

A Student-driven Approach to Assessing and Utilizing Assistive Technology to Improve Course Accessibility, Classroom Inclusivity, and Student Engagement

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A Student-driven Approach to Assessing and Utilizing Assistive Technology to Improve Course Accessibility, Classroom Inclusivity, and Student Engagement

1. Coming up with an idea
 2. Finding a grant
 3. Writing the grant
 4. Identifying the AT: [Accessibility Technology List](#)
 5. Finding space, creating a lab
 6. Hiring students
 7. Beginning the project
 - Assess apps, extensions, and equipment
 - Utilize highest rated apps, extensions, and equipment
 - Engage with faculty and support services to integrate AT campus-wide; Create instructional videos for global, student-centered education
 - Aggregate Data for public use; Continue phase three; Build student-driven social media network
- **Collaboration;** Working through the problems; Trusting the students; Continually moving forward; Planning for the end; Planning for the future
- Pros and Cons of a student-centered approach

Phase One: Assessment

Student Instruction

- Find as many apps, extensions and built-ins as possible and assess each individual trial. If a product appears worthwhile do multiple trials and refer to your peers.
- Try to find as many free/cheap options as possible.
 - Windows, Mac, iOS, Android, Chrome Apps and Extensions, AT Equipment
 - 203 Total Trials
 - 41% of trials under 30 minutes
 - 51% rated easy to use
 - 13% rated difficult to use
 - 61% would be recommended
 - 34% were noticeable to classmates

Assessment Criteria

- Name of AT/App and Trial number
- Platform Used/Platform Restrictions
- How long did you use this product today?
- Who would likely benefit from this product?
- How easy was it to use this product?
- How frustrated did you get while using this product?
- Where would students likely use this product?
- If used in the classroom how apparent would this product be? Can it be used silently?
- Provide important info about this product, including strengths/weaknesses.
- Would this product assist students who don't have a disability?
- Comment on any costs, including add-ons.

Assistive Technologies Assessed

Read & Write Gold
 Dragon Dictation
 Mac and Windows Dictate
 Talking Calculator
 PIAF Printer
 Sensus Access
 Robobraille
 Sonnocent Audio
 Notetakter
 Echo Smart Pen
 Audio Graphing
 Calculator
 Math Talk
 MathType
 Daisy Math
 Dolphin Easy Converter
 Dolphin Publisher
 ZoomText
 BAT One Handed
 Keyboard
 Voice Dream

SpeakIt!
 Announcify
 What's Up
Ginger
 Grammarly
Bee Line Reader
 Visor
 Scrollr
 Chrome Vox
 Oswald
 Voice note 2
 Google Dictionary
 Save to Pocket
 Carat Browsing

Scribble Toolbar
 @Voice Aloud Reader
 Read & Write Gold
 for Chrome
 Read & Write Gold
 for Edge
 Zoom – iPad
 Evernote
 White Noise
 NVDA (Non visual
 Desktop Access)
 Word Equation Editor
 Central Access Reader

Evernote Touch
 Evernote Web Clipper
 Microsoft Translate
 Google Translate
Select and Speak
 Readability
 Voice Note II
 My Study Life
 Accessibility
 Conversion
 Pocket
 AT Bar
**Permanent
 Readability**
 Voice eBook
 iPad Magnifier

76% cognitive
 48% visual
 43% physical
 34% psychiatric
 18% acoustic

Making PDFs Accessible

- Robobrace.org
- Test Taking
- Textbooks is alternate format
- In-Class
- Optical Character Recognition (OCR)
- Adobe Pro
- Robobrace

AT - Read and Write Gold (100% Approval)

- Improves reading comprehension: hear web pages and documents read aloud with a choice of natural voices
- Helps students understand unfamiliar words with text and picture dictionaries
- Develops writing skills and confidence with word prediction
- Supports homework and independent research with study skills tools
- Turns documents and web pages into MP3 files for easy listening on the move
- Assists English Language Learners and students studying a second language
- Accessibility features like screen masking give extra support to students with dyslexia and other literacy challenges
- **Universally Designed/Campus License/Orientation**
- **Tutorial Videos**

AT - Voice Dream

100% Approval

Recommended
by Accessibility
Resources

4:29 PM
Pride and Prejudice

half so good-humoured as Lydia. But you are always giving her the preference."

