Project_INSPIRE_Course_4_Lesson_4

SPEAKER: Welcome to Geometry and Tactile Graphics for Students in Grades 3 to 8. This is "Lesson 4: Creating Quick and Efficient Tactile Graphics."

Slide 2 has the objectives. You're going to be able to identify methods, tools and materials that can be used to create tactile graphics, understand the importance of the BANA guidelines when creating tactile graphics, and identify the steps needed to plan and create a tactile graphic.

Let's get started on slide 3 by talking about some of the key points that I want you to keep in mind as we move through this lesson. First, a tactile graphic is a representation of visual information. It's not a carbon copy. And we'll talk more about that.

There are multiple ways to produce tactile graphics for the braille user. And we'll go over those. Very important point, the quality of tactile graphics vary considerably. And so your student needs to recognize this and develop some strategies.

So my fourth point here is, to be efficient, the braille reader must be proficient with different production methods and be able to make inferences to pull from past experiences to increase understanding of content being portrayed. So your role in part is to ensure that your student has the opportunity to learn how to read and interpret graphics that are produced using more than just one method so that they build their familiarity.

Moving on to slide 4, I list some of the methods that are used when students are going to be seeing tactile graphics. One is thermoform. Another is computer generated. For example, I might use an embosser with the Tiger software. Microcapsule paper and a fuser, a collage prepared by a person who works in the school. So this may be very much on the fly.

A combined graphic that might include computer embossing with collage. And then I also can make representations using tools such as the Draftsman. Let's take a look at these different methods.

So on slide 5, I talk about thermoform. And there is an image that's produced in thermoform with two arrows pointing to the left and a grid. The important thing to keep in mind with thermoform-- that this is a method that is often used in textbooks.

Advantages include that once a master is created, we can produce as many of these copies as we want. And the quality is not going to be impacted. It's very readable because of the height and crispness that can be produced with thermoform.

On the flip side, a disadvantage is that many students do not care for the paper, that plasticky feeling that they get from a thermoform image. And being able to produce these is not easy because most schools don't have the equipment available. So your student's primarily going to see thermoform in textbooks.

Slide 6 talks about computer-generated graphics. And I've got an example of a bar graph, where I have open bars and filled-in bars and a key for the student to understand which is which. The nice thing about using a computer connected with an embosser with software is that I am able to save and edit my files for future use.

I also can really involve folks who don't know braille, especially in the designing of the graphic. And then I can go in and put the braille. And with the computer software, a lot of times, they can do the braille even if they don't know the code because of being able to see what they're typing in.

A nice thing about computer-generated graphics is they allow you to print graphics from the accessible graphing calculator. So if your student is using that tool, then they're able to emboss what they're using.

There's some disadvantages. It can be very expensive to get set up with the software and the embosser. There's also a high learning curve when you really need to figure out what settings are going to work. And how are you going to format each graphic so that it's clear for the student?

There's also little distinction among the textures. So if you have a student, they may not be able to tell the dashed line from the solid line, for example.

Slide 7 talks about a free computer program called QuickTac. This is available from Duxbury Systems. So if you have Duxbury, you can go to the Duxbury Systems website and download QuickTac for free. It's fast. It's very easy to learn how to use.

Some disadvantages are that you do need an embosser and the Duxbury software potentially if you want to pull the graphic into Duxbury, though you can use QuickTac without Duxbury. And it's really meant for relatively simple graphics.

Now, we have a video on this "Lesson 4" page about how to use QuickTac. And we do a quick demo. My image on this page is a screen showing you some shapes that we drew with QuickTac.

Slide 8 is about microcapsule paper and fusers. They're what I like to call the toaster. You might have a PIAF or a Tactile Image Enhancer. You may have a Swell Form Machine, different, you know, it's like having a Ford or a Toyota. They come in different varieties.

But the idea here is it's a heat process where I have paper that's special paper called microcapsule paper. I put a black image on it. And when I run it through this heat process, anything that's black on that special paper will become raised or puffed.

The nice thing about using microcapsule paper and a fuser is you can make multiple copies, and it's quick. The machine is inexpensive compared to, let's say, getting computer software and an embosser.

