Shifting Sands of School Librarianship: From Math Phobic to Math Enthusiast

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THE UNFORTUNATE HUMOR IN MATH

Another Day Gone By
and I Didn’t Use
ALGEBRA
Even Once!

MATH TEACHERS
HAVE PROBLEMS

HOW TO DO MATH:
1) WRITE PROBLEM DOWN
2) CRY

Image credit: cafepress.com
Who’s With Us?

Who’s done Cooperation or Coordination with Math Teachers?

How about Collaboration?

Who would like to make Collaboration happen with Math Teachers?
## Looking for $x$ : What Adds Up?

<table>
<thead>
<tr>
<th>Barriers to Tech Integration in Math</th>
<th>School Librarians: Key Change Agents</th>
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</thead>
<tbody>
<tr>
<td>✓ Access</td>
<td>✓ Tech Leaders</td>
</tr>
<tr>
<td>✓ PD Needed</td>
<td>✓ Teacher of multiple literacies</td>
</tr>
<tr>
<td>✓ Curriculum &amp; Pedagogy</td>
<td>✓ Open to Collaboration</td>
</tr>
<tr>
<td>✓ Relevant to Math?</td>
<td></td>
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</tbody>
</table>
“Math teachers have their own tech”

“The math teachers are too busy to co-plan”

“I don’t know how to help”

“We don’t really have math books”

“I don’t know math well”

“I’m not able to make tech purchasing decisions”

“Math teachers are under a lot of pressure and don’t have room in the curriculum”

Perspectives of School Librarians
“Tech gets in the way”
“We’ve never tried that”
“The librarian is so busy”
“I don’t need help in my class”

“I don’t think the librarian really knows math”
“I already get the PD I need”
“I find my own resources”

“There’s no way I can fit anything else into my curriculum”

Perspectives of Mathematics Teachers
(A) ...apply mathematics to problems arising in everyday life, society and the workplace.

(B) ...use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution.

(C)...select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate and techniques including mental math, estimation, number sense as appropriate to solve problems.
(D) ...communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate.

(E) ...create and use representations to organize, record, and communicate mathematical idea.

(F) ...analyze mathematical relationships to connect and communicate mathematical ideas.

(G) ...display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.
Current technologies offer abundant opportunities to cultivate students’ capacities for reasoning, inquiry, representing mathematics in multiple modes, and communicating quantitative information meaningfully;

Librarians can help alleviate barriers to technology integration:
- Providing access to digital resources and technology
- Imparting knowledge of digital resources and technology and how to use/integrate into curriculum seamlessly
- Provide PD to math team
- Teaching students how to use the technology

The AASL Standards for the 21st Century dictates the skills that librarians are responsible for, which includes technology and inquiry skills.
Making linkages between CCSSM and AASL

Serve as a guide for math teachers and librarians to think about how these standards interrelate, next step is thinking about how to make connections.

http://www.alra.org/aasl/guidelinesandstandards/commoncorecrosswalk/math
TECHNOLOGY INTEGRATION INTO MATHEMATICS
GUIDE TO REFERENCE M-TEKS
HTTP://TER.PS/5AC

(a) Introduction.
(1) The desire to achieve educational excellence is the driving force behind the Texas essential knowledge and skills for mathematics, guided by the college and career readiness standards. By embedding statistics, probability, and finance, while focusing on computational thinking, mathematical fluency, and solid understanding, Texas will lead the way in mathematics education and prepare all Texas students for the challenges they will face in the 21st century.
(2) The process standards describe ways in which students are expected to engage in the content. The placement of the process standards at the beginning of the knowledge and skills listed for each grade and course is intentional. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use mathematics efficiently and effectively in daily life. The process standards are integrated at every grade level.
When possible, students will apply mathematics to problems arising in everyday life. Students will use a problem-solving model that incorporates information, formulating a plan or strategy, determining a solution, justifying the solution, evaluating the problem-solving process and the reasonableness of the solution. Appropriate tools such as real objects, manipulatives, algorithms, paper and pencil, and technology are chosen simultaneously by the teacher and student. They include mental math, estimation, number sense, and general problem solving techniques such as simplifying, choosing variables, and using patterns. Students will use mathematical relationships to generate connections and predictions. Students will analyze mathematical relationships and communicate mathematical ideas. Students will display, explain, or justify the results of mathematical investigations using precise mathematical language in written or oral communication.

