

# Technology Tips for Differentiated Instruction

<http://www.westedrtec.org/techtips>

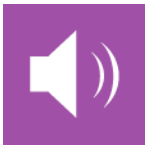
by WestEd's Regional Technology in Education Consortium (RTEC) in partnership with the Alliance for Technology Access

## Current Tips:

### Digital Text



### Audio



### Digital Enhancement



### Software



### Visual



### Curricular Supports



### Targeted Populations



**Technology Tips is a web site, a PowerPoint presentation, and materials to support hands-on staff development, customized for individual sites or districts. It's...**

- focused on technologies most schools already have
- for use in professional development of technology
- for general and special educators, and staff

## Differentiated Instruction

" is a model of instruction that revolves around the belief that students learn in many different ways." (Verde, 2004)

It means

- providing materials and tasks at varied levels of difficulty with varying degrees of scaffolding, through multiple instructional groups, and
- encouraging student success by varying ways in which students work: alone or collaboratively, in auditory or visual modes, or through practical or creative means. (Tomlinson, 2000)

## Why differentiate instruction?

- Because not all children learn in the same way.
- Because NCLB says all children need to become proficient.
- Because research and practice demonstrate that differentiated instruction techniques are effective.
- Because we can maximize student's growth by meeting each student where he or she is and helping them progress.
- Because of the diversity of students found in today's classrooms. (ELL, disabilities, cultural backgrounds, etc.)

**Technology can help you tailor instruction to meet the needs of all students by allowing changes to:**


- content
- channels of input, and
- means of output.

Technology is also an excellent platform for cooperative learning.

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	<h2>Digital Text</h2>										
<p><u>What is digital text?</u> Text stored as strings of characters.</p> <ul style="list-style-type: none"><li>• If you can select and change the font of text on the computer screen, it's electronic text.</li><li>• Many books and historical documents have been converted to digital format, for access via computer.</li><li>• New writing is being done to take advantage of hyperlinking and multi-media.</li></ul> <p><u>Who does it help?</u></p> <ul style="list-style-type: none"><li>• Those who have trouble reading standard print from books</li><li>• Those who need additional information or supports placed immediately near the relevant text.</li><li>• Those who could benefit manipulating or interacting with the text.</li></ul> <p><u>Why use digital text?</u></p> <ul style="list-style-type: none"><li>• Visual display can be varied</li><li>• Auditory display - good for pre-reading</li><li>• Allows embedding learning supports in content<ul style="list-style-type: none"><li>• Pre-reading background, definitions</li><li>• Summary</li><li>• Key questions</li></ul></li><li>• Allows students to copy/paste, or otherwise manipulate the text.</li></ul>	<p><u>Free books online</u></p> <ul style="list-style-type: none"><li>- <i>Digital Book Libraries</i> (over 90 sites listed) <a href="http://www.ditext.com/etexts.html">http://www.ditext.com/etexts.html</a></li><li>- <i>Internet Public Library</i> <a href="http://www.ipl.org/">http://www.ipl.org/</a></li><li>- <i>Project Gutenberg</i> <a href="http://promo.net/pg/">http://promo.net/pg/</a></li><li>- <i>University of Virginia's e-Book Library</i> <a href="http://etext.lib.virginia.edu/ebooks/ebooklist.html">http://etext.lib.virginia.edu/ebooks/ebooklist.html</a></li><li>- <i>American Memory</i> at <a href="http://memory.loc.gov/">http://memory.loc.gov/</a></li><li>- Alex, (Literature &amp; philosophy) <a href="http://www.infomotions.com/alex/">http://www.infomotions.com/alex/</a></li><li>- The Oxford Text Archive catalog, <a href="http://ota.ahds.ac.uk/">http://ota.ahds.ac.uk/</a></li><li>- Project Bartleby has many reference books, poetry texts, and historical editions. <a href="http://www.bartleby.com/">http://www.bartleby.com/</a></li></ul> <p><u>Examples of free digital text by author</u></p> <table><tr><td>Dickens</td><td>Robert Frost</td></tr><tr><td>Mark Twain</td><td>Edgar Allan Poe</td></tr><tr><td>Edgar Rice Burroughs</td><td></td></tr><tr><td>Jack London</td><td>Rudyard Kipling</td></tr><tr><td>Jane Austin</td><td>Beatrix Potter</td></tr></table> <p><u>Examples of free digital text by title</u></p> <p>Declaration of Independence Bulfinch's Mythology Bartlett's Quotations Tom Sawyer Alice in Wonderland Wizard of Oz The Tell-Tale Heart Oliver Twist Little Women</p> <p><u>Almost free books online</u> Benetech's BookShare, <a href="http://www.bookshare.org">http://www.bookshare.org</a> Over 12,000 titles of books still in copyright.</p> <ul style="list-style-type: none"><li>• Individual subscriptions enable "all-you-can-read"* access to books in easy-to-use digital formats for a full year. Subscriptions are \$75 the first year, then \$50.</li><li>• School subscriptions also available at \$300 for 30 books, \$450 for 60 books, or \$600 for 100 books.</li></ul>	Dickens	Robert Frost	Mark Twain	Edgar Allan Poe	Edgar Rice Burroughs		Jack London	Rudyard Kipling	Jane Austin	Beatrix Potter
Dickens	Robert Frost										
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## Audio (Talking Text)

