# CTEBVI 2023 Workshop 202

## Brailling Math: Using DBT to Produce UEB with Nemeth or UEB with UEB Math/Science

### Caryn Navy — Duxbury Systems, Inc.

All files used in this workshop and other sample files can be found in <http://www.duxburysystems.com/downloads/print_to_ueb_nem.zip>

## Introduction

We are here to talk about producing braille math with DBT as UEB with either Nemeth Code or UEB Math/Science for the math notation.

The guidance on UEB with Nemeth is found in the document *Guidance for Transcription Using the Nemeth Code within UEB Contexts*. The current version, approved in April 2018, is available for download on the BANA website; go to brailleauthority.org, select **UEB Information**, and then select **Nemeth-UEB Guidance.**

The codebooks on UEB and UEB Math/Science are The Rules of Unified English Braille and the UEB Guidelines for Technical Materials; go to brailleauthority.org, select Codebooks and Guidelines, select UEB, and use the links there to the UEB page on the ICEB website.

here are quite a few ways to enter math for producing braille math with DBT, which means quite a few ways to enter math for producing Nemeth Code in UEB context.

## Data Entry Methods

1. Enter math in DBT itself.
2. Use MathType as a Word add-in to create math in a BANA template Word document to open in DBT.
3. Use Office math shortcuts to enter math as **Office Math Markup Language** (OMML) equations, and then use MathType to convert OMML equations to MathType equations.
4. Start with an existing .docx file that contains OMML equations and/or MathType equations and proceed with the previous items.
5. Enter math in Word without using MathType or creating OMML equations.
6. Use Scientific Notebook to create a .tex file to open in DBT.
7. Work with a TeX or LaTeX file created in other ways, e.g., created in a different math word processor (perhaps by the professor), created from math OCR with InftyReader, etc.

### Comments on These Data Entry Methods

Each numbered comment refers to the data entry method above with the same number:

1. DBT does not offer an extensive array of tools to help you with direct math entry.
2. The BANA Braille Word Template helps to improve braille formatting. MathType provides math data entry and editing tools and a sighted-friendly view of the math.
3. Using Office math shortcuts and converting from OMML to MathType has the advantages of using MathType but makes data entry more accessible. The accessible data entry method is to press Alt+Equals to start a math expression and then use appropriate shortcuts for entering the math notation. For information on this method of data entry, consult any of the documents at the links below:
   * <http://www.chem.mtu.edu/~tbco/cm416/EquationEditor_main.pdf> (a comprehensive document)
   * <http://iun.edu/~mathiho/useful/word07shortcuts.pdf> (a cheat sheet)

As an example, in Word 2007 or higher, press Alt+= and type (\sqrt(x^2 + 1)/2 Then press space to get out of the math entry box. You can also left click or press Control+RightArrow to get out of the math entry box.

To convert from this format of OMML equations>, go to MathType, Format Equations, Convert Equations and use the dialog as shown below.   
  
[Caption: Convert from OMML equations is checked, and convert to MathType equations is checked.]

[Note: There are also occasions to check the option Convert MathType or Equation Editor equations, for example if data entry was done in the pre-Word 2007 Equation Editor, or if the data entry was done on a different platform (Mac vs. Windows).] In case the starting file has OMML equations, start by converting from OMML to MathType. Use the instructions for items 2 and 3 as appropriate.

1. Entering math directly in Word, when normal keyboard entry is sufficient. This works better than you might expect in simple situations. If you are working with DBT 12.4 or higher, insert the code for technical notation start at the start of each segment of math notation and the code for technical notation end at the end of it; apply the style Uncontracted to any problem label within the segment.
2. Scientific Notebook is still popular. There are not as many tools for formatting the braille as when working with Word and the BANA template. However, starting with DBT 12.2 (and improved later), importing from LaTex has a nice bonus for Nemeth in UEB context (automatic placement of important styles, avoiding extra Nemeth switch indicators.).
3. LaTeX files from professors or from InftyReader are very nice when available. This happens most often in a college setting.

Transcribers often prefer using Word with MathType and the Word BANA Braille template. It is fine to use Equation Editor 2007 or higher and convert to MathType. For help with identifying the nature of embedded objects in Word, you can use the **Go To** command. Press Control+G and then Shift+Tab to select what kind of object to go to. Choosing **equation** will take you to MathType equations but not to OMML equations. Choosing **picture** can help to identify math equations that are just embedded graphics. In general, the **Go To** command can help to locate items that need transcriber attention, such as pictures, tables, and footnotes. There are also interesting data entry tips at <https://docs.wiris.com/en/mathtype/mathtype_desktop/tips/tips_word#advanced_techniques_for_adding_equations_and_symbols_to_word_documents>.

Together, MathType and the BANA template give you good tools for creating and displaying the math and for getting the desired BANA format. MathType is fairly inexpensive, especially for schools. Some schools already have multi-user licenses for other purposes.

