2011-2012
Roosevelt High School

A Construction/Geometry Course Model

MINNEAPOLIS PUBLIC SCHOOL’S CTE PROGRAM
WENDIE PALAZZO
GODFREY EDAFEREIRHI
MIKE LINDSTROM
Year 1 Model (2011-2012):

- 1 math teacher + 1 construction teacher
- 2 hour block of time each day for a year
- 1 section of students
- Common planning time
- Both teachers are present for all of class time (a traditional “team-taught” approach)
- NRCCTE Math-in-CTE model
NRCCTE Math-in-CTE Model: Pairs Math and CTE Teachers – 10 Days PD
Building codes require that there cannot be more than 3/8” difference in rise between any two steps on a stairway and rise must be less than 7 3/4”. Tread width must be a minimum 11 3/4”.

The following terms will be used in explaining the math related to a set of stairs. (see Figure below)

2. Assess students’ math awareness as it relates to the CTE lesson.
Develop the Math/CTE Lesson
Review the Traditional Mathematics

\[
\sin \theta = \frac{O}{H}
\]

\[
\sin 56^\circ = \frac{EB_x}{EB}
\]

**Substitution**

**Solution**

\[
EB_x = \sin 56^\circ \times EB
\]

\[
\cos \theta = \frac{A}{H}
\]

\[
\cos 56^\circ = \frac{EB_x}{EB}
\]

**Substitution**

**Solution**

\[
EB_x = \cos 56^\circ \times EB
\]

c. List all known and unknown forces. Label direction of force with an arrow.

i. Forces in the x-direction

\[
ED \quad 775 \text{ lbf}
\]
Deliver the Lesson; Debrief and Revise
(Brian Nutter – Construction; Randy Naughton – Math)
A Solid Connection to the MN and CCSS for Math: www.scimathmn/stemtc
Standard in Lay Terms

MN Standard in Lay Terms

The chemical properties of all elements are the result of differences in atomic structure.

Big Ideas and Essential Understandings

Big Idea

Atoms are arranged in rows and columns in the periodic table depending on the number of protons. Along with protons, atoms also have electrons and neutrons. An element that has the same number of protons but a different number of neutrons is called an isotope and some of these are extremely unstable making them radioactive. All of this information was discovered over the last 150 years by chemists. The people given credit for the development and modification of these models include, Dalton, Thompson, Rutherford, Chadwick and Bohr.
2011-2012 (Year 1) Academic Performance in Mathematics (Geometry):
Course Demographics

Gender and Ethnicity - # of Students

- Male: 18
- Female: 4
- Hispanic: 8
- Black: 6
- White: 2
- Am Ind: 2
- Asian: 1
MAP Test Given

- Measures of Academic Progress (by NWEA)
- Computer Adaptive
- Fall, Winter and Spring
- Math Level and Growth
- Math Strands:
  - Algebra
  - Geometry
  - Statistics
  - Combined Score
## 2005 Mathematics Achievement and Growth Norms (RIT values)

<table>
<thead>
<tr>
<th>Grade</th>
<th>FALL Median</th>
<th>FALL Mean</th>
<th>SPRING Median</th>
<th>SPRING Mean</th>
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<td>191</td>
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<td>193</td>
<td>192.3</td>
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<td>201.7</td>
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<td>218.3</td>
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<td>234</td>
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<td>235.6</td>
<td>240</td>
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<th>Ending Grade</th>
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<th>Fall to Fall</th>
<th>Spring to Spring</th>
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<td>10</td>
<td>2.8</td>
<td>3.8</td>
<td>3.2</td>
</tr>
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</table>
Fall to Spring MAP Math Overall Growth

RIT Point Growth

-5 0 5 10 15 20 25

Student 1  Student 2  Student 3  Student 4  Student 5  Student 6  Student 7  Student 8  Student 9  Student 10  Student 11  Student 12  Student 13  Student 14  Student 15  Student 16  Student 17  Student 18

RIT Point Growth

Typical Growth

Nationally
Fall to Spring MAP Math Geometry Strand Growth

Geometry Strand RIT Point Growth

Student 1
Student 2
Student 3
Student 4
Student 5
Student 6
Student 7
Student 8
Student 9
Student 10
Student 11
Student 12
Student 13
Student 14
Student 15
Student 16
Student 17
Student 18

RIT Point Growth
Overall MAP Math Growth (Fall to Spring) of the Implementation Year

- 14 of 18 students exceeded their growth target
- 1 student exactly met their growth target
- 3 of 18 students fell short of their growth target
- 15 of 18 students (83%) either met or exceeded their personal growth target in mathematics; The national average is 50% meeting/exceeding their growth targets...
- 15 of 18 students (83%) exceeded typical national growth expectations for 10th graders (56% significantly exceeded those numbers)
- 5 students dropped (performance unknown)
Cautious Optimism...

- From the NWEA website: “Classes in which 50% or more students have positive growth indices, show above average growth in relation to the norm group.”
- The margin of error for MAP is typically +/- 3%
- An extremely small percentage of classrooms nationally will have 83% of students meeting/exceeding growth targets
- This class at Roosevelt was demographically a much more “at risk” group than the national average
- Typically new programs score lower in their first year as “bugs” are worked out of the system
MPS CTE
A Continuous Improvement Model:
Year 2 Model (2012-2013):

- 1 math teacher + 1 construction teacher
- 2 one-hour blocks of time each day for a year
- 2 sections of students (some of the same students, but different hours)
- Common planning time
- Only one teacher present during each of the class times
- NRCCTE Math-in-CTE model continues
Improvement Options Under Consideration:

- Binder logos, shirts, signs to create program branding and increase marketing
- Increase common planning time (currently before or after school)
- Increase emphasis on daily formative assessment
- Explore partnership certifications with Dunwoody Technical College
- Restructure the 2-hour block to improve access to other electives
Additional Resources Recommended:

- CNC router added: should be a great additional tool to demonstrate geometry applications
- CAD training for both CTE and Math teacher to accompany CNC router
- Student binders to assist in student organization
- 2 Computers to integrate with CNC router
STEM 1.0 - The First Step...
Quality, Standards-based Courses in All 4 Areas

Science
Technology Education
Engineering
Mathematics

Lindstrom, 2009
STEM 2.0 - The Ultimate Goal...
Integrated STEM for ALL Students

Lindstrom, 2009
Questions and Contacts

- **Godfrey Edaferierhi – MPS CTE**
  - [Godfrey.Edaferierhi@mpls.k12.mn.us](mailto:Godfrey.Edaferierhi@mpls.k12.mn.us)
  - 612-668-0656

- **Mike Lindstrom, Ed.D. – MPS Consultant**
  - [Mike.r.lindstrom@gmail.com](mailto:Mike.r.lindstrom@gmail.com)
  - 612-209-1739

- **Wendie Palazzo – MPS CTE Director**
  - [Wendie.Palazzo@mpls.k12.mn.us](mailto:Wendie.Palazzo@mpls.k12.mn.us)
  - 612-668-0652