### What is talking text?

- Words on the screen are read by the computer, on command.
- In some cases, the words need to be highlighted first.
  - allows reading of individual words or phrases.
  - works with word processors, websites, and more.
  - often called text-to-speech.

### Who does it help?

- Students who struggle with the task of composing grammatically correct sentences;
- Those who could benefit from hearing omissions or inaccuracies in their work;
- Those who could benefit from auditory input to support reading.

### What does research say?

- Developing reading comprehension is a complex skill.
- If a great deal of effort goes to sounding out words, energy for comprehension is reduced.
- Talking text can provide one more tool for supporting comprehension for some students. (Rose & Dalton, 2002)
- Many students improve editing and proofreading.
- Hearing one's own words is rewarding and motivating.

*Note: You WILL need headphones.*

### Benefits of talking text

- Talking text allows a student to select individual words that they may be having problems with and can support reading at a

There are three main ways to get computer text to talk. The easiest is to use speech features within a program such as Kidspiration. Another way is to use a utility, so that text highlighted within any program will talk. A third way is to use a free or commercial talking word processor. Speech in existing software includes:

### Kidspiration

- The Listen tool (Symbol of an ear) reads the words in their projects.
- The Record command (click Record on the Goodies menu) can record sounds so they can be attached to symbols or ideas to expand and reinforce learning. This allows a teacher to record instructions for students to use in an activity.

### Inspiration

To turn on the Listen tool, got into "Application Properties" from the Utility menu. Next, check the box that corresponds to the Listen tool.

### Kid Pix

Make selections under the Speech Menu

- Read Text Aloud
  - Reads text entered with the keyboard, using typewriter key
  - Text boxes will be read in order, top to bottom
- Pick a Voice
  - Dialog box with choice of voices
  - Preview to hear how each sounds
  - Click OK to select a voice

### AppleWorks (Mac)

- Open a Word Processing document.
- Highlight text and click "lips" or "text to speech" icon in the button bar.
- If there is no "talking" icon in the tool bar:
  - . Open Preferences, Available buttons, Word Processing
  - . Drag "lips" into button bar, click "done".

### AppleWorks (Windows)

Similar to Mac but if there is no "talking" icon in the tool bar, do this:

- Press the button with a triangle in the top left of the tool bar.
- Select Default *and* Visible at Start Up.
- Press the triangle button again and select Edit Button Bar.
- Select Default and Modify. From the pulldown menu, Button Categories, select Word Processing.
- Select Speak Text, a dialogue box will explain the function.