## The Currently Recommended Tool Set in Spring 2019

1. The current version of DBT, now DBT 12.4 SR1
2. the corresponding version of SWIFT, SWIFT 5.2 works with DBT 12.4 SR1
3. MS Word (2007 or above)
4. The current version of the BANA Braille template for Word, now BANA Braille 2017
5. Mathtype (currently at Version 7.4.1.458)

### Comments

1. DBT 12.4 sr1 was released in March 2019. Use **Help**, **Check for Updates** to make sure you are using this version or higher. Please use the **(UEB) - BANA with Nemeth** DBT Template in DBT for producing Nemeth Code in UEB context.
2. SWIFT 5.2 is a free product from Duxbury Systems released in January 2018, to work with DBT 12.2 SR1 or higher. Install SWIFT 5.2 from <http://www.duxburysystems.com/swift.asp> See the section below about setting up SWIFT and Word.
3. Microsoft Word is available from many sources.
4. The BANA Braille 2017 template is supplied with DBT, including DBT 12.2 SR1 and DBT 12.4 SR1; SWIFT 5.2 makes it easy to attach this Word template to your Word documents.
5. Mathtype is available from WIRIS at <https://store.wiris.com/en/products/downloads>. Design Science, which created MathType, joined forces with the Spanish company Wiris in 2018. MathType has a new yearly subscription pricing structure. Note that if you are using MathType version 7.0 or higher with DBT, you need to use DBT 12.3 or higher. DBT 12.2 or below works with MathType through version 6.9 but not with version 7.0 or higher. Looking backward, the old Microsoft Equation Editor 3.0 built into Word prior to Word 2007, kept in Microsoft Word for backward compatibility, was removed from Word by Microsoft updates on January 9, 2018, due to a security flaw. However, MathType can still handle equations created with Equation Editor 3.0.

## The Basics

Whichever method you use to create files for producing Nemeth Code in UEB context, it is important that you use the DBT template called **English (UEB) - BANA with Nemeth**. There are four styles in this template that provide the machinery for Nemeth Code in UEB context. The four styles are:j

* math
* math-TextInMath
* math-NLE
* OneWordBridge

The style **math** is for technical notation. Each segment in the math style in this DBT template appears in braille as Nemeth Code with the start and end Nemeth indicators around it, spaced \_% and \_: (dots 456, 146 and dots 456, 156).

The style **math-TextInMath** is intended for use within the math style for enclosed nontechnical notation. In braille, the style math-TextInMath does not add any start or end Nemeth indicators. The braille for the math-TextInMath style in this DBT template is in Nemeth context, with Nemeth digits, the Nemeth punctuation indicator and grouping signs, etc.; it uses no contractions.

The style **math-NLE**, like the style **math** is for technical notation. The NLE stands for "new line end." The only difference from the style **math** is that the braille in this style ends with the end Nemeth indicator at the start of the next line, in the current indent position.

The style **OneWordBridge** is intended for one word separating two segments of technical notation. In braille, the word appears in UEB with unspaced ,' (dots 6, 3 – the one-word switch indicator – before it).

To understand the basics, let's start with working entirely in DBT, without using Microsoft Word, MathType, or Scientific Notebook. To apply a style in DBT, highlight some text, press **F8**, and select the correct DBT style from the list.

The number 12 followed by period can appear in braille in three different forms in this template.

* In UEB, outside of math style: #ab4
* In math style: #12.
* In math-TextInMath style within math style: #12\_4

In the file below I entered an exercise in DBT. Since the answer choices are entirely technical notation, I entered them all with one use of the math style. Within that use of the math style I applied the style math-TextInMath to the letter plus the period in all three labels.

[Caption: See the file powers.dxp.]

Translation gives the resulting .dxb file below.

[Caption: See the file powers.dxb.]

Now we switch gears to doing data entry in Word. If you do not have SWIFT installed, install it before doing data entry in Word for creating Nemeth in UEB context.

## Setting up SWIFT and Word

Installing SWIFT adds a **Braille Tab** in MS Word. This is shown on the top right of the above graphic.

[Caption: shows the key options dialog in SWIFT.]

Your first step should be to go to the **options menu** in SWIFT and check **BANA** as your **User type**.

Once you set the **User type** to **BANA**, you will see that the left-most option in SWIFT is **Choose Template**. You do not have to keep this the same from one project to another. For producing Nemeth Code in UEB context, choose the bottom template, **BANA UEB with Nemeth**

The above graphic shows how to find the **Technical Chain Start** and **Technical Chain End** buttons (and how to reach them with keystrokes).

## An Example in Word

[Caption: See the file ch8pt.docx.]

Any MathType object automatically creates the math style in DBT, and any use of MathType's text style within an object automatically creates the style math-TextInMath in DBT.

To create this file, I started with an online "Chapter 8 Practice Test" file for a Calculus 2 class. It already had MathType equations. I added the BANA template, adjusted the styles, etc.

Each MathType object will create a separate use of the math style, with its own use of the start and end Nemeth indicators. To avoid that, create a **technical chain** in Word around the desired MathType objects, by inserting special start and end tags. As shown in the graphic below, in the BANA Braille 2017 template for Word, the buttons for starting and ending a technical chain are called **Technical Chain Start** and **Technical Chain End**. The keystrokes for pressing these buttons are Alt followed by X Y Y K T and Alt followed by X Y Y K L.

