Knowbility
K12 Access Summit

Teaching Students the Nemeth Braille Code for Mathematics and Scienc Notation
Pre Recorded Session

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Sarah:

Welcome to "Teaching Students the Nemeth Braille Code for Math and Science Notation: A Free Totally Accessible Online Approach." I'm Sarah Larkin, I am a Statewide Math Consultant for the Iowa Educational Services for the Blind and Visually Impaired.

Susan:

And I am Susan Osterhaus, and I also am a Statewide Mathematics Consultant, but I'm at the Texas School for the Blind and Visually Impaired.

Tina:

And hi, I'm Dr. Tina Herzberg and I am Professor and Coordinator of the Visual Impairment Education Program at the University of South Carolina Upstate. Our objectives for today are, identify three strategies that can be used to teach Nemeth Code to young students who read braille. Make connections between learning the Nemeth Code and learning math across the grade levels. And third, locate Nemeth Code symbols and examples in mathematical contexts using the Nemeth Symbol Library for a variety of uses, including mathematical and Nemeth Code learning. So we often get asked the question, when should Nemeth Code instruction begin? And I truly believe this that you never can begin too early. And today we have a picture of a young girl, approximately three-years-old, who is brailling a number on her braille writer. And then also on the slide, we have a Nemeth Code, 1 plus 3 equals 4. So going right back to that philosophy that you really can never begin too early is that we have worked together with Pearson to develop a Nemeth Curriculum. And so what we did is for the younger students is we had the Nemeth Code Curriculum that really is step-by-step designing to introduce students who are visually impaired to the numbers, and then all of the different Nemeth symbols that they would need through second grade. And then for students a little bit older in grades three through eight, there are the Nemeth Braille Focused Lessons. And so there are different lessons about multiplication, division, fractions, the five-step rule that we use when, oh, for example, reading and writing the names of ways. Mixed numbers, number lines, and then also radical expressions. And then the third part of the curriculum is actually the Nemeth Symbol Library. And so what we have, we have entries for over 200 math symbols and really gives definitions, and really easy to understand wording as well as little helpful hints about how to remember, how to braille these symbols. And then you can download multiple examples of how the symbol would be used in mathematical context. So the previous slide was the webpage that you will find on the Pearson website that introduces you to these three different parts of the curriculum. Let's spend the next few minutes talking about the curriculum for the younger students, the step-by-step approach that we have used. And so with the curriculum is that when you go to the next really dive into the Pre-K to second grade curriculum, you will find a series of zip folders. And so depending on the age of your students and what concepts that you want to introduce them, is that you're gonna download different and zip files. For example, you're getting ready to start the school year and you just learned that you have a student that's gonna be enter Pre-K that you know that's gonna be a braille reader. And so you may wanna download everything. So the really cool part about it is that there's six different modules in Pre-K, but even before then there's a pre-test so that way you really can figure out what it is that they already know. And then there's step-by-step in the curriculum. There are different games that you can play and all the way through the year, you're introducing them to reading and writing the numbers from 0 to 10. In this very end, we come up with some review games for them and a post test. Let's say though, maybe that you have a student who's already finished with Pre-K and they're going into kindergarten. So what we have done is that we have looked at all the different symbols that you would use during kindergarten, and we've also divided this within six different modules. So once again, we recommend starting with that pretest really find out exactly what your student knows. Let's say, for example, that you really figure out that they're still having some difficulties with a couple of the numbers. You could actually go back to the Pre-K and kinda supplement the instruction with it. So this is the beautiful part that really fits together and just builds upon each other. So in kindergarten, for example, they're introduced to tally marks, the general omission symbol. They also learn about addition and subtraction, a little bit about geometry and lots of activities about the braille of hundreds chart, because that's a big concept that's covered in the kindergarten year. And in first grade, more about addition and subtraction, and in particular about vertically aligned problems, including problems that have omissions. We also introduced them about multiple choice questions that using the English letter indicator with these as well as the long dash. So notice now the subtraction is not just in addition, it's not just a 10, but it has expanded to 20. And then we also build upon what they've already learned about place value. And now they're building all the way to 120, and we've even created a counting to 120s chart because there's not one readily available in braille. And then we end the first grade with writing and comparing numbers. And so they're introduced to the less than, and the greater than side. And then in second grade, students, actually the contents divided only into four different modules for this one. And so instead of subtraction, and addition to 120, this time it's to a hundred, but they're also introduced to the carried number indicator as well as the cancellation indicator. And then we talk about numbers all the way to the thousand, as well as word problems and money. So the great part is by the time they finish second grade, is they should have a really good foundation Nemeth Code to really build from there for the rest of their education. So just a little bit more about the Pre-K to second grade, is that really, it is all about teaching students to read and write Nemeth Code within UEB context and is aligned with the Common Core State Standards, probably from the students that we've talked with their favorite though, is that it's very hands-on. There's lots of games and activities. We're gonna look at a couple of those in just a moment. And for the teachers, what we hear that they really like is that there's a script. All of the braille files are ready, all they have to do is be a boss for their students. There's answer keys, data recording sheets, review activities, and assessments. And so the nice part is that they can be gathering data for their IEP while using the curriculum. So let's look at a couple of those hands-on activities we were talking about. In Pre-Kindergarten, building a train. So this is in the module where they learn about the number seven. And so what they are doing is they are using a craft stick and foam stickers to build a train. And so what they are doing is that they have different flashcards label, one to seven, they have to read, after they shuffle the flashcards, they have to read the number, and then how many ever let's say, if it's six, then they are gonna put six of the foam stickers onto the craft stick. Now the really cool part is they keep that all of these trains that they're making because later on, we have another activity that they use them for. And the really cool part, let's say we really want our students to have lots of opportunities to participate in activities with their peers, so if there are friends that would like to play that reprint is you can just add the number and print above the braille, and then they can complete this activity together easily. So kindergarten, an example of one of hands-on activity is a maze. In our previous pilot studies and talking with students, many of the middle school and high school students talked about that when they were little, they didn't always get a chance to participate in those really fun activities like mazes. And so we're like, wait a minute, we can change that. And so that's exactly what we've tried to do. Some of those activities that they actually talked about not having a chance to do, we've tried to include them in the curriculum. And so this first one is a maze and it is reviewing addition and subtraction in kindergarten. So all the problems are within 10, but they get to do it in a fun way by actually using a maze. And so we piloted this with some [indistinct] readers and we got a feedback, that I hate a door, I need to know how to get to my next box and so that's exactly what we added. And at the very end of the maze after they've gone to the right and then down, and then to the left and then down again, and then to the right, the double line means, Hey, I got there, I've arrived at the end of the maze and got to finish. So something else kinda fun is that what we have here is a American Printing House for the Blind Hundreds Chart. And we repurposed it, and so what we did is we actually cut it into six different pieces. And then what the students do is they rebuild the chart. So the wonderful part about this is that you will notice that there is print as well as braille on the American Printing House for the Blinds Hundreds Chart. And so they also, once again, could do this easily with a peer, but a great chance after they've been building the chart to a hundred, to really see what they're understanding about place value in a fun way by rebuilding the chart, that's been cut apart. So one of the other things that we came up with is that kind of a find the path activity. So there's actually instructions and we don't have 'em on the slide, but they're in braille. And we also give the print for the teachers. But what they're told is that you have to finish the math problems and all of the answers that are eight and nine is you're gonna use something like Wikki Stix to create a path. And when you get through with the path, you find the airplane. And what they actually get to do is they get to create their own airplane. So we have one in SimBraille, but we've heard from students that they've actually used a variety of materials to make a text or plane, or some that have actually been just interested enough to try to make one in braille themselves.