And you get some really nice, crisp angles and geometric shapes, as you can see on the drawing I have here of a rectangle with two lines dissecting it diagonally and then a dashed rectangle

drawn in. The paper, as a disadvantage, is very expensive. And you don't have a lot of options for textures or height.

Slide 9 talks about when you're preparing a drawing, whether it's for the fuser or the computer. You want to make sure that you use the proper braille font. So if you're doing for the fuser, you're going to use the Swell font. And that's size 28. And you can get this for free off of the Texas School for the Blind and Visually Impaired. So make sure you check our resource list.

The computer programs have their own braille font. So you want to use the font that goes with the software that goes with your embosser.

You have lots of options. But one easy thing is if you have a drawing, you can put it into a program such as Word. Then manipulate it, simplify it, add labels, whatever you need to do. But as you're doing that manipulation, you want to consider the weight or the thickness of the line, what textures you're going to use for your areas, where your lead lines are going to be and making them less prominent than the line in the graphic.

Where are you going to put the labels? Because you need to make sure you leave a gap of one-eighth of an inch. And we'll talk about some of these things in a little bit.

Now, slide 10 talks about how you actually do that reworking of an image for clarity. And we do have a video that really is a nice one that walks you through preparing a tactile graphic for the Tiger, so one of the embossers that Sara Larkin, who does the demo, had.

What's really important is that you look at the components of the drawing and then you revise to simplify. So let's take a look at the three pictures that Sara uses in her video.

So the original image shows a tree on the left. It shows a person on the right. So the height of the person is 5 feet. The length of the line at the bottom from the tree past the person is 24 feet. The length from the person to the end of the triangle is 8 feet.

And so we basically have a right triangle here. And we're showing the students some of the lengths so that they can do a calculation to determine other lengths of this triangle.

Now, in a not so good example, Sara's taken and she's drawn a tree. But instead of having it all leafy and stuff, she's basically used a filled-in circle and a triangle for the trunk. She still has the person drawing. And she's taken and converted the print to braille with a box around each of the braille labels. Not very clear.

So in the third drawing, she's really simplified it down. She's replaced the person with a line. She's replaced the tree with a line. She's taken the boxes off of the braille labels. And she's also modified the line showing the length of this entire drawing being 24 feet. If you want to see how she did this and learn a little bit more about her thinking process, watch the video. It's good.

All right, slide 11 also has a video that accompanies it. And this is about the APH Tactile Graphics Image Library. So if you're not familiar with this free resource that you register for online, you want to check it out.

You're able to go into the library. On the left-hand side, you'll find different topics. So you could go, for example, to Geometry, as we did here. And you'll see a list of different images that you have in the library on your topic.

For each of these, you can download a PDF. And they're ready for you to print. They're ready for you to put onto microcapsule paper and fuse. You also could bring these in to a program-- so take a screenshot and bring them into Word, for example-- and then do some editing. If you're going to do that, make sure you use your Swell braille font.

Now, you want to watch the videos so that you can see how Sara does this. Great video. Slide 12 talks about the "Do it on the fly" collage method. This is where I get my materials out-- my glue, my different textures. And I put something together.

My example here isn't a geometry example, but it's a flower. Each texture represents a part of the flower from the stem to the leaves. You want to make sure you have a key for your students so that they can get that practice of going from the key to the drawing and learning to interpret.

Now, the nice thing about the collage method is you can really individualize for your student. You also have that opportunity to use a variety of textures so things really stand out.

But there are some disadvantages. Takes a lot of prep time, including letting things dry, which, if you're doing it on the fly, can be a real problem. You have to really think about planning. What materials do you need? Whether they're going to be tactually distinct enough for the student? How big are you going to make this?

A lot of folks have a tendency to put too many textures in there. So simpler is really better no matter what method we're using. As TVIs, as paraprofessionals, as braillists, what concerns us is we may make collage tactile graphics for our student.

But then the student comes to the assessment, whether it's in the textbook or a state assessment or provincial assessment. And then they're seeing graphics that have been produced using another method that they're not familiar with. So it's really important that you think about what your student is going to see down the line and make sure they have practice with that method.

