

Project INSPIRE: Course 5, Lesson 7

Transcript

SPEAKER: Welcome to "Nemeth Code Symbols Used in the Middle Grades and Strategies for Supporting Mass Learning." This is lesson 7: "Teaching Math Skills to Students With Visual Impairments and Additional Disabilities" and our guest for the lesson is Leslie Borton, who will be doing the second half of this presentation.

Let's go on to slide two and talk about the objectives. You're going to be able to select and adapt materials to support learning and engagement of students with visual impairments and additional disabilities, design math instruction that supports student learning and the expanded core curriculum, describe strategies TVIs can utilize when collaborating with other members of the students educational team to promote generalization of skills. So we really want our students to carry these math skills forward into the real world.

And finally, our fourth objective is to be able to explain ways in which families can support their child's learning of math concepts at home and in the community. Because when we're talking about our students with additional disabilities, it's imperative that we involve the family. I want you to keep that in mind as we go through this lesson.

Slide three, let's talk about the characteristics and needs of our students with additional disabilities. And I think we all recognize that we have a very heterogeneous group of students who come under the category of visual impairment. So for this lesson, we're really going to focus on a subset of students with additional disabilities, because some of our students have only one additional disability, for example, hearing or an intellectual disability. Many of our students have multiple additional disabilities, including intellectual disabilities.

So when we think about our students, we can't just say, "Oh, you have an additional disability, and this is what you need." Instead we really need to individualize instruction, and this group of students, this big group of students with additional disabilities really benefit from hands-on learning and making instruction meaningful. And as you're working with students with additional disabilities whether we're talking about math or science or we're talking about other areas of the curriculum, it's really important that the whole educational team think about both the short-term and long-term goals for the student, and how does math instruction play into these long-term goals for our student even if they have another 6 or 7 or 8 years where they qualify for special education services. Folks it is not too early to begin to think about this group of learners in their long-term goals.

Let's go on to slide four, and I'd like to talk about the role of the teacher of students with visual impairments recognizing that many of you taking this course are in additional roles. For example, you may be a paraprofessional. You may be a graduate student who is preparing to be a teacher of students with visual impairments. You maybe a general education teacher or a family member. So I want you to

think about how you play in to the life of the student with additional disabilities. Though I'm talking specifically on slide four about students with additional disabilities.

So one of the first key things that we as teachers of students with visual impairments do is to provide accessible materials, including braille. In Project INSPIRE, we are focused on our braille learners, but I do want to point out that some of our learners are dual media learners. Some of our learners have low vision. Though we say braille here, obviously you're going to be doing that functional vision assessment and learning media assessment to find out what specifically this particular student needs.

I want you to use correct math terminology, and that is so important for our students. At the same time, if they're in a general ed math class or special ed, teachers providing their math instruction, you want to check in on the terms they're using. You need to know your state standards and how to modify them as needed to ensure that your student is meeting the standards but getting that individualized education. And of course, you're going to evaluate student progress across time. Now I've got a picture on the slide that shows a student working on a division problem using cubes and containers to work through that problem so that she gets that idea of how I can take a number and divide that into equal parts.

Let's go ahead and go on to slide five and continue to talk about the role of the TVI. You want to understand the student's capabilities. We have a bad habit folks in this field of underestimating our students' abilities, and it's important that we challenge them. Many times I have seen in special education that we do the same thing over and over and over again with our student from year to year from IEP to IEP, and we're not challenging them, helping them progress to the next skill set.

So I want you to keep in mind that you need to know your students capabilities. You need to have high expectations. You need to challenge them. At the same time, you need to monitor and adjust. We're talking about kids who need an individualized approach. And so sometimes what's not working is you. It's not the student. It's how you're presenting the materials.

It's the type of materials you have. It's the concepts that they haven't already learned. It's the terminology you're using. So don't just say, "Oh, the student isn't to the point where they are able to learn concept X." Instead I want you to really go back and look at what do we need to adjust here so the student can be successful with concept X. It's really important when we get to the middle school level that we are teaching what's relevant to the student. How can they use this throughout their lives at home, at school, in the community now, and where does this go in the future? And it's imperative that we really expect success for our students.