Susan:

Oh, look at that airplane. [chuckles]

Tina:

So in first grade, they are introduced to numbers to 120. And so once again, to get lots of practice with the counting to 120 chart is that we came up with another activity. So this time it's actually, they have to figure out the shape where the missing numbers are. And so this time we have two different rectangles. So number one, they have to find the missing numbers and then identify not only what shape it is, but then also talk about what are the missing numbers. And this one is kinda nice too because you know, not then you're also, not only are we reading and writing in Nemeth, but then we're also building their geometry skills at the very same time. So in second grade, we have an activity, it's based on a commercially available game of connect four. But what we've done is we've made it specifically for the Nemeth Code within UEB context. So in second grade, they learn about money. And so what we do is we have different game cards, there's actually a series of them. And so they get to pick out which game card that they might like. And there's flash cards, and so when they have a flashcard, they get to decide, Oh, 'cause there may be like, let's say like $3.25, there may be two of those on their card, there only may be one. So if there's two, they have to figure out where am I going to place it? And so what they're eventually trying to do though, is to get four on the row 'cause that's exactly how you win. So there's a little strategy as well as about reading the monetary expressions to this game. So this is just a few of the hands-on activities that we've included in the curriculum. There's also BINGO, which is always a fan favorite. We came up with a template for the five frame and the 10 frame. There are also some commercially available from American Printing House for the Blind, but recognizing that not everyone may have one, that we have one for you. Number searches, that was another one that our students told us that they didn't always get to participate when they were younger, so we made sure to include. Guess my number, which I think might be Ms. Susan's favorite activity of it all. We give them hints and they have to figure out what the special number is. Roll and race game cards, it's a different type of game with a game cards. But once again, this time, instead of reading flashcards, it's all based on rolling a dice. There's flashcards and a lot of the flashcards, it's for activities, but then it's also to really be able to challenge them like, okay, you read those 10 flashcards in one minute last time. Do you think you can read 'em in 45 seconds? Really trying to build that automaticity. Shape activities many more than just the one that you saw, the counting to 120 chart are already referred to. And then we also created some place value charts because especially like if they're using like base 10 blocks or other types of manipulative in their classroom, this way, it helps them be able to organize which ones should be in the hundreds columns, which should be in the tenth and which ones should be in the what. So along the way, we provide strategies for the teacher or parents who may be supporting the student in building their math skills. So sometimes, you know, students kinda forget which one should I use? First, my right or my left one writing the equal sign? Well, the first thing is that it's equal, so we know that we're gonna have use two fingers on our left and two fingers on the right, because it's the very same 'cause they're equal. And so what you do is you actually start with your right and then you go with your left. So the really cool part, the memory cue though, is that two fingers are equal to two fingers. So that two dots then are equal to two dots.

Susan:

Oops, I think I'm up now. [chuckles] Okay, so now we're going to speak about the, or I'm going to speak about the Nemeth Braille Code Focused Lessons. So if you could get us over there, Sarah, I'll show them a little bit about what that looks like. So these focus lessons they are designed, I'm gonna rereading a little bit from the webpage, to help students learn the Nemeth symbols primarily used in grades three through eight, increase their knowledge and understanding of key mathematical concepts. So we are teaching the Nemeth Code, but we're slipping in a little bit of that math. And although that we said grades 3 through 8, students of any age, well, I think can enjoy these and learn from the lessons, and especially, I'm pointing this out for any of those older students. If you need a refresher or additional practice with Nemeth symbols, I think the focused lessons might be just what you need. And the way these were developed were we actually got feedback from says dozens of students interested in learning the Nemeth symbols in a fun and supportive way. And these include how to read and write new symbols in Nemeth Code, how to use these symbols for math concepts and applications like number lines, modified expressions. We also give them examples in braille, examples in print for parents and teachers, activities and games to reinforce them and a list of special symbols for reference. And we even give an abbreviated lesson document with only the examples and problems for the students, especially those who are transitioning to braille or new to the Nemeth Code. And so you can use that document kind of like a, I hate to say cheat sheet, but it's like a really neat kind of reference sheet that you can use. And I'm gonna go ahead, I'm not gonna go to any of these links. So Sarah, let's just go and zip over to the back to the PowerPoint. And then I'll talk a little bit more about the focused lessons there. So again, as we said, these are designed for the original design was for 3rd through 8th grade, but I think that this goes beyond all that. There is for example, the five-step rule and exceptions, which includes a lot of higher level than even the 3rd through 8th grade that students will really want to know about. And we'll show you some examples of that in a moment. Fractions in mixed numbers, you might think, well that's 3rd through 8th grade, but guess what? We also put a little bit of algebra in there. There's some variables in those fractions. So you're gonna get a little bit more than 3rd through 8th grade. Multiplication division sounds pretty simple, right? But again, we'll give you a chance to work with some variables if you'd like that as well. Number lines, I think that we are all in love with number lines. So you are going to have lots and lots of practice with number lines, creating them and interpreting them. And then we even have radical expressions in there. So that's what the focus lessons are about. But let's show you a little bit more in detail. So let's go to the next slide. So what I'm gonna show you are some excerpts. Tina showed you mostly all the fun games and so forth that we did with that Pre-K through grade two students, but they are very, very, very step-by-step instructions. And what some of the students told us in this age group was we love that, we would've loved that when we were younger, 'cause these were middle school students that we were talking to. They said, but we want something a little different. Well, that's another thing just because everybody wants something designed for them. So what they asked us to do was it's still okay to have some steps, but make it a minimal number of steps and just have like little mini lessons, which we ended up calling focused lessons. So we basically, we created these based on what they said they wanted. So when you read these, they're very much, much shorter than the step-by-step script for the younger kids. But again, I still think they like those steps, that I'll show you a few things, you know, just so you'll understand what we're talking about. This is what they requested, so we tried to write it for them. Well, of course then teachers though, they wanted us to include them as well. So we ended up adding many more things for the teachers as well. But when you read the lessons, you're gonna notice that they are clearly focused on this age group. We are talking more to them this time, rather than talking to the teacher. And also with the younger students, it's a teacher script and the teacher is teaching them. Here, they're a little more independent, but we still have a little bit of step-by-step instruction. For example, in the five-step rule and exceptions, the first thing on your left that you're looking at is one of the exceptions, which is usually at a little bit lower grade. And this is the following steps outlined how to write 356 with a bar under the five that's used when you're talking about place value. By the way, this exception was actually created by teachers requesting banner to please make up an exception to the rule of having to do the long five-step rule. So I just want you to know that this is very exciting exception that teachers requested. And then now here we are, we're teaching it to these students. And as you can see, we go step-by-step to show them how to actually write that. On the right, we have the full five-step modification rules and it, again, we have step one, step two, step three, step four, step five because it