Nursing students’ readiness for the numeracy needs of their program: Students’ perspective

Linda Galligan, Anita Frederiks, Andrew Wandel, Clare Robinson, Shahab Abdulla, Zanubia Hussain
The Big picture

LOW SES; Mature aged; EXT/online

UNIVERSITY OF SOUTHERN QUEENSLAND

1998

2012 trial

2015 (442 + ??)

2014...

Sciences

Engineering

Business

Nursing (80)

Other: Education/Arts
Some demographics
The question

Overall my maths preparation was adequate for the courses that I studied.
Method

- Survey at the end of semester AFTER they have their results
- Selected interviews
- Link survey to overall results and specific concepts
- Lecturers’ perceptions (another paper)
Nursing

• Since 1980’s at USQ
• Increasing in popularity (+ more health science)
• Large online component (since 2010); multicampus
• Acknowledgement Numeracy is an issue (1st year subject)
• New developments......
Questions

• Calculator use
• Decimals
• Percentages
• Ratio
• Algebra
• Statistics
• Problem solving

• Demographics
• Overall perception
• Open-ended questions
## Results of responses to survey

<table>
<thead>
<tr>
<th>year</th>
<th>course</th>
<th>No. students (total cohort)</th>
<th>dropped</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2012 (s1)</strong></td>
<td><strong>TRIAL</strong></td>
<td>MAT1008**</td>
<td>20 (262)</td>
</tr>
<tr>
<td><strong>2014 (s1)</strong></td>
<td></td>
<td>NUR1140**</td>
<td>23 (330)</td>
</tr>
<tr>
<td><strong>2015 (s1)</strong></td>
<td></td>
<td>NSC1500; MAT1008</td>
<td>74 (703); 56 (647)</td>
</tr>
<tr>
<td><strong>2015 (s2)</strong></td>
<td></td>
<td>NUR2000; MAT1008</td>
<td>79 (702), 29 (386)</td>
</tr>
</tbody>
</table>
51 - 50 plus one I cannot find

Anita Frederiks, 1/06/2016
Years between pre-university maths and starting Nursing degree (n = 85)

- 0-2 years: 35%
- 3-5 years: 15%
- 6-10 years: 15%
- more than 10 years: 30%
Age distribution for sample (n = 84)
Proportion of students' pre-university maths preparation (n = 84)
Overall perception of preparedness (n = 85)

- Agree: 70%
- Neutral: 10%
- Disagree: 20%
Perception for different topics

- Using calculators:
  - Prepared: 90%
  - Poorly prepared: 10%
  - Not applicable: 0%

- Decimals:
  - Prepared: 88%
  - Poorly prepared: 12%
  - Not applicable: 0%

- Fractions:
  - Prepared: 85%
  - Poorly prepared: 15%
  - Not applicable: 0%

- Percentages:
  - Prepared: 90%
  - Poorly prepared: 10%
  - Not applicable: 0%

- Ratios:
  - Prepared: 92%
  - Poorly prepared: 8%
  - Not applicable: 0%

- Using Graphs:
  - Prepared: 95%
  - Poorly prepared: 5%
  - Not applicable: 0%

- Problem Solving:
  - Prepared: 80%
  - Poorly prepared: 20%
  - Not applicable: 0%

- Algebra:
  - Prepared: 90%
  - Poorly prepared: 10%
  - Not applicable: 0%

- Statistics:
  - Prepared: 85%
  - Poorly prepared: 15%
  - Not applicable: 0%
Comparison S1 & 2 2015 results of final maths quiz (44 questions)

<table>
<thead>
<tr>
<th>Number of students</th>
<th>Total marks/44</th>
<th>Number of questions out of 44 with difference between cohorts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survey/Total</td>
<td>(Survey/total)</td>
<td>Diff by &lt;5%</td>
</tr>
<tr>
<td>S1 (47/403)</td>
<td>35.4/34.2</td>
<td>+4,-0</td>
</tr>
<tr>
<td>S2 (26/203)</td>
<td>32.9/33.2</td>
<td>+4,-5</td>
</tr>
</tbody>
</table>

The formula for finding the amount of drug to give a patient is

\[
\text{amount prescribed} \times \frac{\text{amount in each unit}}{\text{volume}}
\]

On the label below, what is the volume the medication is in?

**PREScription ONLY MEDICINE**
**KEEP OUT OF REACH OF CHILDREN**

**Bricanyl® Elixir**

* Only 7% diff in S2
Just reading

- In previous research (Galligan 2011) up to 1/3 of errors could be due to misreading the question
- Write the following in numerals: Eighty Thousand Two Hundred and Six. For example, twenty one = 21. Note: please do not include spaces or commas in your answer
- 71% correct
  - Most of the incorrect was 8206
  - One person each had 800206; 82006; 80,206; 80260 etc
Decimal reading....