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<p>higher level.</p> <ul style="list-style-type: none"><li>Emerging writers experience the connection between the spoken and written word from the writing perspective.</li></ul> <p><u>Thinking of Your Students...</u></p> <ul style="list-style-type: none"><li>Who would benefit from highlighting individual words and hearing them read? Or from hearing the definition of the word read?</li><li>Who would benefit from hearing an entire selection or article on a website read aloud?</li><li>Who would enjoy hearing their own words read by the computer?</li></ul>	<p>- Select Add, OK and Done.</p> <p>This adds the Plain Talk button to your tool bar. Change voices via the Speech Control Panel</p> <p><u>StoryBook Reader Deluxe</u> Look for Speech under Goodies</p>
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## Talking Text: Utilities

Utilities will read highlighted text within other programs, such as MS Word, web browsers, etc.

### MACINTOSH

How to provide talking text - Mac OSX (10.3.1)

Go to Speech Preferences and choose:

- Finder menu, System Preferences, Speech, Spoken User Interfaces
- Set key to read highlighted text (Command plus \_\_)
- Choice of voices & rate (under Default Voice)

Macintosh (10.2 or earlier)

Download free utility called HearIt

<http://www.ldresources.com/files/hearit.sea.hqx>

- Install as a control panel and restart.
- Set key combination (Hit Control plus L to hear text.)
- Works with highlighted text in any program
- Deselect text to stop the talking.

### WINDOWS

There are free Microsoft voices that are of reasonable quality, but the AT&T Natural Voices are the most human sounding. Sometimes AT&T Natural Voices are bundled with other software and sometimes they are offered for an additional \$30.

Windows XP: Natural Voices

Free version reads text, Word, pdf, and email using hot keys or a floating toolbar. Highlights each word as it is read. Professional version includes Natural Voices Mike & Crystal. \$39.50

<http://www.naturalreaders.com>

Windows XP & 2000: Universal Reader

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\$39.95 utility that works within other software, including browser. Price includes AT&T Natural Voices.

Very easy to use.

Operates via a floating toolbar that has a "speak" button.

<http://www.premier-programming.com/UR/Ureader.htm>

## Windows 3.1 & 95: HELPread™

Free utility that works with other software, including browser.

<http://www.dyslexia.com/helpread.htm>

## Windows: ReadPlease 2003™

Free utility that reads text which has been highlighted and copied.

Works on Windows 95/98/ME/NT/2000/XP.

Includes 3 Microsoft voices.

Free conversion utility to make MP3 files.

<http://www.readplease.com/english/readwords.php>

## Microsoft Reader™ for Windows 98 and newer (Also Pocket PC 2002 and Tablet PC)

This is a specialized reading utility that works with eBooks that have been formatted for MS Reader (Many free from the University of Virginia etext site.) It offers great ease of visual reading, control of font size, ability to annotate, and other features.

You will also need to download the free Microsoft Reader Text-to-Speech Package.

<http://www.microsoft.com/reader/downloads/pc.asp>

## Talking Word Processors

### Windows: E-Text Reader™

Free talking word processor for Windows 98SE/ME/2000/XP

Highlights each word as read & has adjustable speed of reading.

Allows zoom, colored highlighting & find.

Allows setting bookmarks, for jumping from forward and backward.

Opens .doc files (Microsoft Word)

Sounds best with AT&T Natural Voices (\$29.95)

[http://www.premier-programming.com/elib/etext\\_reader.htm](http://www.premier-programming.com/elib/etext_reader.htm)

### Macintosh: Tex-Edit Plus™

Talking word processor -\$15 shareware.

Other languages include Japanese, French, German, Spanish, Dutch, and Italian.

Will highlight each word as read.

Can change highlight, font, and background colors.

Can insert voice recordings and graphics. (Vicki may be the best voice.)