is a five-step rule and we give them exactly what each part is called, the dot configuration and then the actual braille, in this case, SimBraille. But remember that all the students themselves, they actually have everything completely in braille. This, what you're looking at right now is so that those of you who can see, can see it and also that you, as a teacher or a parent, you're able to follow along as well. Okay, let's keep going. So besides the five-step rule, as I mentioned, fractions and mixed numbers, now that that last slide showed you actually an excerpt from the lesson. What this is, this is an excerpt from some of the activities. And so we've got on the left side, we have a couple of fraction problems. And I remember I told you that we might, we were gonna probably have some variables. And so in this particular case, I am showing you some with variables. We have Y over Z times Z over X. And by the way, let me go ahead and read that completely. The way we have it in there is we are asking them, in this case, this is a writing activity. So we are saying, we want you to write the following, open fraction, Y over Z closed fraction times, and then in parenthesis, we have multiplication dot, closed parenthesis, open fraction Z over X closed fraction. So as they're reading that, they can immediately start brailling that it follows that Nemeth Code, as they're hearing this, they can immediately be brailling this up in Nemeth Code. And in other words, they don't have to listen to me, say the whole entire thing as they're reading it, they can be inserting that Nemeth Code. So that's what that's about on the left side. On the right side, we have an example from activity and actually this one has the directions included because I sniped it at the top. And that is write the following problems involving mixed numbers, using a horizontal fraction line and number each problem. So we're being very specific with them. Like I was with the multiplication dot to your left. We're telling them exactly the type of fraction line they need to use. The horizontal one, not the diagonal one, for example. Okay, and we have 3 1/2 plus 2 1/4, and we say that it's so important in all these activities, we teach them how to say it and how to write it. And this is also, we found teachers have asked us and said, they really like us telling them how to pronounce it as well. And again, this is good practice for the student 'cause they're learning how their math teacher is going to say it. Okay, so besides fractions and mixed numbers, let's get to the next one. Multiplication and division. Now we're going back to the lesson again. On your left, you have a little bit about the introduction on multiplication. And you'll notice it's talking about it's related to addition. So we teach 'em a little bit about math as we're teaching them those Nemeth symbols. Well, it's not, don't think that this is a substitution for a mathematics curriculum, but you just, in our opinion, you just can't teach the Nemeth Code without teaching some math. Imagine if you were in a regular classroom, and the math teacher's teaching away, and the math teacher said, okay, we're gonna sit down and learn 1,356 math symbols today. You don't do it that way. You learn as you're learning the math, you're learning that new symbol, same thing with the Nemeth Code. You're learning how to write that math symbol using the Nemeth Code as you're learning the math. So again, on the left side, we've got multiplication and on the right side, we have an introduction to division. It relates it back to multiplication, gives them some examples. And again, what you're seeing is actually what the teacher or the parent is gonna see. And just remember, that the student has all of this in braille. So they have their own separate braille document and we have, I'm thinking very few pages, four or five, maybe at the most six pages of, in other words, much shorter, and they can sit down and learn these each of these lessons very quickly. Take the practice, and we have lots of activities that go with each of these lessons. Okay, keep going. We have, and I told you already that we just love the braille number lines. And so first thing that we do is we talk about creating a braille number line. So what you're seeing here is we give them exactly the steps that you need to create the number lines, the exact symbols, the dot configurations, and so forth. And you'll notice, I said that these are actually focused on the student. For example, it says these tactile number lines are also quite visual. So imagine that you're a middle school student and you're listening. That is, they look very much like the print versions of number lines. Therefore, it is rather easy for a sighted math teacher to interpret them once they're given the rules for the various symbols. So here's what you could teach your math teacher. So that's what I'm trying to say is these are really focused on the kids and we're teaching them to teach their math teacher, not necessarily their TBI, but their actual math teacher. And let me tell you that is the best way for a student to learn something, in our opinion. When they get to be the teacher, they can teach the teacher something, and most math teachers are very excited to learn about how math looks in the Nemeth Code. Okay, let's keep going, talking some more about those number lines. Well, once you've created one, you've gotta graph on those number lines. So here's another little, this