Let's take a look at the picture of this young man who is using a number line to work the problem 4 plus 4 equals 8. So he's found the number four with his left finger. He's counted over four more with his right finger, and he's landed on eight. When we're working on math facts at the middle school level, and my student is using a number line because they have not memorized the math facts, it might be time for me also to introduce a talking calculator for that student and to think about why are we emphasizing math

facts at this point in time. Do I have a reason that's going to allow that student in the future to use that information?

Perhaps, this is a student who is going to be working in a situation where he needs to count out a certain number of each item that he needs to do his job. So he does need to understand math concepts around counting.

Slide six, let's talk about collaboration. We are collaborators in education, and so we really need to get everybody on the team together, including the parents and related service providers. And we need to communicate regularly.

This is common sense across all areas, not just math. But if we're not communicating and all focused on where we're going with the student, then we're doing math in a bubble, and that's not effective. TVI should observe in the classroom to better understand the physical environment and how successfully the student uses instructional materials.

Now this means does my student know where their braille materials are? Does my student have access to a braille ruler if other students are using a ruler? How is the environment set up for them? Do they know where their materials are?

What type of instruction is the teacher giving related to those materials? And how does my student participate in math class? If my student is the island in the mainstream folks, we really need to look at this. I want my student participating, and then obviously want to focus on the math concepts. If the teacher is talking about fractions and we're doing a lesson preparing to do a cooking activity where the student is going to need to use a $\frac{1}{2}$ cup and a $\frac{1}{3}$ of a cup and my student doesn't have that background knowledge of what is a cup and then how do I divide a cup into parts, then my student is going to be lost in that discussion of that cooking lesson. So when appropriate, I want you to interview the student, the teacher, the paraprofessional, all those folks involved in that student's life to better understand what are the expectations for the student, what knowledge does that student have. Often as TVIs we're in and out. You've got to be able to get information from others. And then you're going to use this information you've gathered through observations, through talking with the student, the teacher, paraprofessionals, your knowledge of the math curriculum, and you're going to need to decide are there things I need to pre-teach or preview with that student that would support that student in having greater success in the math class.

How am I going to support the staff so that they understand the needs of a blind student? Because we all know we're often told, "Oh my gosh, I've never had a blind student in my math class before. I'm not sure how to teach fractions to her." So we want to think about what supports we need to provide to those educators.

We also want to think about if instructional materials, such as clocks, timers, rulers, et cetera need to be adapted. Often our APH materials are sufficient for our students, but sometimes especially for our

students who have cognitive impairments or physical impairments we may need to do some additional adaptations.

And then we want to think about instruction in using and interpreting graphics would be warranted. So much of what goes on in our world today is graphically based. Does our student need to understand how to read pie charts and bar charts and line graphs, for example, and what skills do I need to work on with the student to be successful?

Going on to slide seven, I want to talk about curriculum for students with visual impairments and additional disabilities. We all know we have an IEP. What does the I stand for? Individualized. We cannot have cookie cutter IEPs for our students. So I know I'm preaching to the choir here, but the whole idea with an IEP folks is to think about what does that student need to learn, what adaptations, what modifications, would instructional strategies. And we really want to think about that specific student and base our recommendations on data we have gathered.

For many of our students, they're going to be learning the core curriculum, which of course, includes math and science and reading, but they're also going to be learning the expanded core curriculum. If you're not familiar with the expanded core curriculum, we really encourage you to take some time, do a quick Google search, and you'll find out that that is a framework with nine areas.

So when we think about our students who need to participate in the core curriculum that have additional disabilities where they also need some instruction in the expanded core curriculum, our students may be on grade level with the standards that everybody else at that grade level without a disability is using, but they may need some accommodations. This might be where our braille, our hands on manipulatives, pre-teaching comes in.

