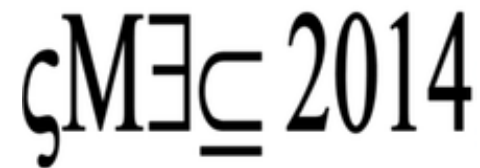




Project Maths and PISA: Comparing the PISA 2012 performance of students in Initial and Non-initial schools



Brían Merriman, Gerry Shiel,
Rachel Perkins, & Jude Cosgrove

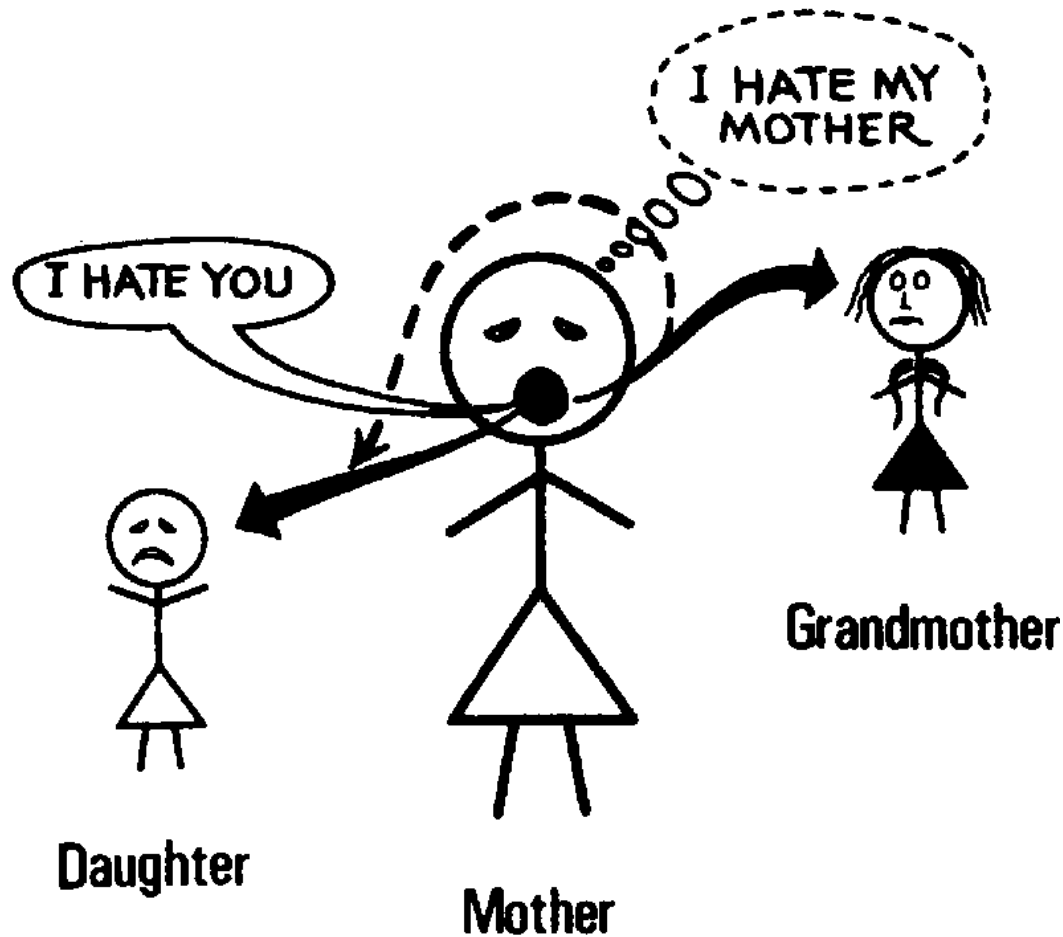


Educational Research Centre

Project Maths and PISA 2012

1. Background
 - i. Project Maths
 - ii. PISA
 - iii. The present study
2. Test-Curriculum Rating Project
3. Differences in PISA 2012 achievement
4. Differences in PISA 2012 attitudes and behaviour
5. Model of PISA 2012 mathematics performance

Not Projection Maths



Project Maths

- New post-primary mathematics curriculum
 - Implementation began in 2008 in 24 pilot schools (later 23)
 - National implementation from 2010
- Culmination of NCCA research and consultation, analysis of international best practice in pedagogy, review of examination performance (see Conway & Sloane, 2005; NCCA, 2005, 2006)
- 5 syllabus strands
 1. Statistics and probability
 2. Geometry and trigonometry
 3. Number
 4. Algebra
 5. Functions
- Evaluation of achievement, learning, and motivation (Jeffes et al. 2012, 2013)