isn't the exact introduction, but it's a big, a nice hunk out of the lesson. And we're showing them an example and we're saying we're at the following integers on a number line, negative 2, negative 1, 0, 1, 2. We have for of those sided folks in case they're like, what does that mean? We're giving them a nice print number line, and then following that we're showing them how to actually design and create that, those points on a number line, and we have all the dot configurations there. And we even describe it. It's not just in all text, it's actually right there in the document. And we're saying a braille number line is shown, the scale marker and increments of one, starting with negative 3 and ending with 3, a closed circle is placed above the scale marks at negative 2, negative 1, 0, 1, and 2. So no matter what their level is, it is described to them. It's shown to them in braille and for those teachers or parents who can see, we're actually showing them what it looks like in print as well. Okay, well, we have to go a little more than just graphing points, we also wanna show them how to graph and interpret inequalities on a number line. Have you noticed we're progressing from 3rd through 8th grade pretty quickly here? So now here we are, and this this on the left, we're talking about graphing X is less than three on a number line. And we have, again, we have a print version of this, but look at what it's saying. It's saying step one, construct the number line and space it so that you have at least two scale marks larger than three and a few smaller than three. I mean, it gives step-by-step instructions for that beginning one. So just to get them started, we even show them and we tell them if you want to, we'll let you do it this way as a student, which might be a little easier for you, but we're also gonna show you the way the transcriber would do it the way you're gonna see it in the textbooks, the way you're going to see it on your standardized tests. So again, we are talking to the student and showing them what they can do themselves, if they choose to or what they're going to see as far as what the transcriber's gonna do in a textbook or on a test. I'm gonna have to, I will confess that most of my students say, I wanna do it like the transcriber. I wanna do it like what it's gonna be in a textbook or the test, but the fact that you're giving them that choice, I'm sure you remember middle school students or any students love to have that choice. They want it to be their choice as to how they're going to do it. And this way that gives them some more confidence and they get to make the choice. If they wanna be the perfectionist, you're not making them be the perfectionist. They have chosen to do that. Okay, and on the right side, we have some more... One of the left side where it's they actually had to graph. They had to do all the creating of the tactile graphic of the inequalities on a number line. On the right, we have a lesson where they're actually having to interpret it. So this time, they are given the braille number line graph and they have to figure out what is this? And so we go ahead and give them the problem, and give them the entire graph, and we ask them, what is this? And then they're going to fill in the blank and say, X is greater than three. And we show them how to verbalize that, how to write it in print and how to write it in braille. Okay, let's keep going. We're gonna talk about reading and writing radical expressions. The basic rules for writing a square root. I just, and I'm sorry, but I just think to me, that students will just love this, and teachers and parents too, when writing a square root, you follow three simple steps you braille. One, the radical symbol, we tell you what it is. Two, you write the radicand, then you write the termination indicator. It's three steps, boom, boom, boom. I mean, there things are get a little more complicated, but at first just show 'em how to do it, boom, boom, boom. So we're telling him, these are the three steps, then this is followed by, well, how do you write the principle square root of four in Nemeth Code? You write that radical symbol, just like we said, you write four because that's the radicand, that's what's in the value in the radicand and then there's the termination indicator. So immediately, you show 'em three steps and then you do one, and then they get a lot, a whole lot of practice. And then of course, that's the writing of the square root. But then we also want to be sure that they can read a square root, and we give them examples of that. For instance, the square root of 25 and we show them how to write it. The square root of X, we show them how to write it. And we even say for most square roots, you're just gonna say the square root of, and then read the radicand. It does get more complicated and we explain all those rules and so forth. And I do left off the fact that we do even do radical expressions with indices. We do radical expressions, nested radicals. So for those of you who are listening and kinda remember like, Oh, I don't, I think that was beyond 8th grade for me, it's there, if they want to go further or they can stop. This is what's nice, each of these lessons is separate. They build, but you can stop when you get to their level, they can stop and say, that's as far as I am in school, I'm gonna stop right there. I'm just where I need to be. And I believe Sarah, am I at the end of my, I think I'm gonna pass it to you.

