

Nemeth or Unified English Braille (UEB): Factors and Considerations for Math Code

The Minnesota Braille workgroup recommends that, until research-based data indicates the need for a change, the Nemeth Braille Code within the context of UEB is the code for instruction in Science, Technology, Engineering and Math (STEM) subjects. Only after a thorough review of the student's individual strengths and needs should UEB technical be considered.

The intent of this document is to assist Minnesota teachers of students who are blind or visually impaired (TBVI) with [factors to be considered and discussed by the Individualized Education Program \(IEP\) team](#) when assessment and data indicate that UEB Technical for STEM instruction may be a more appropriate code to meet the individual needs of the student. The two existing codes are Nemeth and Unified English Braille (UEB). [A description of both codes can be found in the National Center on Educational Outcomes Brief *Considerations for States Providing Materials in Braille*.](#)

Nemeth is a braille code used for math and science notation developed in 1946 by Dr. Abraham Nemeth. In 1952, the Joint Uniform Braille Committee accepted Nemeth Code as the standard braille code for representing math and science expressions in the United States. In 2013, the International Council on English Braille added the ability to use Nemeth Code within UEB context to the Rules of Unified English Braille. The certification process for Nemeth Code transcribers and proofreaders in the United States is well defined and established.

Unified English Braille is one code for literary, mathematics, and computer science text elements that was adopted by the Braille Authority of North America (BANA) in 2014. The UEB technical code for math and science is part of UEB and is used in all grade levels; therefore the use of the term UEB indicates a complete code that includes math and other STEM subject notation. Although there are certification processes in other countries, a certification program for UEB Technical is still being developed in the United States.

When the Learning Media Assessment (LMA) determines that braille is the student's most appropriate reading and learning mode, the code (Nemeth or UEB) for the instruction of subjects that require STEM should be specified and [documented in the Present Levels section of the IEP](#). It is important to consider both student and parent input when making all educational decisions.

Requests for instructional materials in subjects that require STEM for all grades [will be produced in Nemeth Braille Code](#) within the context of UEB, with guidance specified in the [Guidance for Transcription Using the Nemeth Code within UEB Contexts](#). [UEB will be provided instead of Nemeth](#) if the student's IEP dictates UEB for STEM instruction, with [guidance specified in Provisional Guidance on Transcribing Mathematics in UEB](#).

Whichever math code is taught, it is important to note that higher level STEM content will require specific instruction as more complex symbols are introduced. In some instances, UEB guidelines allow

for more than one way to display technical material. It will be important for students to be aware of the multiple methods of transcribing a single math concept in UEB. Additionally, UEB requires more cells and symbols with higher level STEM concepts, therefore, determining which code best meets the needs of the learner may need to be re-evaluated as the student progresses in both braille fluency and higher level math concepts.

Current research is limited surrounding use of UEB in higher level math, as UEB is relatively new to the United States. Nemeth within the context of UEB is currently the recommended code in Minnesota. The factors outlined in this document are provided to assist IEP teams to address when an exception to this recommendation needs to be considered.

Factors:

1. Instruction

- The student's previous instruction in the area of mathematics.
- The student's current familiarity and ongoing instruction with mathematic symbols (Nemeth math code and/or UEB).

Considerations

| Nemeth | UEB |
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| A student who has begun mathematics instruction using Nemeth will most likely benefit from the continued use of Nemeth to complete mathematics courses throughout the remainder of his or her school years. | The math symbols used in UEB (e.g., plus, equals, parentheses, dollar sign) are the same in both literary and mathematics text, thus, reducing the need for separate code instruction in mathematics. (This will not eliminate the need for more specific instruction of braille symbols in higher level STEM concepts.) |
| A student who demonstrates minimal confusion with symbols (i.e., two separate braille symbols representing one print symbol depending on context) may benefit from math instruction in Nemeth. (Data gathered from several observations/assessments demonstrating student performance with braille symbols should be used in making this determination.) | A student who has demonstrated confusion with symbols (i.e., two separate braille symbols representing one print symbol depending on context) may benefit from instruction in UEB. (Data gathered from several observations/assessments demonstrating student performance with braille symbols should be used in making this determination.) |

2. Cognitive Ability

- The student's current academic skills.
- The student's mathematics ability including achievement in mathematics concepts.
- The student's ability to think critically.