<http://www.tex-edit.com/>

### **Commercial products - Not free but can be worth the expense.**

- Write OutLoud (\$99 or less) Free 30 day trial for teachers.
- IntelliTalk (\$140 or less) Free 45 day trial downloadable from <http://www.intellitools.com>
- CAST eReader (\$229 or less)

Commercial products will:

- highlight sentence and word within sentence as it is read
- allow reading by letter, word, or sentence
- allow correction of pronunciation & have other helpful features.

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## Enhanced Text

### What is enhanced text?

Think of the modern textbook. A chapter on a historical period might include:

- a timeline,
- a photograph,
- a reproduction of art featuring an important historical figure,
- a graphic of a historical document, and
- questions for reflection.

A related reader's guide for English learners might include

- definitions of difficult words,
- cultural context, and
- explanations of idioms.

Put all these types of resources into an electronic document or website, and you have the textbook of the future. Today we can find an increasing number of sources with

- Added information, questions, links, graphics, or videos to enhance comprehension
- Audio versions, in a variety of formats, that can accompany text.

### Who does it help?

- Students with learning disabilities
- Students who find reading challenging
- Students who may struggle with vocabulary (LEP)
- Students who come from diverse cultures

### National Reading Panel research

Techniques to enhance comprehension include:

- questions that allow self-monitoring for understanding,
- using graphic and semantic organizers,
- student-generated questions about the text,
- becoming aware of story structure, and
- periodically summarizing key points.

### Strategies for enhancing text

Preview:

- background
- summary
- visual summary
- vocabulary

Reading strategies

- questions about content
- breaking down complex sentences
- making predictions

Review and assess

- compare and contrast
- story mapping

Literary analysis

- plot, mood, theme, style, point of view

### Enhanced text: Sources

Find these links and more at the Tech Tips website.

The Intersect Digital Library Catalog

<http://intersect.uoregon.edu/>

- The Diary of Opal Whiteley
- The Diary of Juan Bautista de Anza
- Your Genes, Your Choices: Cloning
- On the Run
- An American History Sourcebook

Spark Notes <http://www.sparknotes.com>

Example: *Harry Potter and the Chamber of Secrets*

Prentice Hall Literature website for

*Timeless Voices, Timeless Themes* at

<http://www.phschool.com/atschool/literature>

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## Microsoft Word

There are some great features to Microsoft Word that support differentiation strategies. These include:

- Computer-generated summaries can identify essential content for students to pre-read
- Highlight text can focus on key words, themes, characterizations, main ideas
- Changing how the text looks on the screen allows user preference for font: type, size, and color.
- Adjusting the grammar checker allows the teacher to reduce frustration for students or target specific errors
- Determining the readability of text tells you the grade level for any document.

How are they used?

### **Auto-Summarize**

- Pre-reading for meaning
- Post-reading to self-test or summarize

### **Highlighting Text**

- Adding color to text increases the odds that the information will be stored in long-term memory and more readily recalled.
- Generally speaking, when emerging readers read, they skip over words they don't understand. Highlighting such words as they read cues them to go back later and decipher the meaning of the selection.

**Changing the text display** helps students who are having difficulty reading standard text on the screen.

**Grammar checking** can be made more appropriate to the task or grade level by checking off individual features, among the 26 options.

**Readability** can be used with electronic text to determine grade level, or when simplifying text.

### How to Auto-Summarize

Under Tools, choose Auto-Summarize

Dialog Box gives choices on:

- % or size of summary
- Method: highlight, summary on top, etc.

### How to do highlighting

Select text. Select highlighter in formatting palette.

### How to change the display in Word

Preferences, General: blue background with white text  
Font: Serif or sans-serif, size, and color

### How to modify the Grammar Checker

Preferences, Spelling and Grammar, Grammar, Writing Style: Customize grammar checking

- Casual,
- Formal, or
- Custom: 26 settings such as capitalization, contractions, passive voice, run-on sentence, etc.