Though I love the collage method because we really can individualize. So each method, as you've seen, has its advantages and disadvantages.

A lot of folks will combine methods. And this makes a lot of sense. For example, I might emboss something on my embosser that I prepared and then go ahead and add collage to it. So the nice thing about this is it lets you get the best of both.

And also, make sure that your braille is correct because it's being produced, you know, by your embosser. You'd still, as a disadvantage, have to do a lot of planning to make sure everything's going to fit in the space. And again, you can get too much clutter.

I have two drawings that show things that I've done using this method. So in the top drawing, I've taken with my embosser. I've prepared a triangle. I've labeled it A, B, and C. And then I've added textures on the left and the right sides to show that those sides are congruent and a different texture to show that the angles on the bottom are congruent. Angle C is congruent to angle B.

In the bottom picture, I've used my embosser to make an x- and y-axis. Then I have used my felt to make two triangles that are identical. And I'm showing the student [INAUDIBLE] we do reflection. So each of my vertices has a different texture.

So I've used some rubber dots. I've used some foam shapes. So each one's different so that my student can see when I reflect where each of those vertices go. So I like combining different methods.

Slide 14 talks about some of the commercial tools, such as the TactileDoodle, the inTACT Sketchpad, and the Wheatley. Now, these are great because they're fast, and they're easy to use.

However, you can't really add braille to these easily. And you only have one height. So I've got my TactileDoodle on the top and my Wheatley on the bottom of my images. They're both the same triangle with an exterior angle I can create very quickly with this method.

So when do you actually develop a tactile graphic is our topic of slide 15. When information is new to the student, you want to develop a tacticle graphic. When the student has to understand that information to be able to get a bigger concept-- so for example, if we're going to be working on coordinate planes, I want to really make sure that when we first introduce coordinate planes, that my student has a good, clear coordinate plane showing quadrant I.

Then I know we're going to be going into quadrants II, III, and IV. So it's going to be critical that my student really understands that big picture and how that coordinate plane is laid out once it has four quadrants.

Sometimes information is not adequately described in the printed materials. So let's say, for example, in social studies class, you know, we're learning about a concept. That student really needs to see how something works or what it really looks like to understand it.

Also, if the student's going to be using that information in a variety of ways over time. So I always like to think about a skeleton, for example. Or, you know, we're learning about a system in science class, one of the body systems. You know, they're going to get to see that multiple times. So they really need to have an understanding of how the blood flows through the body.

Sometimes an object is too small, too large, too dangerous to touch. And so we want to represent that. Now, let's go on to slide 16. And I've got a couple of things I want you to keep in mind.

Tactile materials are an alternative to but not a complete substitute for visual materials. So our braille reader is not going to get the same level of knowledge from a tactile drawing that a print reader is going to get from a visual drawing. We're really going to have to be systematic, and that student's going to need to be supported on concepts that are behind that drawing.

The simpler you keep a drawing, the clearer it's going to be for the tactile reader. And so I really encourage you to examine anything you create with your fingertips to decide whether it's legible, not your eyes. Your eyes don't matter in this case. It needs to be tactually clear to the braille reader.

Slide 17 is the resource that we really want you to be aware of, which is from the Braille Authority of North America. And it's the "Guidelines and Standards for Tactile Graphics, 2010." So as we're recording this early in 2021, this is being revised to bring it up to date for UEB.

This document, so to speak, helps transcribers prepare tactile graphics. It's not written for teachers or visually impaired students or paraprofessionals. It's really a document that supports those creating textbooks and assessments. So you kind of need to, to keep that in mind as you're using it.

You can get a hard copy either in print or braille from APH. Or you can use the HTML online searchable version, which is what we like. Or you can download a PDF, which comes in many files in a ZIP folder.

There's also a "Guidelines and Standards for Tactile Graphics Supplement." And what's nice about the supplement is it has actual braille diagrams, graphics, that are explained to you. So if you get the print version, you're going to have the print explanation. But you're going to have the braille version of the graphics.

If you get the braille, you're obviously going to have it in both. So if you are a print reader, do not order the braille version. You're still going to get the braille graphics in the print version.

