Digital Math Strategies To Personalize Learning in K-8
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Expert Presenters:

John K. Williams Jr., assistant principal and former math teacher, Whittemore Park Middle School, Horry County, S.C., school district

Audra McPhillips, mathematics specialist, West Warwick public schools, R.I.

Jim Monti, director of educational reform, compliance, and technology, West Warwick public schools, R.I.
An on-demand archive of this webinar will be available at www.edweek.org/go/webinar in less than 24 hrs.
Digital Math Strategies to Personalize Learning in K-8

John Williams
Assistant Principal
Whittemore Park Middle School
About HCS…

- 42,600 students in grades PK-12
- 3rd largest school district in South Carolina
  - 51 schools
  - 9 attendance areas

Student Demographics

- Caucasian: 64%
- African American: 20%
- Hispanic: 9%
- Other: 7%
About HCS…

➢ One-fourth are eligible for gifted and talented
➢ 13% have disabilities other than speech
➢ Each student in our middle schools have an iPad.

Student Poverty Rate

- 63% Subsidized Meals
- 37% Full Pay Meals
About wpms...

- Enrollment of 792
- Boys – 432
- Girls – 360
- 85% Free/Reduced Lunch
- 29% Special Education
About wpms...

- Our students are provided 100 minutes of math and ELA each day.
- Our students are provided 100 minutes of science and social studies every other day.
- We rotate the students between two teachers.
We use a blended-learning model to support personalized digital learning

Blended Learning Model

◆ Direct Instruction
◆ Digital Content Instruction
◆ Digital Creation
   ◇ Project-Based Learning
   ◇ Curriculum-Based Performance Assessments
   ◇ Application of Knowledge
Direct Instruction

◆ Explicit instruction is provided to a small group of students addressing curriculum standards or to remediate students.

◆ Dynamic groups are devised using data from digital tools and programs.
Digital Content Instruction

◆ Explicit and intentional digital instruction assigned to:
  ✦ Compliment direct instruction
  ✦ Provide relevant intervention
  ✦ Accelerate student learning
Digital creation

◆ Opportunities are provided for students to engage in real-world application of the content.
◆ Allows students to collaborate and demonstrate their learning, including critical thinking, communication, and creative problem solving
DIGITAL MATH TOOLS

Within our model we use various strategies to personalize math instruction to meet the needs of our students. These strategies include:

✧ Literacy Infusion
✧ Social Media
✧ Gaming
✧ Adaptive Content & Assessment
✧ Paperless Practice
The Common Core Standards have increased the demand for the use of informational text. We use Achieve3000 in the math classroom to complement instruction because it allows students to interact with text at their reading level and it helps to make the connection between reading and math.
Social Media

◆ The use of social media is engaging, promotes skills in communication and critical thinking, and helps to personalize learning.

◆ We use sites like Edmodo and Google Classroom to engage our students. These two sites allow teachers to organize playlists for students to complete lessons or activities in a safe environment that is teacher-controlled.
Gaming

◆ Students are engaged by games, and gaming is another instructional strategy that lends itself to personalization.

◆ Gaming, through sites like Kahoot, Socrative, Khan Academy and USA Testprep, can be used to monitor student learning in a way that is fun for students. The data received from these sites allows teachers formulate instructional groups.
Adaptive Content & Assessment

◆ We implement programs with adaptive content & assessment like Khan Academy, LearnBop, ALEKS and iReady to help us personalize learning for all students regardless of their instructional level.

◆ The data retrieved from the adaptive assessment programs allow teachers to formulate instructional groups to either accelerate or provide intervention for students.
Paperless Practice

◆ Any teacher knows that perfect practice is necessary if students are going to be successful.

◆ Paperless practice allows the students to practice math skills and dramatically reduces the amount of papers that teachers have to grade by hand.

◆ We use sites like Khan Academy, IXL and CK12 to accomplish this goal, and the students are able to practice, but it feels like play.
Logistical Issues

✓ Infrastructure
✓ Device Selection
✓ Planning
✓ Administrative Investment
✓ Teacher Investment
Transformative Teaching
DreamBox Learning K-8 Math

Rigorous Mathematics Curriculum

• Reporting Aligned to CCSS, Texas TEKS, Virginia SOL, Canada WNCP, & Canada Ontario Curriculum Reports
• Standards for Mathematical Practice

Motivating Learning Environments

• Student Directed, Empowering
• Leverages Gaming Protocols

Intelligent Adaptive Learning™ Engine

• Millions of personalized learning paths
• Tailored to a student’s unique needs

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Digital Math Strategies

Personalized Learning in K-8
Audra McPhillips - PK-12 Mathematics Standards Implementation Specialist/Coach
amcphillips@ww-ps.com