They might be on grade level standards, but the curriculum is adapted with below grade level expectations. The rest of the class might be graphing inequalities, and our student may be just working on the concept of doing a basic graph and then using that to travel a route within the school. So I can go three feet this way, and I go two feet that way.

We may be preparing our student for instruction. So that's when we're focusing more on communication, social interaction, motor skills, and this is when a student may use more of a functional curriculum. This information comes from a book by Sacks and Zatta, 2016, which is on our resource list.

So what exactly is a functional curriculum? That's my focus for slide eight. It's focused on meaningful activities. So this is where I'm going to have my student often doing activities around independent living skills, orientation and mobility where they're learning to be more functional.

So academics are part of this, but it's in supporting skills in those other areas. So we're really focusing on the natural environment. Learning to go to a restaurant to order a meal to then pay for that meal using money to then carry that meal to the table and eat it appropriately involves a lot of math types of concepts

as far as the money piece goes, but it's more in a functional environment in the natural way it occurs, we're going to take and have routines for that student.

So, for example, in the classroom, we might have a routine around everybody needing to pay for their lunch in the school cafeteria. So counting out what money you need, talking about what you're going to purchase, having your money and then getting your change, counting your change to make sure it's accurate. So we want to do age-appropriate things at middle school with our students. So are other students getting online and downloading music, for example? How much does that cost? How do you figure that out? You might want to do activities around that?

Is the holiday time, and it would be age appropriate to buy a friend a gift and then wrap it? So then do I want to measure out how much ribbon and wrapping paper I need that might involve using a ruler? We really want to focus on activities that have a beginning, middle, and end and that are predictable. So our student can practice and build skills, very much we want to focus on students' interests and strengths. So if I have a student, for example, who's really into baseball, knows all kinds of things about the local triple-A baseball team, I'm going to use that information in that interest of that student to then build word problems that are math-oriented. We might talk about how much does it cost to buy a ticket to go to the game, and then you want to have popcorn and a hot dog.

What time does the game start? At what time would you need to get the bus so that you could get to the baseball field on time. And that allows the student to think about partial participation. OK, this is probably not a student who is to the point where they're taking the bus independently to the ball field, but can they plan the time that the family is going to leave and how long we're going to be on the bus and how long it's going to take us to walk to the baseball stadium and those types of things so that they start to get a concept more of time?

So we want to really emphasize building towards interdependence and independence. The reality is none of us are fully independent, gang. We all are interdependent on each other, and so we want to think about that with our students.

Slide nine, so what exactly are we going to focus on with our students who have additional disabilities, are using a functional curriculum? For example, counting, how many items do we need for an activity? One-to-one correspondence, so this would be let's say I'm setting the table. And what do I need to put at each place setting at each chair.

Using the dollar up method, so I might have a student money-wise who coming up with \$7.19 isn't going to work for them. So we focus on when it says 7, you count 1, 2, 3, 4, 5, 6, 7 one dollar bills, and then one more makes 8. So you give \$8, and you get your change, rather than my student trying to count out a \$5 bill, two \$1 bills, a dime, a nickel, and 4 pennies. So I work my student on how to count by ones. We use one dollar bills, and we go one more.

Time, setting a timer to alert when the brownies are done baking. So what does time mean, and how does that apply in my life? Another one I gave you around measurement already is how much do I need, a $\frac{1}{3}$ of a cup, a $\frac{1}{2}$ of a cup of that ingredient for a recipe?

All right, slide 10 talks about money. Now we really want you to use real money whenever possible and infuse money skills into the student's community travel. So this is where you can get with the O&M instructor and the family. Let's talk about where are natural places for the student to earn money and to spend money.

And where does this happen in the classroom? Does the student have an opportunity to earn money, and then go, let's say to the teacher's lounge and purchase something out of the vending machine. When practicing money skills, you want to build on the student's interest. So I have a little money practicing activity here where I have a tray that has a bottle of water, a granola bar, and a pack of gum. Each of these is labeled with a print-braille label.