"They have **none** of them much to recommend them," replied he; "they are all silly and ignorant like other girls; but Lizzy has something more of quickness than her sisters."

"Mr. Bennet, how can you abuse your own children in such a way? You take delight in vexing me. You have no compassion on my poor nerves."

"You mistake me, my dear. I have a high respect for your nerves. They are my old friends. I have heard you

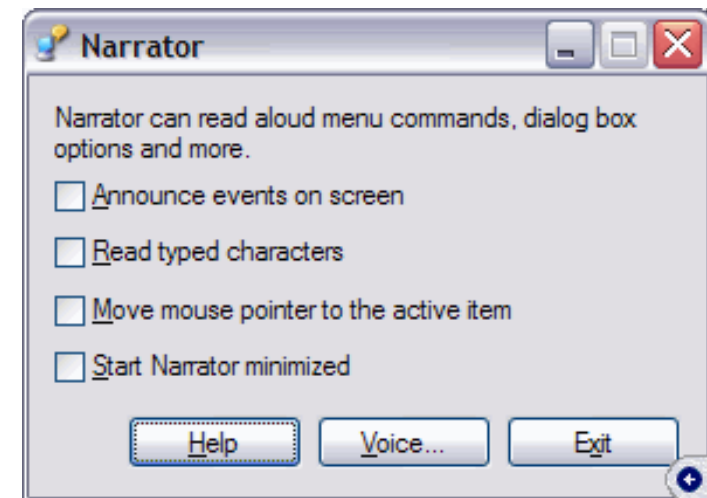
6
mention them with consideration these twenty years at least."
"Ah! you do not know what I suffer."

