Improving Mathematics Vocabulary Instruction

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Improving Mathematics Vocabulary Instruction

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Advisors: Professor Beck (CS), Professor Traver (US)

GPS: Ignorance is Not Bliss

Problem
• Third grade students struggle with mathematics vocabulary
• Words with multiple meanings cause confusion

Background
• 33% of third grade students scored below proficient on the math MCAS
• Deficiency is partially caused by confusion about vocabulary used in test
• The focus of our project is on words with multiple meanings (Common Use vs. Math)

Conclusion
• Students were engaged and performed well
• The gap between the pre-test and post-tests is large, indicating a sharp increase in knowledge
• The gap between the immediate and delayed post-test results is very small, indicating substantial retention
• The data infers the pilot program was a success

Assessment Plan
Pre-Test
- 10 Question Vocabulary Matching Worksheet

Activity
- Each student is given one word to draw/explain (Math OR English definition)
- Students find the person with the same word

Presentation
- Partners create a poster to present
  - a drawing/example
  - mathematical definition (in own words)

Immediate Post-Test
- Same words/definitions as Pre-Test (different order)
- Directly after presentations

Delayed Post-Test
- Same words/definitions as previous two tests (different order)
- 5 Days Later

Statistical Analysis:

<table>
<thead>
<tr>
<th></th>
<th>Average Score</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>3.7 ± 1.0</td>
<td></td>
</tr>
<tr>
<td>Immediate Post-Test</td>
<td>5.8 ± 1.2</td>
<td>P &lt; 0.00006 vs. Pre-Test</td>
</tr>
<tr>
<td>Delayed Post-Test</td>
<td>5.3 ± 1.3</td>
<td>P &lt; 0.01151 vs. Pre-Test</td>
</tr>
</tbody>
</table>

Improvement from Pre-Test

<table>
<thead>
<tr>
<th></th>
<th>Immediate Post-Test</th>
<th>Delayed Post-Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S = # of Students</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 to 2 (S = 5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 to 4 (S = 8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 to 8 (S = 5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Acknowledgments:
Ellen Day, Jessica Kowalik, Martha Cyr, Shari Weaver, WPI IRB, Vishal Rathi (PLA)

References:

“… alerting students to words that they use regularly and then showing them an alternate math definition is a great way to make a deeper connection.”
– Jessica Kowalik, Third Grade Teacher