DIFFERENTIATION & NEURODIVERGENT LEARNERS

Speaker Notes Feb 2026

Slide 1:
Welcome!
Welcome to our session on Differentiation and Neurodivergent Learners. My name is Carly Abraham and am happy to be here with you.
I encourage you to ask questions throughout the presentation, as I want this to be an interactive session.
If you have to leave at any time, feel free. I hope you are enjoying your convention and I hope you enjoy this session and the rest of the convention!

Slide 2:
I have many years teaching math and sports.
I have a masters in Education specializing in curriculum, learning and teaching.
I am currently teaching math at North Trail High School in the CBE.
I have presented before at Calgary City Teachers Convention and other conventions on behalf of MathImagine.
Please note, I am NOT selling products for MathImagine, this session is not resource specific.

Slide 3:
A few words about The MathImagine Foundation before we begin. MathImagine was founded by Celia Baron and is now a Foundation in Celia's memory with the objective to improve numeracy through education, her resources, and outreach.

Slide 4:
Introduction of Celia Baron and MathImagine
Celia Baron was a Mathematics Educator.
She was looking for mathematics resources for the younger elementary age groups that was up to her satisfaction.
She couldn't find any so she created her own resources.
She created two main series:
•Thinking Strategies is an operation specific type of resource. The workbook starts easy and gets harder as it goes along. It includes lots of games and activities for elementary age students.
•The Cross Number series has a mix of all operations. It also starts easy and gets harder as it goes.
Both resource series are linked to mathematic outcomes and help identify weakness in the student's progression.
Celia's resources were approved by John Van De Walle, a famous mathematic educator and researcher.
MathImagine started by selling the resources.

Over time, MathImagine grew into a Not-For-Profit, and is on the way to being a charity. Currently The MathImagine Foundation offers 13 sessions, one of which you are in today. These sessions are offered to teachers, hoping to enhance their mathematics education practices.
The sessions range from pre-school to junior high.
There are operation specific sessions, model sessions and there are games sessions.
The MathImagine Foundation presents at most Alberta Teachers conventions, presents at other provinces professional development and has presented at the Math Recovery conference in the US.
I'll show you the different types of sessions at the end of the presentation.

Slide 5:
This is the plan for the next hour. THIS WILL BE AN INTERACTIVE SESSION.
First, we will do introductions
Then I'll talk about what differentiation is, and how this relates to our presentation, as this is important to understand before we discuss how to accomplish it.
Then I'll cover some effective strategies you can use when it comes to neurodivergent learners and differentiating in your class.
And then we'll wrap up and do a review of what was helpful in the session.
ASK THE GROUP, WHAT DIVISION DO YOU TEACH IN? DO YOU WANT TO LEARN ABOUT DIFFERENTIATION? DO YOU WANT TO LEARN STRATEGIES TO DEAL WITH NEURODIVERGENT LEARNERS? DO YOU WANT TO LEARN IDEAS YOU CAN APPLY IN THE CLASSROOM?

Slide 6:
Skip this slide

Slide 7:
First lets begin by first setting a baseline for what differentiation is. We can start here and refer back to it as the session progresses. Often teachers differentiate naturally in their practice. This is especially true in this day and age, vs when I went to elementary school.

Slide 8:
Take a moment to look at this diagram from page 23 of Van de Walle, John A. (2014). Teaching student-centered mathematics. Developmentally appropriate instruction for grades 3-5. Boston, Pearson.
The different representations can illuminate different aspects of a mathematical idea. It is important for us to provide our students with opportunity and encouragement to represent their understanding in different forms.
When our students are given more ways to think about and test their developing ideas, the better they will correctly develop and integrate their ideas into, as Van de Walle says, "a rich web of concepts and thereby develop relational understanding" (2014, p. 23).

By working on developing our students abilities to move between these representations, we are helping them to develop deep understanding and better retention of ideas.
Differentiation helps us design our lessons to include the strengths and help work on the weaknesses of all of our students.

