Assistive Technology

OPTIONS FOR MATHEMATICS

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"Hey, what assistive tech do you have for math?"

LANGUAGE ARTS

- Reading
- Writing
- Speaking
- Listening

MATHEMATICS

- Calculating & Processing
- Measuring & Comparing
- Analysing & Drawing Geometric Entities
- Managing data
- Problem Solving
- Reading (Words + Symbols)
- Writing (Words + Symbols)
- Speaking (Specialized Vocabulary)
- Listening (Specialized Vocabulary)

No "*One Tool*"

DOES NOT EXIST

Math Assistive Tech

Type of AT Tool

• description and features

Needs Addressed:
- As per learning profile

Leverages Strengths:
- As per learning profile

Examples:

Most are Free for Ontario Schools

OSAPAC or *gratis*

Exceptions marked with$

Math Technology Tools for Specific Needs

Click [here](#) to view/download

Tools	Dysgraphia (motor skills / writing)	Dyscalculia (Math Operations)	Math Reasoning (Problem solving)	Organization / Executive Function	Reading	Working Memory	Long-term Memory
Math Dictionary with Visuals							•
Virtual Manipulatives and Simulation Tools	•		•	•		•	
Spreadsheets	•	•		•		•	
Geometry Software	•		•				
Equation Editors	•						
Symbol functionality in word processors	•						
Equation Banks	•						•
Digital Grid Notepaper	•						
Talking Calculator	•	•				•	

Tool Software
Vs.
Curriculum Software

If the software has the questions and knows the answers, it's not tool software.

If the outcomes are not open-ended, it's not tool software.

If the teacher and/or student are not in full control of where the learning is headed, it's not tool software.

If it's not tool software, it's curriculum software, a.k.a. "Skill and Drill"

Math-Specific Tools

Spread-sheet

- Built-in functions (e.g., *Average*)
- Calculate complex expressions
- Create graphs
- Text-to-Speech (MS Excel)
- Used in workplace

Addresses Needs:
- motor skills/dysgraphia
- math calculation/dyscalulia
- organization
- working memory

Leverages Strengths:
- computer skills
- math problem solving

Examples:
   Microsoft Excel$^$
   Open Office or *Libre Office*

Math Dictionary

• Written definitions and explanations along with visuals for reference

•Interactive examples can be used for individual practice or whole-group instruction

Addresses Needs:
- semantic memory
- language of mathematics
- understanding of math concepts

Leverages Strengths:
- visual learner

Examples:
http://amathsdictionaryforkids.com (Primary/Junior)
    ✗ not compatible with Kurzweil or WordQ TTS
http://mathwords.com (Intermediate/Senior)
    ✓ is compatible with Kurzweil's Read the Web

Virtual Manipulatives and Math Puzzles

Addresses Needs:
- motor skills / dysgraphia
- language
- working memory
- understanding of math concepts
- math problem-solving

Leverages Strengths:
- visual and/or kinaesthetic learner
- gifted

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Virtual Manipulatives and Math Puzzles

• For group instructional use (great with SMART board) as well as personal use for problem-solving, visualization of concepts, drawing diagrams etc.

• Less mess and easy to manage

Examples:

- Counters, tens frames
- Base-10 blocks that magically stick together
- Visual representations of fractions
- Geometric Shapes
- Money (Canadian coins and bills!)
- Tricky-to-handle tools like compass and protractor
- Interactive 100's chart
- Dice and Spinners (self-tabulating)
- Number lines
- Algebra manipulatives
- Clock faces

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Virtual Manipulatives and Math Puzzles

Examples:
- SMART Notebook
  - **Print Capture** feature will import scanned worksheets/tests; can import entire textbooks from AERO.
- Intellitools Classroom Suite 4$^\$$
- Math Pad Plus$^\$$

Internet Sites:
- http://nlvm.usu.edu (U.S. National Library of Virtual Manipulatives)
- http://conceptuamath.com (focus on fractions)
- http://shodor.org/interactivate
- http://www.brainingcamp.com/resources/math
- http://www.teacherled.com/all-interactive-whiteboard-resources/
- Gizmos (OSAPAC – simulations)

Geometry Software

• Draw and manipulate geometric shapes and constructions with ease.