### How to Get Readability Statistics

Under Tools, choose Spelling, Spelling and Grammar Dialog box: Options button  
Grammar: Show Readability Statistics

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## More Word Features

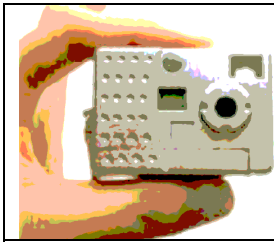
- **Enlarge the toolbar icons:** Larger icons can help younger students and those with visual impairments. (Windows only)
- **Reduce the number of toolbar icons:** To provide fewer or targeted choices.
- **Magnify text:** Various views allow larger text without increasing font size.
- **Increased space between lines:** Enables some students to read more easily.
- **Creating a To Do list** with checkboxes can help some students stay organized and on task.
- **Adding tables** can organize student note-taking or help display rubrics.
- **Using bullets and number lists** can assist students in developing outlines.
- **Writing prompts** can be created to guide a student to place text in a structured draft. When the prompts are removed, a paragraph emerges.
- **Adding comments** allows the teacher or students to put in questions or text that remains hidden until selected.
- **Thesaurus** can help expand vocabulary.
- **Text boxes** can be created as Word Lists to prompt students to use specific vocabulary or to store words that need to be looked up later. Text boxes can also be used for comments.
- **Translation capabilities** exist in the latest Windows versions of Word where a foreign language dictionary is installed. This can be helpful for single word translation.
- **Embedding hyperlinks** can turn a document into a navigation tool.
- **Text to speech:** In Windows, a free program, Natural Reader, can read directly in MS Word. Windows XP also offers some text to speech functionality. On Macs, the system can read highlighted text in Word.



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## Photos, Video, and Clip Art

### Why use photos, videos & other images?

We live in a world of images, both concrete and abstract. Technology allows us to bring many types of images together for an interactive multi-media experience.

### What does research say?

Research shows that students learn best when information is introduced and reinforced using both linguistic and non-linguistic formats.

An independent evaluation demonstrated that the use of video-on-demand improved outcomes in math, science, and social studies. Other research has shown that moving images can help students to improve retention of concepts, facilitate thinking and problem solving and that it can be as good as an instructor in communicating facts or demonstrating procedures.

### What does this look like in the classroom?

When introducing a new unit, the teacher presents a short PowerPoint or Kid Pix slide show that uses images to introduce the topic, along with content vocabulary. He then works with students to create an advance organizer to help students to identify existing knowledge along with important questions. Students are encouraged to create cause-effect models and time-sequence charts as they investigate the topic. In producing a report on the topic, students are allowed to write a traditional paper, create a slide show, a website, or make a presentation to the class.

**Digital photography** can enhance student learning and communication. Examples include:

- Photo essays
- Digital scavenger hunts
- Prompts for work on literacy skills
- Math illustrations
- How-to books
- Trading cards

Digital photographs can inspire students to plan, write, problem-solve and publish. You can import digital pictures into software such as Microsoft Word, PowerPoint, Excel, KidPix, Kidspiration/Inspiration, and AppleWorks.

**Visit** Kirsten Haugen's Vision for Learning site with tutorials, examples, and support for using digital photography in the classroom.

[http://www.4j.lane.edu/%7Ehaugen/iphoto\\_how.htm](http://www.4j.lane.edu/%7Ehaugen/iphoto_how.htm)

### Video via the Internet

Video is a rich medium, combining sound and motion with a point of view. Video clips are better than still images at conveying processes and can be played while on the Internet, or downloaded and pasted into applications. Visit the Tech Tips site for links to many streaming video sources.

### Clip Art & Photos

The Internet allows students and teachers to find pictures of almost anything. These can be copied and pasted into worksheets for printing, into PowerPoint slide shows, and into student reports. The Tech Tips site has many free sources.

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## Graphic Organizers

### What are graphic organizers?

"...a visual representation of concepts, knowledge, or information that can incorporate both text and pictures."

