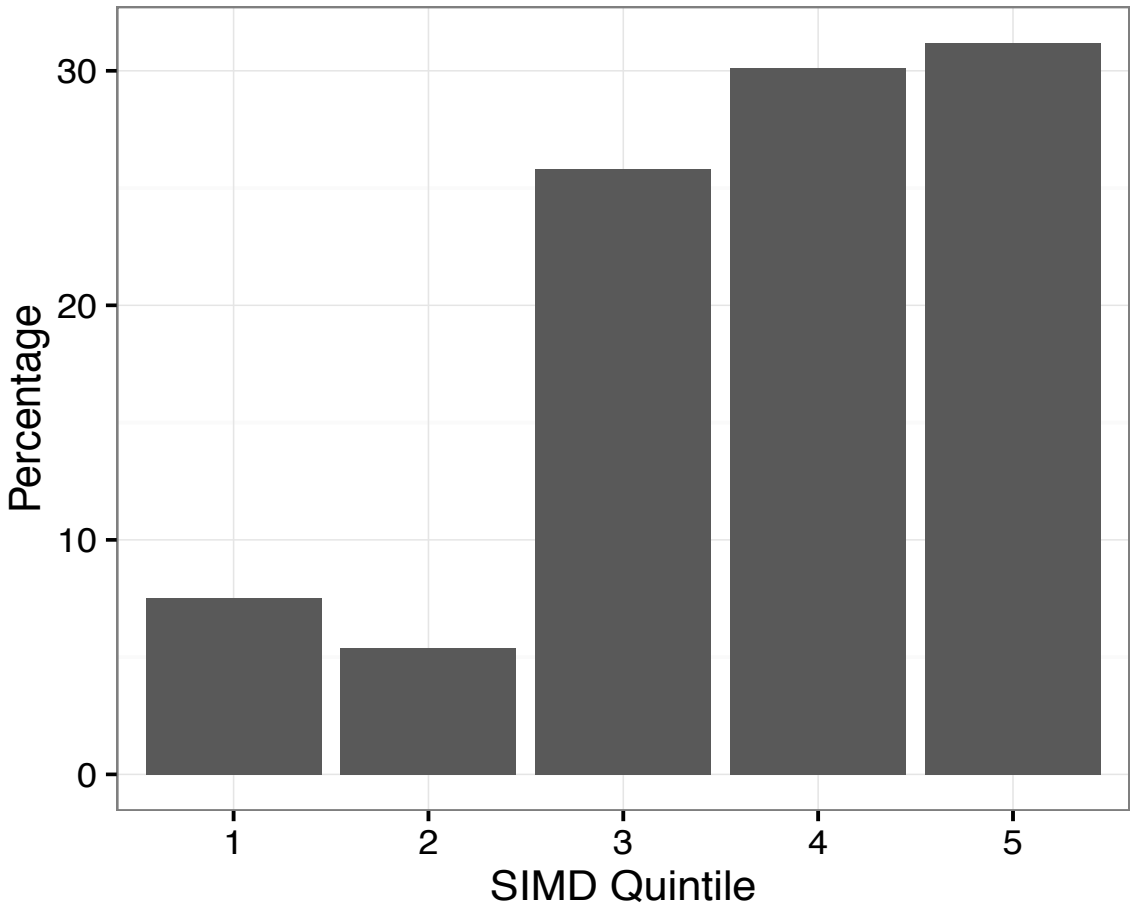
4) FINDINGS: DESCRIPTIVE STATISTICS

Table 1. Descriptive for gender and school of programme for IPIR students and for IPIR students who were domiciled in Scotland by whether they were registered in Fundamentals 1 (Percentage).