Jim Monti - Director of Educational Reform, Compliance & Technology
jmonti@ww-ps.com
West Warwick Public Schools

- Approximately 20 miles south of Providence, R.I.
- Considered an “urban ring” community
- 3,414 PreK-12 students
- 48% economically disadvantaged students
- 83% of 11th graders were proficient or proficient with distinction in reading (2014)
- Cohort started out 59% proficient or proficient with distinction in 3rd grade showing a 24% increase
- Approximately 320 certified teachers
- 160 support staff and 24 central office/building administrators
West Warwick Public Schools

- Greenbush Elementary School: 471 K-4 students
- Horgan Elementary (Title I): 524 K-4 students
- Wakefield Hills Elementary (Title I): 413 K-4 students
- Deering Middle School: 994 5-8 students
- West Warwick High School: 951 9-12 students
- Maisie E. Quinn School: 60 pre-k, 40 5-12 students
2013-14 Chromebook Purchases
- 1 Title I Elementary School - 1:1 (550 CBs)
- 1 Title I Elementary School - 6 Classrooms 1:1 (200 CBs)
- 1 Elementary School - 3 Classrooms 1:1 (80 CBs)
- 1 Middle School - 3 Classrooms 1:1 (80 CBs)
- 1 High School - 8 CBs on Carts (200 CBs)
- 155 CBs to Grades 8-10 Special Education Students

2014-15 Chromebook Purchases
- Remove Windows XP machines for staff
- Purchase Chromebooks for all staff & students

4,500 Chromebooks into production to support communication, collaboration, and content creation.
Grade One
Comparing Numbers (1.NBT.3)

1.NBT.3  Compare two, two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <. (Look for two specific kinds of justification.)

MP 3 - Students will construct a viable argument to convince others which one is correct.

MP 6 - When making that viable argument they will use precise place-value language and comparison language (tens, ones, greater than, less than, equal…)

MP 7 - The arguments that students will be making rely on the most important structure in K-5 math; place value.
Grade One
Comparing Numbers (1.NBT.3)

Concrete and Semi-Concrete Representations
Grade One
Comparing Numbers (1.NBT.3)

- Screencasting
- Deeper and varied levels of justification
- Resource for parents
- Vehicle for teacher feedback
- Self and peer assessment
Grade Five
Add & Subtract Fractions (5.NF.1,2)

5.NF.1 Add and subtract fractions with unlike denominators by replacing given fractions with equivalent fractions.

5.NF.2 Solve word problems, including cases of unlike denominators, using visual fraction models or equations to represent the problem.

MP 2 - Students create story problems to match given expressions (contextualizing).
MP 4 - Modeling the mathematics with visual representations and equations including equivalent fractions is essential.
Grade Five
Add & Subtract Fractions (5.NF.1,2)

Sample: $\frac{1}{4} + \frac{1}{3}$

Picture:

Strategy/Solution: $\frac{1}{4} = \frac{2}{8} = \frac{3}{12}$
$\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$
$\frac{3}{12} + \frac{4}{12} = \frac{7}{12}$

Story Problem: Thomas finished $\frac{1}{4}$ of his homework before dinner and $\frac{1}{3}$ of his homework after dinner. How much of his homework is finished?
# Grade Five

Add & Subtract Fractions \((5.NF.1,2)\)

<table>
<thead>
<tr>
<th>A. (\frac{2}{3} + \frac{1}{2} - \frac{1}{6})</th>
<th>B. (\frac{4}{5} + \frac{5}{4} - \frac{1}{2})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Picture:</td>
<td>1. Picture:</td>
</tr>
<tr>
<td>2. Strategy/Solution:</td>
<td>2. Strategy/Solution:</td>
</tr>
<tr>
<td>3. Story Problem:</td>
<td>3. Story Problem:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C. (\frac{3}{4} - \frac{1}{3})</th>
<th>D. (\frac{3}{8} + \frac{1}{4})</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Picture:</td>
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</tr>
</tbody>
</table>
Grade Five
Add & Subtract Fractions (5.NF.1,2)

A. \( \frac{2}{3} + \frac{1}{2} - \frac{1}{6} = 1 \)

1. Picture:

2. Strategy/Solution:
\[ \frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12} \quad \frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} \]
\[ \frac{1}{6} = \frac{2}{12} = \frac{3}{18} = \frac{4}{24} \]
\[ \frac{4}{6} + \frac{3}{6} - \frac{1}{6} = \frac{6}{6} = 1 \]

3. Story Problem:
   Ethan’s mom was making cookies for a party and she used \( \frac{2}{3} \) of the chocolate cookie mix and used \( \frac{1}{2} \) of the peanut butter cookie mix. Ethan’s mom dropped \( \frac{1}{6} \) of the cookie mix on accident. How much cookie mix is left?