My student has an APH tray divided into four sections. So I have nickels, pennies, dimes, and quarters in those sections. My student has those coin up at the top that selects which item they want from the tray, and then pulls down the appropriate number of coins to the bottom to show what they want to purchase. And that is a way for them to practice their money skills functionally in the classroom, also to start to get an idea of how much things cost when they're out in the real world.

So you really want to encourage the family to get with their child and discuss what items cost. I love to always suggest to families that the student has their own shopping list and a couple of items that they get to buy. We also want to teach use of a calculator if the student needs that to add up the value of the point so that they can get the total.

Slide 11 talks about buying a snack from a vending machine. So here's some background knowledge our student needs to have. Obviously they need to know the value of each coin and how to count by 1s, 5s, 10s, and 25s. So we need to have that practice with those real coins.

Using that talking calculator again if they need to add up the values and knowing their real numbers, signs of operation, and decimal. So you need to make sure that your student has this background information. When you go to have your student use the vending machine, you want to peak their interest. Maybe there's a song that appeals to them that has money in it, or you've made up a song together that's age appropriate. We don't want to be singing Barney here, folks. Have them confirm the price of the snack in braille.

And then we want to have them make sure that they actually have enough money to purchase their snack, so when they go to purchase the snack, they've actually bought the correct amount of money with them. You might have the student discuss how many of each coin is needed, and they can even talk about, well, I could use 5 dimes or I could use 2 quarters.

And have them confirm that they've selected the right combination of coins by actually purchasing their snack, and wow, the snack comes out of the machine. I'm going to turn it over to Leslie Borton, who is our guest here for lesson seven and let her finish up this lesson for us. So Leslie is going to start off by talking about time on slide 12.

LESLIE BORTON: The first I'm going to mention is that telling time in digital format is much more common in the real world, and we understand that. However, using an analog clock will help you teach the student important math skills, and this is something that I have found true with students who have low vision or who are completely blind. It is an important skill for them both to have.

Students can help design and follow a schedule they develop for a day, a week, or a month. That's an important use of time. It encourages families to have students set alarms for key events and get up in the morning, what time they need to take out the trash. So many good ways that a clock can be used for our students who are blind.

I had one student when we started the skill with her telling time with the analog clock, was completely blind, and at the end of the school year her mom thanked me, because her daughter had started things like I need to set my alarm at this time so I can get up in the morning. I'm playing the piano at this time or practicing the piano at this time, so many things that she had learned to use when she had that goal that she had not done before.

In the classroom, we have a variety of devices that show time, so the student is familiar with seeing time on different devices, such as a bedside clock or a phone, calendars, whether they be paper or digital. On slide 13, we're going to talk about the middle school classroom schedule. So some things that your student needs to be familiar with their background knowledge is an analog clock. They need to have that familiarity, know how it works, know how to skip count by 5s and 10s.

Those can be fun songs to do or fun concepts to learn. Be familiar with clock language, such as quarter hour, half hour, hour. How did the students know what time you mean when you say it's a quarter past three? Also know the braille numbers to 12.

So how are you going to teach telling time? First you want to analyze the daily schedule, including the start time, dismissal time, length of periods, and length of passing. And this is such an easy thing to incorporate into your teaching each day.

What time does school start? What time does second period start and so on until you get to the end of the day? Next, discuss how long students spend in reading and math daily.

Then discuss how much time the student spends in lunch and recess. They can add these times up, figure out how much time it is all together, and how many hours and minutes that is. Students can also use the analog clock when they go to lunch and then afterwards provide a variety of questions about time as it relates to their daily and weekly schedule.

On slide 14, we're going to talk about measurement. Measurement is such a key concept for our students, and it's so practical-- it has many practical uses for them. So they need to learn how to use measurement devices such as a ruler, a yardstick, a scale. And some of the activities that they can do with real life, they can measure a piece of brick the length of a ribbon to use when wrapping a package, whether it's a Christmas present, would be a fun activity to practice at Christmas or birthdays, different occasions.