	IPIR students (N=412)		**IPIR students domiciled in Scotland (N=93)**	
	Fundamentals 1			
	Not Registered	Registered	Not Registered	Registered
Gender				
Female	59.9	40.1	54.2	45.8
Male	68.1	31.9	61.8	38.2
Programme of School				
Business School	100.0	0.0		
Exchange Programme	100.0	0.0		
School of Divinity	100.0	0.0		
School of Physics and Astronomy	100.0	0.0		
School of Economics	90.0	10.0	88.9	11.1
School of Geosciences	100.0	0.0	100.0	0.0
School of History, Classics and Archaeology	75.0	25.0	66.7	33.3
School of Law	100.0	0.0	100.0	0.0
School of Literatures, Languages and Cultures	79.4	20.6	57.1	42.9
School of Philosophy, Psychology and Language Sciences	88.2	11.8	100.0	0.0
School of Social and Political Science	30.2	69.8	26.2	73.8

5) FINDINGS: DESCRIPTIVE STATISTICS

Graph 2. Distribution for IPIR students who were domiciled in Scotland by SIMD Quintile.



6) FINDINGS: FIRST MULTIPLE REGRESSION

Hypothesis$_1$: there are differences in the essay marks on the IPIR course between students who registered for Fundamentals 1 and students who did not register for Fundamentals 1.

Table 2. Estimates and Standard Errors for the multiple regression models predicting essay marks for IPIR by whether students were registered for Fundamentals 1 for students enrolled in IPIR.

	Estimates		**S.E.**
(Intercept)	57.21	***	(1.22)
Fundamentals 1	1.36		(1.18)
Male	-1.67		(0.96)
School of Programme (ref.: School of Social and Political Science)			
School of Geosciences	2.08		(3.27)
School of Law	-2.35		(2.25)
School of Philosophy, Psychology and Language Sciences	1.36		(1.63)
School of Economics	-0.42		(1.65)
School of History, Classics and Archaeology	-0.23		(1.52)
School of Literatures, Languages and Cultures	1.62		(1.83)
Business School	-0.88		(5.47)
School of Divinity	-1.22		(9.33)
Exchange Programme	6.81	*	(2.80)
School of Physics and Astronomy	12.46		(9.33)
Number of cases	412		
Adjusted R^2	0.013		

Signif. Codes:'***' 0.001 '**' 0.01 '*' 0.05

Table 2. Estimates and Standard Errors for the multiple regression models predicting essay marks for IPIR by whether students were registered for Fundamentals 1 for students enrolled in IPIR.

Intercept: Average Score for a female student in the School of Social and Political Science who was not registered for Fundamentals 1yp

Average Score for a female student in the School of Social and Political Science who was registered for Fundamentals 1 = **58.57**

7) FINDINGS: SECOND MULTIPLE REGRESSION

Hypothesis$_1$: there are differences in the essay marks in the IPIR course between students who registered for Fundamentals 1 and students who did not register for Fundamentals 1, after considering the Scottish Index of Multiple Deprivation.

Table 3. Estimates and Standard Errors for the multiple regression models predicting essay marks for IPIR by whether students were registered for Fundamentals 1 for students enrolled in IPIR who were domiciled in Scotland*.

	Estimates		**S.E.**
(Intercept)	59.73	***	(2.45)
Fundamentals 1	-2.89		(2.79)
Male	-1.58		(1.60)
SIMD Quintile (ref.: SIMD Quintile 5)			
SIMD Quintile 1 + SIMD Quintile 2	-2.94		(3.20)
SIMD Quintile 3	-3.19		(2.61)
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*Interactions (ref.: Fundamentals 1 * SIMD Quintile 5)*			
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Fundamentals 1 * SIMD Quintile 4	6.06		(3.64)
Number of cases	93		
Adjusted R^2	0.06		