Sara:

You are, thank you very much, Susan. So I get the opportunity to talk about the Nemeth Symbol Library. And this came about because we, again talked to the students. This time, we talked to those high school kiddos, those, you know, what did they want in a curriculum? And one of the things that they found was that they have very little time when they get to high school to sit down and learn something. Instead, they wanted to be able to just look something up and get on with their math lesson. By that time they have some screen reader skills, and so they're able to just access this Nemeth Symbol Library to look up symbols. So I'll talk a little bit about, I mentioned that it started with these higher levels, but then as we started building the Nemeth Symbol Library for the high school students, then all of a sudden the teachers and the parents, and the younger kids said, what about us, can't we look up our symbols too? And so we ended up actually extending it down through all of the grade levels. So now the Nemeth Symbol Library has over 600 examples at all different grade levels. And we even included a tutorial on how to use it and the commands or keys that the student needs to know to be able to access that library. It now contains 240 terms and 136 different definitions. Now you might think that the terms and the definitions should be the same. The reason there's more terms is because sometimes in math, we use more than one term to mean the same thing. For instance, exponent, superscript, power, all mean the same thing. So we have all three terms, but we have one definition in how to write those. The organization of the library, it is kind of a glossary format, so you're just looking up the term. Several of those terms like that exponent, power, superscript are all gonna land you on that same description. And there are lots of examples from easy to complex. So let's look at the actual symbol library and let's do it with a screen reader. So I'm just gonna go ahead and minimize here. Gonna take out all of that. All right, so right now, I am on my home screen. I'm going to go ahead and turn on my screen reader. I'm gonna use NVDA for this. So I'll just do the Windows key, start typing NVDA and hit Enter to start it. [computer rings] Now my screen reader is up and going, I just need to access the internet. So similarly, I'm gonna hit my Windows key.

