Nature or Nurture? Predictors for Student Success

Don Shearman and Leanne Rylands

Mathematics Education Support Hub
Western Sydney University
Australia
d.shearman@westernsydney.edu.au

FYiMaths National Workshop

28th - 29th June, 2018

Mathematics for Engineers

- Two entry points for mathematics for engineers
    - Mathematics for Engineers Preliminary
    - Mathematics for Engineers 1

- All students initially enrolled in Preliminary unit

- Must achieve 70% in Placement test to move directly to Maths 1

- Placement test comprises 50 MC questions covering assumed knowledge

Available Data

- Placement test mark - integer $11 - 42$

- Number of tutorials attended - integer $0 - 11$

- LMS accesses - integer $7 - 189$

- LMS minutes - number $13.45 - 13671.78$

- LMS interactions - integer $25 - 4968$

- LMS quiz submissions - integer $0 - 350$

- Support workshops attended - integer $0 - 6$

- Final mark - integer $4 - 91$

Simple Model: Final Mark predicted from Placement Test and Workshops

- Placement Test mark and Workshops Attended are both significant predictors of Final Mark

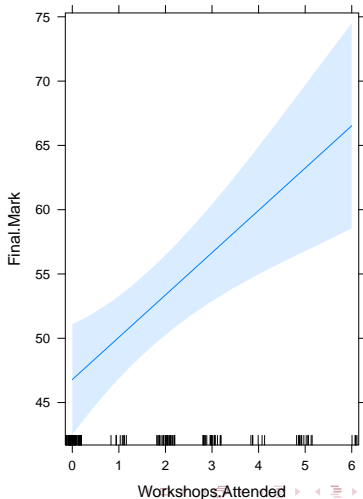- Interaction term between predictors is not significant suggesting that effects are additive

  Final Mark $\approx 1.9 \times$ Placement Mark $+ 3.3 \times$ Workshops

Simple Model: Final Mark predicted from Placement Test and Workshops

Placement.Mark effect plot
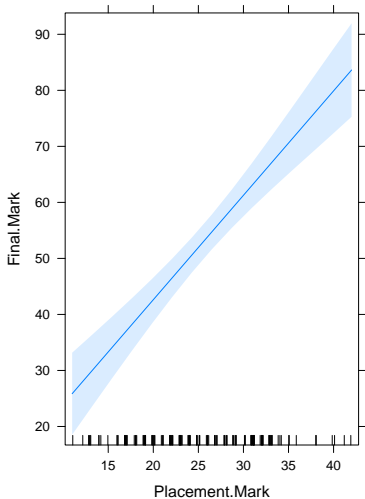
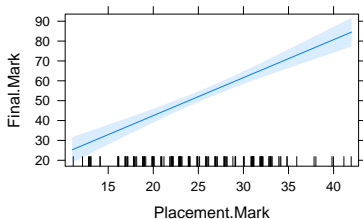**Workshops.Attended effect plot**

Completing the Picture

- LMS measures are highly correlated

- Use scaled Principal Component Analysis to generate summary variable

- Once Tutorial Attendance and LMS activity taken into account, Workshops ceases to be significant predictor or Final Mark
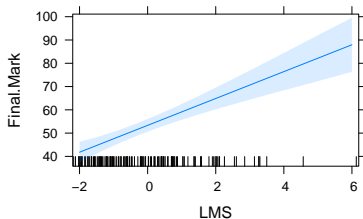
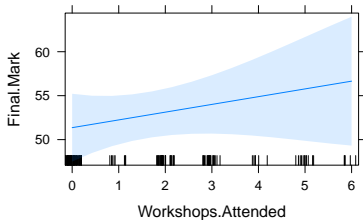$$FM \approx 1.9PM + 5.8LMS + 1.8T + 0.9W - 11.4$$
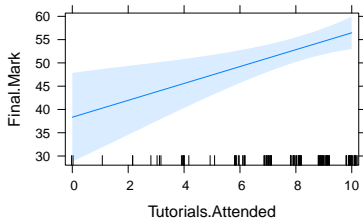
Placement.Mark effect plot

LMS effect plot

Workshops.Attended effect plot

Tutorials.Attended effect plot

So workshops don't matter?

- Significant difference in mean marks between those attending 3 or less workshops and those attending 4 or more.

- For low support students

$$FM \approx 2.0PM + 7.5LMS + 1.4T - 9.6$$

- For high support

$$FM \approx 1.2PM + 1.2LMS + 3.7T - 2.3$$

Further Information

Leanne Jill Rylands & Don Shearman (2018): Mathematics
learning support and engagement in first year engineering,
International Journal of Mathematical Education in Science and
Technology, DOI: 10.1080/002739X.2018.1447699
https://doi.org/10.1080/0020739X.2018.1447699