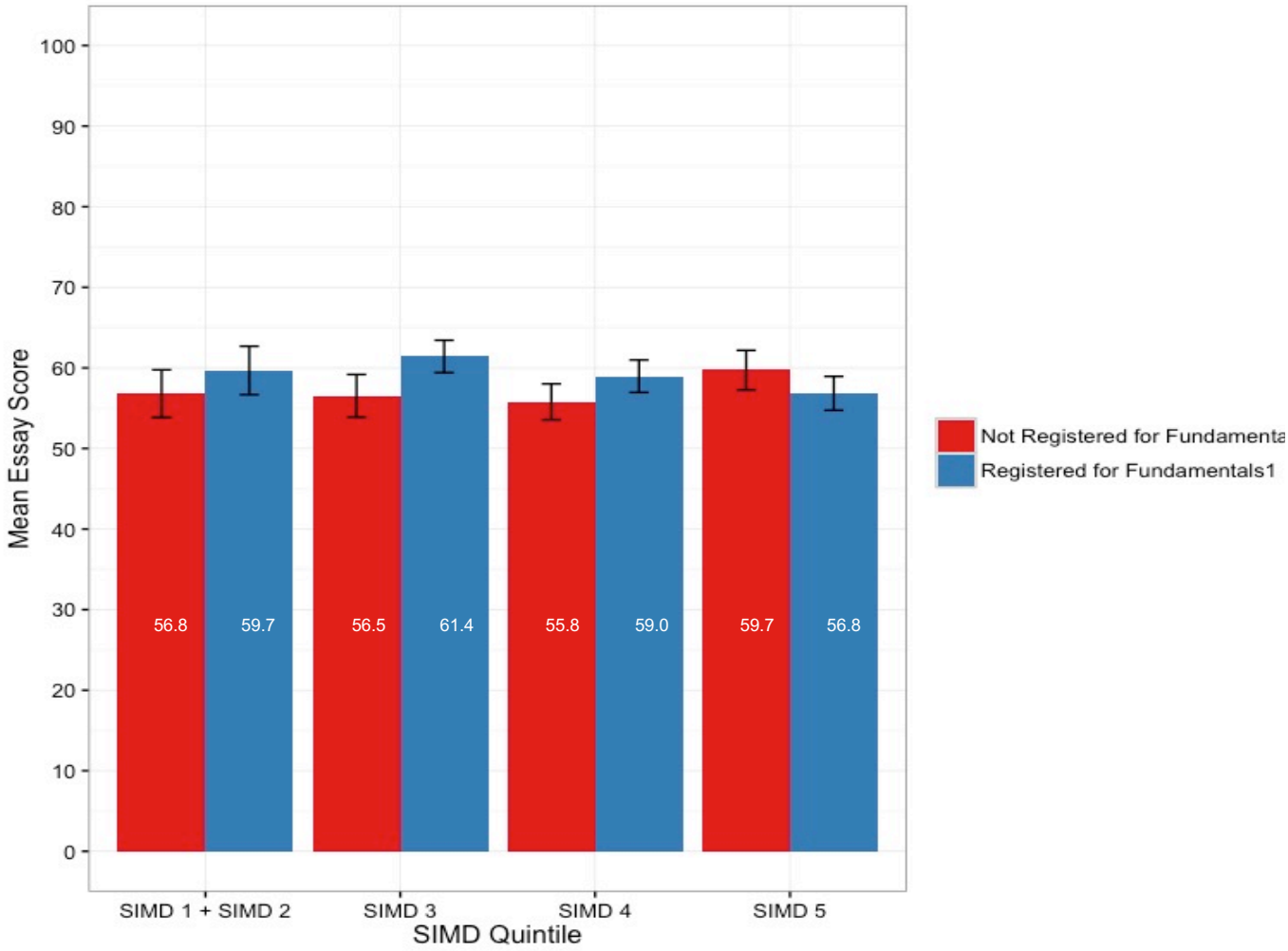
Signif. Codes:'***' 0.001 '**' 0.01 '*' 0.05

* The Second model is also controlled by School of Programme with School of Social and Political Science as the reference group

Intercept: Average Score for a female student in the School of Social and Political Science who is SIMD 5 (least deprived) and who was not registered for Fundamentals 1.

Average Score for a female student in the School of Social and Political Science who is SIMD 5 (least deprived) and who was registered for Fundamentals 1. = 56.84

Graph 3. Mean essay mark for female in the SPSS by SIMD Quintile and by whether they register for Fundamentals 1.



- Interaction Coefficient is significant for students in SIMD Quintile 3.
- E.g.: female students in the SSPS in Quintile 3 score 7.76 points higher than female students in the SSPS in Quintile 5.