You can think of each MathType object as a pearl. A technical chain strings them together. It turns the whole section into one necklace in the math style, with everything between the pearls also enclosed in the math-TextInMath style. Pressing the Technical Chain Start or Technical Chain End button creates the hidden text [[\*idle~ptims\*]] or [[\*idle~ptime\*]], respectively, in the Word document. Here, ptim stands for "pass through in math," and the letter s or e stands for "start" or "end."

When you place the technical chain and technical chain end markers, you control where the Nemeth start and Nemeth end indicators appear in braille. You can position them where you want with regard to line breaks. If you position the technical chain end marker at the start of a line, the resulting technical chain in DBT will use the math-NLE style instead of math, to position the Nemeth end indicator at the indent position at the start of a new line at the indent position.

In the screenshot above, the marks [[\*ptims\*]] and so on are showing even though they are marked as hidden text. Being marked as hidden text means they do not get printed. To toggle the showing of hidden text on or off in the Word 2010 display, press: Alt followed by the letters F, T, D. Check the choice for **hidden text**. , (File, Options, Display, Always show these formatting marks on the screen, Hidden text checked, OK)

## This Example in DBT

[Caption: View the file ch8pt.dxp in coded view in DBT.]

{Caption: See the file ch8pt.dxb in DBT.]

## A Sample LaTeX File

[Caption: You can view the underlying LaTeX by opening chap1.tex in a text editor like Notepad.]

[Caption: See the file chap1.dxp in Coded view in DBT.]

[Caption: See the file chap1.dxb in DBT.]

You can position line breaks and the start and end of math mode in the LaTeX file to position the start and end Nemeth indicators in the braille.

## Recent Improvements

1. The LaTeX importer now assigns the styles math-TextInMath and OneWordBridge between segments of technical notation where appropriate.
2. Both the MathType and LaTeX importers automatically assign the style math-nle (math with new line end) instead of math when the markup for the end of technical notation is at the start of a line. This allows the end Nemeth indicator to appear at the proper indent position, without a preceding space.
3. In the BANA Braille 2017 template in the Misc group we have added the styles **Box Top Nemeth** and **Box Bottom Nemeth**.
4. For importing from the BANA Braille 2017 template, we have fixed the format of the Nemeth Exercise style.
5. We added the codes [:] and [;] in the ending codes for the math style, to keep the end Nemeth indicator on the same line as the preceding Nemeth Code.

## A Few Tips

When viewing math in a .dxp file, always use the coded view since some of the math is shown as codes. Pressing Alt+F3 switches this on or off.

What do you do if you know what sign you want in Nemeth Code but you do not know how to enter it in Word or MathType?

1. Start a new braille document in DBT in the template called Math Notation ....
2. Enter the desired Nemeth Code.
3. Translate to print.
4. Make sure that in Global --> View preferences, the checkbox **Use verbose labels for non-ANSI characters in coded view** is checked. You see the Unicode number for the desired character on the status line.
5. With DBT 12.4, if you are working in Word and all the math symbols can be entered without MathType, to simplify the data entry, you can try using just the buttons for **technical notation start** and **technical notation end**. Also mark any problem labels with the style **uncontracted**, as shown in the graphic below.

[Caption: See the file simple.docx in Word.]

## Some Additional Notes on Sample Files

As an experiment in Word, I toggled the MathType expressions in ch8pt.docx to TeX. The point of this was to create a LaTeX file to open in DBT that allowed me to avoid inserting the technical chain start and technical chain end markers in Word. To go along with this, I also did replace operations to change Word paragraph markers (^p) and tab markers (^t) to the TeX command \par. I saved that as ch8\_manual\_tex.txt. When I opened this in DBT 12.4 during the workshop, I forgot to check the setting for the Import Filter. Because the file did not have the usual LaTeX header information, the Import Filter was not set to TeX, and DBT did not open the file properly; it did not interpret the LaTeX commands as LaTeX. Later on, I recognized this mistake and changed the Import Filter setting to TeX. Then DBT opened the ch8pt\_manual\_tex.txt file properly.

Later still, I came across another method to create a LaTeX file from ch8pt.docx, using Scientific Notebook or Scientific Viewer (Scientific Viewer in my case). Scientific Notebook can open an RTF file with MathType equations and save it as a TeX file. Save the original Word/MathType document as an RTF file, open that as an RTF file in Scientific Notebook, and save it as a TeX file. I found that this worked with Scientific Viewer. I did have to do some manual fixing to clean things up a bit. After that, DBT 12.4 did open ch8pt\_sn\_tex.txt properly.

Even if you do not plan to use the LaTeX conversion for producing your braille, importing the converted LaTeX and looking for the styles math-TextInMath and OneWordBridge can show you where you need to insert markers for technical chains and the OneWordBridge style in your Word document.

In the Word document spatial.docx I inserted hard spaces in the MathType expressions to get reasonable spatial arrangements in DBT.