Computer:

Start Window- Search Window- Start, search, blank.

Sara:

And then I'm gonna start searching Google Chrome.

Computer:

New tab, Google Chrome.

Sara: And I'm gonna hit Enter, and so now I'm in Google Chrome. And I'm gonna, for the sake of ours, maximize it. All right, once I'm in Google Chrome, I need to find that Nemeth Symbol Library. So I'm just gonna type it right in the address bar. I'm gonna type Nemeth Symbol Library.

Computer: N-E-M-E-T-H space S-Y-M-B-O-L space L-I-B-R-A-R-Y, selection removed. Google.com/serch?q=nemeth+symbol.

Sara:

So now I have my search, but now I'm gonna go and type H for headings until I get to the Nemeth Symbol Library that I want to go to. So even if I don't know the web address, I can take myself there. So I'm gonna hit H.

Computer:

Search mode heading level one, mainland marked clickable search results, heading level one, clickable Nemeth Symbol Library accessible assessment, Pearson heading level three visited link.

Sara:

It's a Nemeth Symbol Library. So I know I'm on there, I can hit Enter to go into it.

Computer:

Document visit blank- Nemeth Symbol Li-

Sara:

Now, I'm already in the Nemeth Symbol Library. And so now I want to go ahead and start reading the page that I'm on. So again, I'm gonna navigate by headings by typing H.

Computer:

Mainland marked Welcome to the Nemeth Symbol Library heading level one.

Sara:

H again, to get-

Computer:

Introduction heading level two.

Sara:

And then I'm gonna use my arrows to type, I'm not gonna read the full introduction, but just a couple of sentences.

Computer:

The purpose of this Nemeth Symbol Library is allow individuals to look up Nemeth symbols and math related terms, using the words a student is accustomed to hearing. These listed after this introduction. Once you have found the symbol or term in the list, see.

Sara:

All right, so they can read through that entire introduction, but then I'm gonna go ahead and go to the list of symbols by going by headings again. So I'm just gonna type H.

Computer:

List of Symbols and Math Terms, heading level two.

Sara:

So I know that I am in my list of symbols, and then I can arrow down to look at what some of these symbols are.

Computer:

List with 136 items, link absolute value.

Sara:

So did you hear there were 136? So I could arrow down, maybe one of my terms that I want to look up starts lower later in the alphabet, I might not want to arrow all the way down to those lower ones. I could arrow, but a faster way would be to just open up a links list. And I can do that by hitting Insert + F7.

Computer:

Elements list dialogue, tree view, level zero absolute value 36 of 500-

Sara:

And now I actually can start typing the word that I want to look up. So for instance, let's say I wanted to look up less than, I can start typing less than.

Computer:

L-E-S-S.

Sara:

And then I can hit enter to go to that particular symbol.

Computer:

Nemeth Symbol Library Accessible Assessment.

Sara:

So now it's at the definition for less than, and now I'm just gonna use my arrows to have it read. So notice, I'm not using the mouse through any of this, I'm just using my keyboard. So I'm gonna arrow down to the definition of less than.

Computer:

The less than sign dot five, dots one, three, should be written with a space before and after it since it is a sign comparison. Notice that you begin brailling using one finger on the right hand followed by two fingers of the left hand always and right hand and then left hand. It's a pattern. Also, one finger is less than two fingers or one dot is less than two dots. See examples, link Nemeth in EBAE B-

Sara:

All right, so at the point that they hear, see examples, we have three options now. Three different forms that the student or the teacher could access. We have Nemeth in EBAE, which is the older braille code. We have Nemeth within UEB contexts, which is the newer braille code. And then we have Nemeth in Print and SimBraille for those sighted teachers that might want to look at it at the same time as their students. So let's go ahead and go to one of the braille files and look at some of the examples for using less than. So I'm just gonna hit Tab to go between the links and I'm gonna stop at the Nemeth within UEB contexts.