PISA

- Programme for International Student Assessment
 - OECD
 - PISA 2012 in 65 countries/economies
- Print mathematics
 - Change & Relationships
 - Space & Shape
 - Quantity
 - Uncertainty & Data
 - Formulating
 - Employing
 - Interpreting
- Ireland above OECD average on print mathematics, but below average on Space & Shape (Perkins et al., 2013)

The present study

- All Initial Project Maths schools included in the sample for PISA 2012
 - Weighted sample
- Opportunity to compare Initial and Non-initial schools
 - Project Maths as intervention
 - PISA 2012 as evaluation tool
- Comparison of pre-2010 and Project Maths curricula with respect to PISA items
- Initial and Non-initial schools do not differ significantly on student or school characteristics
 - Except gender: Initial schools 55% female; Non-initial 48.9%

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Test-Curriculum Rating Project

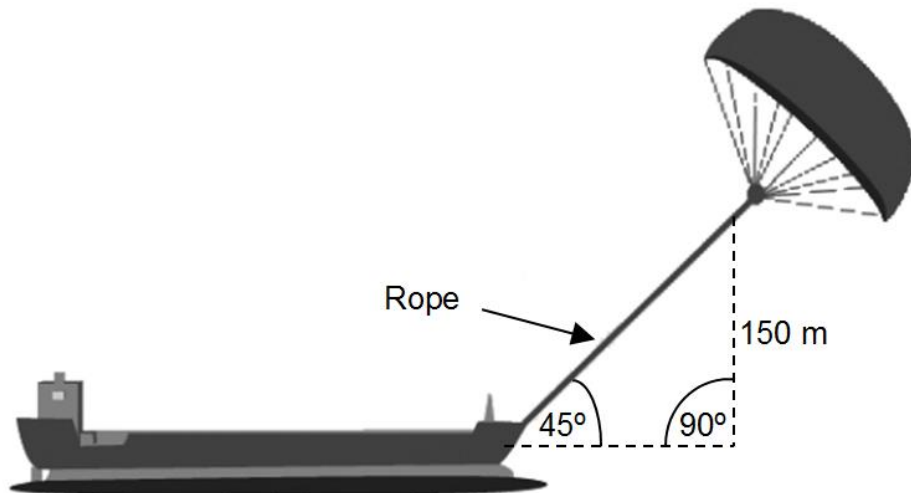
- Aims
 - Assess the coverage of PISA items on pre-2010 and Project Maths curricula
 - Rate the expected familiarity with PISA items of students studying each curriculum and taking each exam at Higher, Ordinary, and Foundation levels
 - Concept
 - Context
 - Process

Sample item

Sailing Ships – Question 2

Approximately what is the length of the rope for the kite sail, in order to pull the ship at an angle of 45° and be at a vertical height of 150 m, as shown in the diagram opposite?

