


A Vertical Mathematics Curriculum for Gifted Primary Students

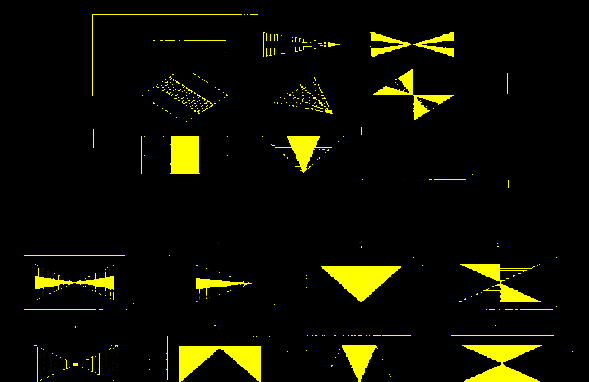
Maree Ryan
Faculty of Educational Psychology
The University of Melbourne



1. Introduction



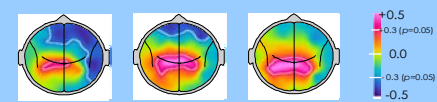

2. Study Method and Design

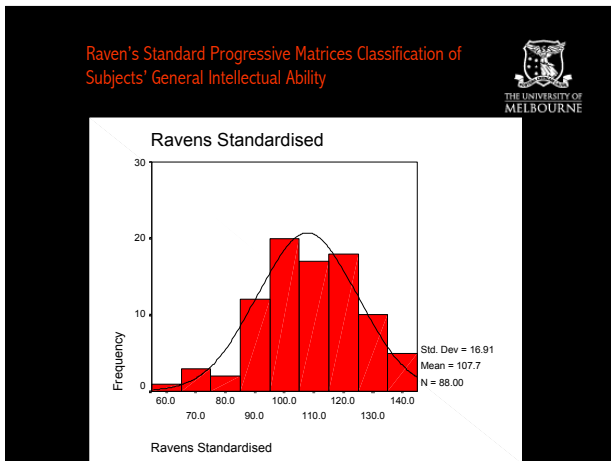
Raven's Matrices




CORRELATION BETWEEN SSVEP AMPLITUDE AND WAIS-R FULL-SCALE IQ
Raven Advanced Progressive Matrices
n=31

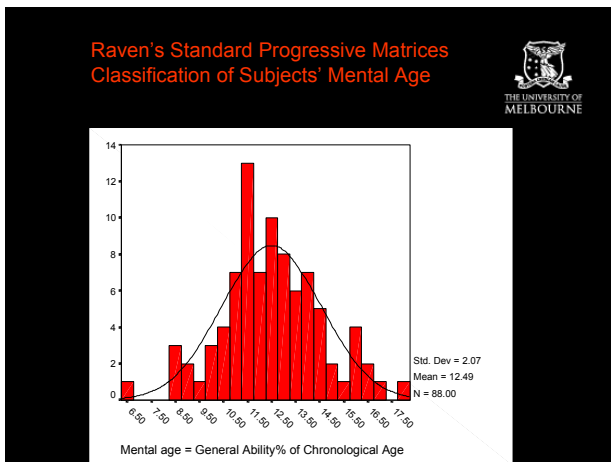
Easy Trials Medium Trials Difficult Trials





Raven's Standard Progressive Matrices Classification of Subjects' General Intellectual Ability

| Classification of Raven's Groups | Raven's Standardised Scores | n | | SD |
|----------------------------------|-----------------------------|----|--------|------|
| Gifted | ≥ 130 | 11 | 133.64 | 3.64 |
| Bright | 110-129 | 33 | 116 | 6.46 |
| Average | 90-109 | 30 | 100.70 | 5.32 |
| Low Average | 70-89 | 12 | 83.33 | 5.37 |
| Low | 69 or less | 2 | 66 | 2.83 |




PATMath Criteria for Classification into Grade and CSF Levels

| PATMath Scaled Scores Test 1 | PATMath Scaled Scores Test 2 | PATMath Scaled Scores Test 3 | Classification CSF Level / National Profiles Level | Grade Classification |
|------------------------------|------------------------------|------------------------------|----------------------------------------------------|----------------------|
| | | 70 - 78 | CSF 5 consolidating | Yr. 8 |
| | | 60 - 69 | CSF 5 emerging | Yr. 7 |
| | 63 - 72 | 50 - 59 | CSF 4 consolidating | Grade 6 |
| 60 - 69 | 53 - 62 | 40 - 49 | CSF 4 emerging | Grade 5 |
| 50 - 59 | 43 - 52 | 0 - 39 | CSF 3 consolidating | Grade 4 |
| 40 - 49 | 33 - 42 | | CSF 3 emerging | Grade 3 |
| 30 - 39 | 0 - 32 | | CSF 2 consolidating | Grade 2 |
| 0 - 29 | | | CSF 2 emerging | Grade 1 |

