# Why does LaTeX not work with adaptive technology?

* I'm attaching a LaTeX, MathML tools for creating accessible documents guide, and here is the author's webpage: <https://www.csun.edu/~hcmth008/>
* My guess is that screen readers have been designed to interpret the HTML markup syntax, and have not yet have the market demand to build a parser for LaTeX.  To dig deeper, I suspect it would be very challenging for screen readers to distinguish between two sets of markup grammar, and to be able to interpret substitution macros in LaTeX.
* LaTeX is a programming language for typesetting documents and is presented in a text format. A person can work in a LaTeX editor and the text content will be read, but it functions like code. If you understand the code, then you will understand the equation. It's a bit like looking at HTML code and being able to envision the web page. So, if you are interacting with the code view, then screen-readers can read the text string of a LaTeX equation. When you use LaTeX, you are providing specific instructions for content (e.g., text, equations, etc.) to be rendered visually in a specific manner. Once a LaTeX file is compiled and printed, you are no longer dealing with LaTeX content.
* There has been some working going on in the UK that may help answer your questions. There is a publication from 2012 <http://www.mathcentre.ac.uk/resources/uploaded/inclusivecurricula.pdf> that might be useful. The articles on starting on page 19 may be useful as they explain how to blind students developed a system of reading  LaTeX in a pretty raw form as a reading medium instead of braille. They considered this the quickest route to access maths. But these were very talented mathematicians who started to develop this technique before the graduated school. The advice we give to VI mathematicians keen to study it at college is to learn LaTeX as soon as possible.
* Some thoughts on your questions. The main reason that LaTeX is a difficult format to convert from into one that works with assistive technology is that it is an unstructured. That is there are no semantics within the maths notation and it is possible to create a document without any structure. The other problem is that anyone can create their own LaTeX macros and can use a range of packages/templates used to compile the LaTeX into other formats. This has a huge impact on how easy it is to convert LaTeX into another format.  Emma Cliffe at the University of Bath is the expert in the UK on this area. She had a project in 2012 to look at the process of converting LaTeX into accessible formats - <http://www.bath.ac.uk/study/mash/maths-access/overview/index.html>  - and she is currently working on a project to produce an up-to-date databased on the best techniques. I (Dr Abi James) am going to talk a bit about this at Accessing Higher Ground. Currently her team prefer PlasTeX as a conversion route <http://plastex.sourceforge.net/>.

# How would you explain professor about how to make LaTeX accessible? (aka is the only option to turn into MathML and use it in a word document or with HTML)?

* In certain LMS (e.g., D2L, Canvas), the equation editor includes LaTeX as one of the input methods.
* Some students who are familiar and/or literate in LaTeX may prefer to use a LaTeX file directly as the student would be working with the language directly. I worked with a few students who preferred this interaction as they had access to the actual equation code. Further, there were several majors in which students were expected to be literate in LaTeX, regardless of disability. It was just how that academic community communicated.
* LaTeX serves an input format (essentially) and as such is much more compact and easier to understand than MathML. However, it was not intended to be an output format and provide the semantic structure of math content - that's a role MathML provides. LaTeX was intended for authoring documents so as to then print them out in an accurate manner.
* If the student is not familiar with LaTeX and prefers to use an HTML or MS Word format (depending on the preferred AT), then you will need to jump through a few steps. If you want to use MS Word with NVDA, then MathType is the easiest tool to use to copy and paste LaTeX into MS Word and use MathType to convert these to math objects. Alternatively, if you want to use HTML, then you can embed LaTeX math equations in an HTML file and use MathJax to convert the LaTeX into MathML content.

# What do you use to go from a LaTeX-based document to a MathML one?

* A handful of converters exists from a quick Internet search.  Would anyone share their experience about these converters?
* You could use MathJax or MathType as conversion tools. MathJax if you are dealing with web pages and MathType if you are dealing with MS Word. There may be others, but these are the two I was most familiar with during production.

# Do you know of any updates about making math accessible within a PDF?

* To my knowledge, MathML with Word or HTML is the best option.
* I believe MathML is supposed to be part of the next PDF/UA specification. I have heard rumors of PDF documents with accessible math equations, but have not seen one yet. Of note is that even if MathML becomes part of the PDF/UA specification, AT will still need to do some work to support such implementations.

# If you got to stand in front of all math faculty at your campus, what would you want to share with them?

* My advice to STEM persons would be: if they save .tex documents as .pdf, keep the original LaTeX source files in case an accommodation for a screen reader user is needed.
* This may be a [good resource for STEM faculty - it's a "tex" accessibility forum](http://tex.stackexchange.com/questions/tagged/accessibility)
* [Math & Science Accessibility](https://www.pcc.edu/resources/instructional-support/access/math.html)
* [Math Accessibility Study](http://www.pcc.edu/resources/instructional-support/access/Math-Accessibility.html)
* While I think there has been some progress in terms of math accessibility, I don't think there is one "great" solution as it depends on what AT a student is using to interact with math content. In many cases, there is some level of alternate format conversion involved. That said, what I think does tend to work well at this time is the following:
  + a) Using MS Word+MathType to author math content. This does give a lot of flexibility in terms of interacting with the content directly or converting it into another format (e.g., HTML, DAISY, etc.). A student can use NVDA+MathPlayer+MathType to interact directly with math equations in MS Word or the student can use the Central Access Reader to read text/math content.
  + b) However, math faculty tend to prefer LaTeX and so the option is to provide access to the .tex files so these may be accessed directly or converted by an alt format team into the desired format.
  + c) If I had an audience, I may even go so far as to say that the hand-scribbled and scanned PDF solution sets are really not helpful if trying to convert into an alternate format (you know, the solution sets in which it looks like a felt-tip marker was used upside-down and in a mirror to write out the answers). I'm not saying every math professor does it, but there are certainly a few...it's just painful for everyone.

# An additional question is how STEM professors are editing their documents nowadays.  I can see the obvious benefits of the typesetting LaTeX in the days of command line, plus a shallow learning curve for maths and computer science experts.  What are the rest of STEM faculty using -- those who don't need complex equations everyday and don't have the need to learn a coding language?

* I know that faculty on the UW campus are using the built-in Equation Editor on MS Office. Very few are using MathType. Otherwise, they use LaTeX.
* This is the response I got from one math professor when asked “Do you know what mathML is?” – “I know about MathML. I have never used it. I do not know of any mathematician using it. Perhaps some mathematicians use it but I have never encountered it online. It is possible that some pages use MathML and I am not aware of it. MathJax is quite popular. I use it on my own personal Web site and it is used by some of the major societies and companies involved in math publications.​”

# I'm very interested in educating our math department about accessibility. Are you trying to get faculty to create math accessibly from the beginning? As opposed to the disability service office converting it when needed?

* Yes, I am trying to help everyone on campus create more accessible born materials. This is, obviously, the work of 162 lifetimes. However, I am realistic enough to know that the “convert it only when needed” philosophy will still exist for some time. Until we can get knowledge/tools/simple processes regarding accessibility to layman, we accessibility professionals all have great job security :]