Classroom Perspective

MARGE PETIT, MARGE PETIT CONSULTING, MPC
FRIDAY INSTITUTE FOR EDUCATIONAL INNOVATION
NOVEMBER 16, 2010
Take Aways!

- **Teacher knowledge** about the research/learning progressions is fundamental – this involves a real commitment to PD, NOT just creating tools and materials, but substantive professional development

- **Tools** should:
  a) reflect the bidirectional nature of learning progressions
  b) Reflect developing understanding, common errors, and preconceptions or misconceptions that may interfere with learning new concepts or solving related problems
  c) Be at a grain size that is manageable and useable by both teachers and students

- **Student self-assessment is key**
How many wheels do 29 tricycles have?

Write an equation to match this picture. How many smiley faces are there?

Farmer Brown donated 7 dozen eggs to the senior center.
How many eggs did he donate?

There are 16 players on a team in the Smithville Soccer League. How many players are in the league if there are 12 teams?

What do these different solutions mean? What do I do?
Source of Insights 2003 - 2010

- Interaction with over 1000 educators in Vermont, Michigan, Alabama, Amman, Jordan, Nebraska, and Ohio a with OGAP materials and resources
- 3 exploratory studies using the iterative process of Design Research
- Analysis of teacher logs, interviews, surveys, student work archives, and action research projects, other.

The Vermont Mathematics Partnership Ongoing Assessment Project (OGAP) formative assessment system

- Fractions
- Multiplicative Reasoning
- Proportionality
OGAP Principles

- **Principle # 1: Build on pre-existing knowledge** (How People Learn (2000) National Research Council)

- **Principle # 2: Learn (and assess) for Understanding** (Adding it Up! (2001) National Research Council)

- **Principle # 3: Use Frequent Formative Assessment** (Inside the Black Box, (2001) Black, P, and Wiliam, D.)

- **Principle # 4: Build Assessments on Mathematics Education Research** (Knowing What Students Know (2001) National Research Council)
Based on these principles

- Build item banks with hundreds of items sensitive to the research
- Developed tools for collecting and analyzing evidence in student work
- Provided PD in use of tools and strategies

We initially thought it was about providing research sensitive tools – but it was really about the knowledge of research.
Teachers told us that knowledge of the research helped them: (OGAP, 2005)

a) better understand evidence in student work;
b) Better understand the purposes of activities in math program;
c) Make informed instructional decisions;
d) Improve first wave instruction.

Teachers told us – PLEASE tell us more on the research.
According to research, some students may see a fraction as two whole numbers (e.g., $\frac{3}{4}$ as a 3 and 4) inappropriately using whole number reasoning, not reasoning with a fraction as a single quantity. (Behr, M., Post, T., Lesh, R., and Silver, E. (1983); Behr, Wachsmuth and Post, (1984); VMP OGAP Study (2005))

Teacher actions: A greater emphasis on magnitude and the use of number lines AS first wave instruction!
Tools:

a) reflect the bidirectional nature of learning progressions

b) Reflect developing understanding, common errors, and preconceptions or misconceptions that may interfere with learning new concepts and solving related problems

c) Be at a grain size that is manageable and useable by both teachers and students
Evidence in Student Work to Inform Instruction

- Efficient and Generalizable Strategies
- Transitional Strategies
- Early Strategies
- Non

Mathematical Topics And Contexts

Structures of Problems

Other Structures

Depending upon the strength of multiplicative reasoning students may move back and forth between multiplicative, transitional, additive and non-multiplicative strategies as they interact with different problem structures (e.g., context, magnitude of factors, divisors, or dividends). Kouta, V. & Franklin, K., 1995; VMP OGAP, 2006)
3. One tricycle has three wheels.

A. How many wheels do 5 tricycles have? Show your work.

\[
\begin{align*}
3 \times 5 &= 15 \\
5 \times 3 &= 15
\end{align*}
\]

B. How many wheels do 29 tricycles have? Show your work.

\[
\begin{align*}
29 \times 3 &= 87 \\
29 \times 3 &= 87
\end{align*}
\]
Student Self-assessment

Where am I?
Where am I going?
### Growth/Progress

<table>
<thead>
<tr>
<th>A</th>
<th>My evidence might show...</th>
<th>B</th>
<th>My evidence might show...</th>
<th>C</th>
<th>My evidence might show...</th>
<th>D</th>
<th>My evidence might show...</th>
</tr>
</thead>
<tbody>
<tr>
<td>I respond to written or verbal feedback consistently.</td>
<td>I respond to written or verbal feedback often.</td>
<td>I sometimes respond to written or verbal feedback.</td>
<td>I don’t respond to written or verbal feedback.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I seek help until a concept makes sense to me.</td>
<td>I seek help when a concept doesn’t make sense.</td>
<td>I sometimes seek help when a concept doesn’t make sense.</td>
<td>I don’t seek help when a concept doesn’t make sense.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I actively extend my thinking if a concept makes sense.</td>
<td>I extend my thinking if a concept makes sense.</td>
<td>I sometimes extend my thinking if a concept makes sense.</td>
<td>I don’t extend my thinking if a concept makes sense.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I actively move myself forward throughout the week.</td>
<td>I move myself forward throughout the week.</td>
<td>Sometimes I move myself forward.</td>
<td>I do very little to move myself forward.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Questioning

<table>
<thead>
<tr>
<th>A</th>
<th>My evidence might show...</th>
<th>B</th>
<th>My evidence might show...</th>
<th>C</th>
<th>My evidence might show...</th>
<th>D</th>
<th>My evidence might show...</th>
</tr>
</thead>
<tbody>
<tr>
<td>I consistently ask specific questions if a concept doesn’t make sense, and I work toward math understanding.</td>
<td>I often ask questions if a concept doesn’t make sense.</td>
<td>I sometimes ask questions if a concept doesn’t make sense.</td>
<td>I rarely ask questions if a concept doesn’t make sense.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I actively try to extend my thinking on a problem.</td>
<td>I often extend my thinking on a problem.</td>
<td>I sometimes extend my thinking on a problem.</td>
<td>I don’t extend my thinking on a problem.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I actively seek challenges if a concept is solid.</td>
<td>I take on challenges given to me if a concept is solid.</td>
<td>I occasionally attempt a challenge given to me.</td>
<td>I don’t take on challenges.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I actively seek the answers to questions I’m asking/ thinking.</td>
<td>I often seek the answers to questions I’m asking/ thinking.</td>
<td>I sometimes seek the answers to questions I’m asking/ thinking.</td>
<td>I rarely seek the answers to questions I’m asking/ thinking.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Draft Rubric – Eric Eeley, Crosset Brook Middle School, Waterbury, VT.
References


Vermont Mathematics Partnership Ongoing Assessment Project. Exploratory Study, student work samples, 2005, 2006, 2007. Student work samples used with permission of the Vermont Mathematics Partnership funded by the US Department of Education (Award Number S366A020002) and the National Science Foundation (Award Number EHR-0227057)

For more information about OGAP go to www.margepetit.com