Slide 9:
Building on some of your ideas, lets now take a look at some practical examples that you may or may not already do in your classrooms.

Slide 10:
These are three key forms of representation for mathematical ideas. These are forms that our children are expected to encounter and work with during their years with us.

Slide 11:
One differentiation strategy is how we use manipulatives.
Math Manipulatives: Base-ten blocks, counters, and number lines to teach addition, subtraction, and place value.
Concrete Learning: Manipulatives help students visualize and physically engage with concepts, making learning more tangible.
Variety of Learning Styles: Supports visual, tactile, and kinesthetic learners by catering to different preferences.
Enhanced Engagement: Using manipulatives can increase student interest and motivation in the learning process.
Tailored Learning Experiences: Allows teachers to customize activities for individual student needs, providing appropriate challenges.
Scaffolded Understanding: Helps break down complex concepts into manageable parts, facilitating gradual learning.
Encourages Collaboration: Manipulatives promote group work and peer learning, enabling students to learn from one another.

Slide 12:
Another type of strategy is using parallel tasks. This allows you to provide both concrete, pictorial and abstract to fit all students learning levels.
For instance above, we have a single question that allows for students to approach it by using different processes or strategies, and also allows students at different stages of mathematical development to benefit and grow from attention to the task

Slide 13:
The same process can also be utilized using open questions.
A single question that can have more than one solution. (Small, 2012)
If a student has no idea what a fact family is, then there is no hope that they can answer Question 1. However, even if he or she is not comfortable with addition, they can answer Question 2, but also a student can go beyond and even combine operations.

Slide 14:
Combined, you can provide students an open ended task. This is a great formative tool as its away to see how students think or what processes they use in their approach to the mathematical problem.
In this example a sixth grade teacher asks for students to respond to the question what do you know about 35%. the First Student Response indicates that 35% is equal to 0.35 and 35 over 100 while recognizing that her first thought is 35 out of 100 she acknowledges that the percentage may be applied to a total of 60 or 146 though she does not explain the proportional relationship the student identifies that 135 and 7 are factors of 35 without indicating why this might be relevant she Associates percentage of 35% is not a benchmark percent as it does not go equally into 100%, note that her response does not include any visual representation.

Slide 15:
The second student provides two visual models for 35% along with the conclusion that if 35% of a group ordered pizza 65% ordered something else his work then focuses on a common Elementary School task of finding several combinations of in a particular number in this case 35 beginning with his fourth example he provides a systemic listing of all the ways to make 35 with two add-ins peeling to end this pattern when he begins to repeat a combination previously given in a different order such data however does not reveal his understanding of percent

Slide 16:
Many students write a decimal and a fraction equivalent to 35% the third student expands on this idea by explaining that it could be written as 0.35, 0.350, or 0.3500 because no matter how many zeros you put on the end of a decimal the value is still the same.
A fourth student might include a representation of what they identify as a thermometer shaded to 35% similar to what you might see for a fundraising goal
A final student might include the misconception that 5% * 7% equals 35%.
A sixth student might place 35% between 1/2 and 1/3 on a number line
A seventh student might cite the familiar rule that to change from a percent to a decimal you move the decimal point two places to the right

Slide 17:
Another useful example is Flexible grouping. This not only promotes collaboration but also allows students to engage with diverse perspectives. This approach can help students feel more comfortable and supported.

Slide 18:
As always, one of the most effective strategies is the use of choice in approaching solutions with students. Like these examples, you could guide students to respond openly by providing them a graphic organizer such as this.
These are strategies that most of you already use in your classrooms. I would love to here how you use choice in your activities.