Syringe measurement

77% correct

Calculate $31.45 + 0.001$

85% correct

<table>
<thead>
<tr>
<th>Prepared</th>
<th>Poorly prepared</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>90%</td>
<td>10%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Fractions

• What is (e.g. 1/7 or 5/8) as a decimal
  91% correct

• Express 20/120 in simplest form
  88% correct
Percentages

• Find 30% of 70
89% correct

• A bag of saline solution contains 250 mL. From this bag 140 mL has been drained. What percentage remains in the bag?
64% correct
Percentages

• A person increased weight from 52 to 65. Express this increase in weight as a percentage of the original weight. Answer to the nearest whole number.
  
  73%

• In a certain country of ** million people, the number of deaths from heart disease in 2008 was ** Express the number of deaths as a rate per 100 000. Answer to the nearest whole number.
  
  58%
A brand of milk contains 10 grams of fat per 250 mL. How much fat is in a 1 litre container of this milk? (Note: please do not include units in your answer.)

\[
\frac{a}{b} = \frac{x}{?}
\]

where \(a\) is a factor of \(x\)

92% correct

91% correct

If not

85% correct
Graphs

93% correct

55% correct

Using graphs

Source: ABS National Health Survey 2004–05.

Select one:
- 1. 4%
- 2. 2.25%
- 3. 7.1%
- 4. 13%
- 5. 6.6%

Answer: 125

Prepared
Poorly prepared
Not applicable
Tricky graph...

S1 2016
21% correct
A child weighing 30 kg requires nitrofurantoin 6 mg/kg. This medication is available as a syrup containing 5 mg/1 mL. How much syrup is to be measured out? 68%
Algebra

To calculate the volume of an injection a formula is

\[ \frac{SR}{SS} \times V \]

Find the volume if \(SR = 322.5\), \(SS = 30.1\), \(V = 4\).
(Round your answer to 1 decimal place.)

95% correct

If

\[ B = \frac{w}{h^2} \]

what is \(B\) if \(w = 116\) and \(h = 2.0\)?
(Round your answer to 1 decimal place.)

91% correct

If \(V = IR\) then \(I = ?\)

57% correct
Overall mark on final quiz & perception of preparation

- **> 85% (n = 53):**
  - Agree: 42
  - Neutral: 7
  - Disagree: 4

- **< 85% (n = 23):**
  - Agree: 15
  - Neutral: 4
  - Disagree: 4

Legend:
- Blue: Agree
- Orange: Neutral
- Gray: Disagree
### Graphing

<table>
<thead>
<tr>
<th></th>
<th>Prepared</th>
<th>not prepared</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct</td>
<td>33 (45%)</td>
<td>8 (11%)</td>
<td>41 (55%)</td>
</tr>
<tr>
<td>incorrect</td>
<td>28 (38%)</td>
<td>5 (7%)</td>
<td>33 (45%)</td>
</tr>
<tr>
<td>Total</td>
<td>61 (82%)</td>
<td>13 (18%)</td>
<td>74</td>
</tr>
</tbody>
</table>

### Algebra

<table>
<thead>
<tr>
<th></th>
<th>Prepared</th>
<th>not prepared</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct</td>
<td>45 (61%)</td>
<td>22 (30%)</td>
<td>67 (91%)</td>
</tr>
<tr>
<td>incorrect</td>
<td>6 (8%)</td>
<td>1 (1%)</td>
<td>7 (9%)</td>
</tr>
<tr>
<td>Total</td>
<td>51 (69%)</td>
<td>23 (31%)</td>
<td>74</td>
</tr>
</tbody>
</table>
So what’s the problem...

<table>
<thead>
<tr>
<th>Maths results show they have the skills</th>
<th>Student perceives they have skills</th>
<th>Student perceives they do not have skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perceived no problem and there is no problem picked up in the assessment</td>
<td>3. Perceived problem but there is no problem picked up in the assessment</td>
<td></td>
</tr>
<tr>
<td>2. Perceived no problem but there is a problem picked up in the assessment</td>
<td>4. Perceived problem and there is a problem picked up in the assessment</td>
<td></td>
</tr>
</tbody>
</table>

- Some students feel unprepared but are OK in the context
- Some students are not OK
- Students are time poor (work and study “full time”; have families) and in nursing many are females and have home/childcare duties
- Students do not spend time on academic work
- Students do not read carefully
- Academic tests can only tell us so much:
  - There may be other questions to ask
  - …proficiency in action is another matter