Measuring a cup of flour for a recipe, there are so many good recipes out there that our students could be doing that call for measurements. How are we going to measure-- how are we going to find a 1/4 cup, how are we going to find the cup, such a great activity for them. Measuring how many inches apart to plant bean plants in the garden. This is such a practical idea. We need to plant them three inches apart. How are we going to measure that in our actual garden?

And then estimating lengths of various objects using different units of measurements. Estimating is a very difficult concept for some of our students. So really get them familiar with the idea of measuring and how to measure accurately before you go into estimating with them. On slide 15, cooking relates to math in so many ways. In this picture, someone shows a student measuring some flour out.

So first, we're going to talk about ordinal numbers like first, second, third, following a sequence of steps in the recipe. Can we put them out of order? Probably not. Why is it important? Those are all good discussions to have when using a recipe.

Measuring ingredients for a recipe-- and this can be a difficult one. Making sure that you're not getting too much flour, making sure that measuring cup is completely full. These are all important concepts to teach when you're telling students how to measure for a recipe. Learning to cut a recipe in half or to double it. If it calls for one cup of flour and we don't want to make the whole recipe, we only want to make half of it, how much flour are we going to use? Or if we have a lot of people eating these cookies, we're going to double it. How much flour do we need now if we needed one cup?

Then setting the temperature on the stove. You need to make sure that your stove or your oven has braille on it and is accessible to your students. And then setting the amount of time for an item to cook, and you can find timers that have braille on them that are very friendly for our students.

Slide 16, ensuring accessibility of instructional materials. And as we all know, not everything that comes to us comes accessible to our students. And this includes braille items to does not come easily accessible to our students and especially to our students with additional disabilities. So it's your job as a TVI to make sure that your students can access the materials that you give them and use them appropriately.

When planning to teach new concepts, evaluate the instructional materials that you've been given and the resources to ensure that they are accessible to your students. This may include having students do a trial run before the lesson so you can problem solve. And this is a great idea. Give your students the materials beforehand.

Let me show you this clock. How are you going to use this to tell time? Does this work for them? What can I do to make it work for my student?

Your adaptations do not have to be expensive. They just have to work for that student. Sometimes it's a simple fix. Sometimes it's a little more difficult.

Just take a little bit of time to figure out where the student is struggling with the original item, and then make it adaptable so that it fits their needs. And then after adapting it for them, present it to the student, again to ensure that all the issues have been removed. Sometimes it's easier to solve one problem and then find a new one. Make sure that all those issues are gone before this student actually has to use that for a lesson.

On slide 17, we're going to examine a fifth grade Common Core Standard for Geometry. So this is G.1 Geometry. Graph points on the coordinate plane to solve real world and mathematical problems. So the Common Core Standard is to use a pair of perpendicular number lines called axes to define a coordinate system within the intersection of the lines, the origin arranged to coincide with the zero on each line in a given point in the plane located by using an ordered pair of numbers called its coordinates. Understand that the first number indicates how far to travel from the origin to the direction of one axis, and the second number indicates how far they travel in the direction of the second axis with the convention that the names of the two axes and the coordinates correspond.

So this is a mouthful for our students, right. We're thinking, "Oh, we've got a student with disabilities. How are we going to make this standard accessible to our students?"

Let's look at slide 18. So here are some questions to ask yourself. Here is a coordinate plane with ordered pairs, and we're going to look at this paper, this worksheet that we have a picture of. And we're going to think about our student, how we're going to apply this.

Is the standard appropriate as is? Is that that standard that we just read, does that work for our student, or are we going to need to change some of the wording and modify it a little bit? Will learning the skill benefit the student? Is being able to plot on a coordinate plane, is that beneficial to our students with disabilities?

What skills related to the standard does the student already have? Does the student know the numbers in braille? That's an important skill to know. Does the student know negative and positive numbers? Things like that that our students will need to know for coordinate points?