24:51 12:12:23
5 of 462 3% CHAPTER 11 Chapter

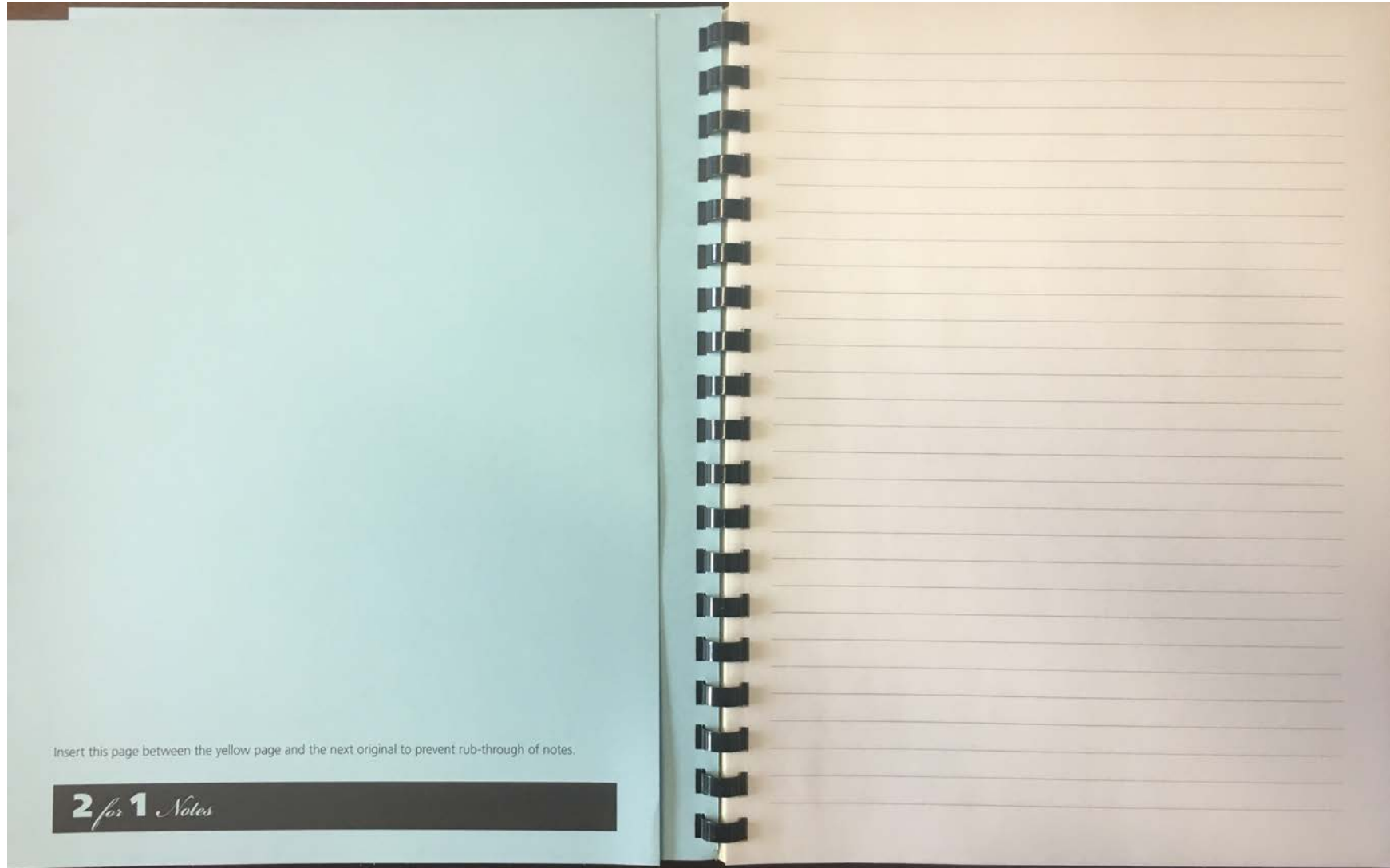
AT – Screen Readers



A free screen reader –
made by users, for users



Low-Tech Notetaking



AT Notetaking - Echo Smartpen

Very High Approval from Students

- Recommended by Accessibility Resources, currently 70 pens issued
- Universally Designed
- Budget Savings of ~ \$4,000 per year/print our own notebooks
- The smartpen uses a microphone, infrared camera and dot paper to create a pencast
- Written notes, recordings, and pencasts can be uploaded, viewed, and stored on a computer through Echo Desktop
- Psychology; Math; Biology; CADE



AT Notetaking - Sonnocent Audio Notetaker

High Approval from Students

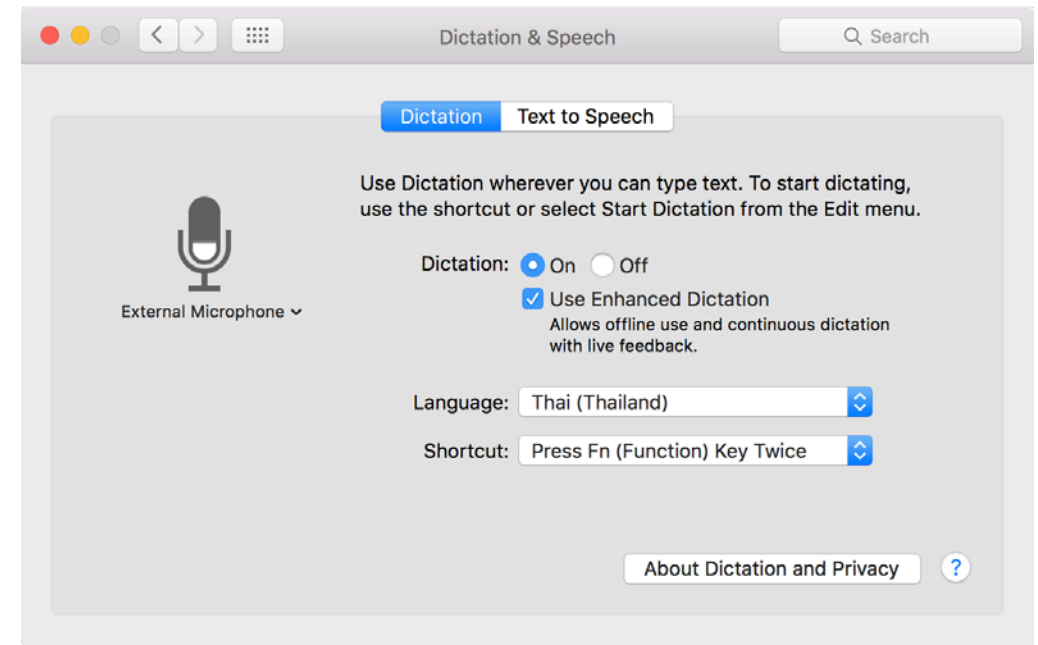
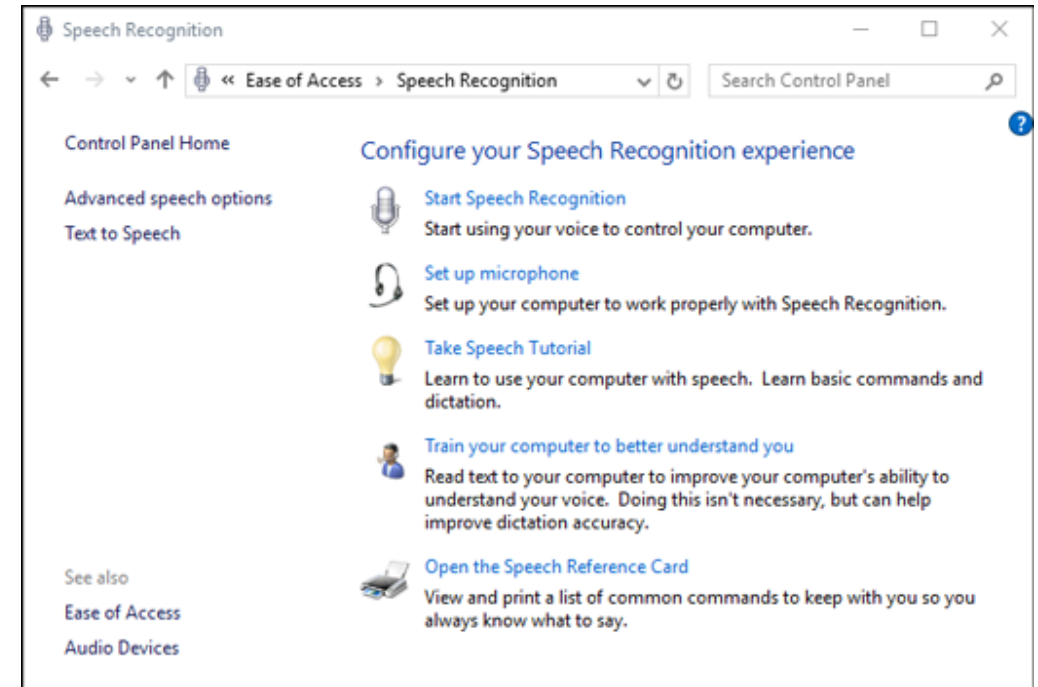
- Record audio and then annotate the recording
 - Color coding
 - Text and image annotation
 - Isolate and move coded sections
 - Import audio files
 - Enhanced sound quality
 - Can type notes

