Catholic Schools’ Math PLC

Linda Ashley – 6th-8th Math Immaculate Conception
Mollie Mallin – 4th-5th Math Immaculate Conception
Patti Reuber – 6th-8th Math St. Helen
Mary Beth Walters – 6th-8th Math St. Helen
Overview

1) Creation of the Math PLC
2) Differences between our Math PLC and a DuFour-Model PLC
3) Our General Approach
4) Year by Year Summary of PLC’s Work
5) Benefits for Teachers and Students
6) Lessons Learned
7) Recommended Resources
8) Q&A
Creating the PLC

- Fruit of the CEC’s curriculum mapping initiative May 2009
- Initial Planning
- Mass Email – all 4-6th Math Teachers
- Planning/Brainstorming Meeting
  - 9 teachers, 5 different schools at 1st meeting, 5 others asked to be a part of our emails
Our Math “PLC” vs. PLC Proper

**Differences**

- Less data driven
- More informal and flexible
- Voluntary

**Similarities:**

- Professionals gathering in common curriculum area committed to improving
- Focus on Learning:
  - How to improve our craft to ultimately improve student learning
- Community
  - Work collaboratively
  - Trust and mutual respect – no blame
  - Supportive
Our Unofficial Approach

1. Discuss challenges / opportunities for improvement
2. Select one common interest / need to focus on
3. Look up the research and identify resources related to the focus area
4. Share findings and create a specific goal and plan for implementation
5. Implement in classrooms/schools and share results
Yearly Foci at a Glance

- Year 1: Problem Solving Graphic Organizer
- Year 2: Problem Solving Graphic Organizer Assessment Tool
- Year 3: Computation
- Year 4: New Standards & “I can” Statements
- Year 5: Parent Involvement
Year 1: 2009-2010

- School Visits
- Online Forum: www.buschurpool.com/mathplc
- Sharing
  - Structure and use of class time
  - Student expectations
  - Favorite lessons, assessments
  - Frustrations/challenges….which led to the focus of the year…
<table>
<thead>
<tr>
<th>FORUM</th>
<th>TOPICS</th>
<th>POSTS</th>
<th>LAST POST</th>
</tr>
</thead>
</table>
| Great Ideas  | 2      | 2     | by preuber  
Wed Nov 11, 2009 3:02 pm          |
| Frustrations | 1      | 5     | by bgsu1999  
Wed Nov 11, 2009 10:49 pm         |
| Articles     | 3      | 3     | by mmallin    
Sun Dec 13, 2009 4:59 pm          |
| Math Links   | 7      | 8     | by tpaulette  
Thu Jan 14, 2010 6:21 pm          |
| Projects     | 11     | 20    | by bgsu1999  
Tue Oct 12, 2010 7:24 pm          |
| Meeting Minutes | 2   | 8     | by madzachmom  
Wed Oct 13, 2010 12:36 pm        |
Year 1: Problem Solving

- Research – NCTM article
- Created first draft graphic organizer (pentagon)
- Created and administered pre-tests by grade level (used forum to continue dialogue from our meetings)
- Introduced graphic organizer (pentagon) in our classrooms
- Revised and created leveled graphic organizers
- Administered post-test
Problem of the Day: The sum of Joe’s age and his younger brothers age is 38. The difference between their ages is 8. How old are Joe and his brother?
**Problem of the Day:** Andy stacks four cubes, one on top of the other, and paints the outside of the stack (not the bottom) How many faces of the cubes are painted?

**Given**
- 4 cubes
- Outside faces painted
- One on top of other
- Bottom not painted

**Unknown Information**
- How many faces are painted

**Answer Sentence**
There are 17 faces painted.

**Plan**
1. Figure out how many faces a cube has.
2. Draw a picture of the 4 cubes, and mark the painted faces.
3. Count the total # of painted faces

**Try it Here**
- Cube 5 faces
- Cube 6 → 4 faces
- Cube 3 → 4 faces
- Cube 4 → 4 faces

**Check**
\[
\begin{align*}
\text{Work backwards} & \quad 5 - 4 - 8 - 4 - 5 - 12 - 17 \\
\text{17 faces} & \quad 0
\end{align*}
\]
Known Information: I know that....