What skills related to the standard does the student need to be pre-taught? Is there something I need to show the student first before I can teach him or her this idea? What adaptations are necessary? Will the student need adult support in the math class, and how can these concepts be related in real life such as point A is home and point M is to the school?

So these are all some great ideas of how we can teach. And not everything that we find for our students is going to be practical, but it all can be taught. We just need to find our work around for it.

On slide 19, we're going to talk about hands on instructions using adaptations. So on the picture on the left, we have a picture of a student who is using seeds to calculate the area on a worksheet in little squares, and one seed goes into each square on that worksheet. So he is putting one seed in each square to figure out and calculate the area, and he can count all those seeds up when he's done. But then another thing he can do with that area is also count the boxes, count how many boxes down there are, so if there's five boxes down, and then count how many boxes across. There might be eight boxes across.

And so he can type in 5 times 8 on his talking calculator and get the number 40, or he can also count that he's placed 40 seeds in each of the boxes. So he's learning two different ways that he can solve that math problem. This is a great practical idea for these students, because solving area and perimeter is very important for them.

Great idea to do to get their hands on is to walk around outside where they see a fenced in area. They can trail the fence and talk about while they're trailing the fence that this is the perimeter. The perimeter is just the distance it is around it. And then we can move into the inside of the fence and how this is the area and talk about ways we can figure out the area.

So area and perimeter are important concepts they are part of the Standard Common Core Curriculum. However, how is this going to be practical for our students as they move on into future jobs and locations? Suppose that your student is going to be on a maintenance crew when they get older, and what part of their job is to figure out how much room they have in a room to put desks or chairs in. How are they going to be able to figure this out?

In the picture on the right, we have a girl solving a multiplication problem doing what I used to call edible math or yummy math where we're using M&Ms. And a fun thing about this math is that when we're done, we can eat what we worked on. But she also has containers that she's dividing the M&Ms up. It looks like she has three containers and probably five M&Ms in each container. And we're going to figure out that 5 times 3 equals 15.

So we look at the student solving the multiplication problem, and she's solving 3 times 5 is 15. And she's got that skill down. Then she goes into real life. How is she going to use the skill in real life? How is it accessible for her?

When she gets to the store, she needs to buy a pair of socks for every day of the week. She needs seven total. She goes to the store. Socks are sold in packs of four. So how is she going to figure out how many packs of socks she needs to buy?

Well, if she remembers the multiplication skill, she'll know that 2 times 4 is 8. That will give her enough for every day of the week, and she's generalized that skill into an everyday event.

And in conclusion on slide 20, some things to keep in mind while you're teaching our students with disabilities, continually evaluate what the student recalls from past instruction. Your students are going to forget things, especially with additional disabilities.

Make sure that you know and you're remembering what do they remember, what can they recall, what can they bring from their past, or what have they possibly forgotten that we need to reinforce again before we go on to the next concepts? Use hands on real learning whenever possible. Make it real to your students. Make it practical show them that there's a reason that they're learning these math skills. Simpler is often better. Don't come up with a huge complex worksheet for them. Keep it simple. Keep it easy for them.

Especially for our blind students, it's going to be easier for them to touch, to feel if there's not a lot of visual clutter on that worksheet. Examine content across instructional areas to determine where math concepts can be reinforced. For instance, science is a great way to reinforce some math concepts. Even social studies, you can pull in timelines and talk about how many years are between events and use math to do that. There are so many different ways that we can use math across all of our subjects areas and be sure that you're looking for those ways.

Work to understand how the student takes in and processes the information. Each one of our students is going to handle this differently. Know how that individual student is going to receive that information, how they're going to process it, and how they're going to be able to use it. Make sure that your student. And then last of all, work as a team. You are not alone in this process. There are so many people out there to support you, whether it's the gen-ed teacher, related services, O&M instructor, so many different people that can help and work together as a team.

We have now concluded lesson seven. We hope that you've enjoyed this presentation, and it will be helpful for you as you work with your students with disabilities and middle school.