B. \( \frac{4}{5} + \frac{5}{4} - \frac{1}{2} = 1\frac{11}{20} \)

1. Picture:

2. Strategy/Solution:
\[ \frac{4}{5} = \frac{8}{10} = \frac{12}{15} = \frac{16}{20} \]
\[ \frac{5}{4} = \frac{10}{8} = \frac{15}{12} = \frac{20}{16} = \frac{25}{20} \]
\[ \frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = \frac{5}{10} = \frac{6}{12} = \frac{7}{14} = \frac{8}{16} = \frac{9}{18} = \frac{10}{20} \]
\[ \frac{16}{20} + \frac{25}{20} - \frac{10}{20} = \frac{31}{20} = 1\frac{11}{20} \]

Story Problem:
Grade Five
Add & Subtract Fractions (5.NF.1,2)

C. $\frac{3}{4} - \frac{1}{3} = \frac{5}{12}$

1. Picture:

![Pie charts]

2. Strategy/Solution:

$\frac{1}{3} = \frac{2}{6} = \frac{3}{9} = \frac{4}{12}$
$\frac{3}{4} = \frac{6}{8} = \frac{9}{12} = \frac{12}{16}$
$\frac{9}{12} - \frac{4}{12} = \frac{5}{12}$

3. Story Problem: Haylee ate $\frac{3}{4}$ of her Oreo cream pie after school then Cassandra ate $\frac{1}{3}$ of Haylee’s pie after dinner how much pie is left?

Audra McPhillips
12:58 PM Sep 22

Person C - You did a nice job identifying equivalent fractions. Could you add another line to Part #2 to show how you can use them to find the answer to $\frac{3}{4} - \frac{1}{3}$?

Your story problem is GREAT!! It just needs some capitalization and punctuation, please... :)

# Grade Five

Add & Subtract Fractions (5.NF.1,2)

## Math Concepts

1. Matching a fraction to a model.
2. Generating equivalent fractions.
3. Adding and subtracting fractions with unlike denominators.
4. Writing a story problem to match an equation.

## 21st Century Skills

1. Working together as group (both face to face and in a collaborative Google document).
2. Finding and inserting graphics/pictures into a Google Doc.
3. Changing font color for emphasis and to show thinking.
4. Problem solving
5. Sharing thinking with others
Final Thoughts...

- Communicate
- Collaborate
- Create
DreamBox Lessons & Virtual Manipulatives

Intelligently adapt & individualize to:

• Students’ own intuitive strategies
• Kinds of mistakes
• Efficiency of strategy
• Scaffolding needed
• Response time

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### Actionable Reporting

#### Concept: Multiplication: Double & Halve

Students use known basic facts and double one factor and halve the other to determine the product of a more challenging problem.

<table>
<thead>
<tr>
<th># Completed with Proficiency</th>
<th># In Progress</th>
<th># Not Started</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 students</td>
<td>10 students</td>
<td>9 students</td>
</tr>
<tr>
<td>John P (about 1 month ago)</td>
<td>Avaneesh S (71%)</td>
<td>Anthony P</td>
</tr>
<tr>
<td>Jacob C (about 1 month ago)</td>
<td>Charles K (71%)</td>
<td>Brittany B</td>
</tr>
<tr>
<td>Rebeca D (about 1 month ago)</td>
<td>Emmanuel M (71%)</td>
<td>Christina P</td>
</tr>
<tr>
<td>Julian B (about 1 month ago)</td>
<td>Luke R (71%)</td>
<td>Emily C</td>
</tr>
<tr>
<td>Edgar H (about 1 month ago)</td>
<td>Alanna M (64%)</td>
<td>Karly H</td>
</tr>
<tr>
<td>Pedro S (2 months ago)</td>
<td>Domenic G (64%)</td>
<td>Leah P</td>
</tr>
<tr>
<td>Daniel C (3 months ago)</td>
<td>Daniel S (57%)</td>
<td>Michael D</td>
</tr>
</tbody>
</table>

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FREE Interactive Whiteboard Lessons

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Required Reading from Education Week:

Free download! **Spotlight on Math Instruction**
Math instruction is undergoing shifts in the common-core era. In this Spotlight, see how computer-based testing impacts math performance, find out which textbooks are aligned to the common core, and learn how to take a blended learning approach to math instruction.