Answer Sentence

Show your work/thinking

Check and Explain
Year 2: 2010-2011

- Focus of Year: Checklist or rubric for grading word problems with graphic organizer
  - Deciding the expectations for each piece of the graphic organizer
  - What should or should not be assessed?
  - Final conclusion: tool to help, not an evaluation in and of itself
  - Value of the “heated” debates
- Math Humor NCTM Webinar
- Sherry Gabert presented the Battelle for Kids data (ITBS and CogAT)
  - Led to the focus of next year…. 
Year 3: 2011-2012

Focus of the Year: Computation

- What does the research say?
- What is the expectation of standardized tests?
  - Incongruent with computation done in class
- Shared resources and approaches used in class
- Weekly computation practice and tracking of results
  - Common focus but varied approach according to needs of the individual teacher and class
Focus of the Year: Common Core

- Concerned about gaps for students in adopting new standards so we did a standards study:

  1) *Compared new standards with old standards at own grade levels:*

     - What’s different, what’s the same?
     - Where do we anticipate missing prerequisite knowledge?
     - What are the critical areas (standards to be emphasized) at our grade levels?
2) Studied new and old standards at grade levels above and below our own grade levels:

• What prerequisite knowledge will students come to us with based on old standards?
• What prerequisite knowledge will students eventually come to us with based on the new standards?
• What will our colleagues be emphasizing (critical areas)?
• Where did things that got removed from our grade level get moved to?
• Where are gaps- what content students might miss all together now?
Year 4: Common Core

- Math teachers at St. Helen and Immaculate Conception inspired to create a standard continuum map and identify exit skills for each grade level in school PLCs
  - Helped teachers identify which standards to spend more time on (exit skills/power standards) and which standards are not worth the extra instructional time

- Text book selection – to help St. Helens

- “I can..” / Target statements
  - Communication of goals at start of unit to students
  - Student self-assessment
# Chapter 3 – Rational Numbers

<table>
<thead>
<tr>
<th>Most</th>
<th>OK</th>
<th>With Help</th>
<th>I Can …</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.1 I can graph integers on a number line.</td>
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<td></td>
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<td></td>
<td>3.2 I can compare and order integers.</td>
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<td></td>
<td>3.3 I can graph rational numbers on a number line.</td>
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<td>3.4 I can compare and order rational numbers.</td>
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<td>3.5 I can find and interpret the absolute value of a rational number.</td>
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<td>3.6 I can interpret absolute values.</td>
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<td>3.7 I can find and graph points on the coordinate plane.</td>
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<td>3.8 I can identify quadrants for points on the coordinate plane.</td>
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<td>3.9 I can find the distance between two points on the coordinate plane.</td>
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<td></td>
<td></td>
<td></td>
<td>3.10 I can solve problems using the coordinate plane.</td>
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</tbody>
</table>