Alright, let's go on to slide 18. And we're going to talk about the decision tree that was developed by Lucia Hasty, who's very well known for her work in tactile graphics. And it really goes back to what I shared a couple of slides ago about not every visual representation requires a tactile graphic.

And Lucia's decision tree really helps guide you in making the decisions on whether or not you include the graphic. So it starts with three questions to ask yourself. And if you say yes to any of these questions, then you're not going to produce a tactile graphic.

So the questions are, "Is the information a repeat of facts in the text? Would the information be more meaningful in text form? Does the graphic require the reader to use visual discrimination or visual perception?"

So if you say yes to any of these, you're not going to produce a tactile graphic. Now, if you say, OK, yep, no, no, no, well, then you're going to get the question of, is the actual object

unavailable, too small, too large, too dangerous to examine by touch and receive details? If you say yes, well, then that's definitely an indicator that you need to produce a graphic.

Another question you're going to ask is, does the reader need the information from a map, figure, or graph to participate in discussion, answer questions, or complete a task? If you say yes, again, you're going to produce the graphic.

So I want you to keep these questions in mind as you're making decisions about what you need to do. So let's actually start talking about designing a method. We're going to use collage as our method for this discussion because many of you are going to be having your collection of materials. And in our resource list, we give you lots of suggestions on materials you want to have on hand when you're using the collage method.

So you want to think about having tactually distinct textures and a variety of tools to produce the graphics. You want to have variety here. When you look at a drawing, you're going to be dividing it into areas, lines, and points. And we'll talk a little bit more about that.

And then once you have that information, you're really going to spend time planning how you're going to lay out the graphic. Keep in mind, as I said earlier, it doesn't have to be pretty. But it has to be tactually clear to the reader.

And so I really encourage you to get input from your reader, especially if you're making your graphic for a specific student. It's good to check in with that student on, hey, is this clear? Is there a better texture I should use? What about the thickness of the lines? How are the labels for you? Get input from the student.

Slide 20 just has a quick little experiment and check in with a reader example. This is not the best graphic in the world. It's a graphic of a guitar. It's been made using cardboard and felt.

And it has lead lines leading to the parts such as the bridge or the body. These lead lines were made with hot glue. And they are so thick that they're more distinctive to the reader, or too strong, than the actual parts of the guitar.

Also, those lead lines go right down to the braille. So we haven't left an eighth of an inch between the end of one texture and the label. So that's another important consideration.

Slide 21 is just a quick little example of what I mean by "simplify." So we have the problem here, number 3. And it says, "Write a number sentence for this picture." And we have a cute picture of an ice cream cone. And it says, "ice cream cone equals 1 ice cream cone."

And then we have a rectangular box. And inside of that, we have three ovals. And inside of each of those ovals, we have four ice cream cones. And the idea is my student is supposed to fill in the numbers-- "blank groups of blank ice cream cones equals blank ice cream cones." So basically, they're supposed to fill in three groups of four ice cream cones equals 12 ice cream cones.

Now, if you look at what we did with braille, it's not about the ice cream cones. I don't need to see the chocolate, the vanilla, the strawberry. I just used a cardboard triangle to represent one ice cream cone. That big rectangle encircling the three groups of four isn't necessary. So I simplified by leaving that off.

And then I made sure I have a tactually distinct texture around each of my groups of four ice cream cones. That way, it's very clear to the student. They can feel, hey, inside of this-- it turns out to be more like a square-- there are four triangles. It's about understanding the concept of three groups of four equals 12, not about cute little ice cream cones.

On slide 22, let's talk about breaking down an image. So I have a print map here called "Bayworld Area in Port Elizabeth." I have a key. So the point or the red circle is "point of interest."

And then I have some abbreviations. So for example, "BR" is "Burger Hut", and "BW" is "Bayworld". If I look at the actual map, you'll see also that I have a north-pointing arrow.

And then I have some lines which are basically my streets. For example, I have "Ocean Avenue", "Strand Avenue", and so on. I have those points. So for example, if I look at the intersection of "Beach Road" and "Ocean Avenue", I can see I have two businesses. So I see "SM", oh, "Smiley Ice Cream", and "SW", "Splash Waterworld".