(b) Knowledge and skills.
(1) Mathematical process standards. The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to:
(A) apply mathematics to problems arising in everyday life, society, and the workplace;
(B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
(C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
(D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
(E) create and use representations to organize, record, and communicate mathematical ideas;
(F) analyze mathematical relationships to connect and communicate mathematical ideas;
(G) display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

(2) Number and operations. The student applies mathematical process standards to represent and use rational numbers in a variety of forms. The student is expected to:
(A) classify whole numbers, integers, and rational numbers using a visual representation such as a Venn diagram to describe relationships between sets of numbers;
(B) identify a number, its opposite, and its absolute value;
(C) locate, compare, and order integers and rational numbers using a number line;
EXAMPLE 1: NUMBER AND OPERATIONS

Topic and Standards:
M-TEKS Math Topic: Number and Operations
M-TEKS Standard: 6.b.2.a, 6.b.2.e, 6.b.3.a, 7.b.2, 7.b.3, 8.b.2.a, 8.b.2.b, 8.b.2.c.
M-TEKS Process Standard: A, B, D, G
AASL Standard for the 21st Century Learner: 2.1.4, 2.4.3, 3.4.1
EXAMPLE 2: NUMBER AND OPERATIONS

Topic and Standards:
M-TEKS Math Topic: Numbers and Operation (Topic can vary based upon assignment)
M-TEKS Standard: (Standard may vary depending upon topic).
M-TEKS Process Standard: A, B, D, G
AASL: 3.1.3, 3.4.1, 4.4.5

http://toondoo.com
EXAMPLE 3: PROPORTIONALITY

**Graphing Stories**

http://vimeo.com/64020531

http://graphingstories.com

http://www.wevideo.com

http://blog.mrmeyer.com/?p=213

**Topic and Standards**

M-TEKS Math Topic: Proportionality

M-TEKS Standard: 7.b.4.a, 7.b.4.b, 7.b.4.c, 7.b.4.d, 7.b.6.g, 7.b.6.h

M-TEKS Process Standard: A, B, C, D, E, F, G

AASL Standards for the 21st Century Learner: 1.1.1, 2.3.1
EXAMPLE 4: PROPORTIONALITY–GRAPHING

Topic and Standards
M-TEKS Math Topic: Proportionality
M-TEKS Standard: 7.b.6.g, 8.b.4.a, 8.b.4.b, 8.b.4.c, 8.b.5.a, 8.b.5.b, 8.b.5.c, 8.b.5.f, 8.b.5.g, 8.b.5.h,
M-TEKS Process Standard: D, E, F, G
AASL Standards for the 21st Century Learner: 1.1.1, 2.3.1

http://nces.ed.gov/nceskids/createagraph/
EXAMPLE 5: EXPRESSIONS, EQUATIONS AND RELATIONSHIP

Topic and Standards:
M-TEKS Math Topic: Expressions, equations and relationship
M-TEKS Standard: 6.b.6.c, 7.b.7
M-TEKS Process Standard: D, E, F, G
AASL Standards for the 21st Century Learner: 3.1.3, 3.4.1, 4.4.5

http://educreations.com
EXAMPLE 6: MEASUREMENT AND DATA

Percentage of Middle School students that recycle

We surveyed a sample of 30 students in each grade to see how many answered "yes" to the question "Do you use the recycling bins at school each day?"

6th grade 7th grade 8th grade

50% of students

15/30

The data shows that we need to recycle more. We should hold recycling competitions and have more recycling bins to encourage students to recycle more.

http://infogr.am/Percentage-of-Middle-School-students-that-recycle/

Topic and standards
M-TEKS Math Topic: Measurement & Data
M-TEKS Standard: 6.b.12.a, 6.b.12.d, 6.b.13.a,
M-TEKS Process Standard: A, B, C, D, E, F, G
AASL Standard for the 21st Century Learner: 1.2.1, 2.1.2, 2.1.3, 3.3.3
EXAMPLE 7: MEASUREMENT AND DATA

http://fieldtripearth.org/

Topic and standards
M-TEKS Math Topic: Measurement & Data
M-TEKS Standard: 6.b.12.a, 6.b.12.c, 6.b.13.b, 7.b.12.b, 7.b.12.c,
M-TEKS Process Standard: A, B, D, E, F, G
AASL Standards for the 21st Century Learner: 2.1.3, 2.3.1
EXAMPLE 8: GEOMETRY

Topic and Standards
M-TEKS Math Topic: Cross-cutting
M-TEKS Standard: 6.b.8, 6.b.11, 7.b.5, 8.b.7, 8.b.10
M-TEKS Process Standard: A, B, C, D, E, F, G
AASL Standards for the 21st Century
Learner: 1.1.1, 2.3.1

http://floorplanner.com
http://ter.ps/3qv
EXAMPLE 9: GEOMETRY

Topic and Standards
M-TEKS Math Topic: Cross-cutting
M-TEKS Standard: 6.b.8, 6.b.11, 7.b.5, 8.b.7, 8.b.10
M-TEKS Process Standard: A, B, C, D, E, F, G
AASL Standards for the 21st Century
Learner: 1.1.8, 1.2.3

http://3dtin.com
A COLLABORATIVE LESSON USING GOOGLE MAPS

http://ter.ps/5c1
THANK YOU

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