Graphic organizers are particularly suited to:

- generating ideas (brain-storming, etc.)
- organizing & displaying information
- aiding learning by explicitly integrating new and old knowledge
- assessing understanding or diagnosing misunderstanding
- increasing recall
- designing a complex structure (long texts, large web sites, etc.)
- incorporating both images and text

### Who do they help?

- Students who benefit from seeing relationships between information
- Students who enjoy an interactive process

### What does the research say?

- Direct teaching of the thinking strategies involved in graphic organizers leads students to use them independently. (Skruggs, 1985)
- Use of graphic organizers in pre-reading helps students relate new information to their existing knowledge. (Novak & Gowin, 1984)

"Graphic organizers are valuable instructional tools. Unlike many tools that just have one purpose, graphic organizers are flexible and endless in application. One common trait found among graphic organizers is that they show the order and completeness of a student's thought process - strengths and weaknesses of understanding become clearly evident. Many graphic organizers show different aspects of an issue/problem - in close and also the big picture. Since many graphic organizers use short words or phrases, they are ideal for many types of learners, including English Language Learners with intermediate proficiency." *WriteDesign:*

<http://www.writedesignonline.com/organizers/>

### Types of graphic organizers

- Concept maps
- Matrices
- Flow charts
- Venn diagrams
- Time lines
- Compare/contrast
- KWHL chart

### Software

KidPix, Inspiration/Kidspiration, OmniGraffle, Microsoft Word, AppleWorks

### Web Resources

Find these links and more at the Tech Tips website.

1. Instructional Strategies for identifying similarities and differences.  
[http://manila.esu4.org/instructionals/strategies/stories/storyReader\\$7](http://manila.esu4.org/instructionals/strategies/stories/storyReader$7)
2. Teach-nology online GO generator:  
[www.teachnology.com/web\\_tools/graphic\\_org/](http://www.teachnology.com/web_tools/graphic_org/)
3. SCORE Language Arts:  
<http://www.sdcoe.k12.ca.us/score/actbank/torganiz.htm>
4. Index of graphic organizers:  
<http://www.graphic.org/goindex.html>
5. PDF and HTML forms:  
<http://www.ocde.k12.ca.us/ctapread/5000.html>
6. ReadWriteThink interactive tools such as Alphabet Organizer and Circle Plot Diagram  
[http://www.readwritethink.org/student\\_mat/index.asp](http://www.readwritethink.org/student_mat/index.asp)

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## Building Rubrics

### **What are rubrics?**

The use of rubrics to score student products and processes have become common in K-12 classrooms. They are used when a judgment of quality is required and can be used to evaluate a wide range of projects and activities. Computers have greatly increased the ease with which rubrics can be made, stored, edited, and shared.

### **Who do they help?**

Rubrics can assist the teacher to increase their objectivity and fairness when grading student work. They force a teacher to think through the elements that will be considered when awarding a grade, which can increase the match between the standards a lesson is trying to address and the student outcomes. When tracking results for an entire class against a rubric, teachers can identify specific areas that are a problem. At the same time, rubrics can raise the quality of student work since they concretely convey expectations to students.

### **What does research say?**

According to a research review done by Dr. Judith Arter, "There is tantalizing evidence that using criteria [to measure student progress and to help students enhance the quality of their own performance] has an impact on teaching and student achievement." She suggests that students can learn the elements of quality by using rubrics to guide their work, as long as the rubric clearly communicates features that actually relate to quality. Dr. Arter cites the need for more research on the impact of rubrics, especially the features and teaching strategies that have the biggest impact.

Arter, J and McTighe, J. (2000) *Scoring Rubrics in the Classroom*, Using Performance Criteria for Assessing and Improving Student Performance, Corwin Press, Thousand Oaks, CA

### **Web Resources:**

The best rubric sites for teachers provide three functions. They allow you to

- Easily create a rubric
- Store it for later retrieval, and
- Search rubrics created by others.