I also have what we call an area, the "Indian Ocean". So I have points, lines, and areas.

So I want to point out a couple of things to you about the braille version. I always have a blank line after my title. My key is going to be enclosed in a transcriber's note. And I open that transcriber's note dot 4, dot 4-6, dot 1-2-6.

And I deviate from the print by telling the braille reader how many columns my key is. So key in two columns. And then I pretty much do the same thing we have in print as far as the circle represents a point of interest and then those abbreviations.

Notice that I close my transcriber's note with dot 4, dot 4-6, dots 3-4-5. So I've done the same thing in braille using the same abbreviations, the same points, and the same labels. But I really had to plan this out.

And I also have the "Indian Ocean", which I've done as a texture which is different than the lines and the points. So I want you to keep this map in mind as we go and we talk about different components of an image.

So the first one is areas, what was my "Indian Ocean". You're going to use textures sparingly. A lot of times, just the label and the key identifies.

Now, I chose to go with having a texture because I really wanted to make sure the student found that "Indian Ocean". Some of the questions had to do with it.

I don't want to have too many loud textures. So I made sure that if I had more than just the "Indian Ocean"-- maybe let's say I had a park. I would use a very distinct texture from that of the "Indian Ocean".

And if you think about having multiple areas next to each other, then think about using a line to separate them. But be careful, because you don't want that line to look like it has meaning.

Now, when I think about lines, I want to pick lines that feel distinctly different. So on my map, all my lines were solid. But sometimes I might have a line that's dashed and a line that's solid. So I want to think about making those different.

I want to be careful not to have more than four or five types of lines on any graphic. Otherwise, it's just too confusing. And I want to leave a quarter of an inch to an eighth of an inch between lines and labels. I want to make sure that if I'm doing a line, it's at least half an inch long so my braille reader can find it and distinguish it as a line.

Now, when it comes to points, I want at least an eighth of an inch between the point and anything surrounding it-- so for example, a line or an area or a label. Open points like I used in my map are clearer than closed points to the reader.

I love my APH Feel 'N Peel stickers that I can use for points. So they have circles. They have stars, different shapes. But be very cautious. Don't put your points over the lines or labels because that's tactually going to be confusing to the braille reader.

I also like the APH Graph Benders because they have different shapes. And we saw that, actually, in the triangles that I was reflecting. So they have squares and circles. And they're made of different textures-- the foam and a pool noodle type of material. So lots of things for you to think about when you're designing here around areas, lines, and points.

Slide 26 talks about titles, keys, and labels. You always want to include the title at the top of the page. You want to use a key or a legend before the graphic. If I don't get to find out what's in that graphic, it's going to make it harder for me to interpret it.

You really need to think about where you're going to put your labels. And you never want to change your labels so they're going vertically even if they are in print. Your labels always need to go horizontally. And you want to have that one-eighth of an inch gap between the label and other elements.

Alright. Let's go on to slide 27 and talk about the key. It's really important that our students know that they need to look for a key. And as I told you already, it's put into a transcriber's note.

The key needs to include a sample of the line, point, or region and what it represents. So you're going to put-- as you saw in my key, I put a point. And then I put that it represents a place of interest.

You're going to group all your symbols together. So if you have, let's say, several different areas, then you're going to put all the areas, then all the lines, then all the points, and then all the abbreviation.

And I do want to point out that BANA has in that tactile graphics guidelines a list of two-cell abbreviations that you're going to use when you're using abbreviations in a key. And you have to have at least a dot 1 or 4 of them. And that's why "Chad" is "TD", which always just seemed really weird to me. But I accept it.

All right, so we very briefly have gone over many of the considerations in preparing tactile graphics for a braille reader. There's a lot of resources that we've pulled for you in our resource list. I encourage you to watch the three supplemental videos so that you get some more information.

And we hope that you've now gotten an idea on how you may prepare tactile graphics for a braille reader. In Lesson 5, we're going to talk about having students do drawing and preparing their own graphics. So thank you so much.