- A → 173 m
- B → 212 m
- C → 285 m
- D → 300 m



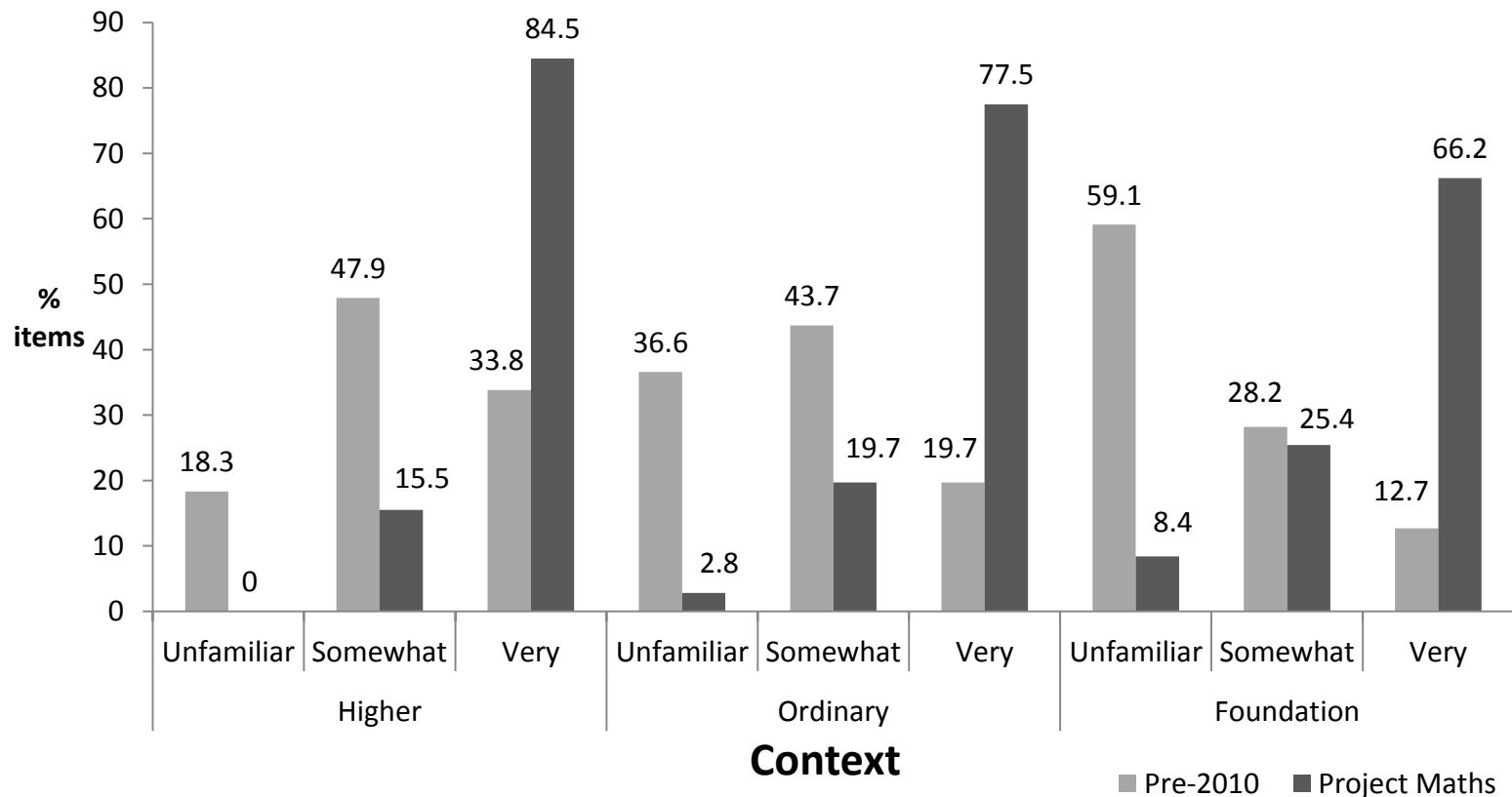
Note: Drawing not to scale
© by skysails

Coverage of PISA items by Irish curricula

Pre-2010 Content Area	<i>n</i>	Project Maths Syllabus Strand	<i>n</i>
Statistics	20	Statistics and probability	20
Geometry	6	Geometry and trigonometry	6
Trigonometry	1		
Number systems	15	Number	27
Applied arithmetic and measure	12		
Sets	1	Algebra	16
Algebra	8		
Functions and graphs	2	Functions	0
Not covered	6	Not covered	2
Total	71	Total	71

Test-Curriculum Rating Project

- Project Maths students were expected to be *Very familiar* with more items at all levels



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Print mathematics

The full report on Project Maths and PISA 2012, including details of print mathematics results, will be published in September 2014. If you would like to receive a copy, please email brian.merriman@erc.ie

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Attitudes and behaviours

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Model of PISA 2012 print mathematics

- Multi-level regression using school-level and student-level variables
- Limited to variables on which Initial and Non-initial schools differ, and certain policy-relevant school characteristics
- Model explains 34% of variance in scores, 82% between schools and 23% within
- Project Maths status is a significant predictor of PISA 2012 print mathematics performance

Final Model of PISA 2012

Selected variables

Variable	Parameter Estimate	SE	Test statistic	df	p
Intercept	502.25	3.27	$t = 153.69$	177	< .001
PM status	10.31	3.77	$t = 2.74$	177	.007
School mean ESCS	22.72	1.82	$t = 12.48$	177	< .001
Student ESCS	17.58	1.29	$t = 13.64$	321	< .001
Gender	-13.41	2.50	$t = -5.38$	609	< .001
Anxiety	-9.97	2.13	$\Delta X^2 = 34.28$	2	< .001
Self-concept	17.54	2.10	$\Delta X^2 = 87.57$	2	< .001
Responsibility for failure	-5.38	1.65	$\Delta X^2 = 52.89$	2	< .001
Intrinsic motivation	9.08	1.71	$\Delta X^2 = 45.95$	1	< .001

Conclusions

- Project Maths has a small but significant impact on PISA mathematics achievement, with certain other conditions held constant
- On Space & Shape, performance of female students at Initial schools significantly better than those at Non-initial
- Students studying Project Maths should be more familiar with the concepts, contexts, and processes of PISA items

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Thank you



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