Two free sites that meet these criteria are:

#### **Rubric Builder** from the Landmark Project

[http://www.landmark-](http://www.landmark-project.com/classweb/tools/rubric_builder.php3)

[project.com/classweb/tools/rubric\\_builder.php3](http://www.landmark-project.com/classweb/tools/rubric_builder.php3)

This free site lets you build and store your own rubrics on line. It also provides a searchable set of rubrics built by other teachers. For instance, the key word "Pueblo" results in seven rubrics, while the term "Native American" returns over one hundred. You can clone existing rubrics and make changes to them. The number of objectives per rubric can be set from one to nine, as can the number of performance indicators. It can be a bit slow but the advantage of being able to find rubrics by subject is worth it.

#### **RubiStar**

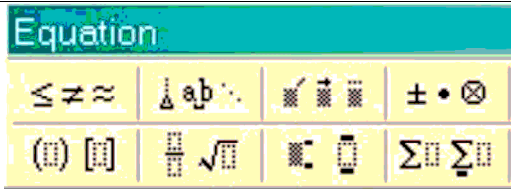
<http://rubistar.4teachers.org/index.php>

RubiStar is a free site that offers templates that can be customized for a wide range of project-based learning activities, including oral projects, products, multi-media presentations, science projects, and work skills. Based on the type of project, appropriate suggested performance indicators can be selected from a pop-up menu. Once a performance indicator is selected, suggested performance indicators appear in a 4 level rubric. These are based on model teacher rubrics and can be edited. Registered users can save their rubrics online for one year. The site also lets you enter student scores for a particular rubric and analyze the class results. There are a limited number of pre-made rubrics, categorized by topic, for browsing.

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## Math Tools

### What are the tools and who do they help?

Computer-based manipulatives, equations, converters, calculators, lessons, and games can all expand the available tools for teaching math.

The fact that it's computer based can be motivating for some students.

For those with difficulty writing or lining up problems, working in a word processor or spread sheet makes things much clearer. As digital text, the problems can also be enlarged, color-coded, or highlighted.

Some of the tools are multi-sensory, including animation and colorful graphics, appealing to visual and auditory learners.

Computer-based lessons can present information in small chunks, allowing the user to control the speed. Many meet the needs of kinesthetic learners by providing hands-on exploration. They can all be used with physical manipulatives, as well as pencil and paper.

### What does research say?

Computer-aided instruction has been shown to be an effective tool for mathematics instruction (Goldman & Pellegrino, 1987; Okolo, Bahr, & Reith, 1993). Students who use appropriate technology persist longer, enjoy learning more, and make gains in math performance. The potential of hypermedia to improve mathematical performance (Babbitt & Miller, 1997) is being realized in today's software design.

**Equation Editor** is a free part of Microsoft Word and Excel. It allows you to type equations into Word and Excel and is recommended for Grades 4 and up; Equation Editor allows you to build equations by picking symbols from a toolbar, as well as by typing numbers and variables.

<http://www.microsoft.com/education/InsertEquation.aspx>

### On line Tools and Software

Virtual tools and manipulatives can be good for students that have difficulty visualizing. Guiding them to the proper manipulative is important. Students can learn different things from the physical manipulative and the virtual manipulative, so both can be used together.

Many links to manipulatives are found on the [www.westedrtec.org](http://www.westedrtec.org) site. For example:

**NCTM (National Council of Teachers of Mathematics) Illuminations Website** has over 55 applets that allow exploration of math concepts. Each is linked to standards and lesson plans.

<http://illuminations.nctm.org/tools/index.aspx>

### National Library of Virtual Manipulatives for Interactive Math features:

*Algebra Tiles*      *Box Plot*  
*Circular Geoboard*      *Coordinate Geoboard*  
*Grapher*      *Histogram*  
*Pattern Blocks*      *Polyominoes*  
*Scatterplot*      *Space Blocs*  
*Tangrams*      *Tesselations*      *Triominoes*

<http://matti.usu.edu/nlvm/nav/vlibrary.html>

**Calculators and Converters** from Math.com  
<http://www.math.com/students/tools.html>

Examples of classrooms and lessons using these tools are also linked to from the Tech Tips site.