Computer:

Nemeth UEB, BRF link. Nemeth within UEB contexts, BRF link.

Sara:

That's the one I want 'cause right now, we're using Nemeth within UEB contexts so I'll hit Enter.

Computer:

Downloading, 0% remaining alert. Download complete, less\_than\_UEB.brf

Sara:

All right, so it told me that it downloaded for me. Now I can just do my Shift + F6.

Computer:

Download start moving, less\_than\_UEB.brf.

Sara:

It's opening that...

Computer:

Import file dialogue. Template list. Nemeth Symbol, the Duxbury Braille Translator.

Sara:

I hit Enter to actually open it up. Now at this point, right now it's showing up visually on my screen. But as a tactile learner, a braille user, I would want a braille display attached to my computer. So then as I arrow through these different lines, I can actually see the braille under my fingers. That is exactly equal to being displayed on the screen. So that's where I wanna see the braille. The other thing I could do is emboss it at this point, send it to an embosser and then I have a hard copy of those examples. All right, let's go ahead and...

Computer:

Closed- Nemeth Symbol Library access- Less than sign dot five, dots one, three should be-

Sara:

So now I'm gonna go to the Nemeth in Print and SimBraille, let me go ahead and shut off my... So it really is that simple for a braille user. If I wanted to look up another symbol, I could just, again, do my Insert + F7, open up that list, search for my next symbol and read what it is. And we always start out with that dot configuration to begin with. Then we always end with those three choices for examples. So let's end the screen reader for now.

Computer:

End NVDA.

Sara:

And if I am a print user, let's say a teacher that is sighted. I can open up the Nemeth with SimBraille. And so this is exactly what is in the student file. There's no difference. So in the student file, it's gonna say number one, it's gonna say six is less than nine is written. So it always has how to say it. The words is written and then after is written, it shows it in Nemeth Code. Now for a sighted teacher, we showed it in print as well, but they're able to see what it looks like in the Nemeth Code for the student as well. And we progress through those examples from easy to more complex. So the first example is just six is less than nine. Then we get into a variable. So X is less than negative one. Then we have a compound inequality. So we have zero is less than x is less than seven. Then we have a couple of variables, y is less than three x minus five. And then we have measure of angle C is less than 30 degrees, which would happen later. So the students that are younger, just have to go through the examples at the beginning that they want to focus on. And when it starts going beyond their grade level, they can just stop. Those older kids can just quickly move past the ones they already know and look at the ones that they want more information about. All right, so now let's go ahead and go back to one of our key pieces we want to share with you. A couple of things, one, we have that tutorial that lists all of those commands. It tells you how it is structured, all of the key strokes and gives you some practice in using it. But we would like to announce most importantly, the fact that we are having this fall, a Nemeth Field Study. So Pearson and the NFB are actually seeking participants to use this curriculum. If you have younger kids, you can use the Pre-K to two. If you have those later elementary to middle school, you could use those focused lessons, or even with those high school students, you might use the focused lessons or the Nemeth Symbol Library. So whatever parts you would like to be a part of, you can include. If you're interested in participating in this field study, we have a link to the survey. So we would ask that you fill out that link or fill out that survey. The study is gonna be conducted from September 5th through December 16th. And during that time, we're gonna really focus on the effectiveness and usability of the curriculum that we've shared with you today. Each participant will receive compensation for your time because we know this is one more thing. Although, we think that you'll find a lot of this useful in your instruction. And everyone involved in the study will have access, first access to this new updated, the curriculum materials. Tina or Susan, is there anything else you'd like to share about the field study?

Tina:

No, I think you've got everything.

Sara:

Okay, so we look forward to visiting with any of you during the Q and A time, and we've also included our contact information. So we'd love to hear from you. Thank you.