- The supports needed for the child to acquire and process new skills and learn braille symbols in a variety of contexts (literary material, mathematics, science).

Considerations

Currently, there is no best-practice evidence or research to support that a student’s cognitive ability has an impact on the code that he or she will use to access STEM.

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| Nemeth | UEB |
| Based on braille fluency data, a student who is able to efficiently transition from code to code may benefit from Nemeth. | Based on braille fluency data, a student who is unable to efficiently transition from code to code may benefit from UEB. |
| A student may benefit from math instruction in Nemeth if instruction can be provided in both the code and math concepts simultaneously. | A student may benefit from math instruction in UEB if repetitive math symbols are consistently encountered across all subject areas in the curriculum. |

3. Interests and Aptitude

- The student's interest in STEM fields.
- The student's aptitude in STEM subjects.
- The student's future post-secondary education and career aspirations.

Considerations

Research (Holbrook & MacCuspie, 2010; Cryer, Home, & Morley Wilkins, 2013) and anecdotal evidence from other English-speaking countries using UEB suggests that the code used for representing materials in technical fields (UEB, Nemeth or British Maths) is less important than instruction in subject matter concepts.

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| Nemeth | UEB |
| A student who is interested in higher level STEM subjects may benefit from Nemeth instruction given the traditional use of Nemeth in these areas and the availability of new and classic texts which have already been transcribed into Nemeth. | A student with high interest in STEM subjects may benefit from the use of UEB if the educational team determines that the consistency of using a single symbol for print symbols used in literary and primary / elementary level mathematics across subject texts would support building foundational STEM concepts. |

References:

Cryer, H., Home, S., & Morley Wilkins, S. (2013). Unified English Braille in the United Kingdom: Part 1- Examination by technical expert braille users. *British Journal of Visual Impairment*, 31, 228–237.

D’Andrea, F.M., PhD. (2019). Considerations for States Providing Materials in Braille. National Center on Educational Outcomes, NCEO Brief #19.

Holbrook, M. C., & MacCuspie, P. A. (2010). The Unified English Braille code: Examination by science, mathematics, and computer science technical expert braille readers. *Journal of Visual Impairment & Blindness*, 104, 533–541.

Hyperlinks:

[Individualized Education Program](https://sites.ed.gov/idea/regs/b/d/300.320/a): <https://sites.ed.gov/idea/regs/b/d/300.320/a>

[Considerations for States Providing Materials in Braille:](https://nceo.umn.edu/docs/OnlinePubs/NCEOBrief19.pdf)
<https://nceo.umn.edu/docs/OnlinePubs/NCEOBrief19.pdf>

[Present Levels](https://sites.ed.gov/idea/regs/b/d/300.320/a/1): <https://sites.ed.gov/idea/regs/b/d/300.320/a/1>

[Nemeth Braille Code](http://www.brailleauthority.org/mathscience/nemeth1972.pdf): <http://www.brailleauthority.org/mathscience/nemeth1972.pdf>

[Guidance for Transcription Using the Nemeth Code within UEB Contexts:](http://www.brailleauthority.org/ueb/nemeth-guidance/Nemeth%20Guidance%20Final.pdf)
<http://www.brailleauthority.org/ueb/nemeth-guidance/Nemeth%20Guidance%20Final.pdf>

[UEB](http://www.iceb.org/ueb.html): <http://www.iceb.org/ueb.html>

[Provisional Guidance on Transcribing Mathematics in UEB:](http://www.brailleauthority.org/ueb/ueb_math_guidance/final_for_posting_ueb_math_guidance_may_2019_102419.pdf)
http://www.brailleauthority.org/ueb/ueb_math_guidance/final_for_posting_ueb_math_guidance_may_2019_102419.pdf