# Chapter 4 – Ratios and Rates

<table>
<thead>
<tr>
<th>Most</th>
<th>OK</th>
<th>With Help</th>
<th>I Can …</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.1 I can model ratios.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.2 I can write ratios and rates.</td>
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<td>4.3 I can find equivalent ratios.</td>
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<td></td>
<td>4.4 I can find patterns to compare ratios.</td>
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<td></td>
<td>4.5 I can use tables to solve ratio problems.</td>
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<td></td>
<td>4.6 I can find unit rates.</td>
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<td></td>
<td>4.7 I can solve problems using unit rates.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.8 I can use a graph to represent equivalent ratios.</td>
</tr>
<tr>
<td>Common Core Standards</td>
<td>Graded Course of Study</td>
<td>I CAN... target statements</td>
<td>VOCABULARY</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Standard 2 - Ratios and Proportional Relationships</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.7.2.1 Compute unit rates associated with ratios of fractions including ratios of lengths, areas and other quantities measured in like or different units.</td>
<td>Measurement Strand</td>
<td>I can write Ratios</td>
<td>ratio</td>
</tr>
<tr>
<td>M.7.2.2 Recognize and represent proportional relationships between quantities.</td>
<td>Measurement Units</td>
<td>I can write Ratios in Simplest Form</td>
<td>rate</td>
</tr>
<tr>
<td>M.7.2.3 Decide whether two quantities are in a proportional relationship, i.e. by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.</td>
<td>10. Select appropriate units for measuring derived measurements, e.g., miles per hour, feet per second.</td>
<td>I can compare Ratios</td>
<td>unit rate</td>
</tr>
<tr>
<td>M.7.2.4 Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams and verbal descriptions of proportional relationships.</td>
<td>11. Convert units of area and volume within the same measurement system, e.g., square feet to square yards, cubic meters to cubic centimeters.</td>
<td>I can find Unit Rates</td>
<td>slope</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I can find Average Speed</td>
<td>equivalent ratios</td>
</tr>
<tr>
<td>M.7.2.5 Represent proportional relationships by equations.</td>
<td>12. Estimate a measurement to a greater degree of precision than the tool provides.</td>
<td>I can identify the Slope of the Line</td>
<td>proportion</td>
</tr>
<tr>
<td>M.7.2.6 Explain what a point ((x,y)) on the graph of a proportional relationship means in terms of the situation with special attention to the points ((0,0)) and ((1,r)) where (r) is the unit rate.</td>
<td>13. Solve problems involving proportional relationships and scale factors.</td>
<td>I can use Slope and a Point to Graph a Line</td>
<td>cross product</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I can identify Rates of Change in Graphs</td>
<td>similar</td>
</tr>
<tr>
<td>M.7.2.7 Use proportional relationships to solve multi-step ratio and percent problems.</td>
<td></td>
<td>I can use Rates of Change to solve problems</td>
<td>corresponding sides</td>
</tr>
<tr>
<td><strong>Standard 4 - Geometry</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M.7.4.1 Solve problems involving scale drawing of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.</td>
<td>19. Set up and solve problems using ratios and proportions.</td>
<td>I can compare Ratios in Simplest Form</td>
<td>corresponding angles</td>
</tr>
</tbody>
</table>
## Chapter 5
### Proportional Relationships

<table>
<thead>
<tr>
<th>I CAN... target statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can write Ratios</td>
</tr>
<tr>
<td>I can write Ratios in Simplest Form</td>
</tr>
<tr>
<td>I can compare Ratios</td>
</tr>
<tr>
<td>I can find Unit Rates</td>
</tr>
<tr>
<td>I can find Average Speed</td>
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<tr>
<td>I can identify the Slope of the Line</td>
</tr>
<tr>
<td>I can use Slope and a Point to Graph a Line</td>
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<tr>
<td>I can identify Rates of Change in Graphs</td>
</tr>
<tr>
<td>I can use Rates of Change to solve problems</td>
</tr>
<tr>
<td>I can compare Ratios in Simplest Form</td>
</tr>
<tr>
<td>I can identify Rates of Change in Graphs</td>
</tr>
<tr>
<td>I can use Rates of Change to solve problems</td>
</tr>
<tr>
<td>I can compare Ratios in Simplest Form</td>
</tr>
<tr>
<td>My 5th Grade “I Can” Target Objectives: First Quarter</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
</tr>
<tr>
<td>I can write the value of a given digit in a number.</td>
</tr>
<tr>
<td>I can write a number in standard form, word form, and expanded form to the hundred millions place.</td>
</tr>
<tr>
<td>I can use mental math to solve addition and subtraction place value problems.</td>
</tr>
<tr>
<td>I can multiply single digits (0’s - 5’s) quickly and accurately.</td>
</tr>
<tr>
<td>I can multiply single digits (6’s - 12’s) quickly and accurately.</td>
</tr>
<tr>
<td>I can multiply by powers of 10.</td>
</tr>
<tr>
<td>I can estimate products.</td>
</tr>
</tbody>
</table>
“Reaching Our Targets” Notes and Practice Questions
Ch 1: PLACE VALUE (pgs. 4-9 in BMB)

Target #1
-I can write the value of a given digit in a number.

Target #1 Notes can be found on page ____________ in my Math Notebook!