Slide 19:
Different Areas of Differentiation

Slide 20:
Now that we've looked at some strategies, I just want to take a moment to set your thinking for our large activity.
Let's briefly focus on areas where can we can provide effective differentiation to our students.:
These include:
the content we want students to learn
the activity or process for reaching the content goals
the product through which students will demonstrate their learning
also
the learning environment

Slide 21:
Content

Slide 22:
Process

Slide 23:
Product

Slide 24:
Learning Environment

Slide 25:
Content - questions and prompts that invite all
Big idea is consistent, the complexity and connections to other topics can be adjusted
Process - using tools cuisenaire, beadstrings
Variety in the form through which children show their learning. Ex. pictures, words, symbols, manipulatives, tech
Learning Environment - How can the physical environment support learners - using groupwork

Slide 26:
Now that we've built an understanding, looked at some basic strategies and have identified specific areas where we can differentiate I would love to hear how you use tools like manipulatives, open questions, or flexible groups in your classrooms, or if you have strategies for specific mathematical topics.
On your table, I've put put 8 common neurodivergent categories that we might find in our math classrooms.

Using the sticky notes I've provided, consider one of the four areas (Content, Process, Product or Environment) and list something that you do, or even that you might be struggling with in your classroom based on that learning category. I will give you about 10 minutes to discuss with your table group and share, and we'll take the same amount of time to share with the big group.

Slide 27:
Leave this slide up while they are working so they have something to reference to.

Slide 28:
Timer

Slide 29:
Let's revisit, are there any strategies or ideas that resonate with you? Are there any notable ones we should list?
** if audience participation is low, or if there are not enough to share, consider going through some of the strategies in the following slides.

Slide 30:
Learning Strategies

Slide 31:
For students with learning disabilities, the following questions should guide your planning:
Organizational, behavioral, and cognitive skills are necessary for the students with disabilities to drive meaning from this activity?
Which students have known weaknesses in any of these skills or concepts?
How can I provide additional support in these areas of weakness so that students learning disabilities can focus on the conceptual task in the activity?

Slide 32:
Structure the environment.
Centralize attention.
Move the student close to the board or teacher. Face students when you speak to them and use gestures. Where possible, remove competing stimuli.
Avoid confusion.
Directions carefully, and ask the student to repeat them. Give One Direction at a time. Use the same language for consistency. For example, when teaching decimals, talk about based materials as ones, 10, and hundreds rather than interchanging with names, such as flats, rods, and cubes, which emphasize shape rather than value.
Smooth transitions.
Ensure transitions activities have clear directions, and that there are limited chances to get off task.

Slide 33:

Identify and remove potential barriers.
Find ways to help students remember. Recognize that memories often not a strong suit for students with disabilities and therefore develop mnemonics for familiar steps or right directions that can be referred to throughout the lesson for example star is a mnemonic for problem-solving: S stands for search the word problem for important information; T stands for translate the words into models, pictures, and symbols; a stands for answer the problem; stand review your solution reasonable.
Provide vocabulary and concept support.
Give explicit attention to vocabulary and symbols throughout the lesson. Preview, essential terms and related prior knowledge or concepts, create a math wall of words and symbols to provide visual accused, and connect symbols to their precise meanings.
Use friendly numbers.
Instead of using 6.13, use 6.00 to emphasize conceptual understanding rather than mixing computational and conceptual goals incorporate this technique computation and operation skills are not the lesson objective.
Vary the task size.
Students with learning disabilities can be become frustrated by the enormity of the task. One way to address this problem is to assign students with disabilities fewer problems to solve.
Adjust the visual display.
Design assessments and tasks so that there is not too much on a single page. The density of words, illustrations, and numbers on a page can be overwhelming for students with disabilities find ways to put only one problem on the page, increase the font size, or reduce the visual display. Be sure the visual display support the meaning of the problem, rather than just unrelated clip art.

