Some Key Ideas

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Not just STEM

• Design
• History and humanities
• May be better examples for STEM than the STEM examples
Discipline Diving

• Lots of giants whose shoulders we can stand on
Domain Specific *and* General Skills

- Don’t give up quite yet on domain-general skills
  - How much tip should I leave on a $56 restaurant bill?
  - MATH TRANSFERRED!!!!!!
  - What does this say?
  - ແຂ່ຍຮ້ອຍຮັກແນວຄິດທາງກວ້ງຂອງພຽງ
  - Spatialt tänkande är oerhört viktigt
  - Spatial thinking is very important
  - Knowledge of language transferred!
• Space could me more like reading and math
• Transfer requires knowledge
  – Nobody knows anything about space
• So bringing all the “no transfer” research might not be as relevant when people lack an entire body of skills and knowledge
Marketing What we are Doing

• Science standards
  – Improving reasoning
  – Use of evidence
  – Argumentation

• Make no small plans
  – But implement incrementally
Need Effective Measures

- Not just achievement
- Certainly not just psychometric test scores
- “Habit of Mind”
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An Assessment Instrument to Measure Geospatial Thinking Expertise
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Promoting Spatial Problem Solving in Science Education

• The Geospatial Semester(s)
• Robert Kolvoord, James Madison University
Coding

– Example words

<table>
<thead>
<tr>
<th>East</th>
<th>West</th>
<th>Up</th>
<th>Down</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near</td>
<td>Beside</td>
<td>Within</td>
<td>Middle</td>
</tr>
<tr>
<td>Space</td>
<td>Surround</td>
<td>Underneath</td>
<td>Map</td>
</tr>
<tr>
<td>Place</td>
<td>Point</td>
<td>Between</td>
<td>Big</td>
</tr>
<tr>
<td>Far</td>
<td>Close</td>
<td>Above</td>
<td>Below</td>
</tr>
</tbody>
</table>

– Repetitions within each interview did not count. Students only got credit for the first instance of each spatial word used.

– A spatial word used in the initial interview also counted if used in the middle and final interview
  - Initial Interview: “We need a large area surrounding the park”
  - Middle Interview: “There was not enough space surrounding the park”
The average number of distinct spatial words spoken covaried by duration for each interview.