Examples:
Write the value of the underlined digit in the following numbers:
   a) 4,592   The value of the 9 is 90.

   b) 678,347,930  The value of the 7 is 70,000,000 (70 million).

Your Turn:
Write the value of the underlined digit in the following numbers:
   1) 9,480  ________   2) 567,421  ________   3) 6,893,210  ________

   4) 58,945  ________   5) 6,718,439,012  ________   6) 315,897,000  ________

   7) 675  ________   8) 489  ________   9) 7,438  ________   10) 439,124  ________

Target #2
-I can use mental math to solve addition and subtraction place value problems.

Target #2 Notes can be found on page ____________ in my Math Notebook!

Examples:
Use mental math to add or subtract.

   a) 567,943 + 2,000  Think: Since I am adding 2 thousands, I am going to add 2 to
Year 5: 2013-2014

- Originally planned on developing a pacing guide
- Later discussion revealed need for helping boost parent involvement
  - Decided to hold a math night at each school:
    - Developed activity binder
      - Each brought 3-4 high-interest and math skill building activities
    - Again, common focus, different approaches
    - Shared what went well and what didn’t go well about each school’s event
**Family Math Event Passport**

**Check out these stations for fun games and activities to play together.**
- Don’t forget to put your name in for the door prizes!

<table>
<thead>
<tr>
<th>Station 1: Grade 2 Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Go Fish a Flashcard</td>
</tr>
<tr>
<td>• Shut the Box</td>
</tr>
<tr>
<td>• Bump Game</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Station 2: Grade 3 Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Guess the factor!</td>
</tr>
<tr>
<td>• Burst the Balloon</td>
</tr>
<tr>
<td>• 24 game</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Station 3: Middle School Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 10 Pin Limbo Dice game</td>
</tr>
<tr>
<td>• Integer War Card game</td>
</tr>
<tr>
<td>• Pass the Pigs (mental math game)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Station 4: Middle School Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Math Dice Game</td>
</tr>
<tr>
<td>• 13 - Solitaire</td>
</tr>
<tr>
<td>• Shape by Shape, Square by Square</td>
</tr>
<tr>
<td>• Dominos</td>
</tr>
</tbody>
</table>
Year 6: 2014-2015

- Future Plans:
  - Study standards-based grading and reporting
  - Rubric writing
    - Focus first on geometry standards:
      - What does 1, 2, 3, and 4 look like for each standard?
  - Parent Communication
    - Understanding 1, 2, 3, 4 vs. A, B, C, D, F
    - How parents and their student(s) can use the standards-based reports
Benefits to Teachers

- **Support**
  - “I’m not the only one” – Others struggle with the same things!
  - “I’m not alone” - I know others I can contact
  - Able to bring up issues and get advice / brainstorm possible solutions together

- Fresh perspectives → generation of new or improved procedures, strategies, activities, etc.

- Promotes more self-reflection

- Reenergizes our teaching

- Makes us step out of our comfort zone and take initiative in areas we might not otherwise

- Increased confidence in teaching and leading
Benefits to Students

- Greater success in learning
  - Benefit from sharing of new approaches and multiple strategies
    - Example: long division, problem solving, computation
    - Especially for students who struggle with math because they learn and think differently

- More involved in math
  - Self-assessment
  - Teaching their parents at parent night

- See teachers as learners
Lessons Learned

- Don’t be afraid of not knowing it all
- Voluntary and informal / no pressure
- Consistency in time and location
- Reach out to available resources
- Hospitality (including food!)
- Having a “lion leader” is helpful
  - Decision maker, goal oriented, direct, strong, challenge driven
- Planning: start small and be concrete
Lessons Learned Continued

- Allow for flexibility
  - Agenda and discussion
  - Implementation of group’s ideas

- Ideal number of members is 6-10

- Importance of open-mindedness

- Benefits and challenges of having teachers from small band of grade levels as well as wider representation

- Pros and cons of multi-school participation
Interested in starting your own PLC?

- **Recommended Resources:**
  - [www.allthingsplc.com](http://www.allthingsplc.com)
  - *Learning By Doing: A Handbook for Professional Learning Communities at Work* (DuFour)
Questions?