The screenshot displays the Sonnocent Audio Notetaker interface. The window title is "Dr Johnson History English Literature.ran - Sonnocent Audio Notetaker". The interface is divided into several panels:

- Audio Panel (Right):** Shows a timeline of the audio recording with colored bars representing different sections. A legend on the right side of the audio panel lists categories: Important (red), Follow Up (blue), Don't Understand (grey), Didn't Hear (green), Research Further (pink), and Core Topic (light green). Below the legend are options for "Edit colour key", "Continuous colouring", "Default audio colour", and "Default section colour".
- Text Panel (Middle-Right):** Contains typed notes corresponding to the audio. The notes are color-coded to match the audio segments. The text includes: "Introduction", "Dr Johnston explains the aims of this course.", "Explains the exams and essays requirements.", "Overview", "use romanticism quote for essay", "Renaissance.", "The what, when and where.", "Have a look at www.ted.com", "Google Peter Dunn", "<http://www.bartleby.com/cambridge/>", and "<http://en.wikipedia.org/wiki/Renaissance>".
- Reference Panel (Middle-Left):** Contains a list of links and topics: "Renaissance [1500-1600]", "Victorian [1837-1901]", "Romanticism [1850-1920]", "Moderns [1900+]", "Renaissance Literature [1500-1600]", and "De Vinci".
- Images Panel (Left):** Shows a book cover titled "The History of Our English Literature".

The bottom status bar shows "WS450094.WMA; 0:00:13" and "Cursor: 0:00:13 / 0:10:09 Visible: 0:00:00 to 0:09:21".

AT - Speech-to-Text All Highly Rated



P.I.A.F Tactile Image Maker

Pictures in a flash!

- 3D printing
- Accessible Graphics
 - Research Methods
 - Math
- Low Tech Options
 - Puff Paint
 - 3D Pens



Math Accessibility

- Original programs
 - Math Daisy
 - MathType
- Goal: Student Accessibility
- Math needs to be accessible from the source
- This changed the focus of our research from providing a program for students to use, to finding the means to assist faculty in creating and converting math content into something that could be then made accessible for students' needs.