• Can also be used for certain types of graphing when Excel doesn't do the trick (e.g., graphing function on Cartesian plane)

Addresses Needs:
- motor skills / dysgraphia
- solving equations
- organization
- understanding of math (geometric) concepts

Leverages Strengths:
- computer skills
- visual learner

Examples:
- SMART Notebook (Primary/Junior/Intermediate)
- Geometer's Sketchpad (Intermediate/Senior)

Data Management Software

• Manage, analyze, manipulate and plot sets of data

Addresses Needs:
• motor skills / dysgraphia
• organization
• copying skills / working memory

Leverages Strengths:
• computer skills
• visual learner

Examples:
• Graphers (Primary / Junior)
• Tinkerplots (Junior/Intermediate)
• Fathom (Intermediate/Senior)

Digital Notepaper

- For arithmetic calculations (primary/junior)

- Click in a box in the grid to type a digit

- Easy to keep numbers lined up in grid

- Show carrying and borrowing

- Can use with Text-to-Speech

Addresses Needs:
- motor skills / dysgraphia
- organization

Leverages Strengths:
- calculation skills
- math problem-solving

Examples:
- Download MS Word templates for Word 2003 and for Word 2007 (use WordQ for TTS)
- Math Pad Plus$^\$$
  - Additional features:
    - ✓ Helps with sequencing
    - ✓ Checks answers for instant feedback

Equation Editor / Bank

- Essentially like a word processor for equations

- Can store and retrieve common formulae (e.g., quadratic equation, area or volume of a certain shape, scientific formulae, etc.)

- <u>Not</u> for students with dyscalculia

Addresses Needs:
- motor skills / dysgraphia
- memory (recalling formulae)

Leverages Strengths:
- calculation skills
- math problem-solving

Examples:
- Microsoft Word$^\$$ Equation Editor
- Open Office / Libre Office
- Math Type$^\$$
- Math Talk$^\$$ (w/ speech recognition)
- INFTY (w/ text-to-speech)
- Efofex Equation
- Microsoft Mathematics

Word Processing Tricks

- When equation editor is overkill

- Easily access math symbols that are part of the extended character set in most typefaces

- Customize toolbars, build macros, use *Ax*

Addresses Needs:
- motor skills / dysgraphia
- memory (recalling formulae)

Leverages Strengths:
- calculation skills
- math problem-solving

Examples:
Microsoft Word
(*Open Office*
- Ax software makes it easy to type certain symbols
http://vulpeculox.net/ax/

Talking Calculator

- Text-to-speech feedback to prevent errors

Addresses Needs:
- working memory
- vision
- visual-motor integration
- copying skills
- calculation skill

Leverages Strengths:
- auditory skills
- math problem-solving

Examples:
- http://pbskids.org/cyberchase/games/calculator (primary/junior)

Kurzweil 3000$^{\$}$'s Talking Calculator

Tools for Any Subject

Sound Recording and Screen Recording

- Instead of writing

- Students make a recording for communicating thinking

- Teachers can record procedures, instructions, or descriptive feedback

Addresses Needs:
- motor skills / dysgraphia
- memory (procedural)
- reading

Leverages Strengths:
- verbal expression
- auditory / visual learner

Examples:
- MS Word$^\$$ voice recorder
  - how-to: Word 2007; Word 2003 & previous
- Audacity
- Kurzweil 3000$^\$$ Voice Notes
- Screencast-o-matic.com
- Lessons at khanacademy.org

Digital Note Capture

• Relieves students of the burden of copying notes during the lesson

Addresses Needs:
- motor skills / dysgraphia
- auditory processing
- working memory
- attention
- attendance

Leverages Strengths:
- study habits

Examples:
- Digital camera$^\$$ + [Evernote](#)
- SMART Notebook
- Mimio$^\$$
- Livescribe Smartpen$^\$$

OCR with Text to Speech

- Reads materials aloud

- User can highlight key information

- Access AERO library of digital texts, or scan

Addresses Needs:
- reading: decoding and comprehension

Leverages Strengths:
- auditory skills

Examples:
- any OCR + WordQ version 3
- Kurzweil 3000$, Premier$, Read & Write Gold$, WYNN$, etc.