Vertical Curriculum Mathematics Clinics


| Mathematics Clinic | CSF Level | Equivalent Grade | Number | Ability Groups |
|--------------------|-------------|------------------|--------|--------------------------------------------|
| 5. R. Clinic | 5 emerging | Year 7 | 20 | 10 Gifted, 9 Bright, 1 Average |
| 4. O. Clinic | 4 consolid. | Grade 6 | 17 | 1 Gifted, 10 Bright, 5 Average, 1 Low |
| 3. M. Clinic | 4 emerging | Grade 5 | 22 | 10 Bright, 9 Average, 2 Low Average, 1 Low |
| 2. H. Clinic | 3 consolid. | Grade 4 | 17 | 3 Bright, 10 Average, 4 Low Average |
| 1. C. Clinic | 2 consolid. | Grade 4 & below | 12 | 1 Bright, 5 Average, 6 Low Average |

- Progress was measured in three ways:
- **Absolute Gain (AG):** Final (December) PATMath Scaled Score – Initial (February) PATMath Scaled Score
 - **Initial Gain (IG):** Absolute Gain divided by Initial Score (expressed as a percentage)
 - **Relative Gain (RG):** Absolute Gain divided by Maximum Possible Gain Score (100% - February score) (expressed as a percentage)

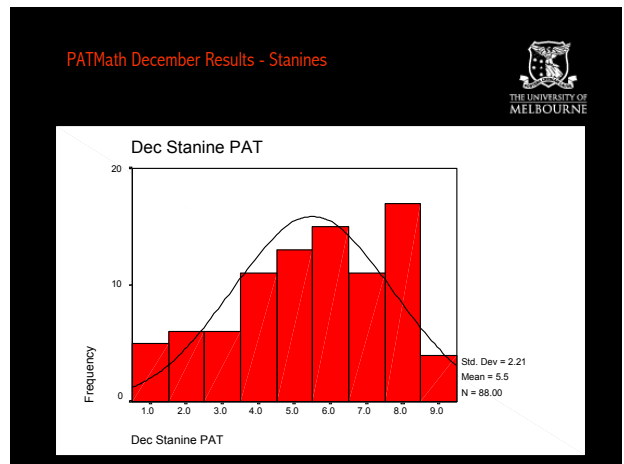
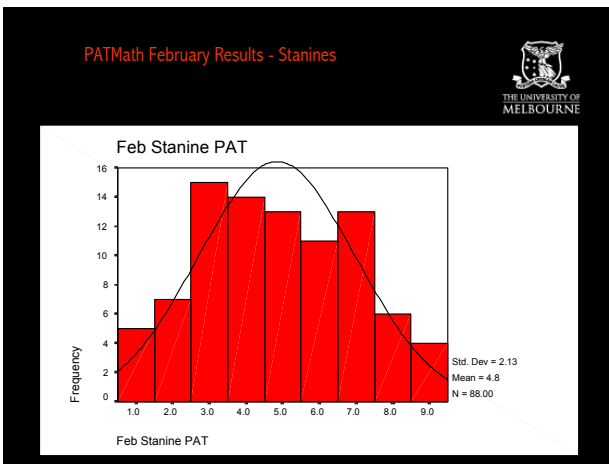


Three main research questions of interest:

- Did the vertical curriculum cohort make significant progress in mathematics during the year?
- Did any of the vertical curriculum Clinics make relatively greater progress compared with the other Clinics?
- Did the Gifted students across the Clinics make relative greater progress compared with the students in the other Ability Groups?