Explaining Math Inputs

- LaTeX (Lamport TeX)
 - A typesetting language used to prepare scientific and mathematical documents that focuses on content rather than appearance.
- MathML (Mathematical Markup Language)
 - A programming language "for describing the visual structure and meaning of mathematical formulas." (Sandhu)
- OMML (Office Mathematical MarkupLanguage)
 - Designed for integration with Microsoft products

Mathematical Graphic Editors

- Microsoft Equation
 - Equation editor for Office Suite
- MathType
 - Math content authoring software
 - Standalone or MS Word/PPT Plug-in
 - Compatible with TEx, LaTeX and MathML
 - Conversion tool for MathML and LaTeX
 - Does not create graphs
 - Exact Speech Command

Σ Inline Σ Display ∞ Math ▾ (1) Insert Number ▾ ⬆ Previous Σ Equation Preferences 📄 Export Equations 📘 MathType Help ▾
Σ Left-numbered Σ Right-numbered Ω Other ▾ (4) Insert Reference ⌂ Equations ▾ Σ Format Equations 🌐 Publish to MathPage 🌐 MathType on the Web ▾
Σ Open Math Input Panel 1:1 Chapters & Sections ▾ ⬇ Next Σ Convert Equations 📄 Toggle TeX 📄 Future MathType

Insert Equations Symbols Equation Numbers Browse Format Publish MathType

$\sqrt{2}$

ω

$\lim_{x \rightarrow -1} \frac{x^2 + 2x + 1}{x + 1}$

Math input panel

The image shows a software interface for entering mathematical expressions. At the top, there are menu items: "History", "Options", and "Help". The main workspace is a yellow grid where the expression $3x^3 + 6x + 9$ is written in black ink. The final digit "9" is highlighted with a dashed red box. A context menu is open over this digit, listing several options: "9 (Number Nine)", "q (Latin Small Letter q)", "n (Latin Small Letter n)", "4", "g (Latin Small Letter g)", "η (Greek Small Letter Eta)", and "7 (Number Seven)". At the bottom of the menu is a "Close" button. To the right of the grid is a toolbar with buttons for "Write" (pencil icon), "Erase" (eraser icon), "Select and Correct" (lasso icon), "Undo" (blue arrow icon), "Redo" (grey arrow icon), and "Clear" (red X icon). Below the grid is a white input field containing the typed version of the expression: $3x^3 + 6x + 9$, where the "9" is red. An "Insert" button is located to the right of this field.

Spoken Math

Screen Readers

- NVDA (NonVisual Desktop Access)
 - Free program for Windows
 - MathPlayer is a component
- JAWS (Job Access With Speech)
 - Rendered with MathJax in IE
 - MathPlayer is a component
- Voice Over Command
 - Built-in on Apple Computers
- Microsoft Narrator
 - Built-in on Microsoft Windows

Text-To-Speech Document Readers

- Central Access Reader
- [Central Access Reader's Website](#)

Central Access Reader

- Free Text-To-Speech Document Reader that uses the voices installed on the computer in use.
- Supports OMMML and MathML.
- Supports math disciplines ranging from General Math and Algebra to Calculus and Logic.
- Only reads content in document format, not PDFs
- Allows you to open multiple documents to be read independently.
- Allows you to paste text and equations from your clipboard directly into the program.

Central Access Reader Continued

The screenshot shows a software interface with a dark grey background. At the top, there is a header bar with 'demo equation' and a close button. Below the header, there are two tabs: 'Headings' and 'Pages'. A vertical toolbar on the left contains icons for zooming, undo, redo, and other functions. The main content area displays the text 'This is a demo equation:' with 'This is a demo' highlighted in green and 'equation:' highlighted in yellow. Below the text is the mathematical equation $z = 2 \frac{(a+b)^2}{c}$.