# Technology Tips for Differentiated Instruction

<http://www.westedrtec.org/techtips>

by WestEd's Regional Technology in Education Consortium (RTEC) in partnership with the Alliance for Technology Access



## Disability Tips- Mac

**Macintosh OSX** has features for people with **visual impairment**:

- Zoom- enlarges the full screen
- Keyboard navigation- eliminates need for mouse
- Talking alerts- reads alert messages aloud
- Text to Speech- reads selected text aloud using one of many voices
- Display Adjustment- reverse or enhanced contrast

Macintosh features for those with **physical impairment**:

- Sticky keys- one handed keyboarders can capitalize
- Slow keys- defeats unintended multiple keystrokes
- Keyboard navigation- keyboard shortcuts for open, save, etc.
- Mouse keys- allows mouse movement through keypad
- Speech recognition- specific commands and choices can be spoken.

Macintosh features for those with **hearing impairment**:

- Visual Alert- flashes the screen when software/printer need attention.

Macintosh features for those with **learning disabilities**:

- Display Adjustment - Reverse contrast can help some readers.
- Text to Speech- reads selected text aloud using one of many voices.

(Earlier Mac versions have many of these features as well.)

**OSX Tiger**, the newest system, has improvements on a number of these features, including enhanced text to speech. New Tiger features include:

- cursor enlargement,
- an easy to use dictionary, and
- iChat video conferencing - good enough to allow users to read sign language!

***Get links to instructions for each of the above items, as well as links to great shareware, under Targeted Populations at the TechTips website..***



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## Disability Tips- Windows

### Microsoft Windows XP has features for people with **visual impairment**:

- Font style, color, and size of items on the desktop
- Icon size—make icons larger for visibility.
- Screen resolution—change pixel count to enlarge objects on screen.
- High contrast schemes—select color combinations that are easier to see.
- Cursor width and blink rate—make the cursor easier to locate, or eliminate the distraction of its blinking.
- Show location of pointer—quickly reveal the pointer on screen.
- Microsoft Magnifier—enlarge portion of screen for better visibility.
- ToggleKeys—hear tones when pressing certain keys.
- Sound Schemes—associate computer sounds with particular system events.
- Narrator Text-to-Speech—Hear window command options and text read aloud.

### Windows features for those with **physical impairment**:

- Handwriting Recognition—converts mouse or mouse pen motion into text.
- Double-Click Speed—choose how fast to click the mouse button to make a selection.
- ClickLock—highlight or drag without holding down the mouse button.
- Pointer Speed—set how fast the mouse pointer moves on screen.
- SnapTo—move the pointer to the default button in a dialog box.
- Reverse the function of the right and left mouse buttons—reverse actions controlled by the right and left mouse buttons.
- Character Repeat Rate—set how quickly a character repeats when a key is struck.
- Dvorak Keyboard Layout—choose alternative keyboard layouts for people who type with one hand or finger.
- StickyKeys—allow one handed typing for key combinations.
- FilterKeys—ignore brief or repeated keystrokes and slow down the repeat rate.
- MouseKeys—move the mouse pointer using the numerical keypad.
- On-Screen Keyboard- a limited version of a virtual keyboard (used with keypad or mouse).

### Windows features for those with a **hearing impairment**:

- ShowSounds—display captions for speech and sounds.
- SoundSentry—display visual warnings for system sounds.
- Notification—Get sound or visual cues when accessibility features are turned on or off.
- 

### Windows features for those with a **learning disability**:

- Font style & color — students with visual processing issues may read more easily using alternate color schemes, such as white on black, or blue on yellow.
- Speech recognition — XP and Office XP allow voice input of text.
- Text to Speech— Excel and Word 2003 and XP will read highlighted text.

**Get links to instructions for each of the above items, as well as links to great shareware, under Targeted Populations at the TechTips website.**