3. Results



PATMath Absolute Gains for Clinics




| Clinic | n | SD |
|-------------------|----|------|
| R (Year 7) | 20 | 4.22 |
| O (Grade 6) | 17 | 6.43 |
| M (Grade 5) | 22 | 6.96 |
| H (Grade 4) | 17 | 7.84 |
| C (Std 4 & below) | 12 | 5.86 |
| Cohort | 88 | 6.91 |

ANOVA of PATMath Absolute Gain for Clinics

| Source of Variation | SS | df | MS | F | p |
|---------------------|---------|----|--------|------|--------|
| Between groups | 776.24 | 4 | 194.06 | 4.76 | .002** |
| Within groups | 3383.37 | 83 | 40.76 | | |
| Total | 4159.62 | 87 | | | |

PATMath Initial Gain Scores for Mathematics Clinics




| Clinic | n | SD |
|-----------------|----|-------|
| R (Year 7) | 20 | 6.855 |
| O (Grade 6) | 17 | 11.64 |
| M (Grade 5) | 22 | 13.42 |
| H (Grade 4) | 17 | 16.53 |
| C (G 4 & below) | 12 | 15.65 |
| Cohort | 88 | 14.60 |

ANOVA of PATMath IG Scores for Mathematics Clinics

| Source of Variation | SS | df | MS | F | p |
|---------------------|----------|----|---------|-------|---------|
| Between groups | 4649.00 | 4 | 1162.25 | 6.933 | .000*** |
| Within groups | 13913.36 | 83 | 167.63 | | |
| Total | 18562.36 | 87 | | | |

PATMath RG Scores for Mathematics Clinics




| Clinic | n | SD |
|-----------------|----|-------|
| R (Year 7) | 20 | 32.06 |
| O (Grade 6) | 17 | 34.51 |
| M (Grade 5) | 22 | 38.37 |
| H (Grade 4) | 17 | 36.52 |
| C (G 4 & below) | 12 | 21.07 |
| Cohort | 88 | 35.64 |

ANOVA of RG Scores for Mathematics Clinics

| Source of Variation | SS | df | MS | F | p |
|---------------------|-----------|----|---------|-------|------|
| Between groups | 14793.46 | 4 | 3698.36 | 3.206 | .017 |
| Within groups | 95756.09 | 83 | 1153.68 | | |
| Total | 110549.56 | 87 | | | |

PATMath AG Scores for Ability Groups




| Ability Groups | n | SD |
|----------------|----|-------|
| Gifted | 11 | 5.28 |
| Bright | 33 | 6.16 |
| Average | 30 | 8.60 |
| Low Average | 12 | 6.097 |
| Low | 2 | 3.54 |
| Cohort | 88 | 6.915 |

ANOVA of PATMath AG Scores for Ability Groups

| Source of Variation | SS | df | MS | F | p |
|---------------------|---------|----|---------|------|------|
| Between groups | 100.27 | 4 | 1162.25 | .513 | .727 |
| Within groups | 4059.35 | 83 | 167.63 | | |
| Total | 4159.62 | 87 | | | |

PATMath IG Scores for Ability Groups




| Ability Groups | n | SD |
|----------------|----|-------|
| Gifted | 11 | 8.46 |
| Bright | 33 | 13.40 |
| Average | 30 | 17.28 |
| Low Average | 12 | 15.14 |
| Low | 2 | 7.09 |
| Cohort | 88 | 14.61 |

ANOVA of PATMath IG Scores for Ability Groups

| Source of Variation | SS | df | MS | F | p |
|---------------------|----------|----|--------|-------|------|
| Between groups | 860.719 | 4 | 215.18 | 1.009 | .408 |
| Within groups | 17701.65 | 83 | 213.27 | | |
| Total | 18562.36 | 87 | | | |

PATMath RG Scores for Ability Groups




| Ability Groups | n | SD |
|----------------|----|-------|
| Gifted | 11 | 41.26 |
| Bright | 33 | 29.41 |
| Average | 30 | 44.88 |
| Low Average | 12 | 23.65 |
| Low | 2 | 16.26 |
| Cohort | 88 | 35.65 |

ANOVA of PATMath RG Scores for Ability Groups

| Source of Variation | SS | df | MS | F | p |
|---------------------|-----------|----|---------|------|------|
| Between groups | 1029.96 | 4 | 257.49 | .195 | .940 |
| Within groups | 109519.59 | 83 | 1319.51 | | |
| Total | 110549.56 | 87 | | | |

The Gifted Student's Progress



Of the eleven students in the gifted student group:

- One Grade 6 student progressed to CSF Level 5 *Established*, or what is considered to be Year 8 level.
- Eight Grade 6 students moved on to CSF Level 5 *Consolidating*, or what is normally considered to be at a Year 7 level.
- One Grade 5 student progressed to achieve CSF Level 5 *Consolidating*, or what is considered to be Year 7 level.
- One Grade 6 student progressed to CSF Level 4 *Consolidating*, or what is considered to be equivalent to Grade 6 level, which was chronologically age appropriate.



3. Discussion & Conclusion