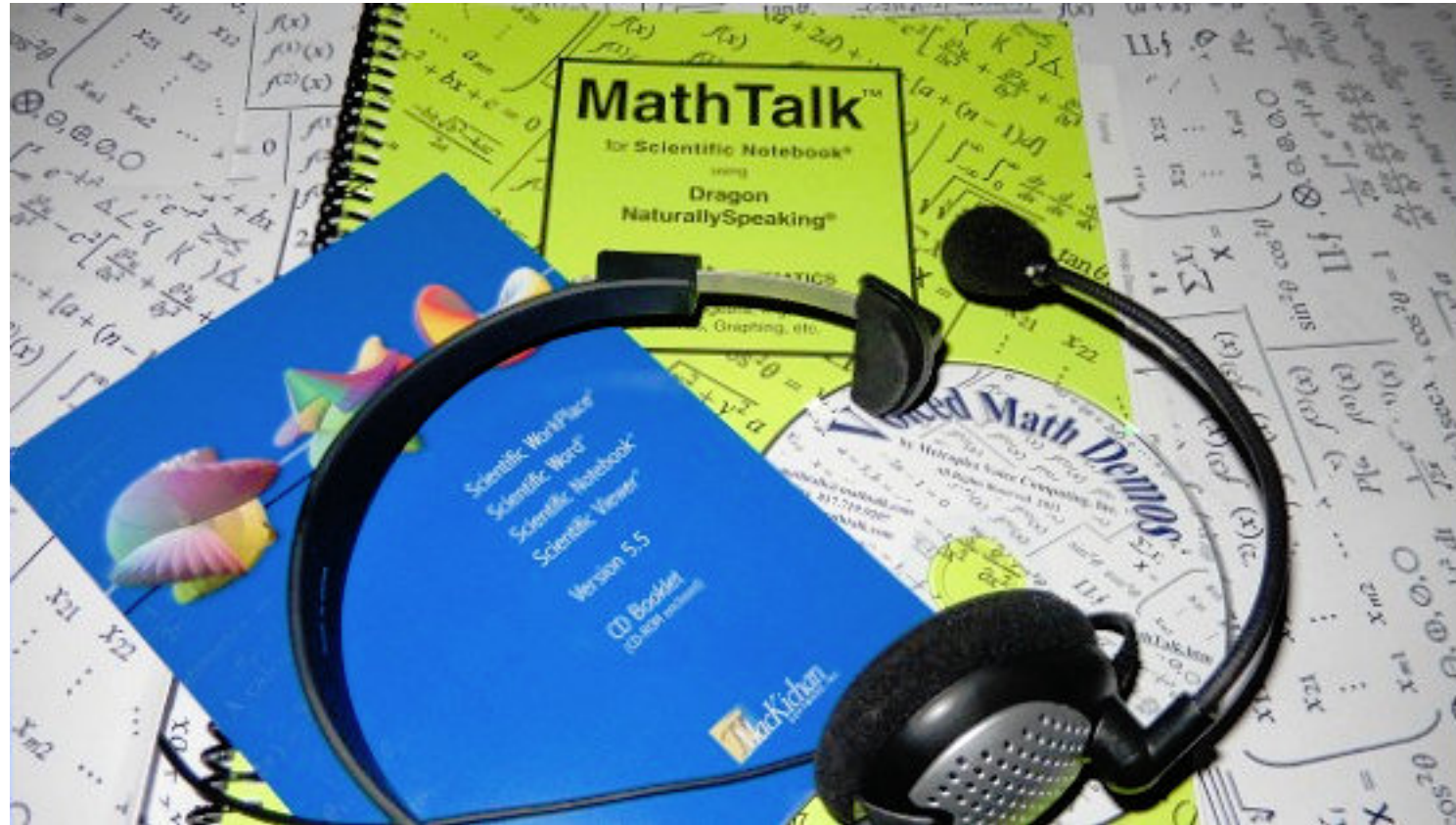
Plain English: “Z equals 2 a plus b squared over c”

Unambiguous English: “Z equals 2 times the fraction open paren a plus b close paren superscript 2 over c”

Process of making PDF's containing math accessible

1. Start with PDF
2. Open in MS Word
3. Use MathType / Equation to convert equations to MathML/OMML and insert necessary Alt Text
4. Open saved Word Document in Central Access Reader

MathTalk/Scientific Notebook with Dragon



Student Made Tutorial Videos

- [Evernote Tutorial](#)

Roadblocks/Future Plans

- Roadblocks
- Complete results will be shared on Accessibility Resources website, and through SUNY Admin support
- Faculty and CADE
- Social Media
- More Videos
- Peer to Peer Support

??? Questions ???