Slide 34:
This slide is a summary of our previous slides

Slide 35:
Reiterate, the timeframe.
Give students additional reminders about the time left for exploring materials, completing task, or finishing assessments. This helps students with time management.
Ask students to share their thinking.
Use aloud method or think pair share strategy.
Emphasize connections.
Provide concrete representations, pectoral, representations, and numerical representations. Have students connect them through carefully phrase questions. Also, connect visuals, meetings, and words. For example, in teaching part part and whole part ratios, you can bring a group of eight students to the front of the class placing part of the group, example those wearing red, to the left, and the other part, those not wearing red, to the right. Point out the part, part or red, not red and part hole or red total relationship with gestures as you asked students to explain how the following symbols connect to the situation.

Adapt delivery modes.
Incorporate a variety of materials, images, examples, and models for visual learners. Some students may need to have the problem assessment read to them or generated with voice creation software. Provide written instructions in addition to oral instructions.
Emphasize the relevant points.
Some students with disabilities may inappropriately focus on the colour of the cube instead of the quantity of cubes.
Use methods for organizing written work.
Provide tools and templates, so that students can focus on the mathematics rather than on the creation of a table or chart. Also use graphic organizers, picture, base, models, and paper with column or grids.
Provide examples and non-examples.
Give examples of dilations of triangles and triangles that are not dilations, or situations that are functions and situations that are not. Help students focus on the characteristics that differentiate the examples from the non-examples.

Slide 36:
Consider alternative assessments.
Propose alternative products.
Provide options for how to demonstrate understanding, example of verbal response that is written by someone else, voice recorded, or modelled with a manipulative. Use voice, recognition software or word predictions software that can generate a whole menu of word choices when students type a few letters.
Encourage self monitoring and self assessment.
Students with learning disabilities often are not at self reflection. Asking them to review an assignment or assessment to explain what was difficult and what they think they got right can help them be more independent and take greater responsibility for their learning.
Consider feedback charts.
Help students monitor their growth by charting progress overtime

Slide 37:
Help students bring ideas together.
Initially create study guides to emphasize the key, mathematics concepts and support students as they review concepts. Then have students work towards independence by having them develop study guides by identifying, summarizing, and coordinating the big ideas.
Provide extra practice.
Use carefully selected problems, not a large number, and allow they use of familiar physical models

Slide 38:
A quick review

Slide 39:

Now that we looked at several strategies that are effective, lets look at what research says about strategies that are ineffective.
There are a number of ineffective approaches for gifted students that find their way into classrooms five common ones are these

1. assigning more of the same work.

this is the least appropriate way to respond to mathematically gifted students and the most likely to result in students hiding their ability. the metaphor that's often used is all scales and no music.

1. giving free time to early finishers.

all those students find this rewarding it does not maximize their intellectual growth and can lead to hurrying to finish a task

1. Assigning gifted students to help struggling learners.

routinely assigning gifted students to teach students who are not meeting expectations that the gifted students have mastered does not stimulate their intellectual growth and can place them in a socially uncomfortable and or undesirable situation consistently using this approach puts mathematically talented students in a constant position of tutoring rather than allowing them to create deeper and more complex levels of understanding

1. Providing additional opportunities.

unfortunately, generalized gifted programs are often unrelated to the regular Mathematics curriculum while it can benefit students, add-on experiences are not enough. gifted students need adaptations to the instructions in their mathematics classroom. Learners with a high level of ability shouldn't get one stop shopping in a gifted program that focuses on all academic subjects; they need individual attention to develop depth and a more complex understanding of mathematics

1. providing independent enrichment on the computer.

this practice often does not engage students with mathematics in a way that will engage conceptual understanding and support their ability to justify their thinking to others there are excellent enrichment opportunities on the internet but too often computer time becomes time to do games and simply

Slide 40:
When dealing with students with learning disabilities, here are some general suggestions: First, we can incorporate technology into our teaching. Allowing students to use devices like laptops, tablets, or even recording devices can help them with note-taking and assignments, making the writing process less daunting. Next, it’s essential to provide extra time for assignments and tests. Many students with dysgraphia need more time to process their thoughts and put them into writing.
We should also offer flexible submission options. Instead of requiring everything to be written down, we can allow students to submit their work in other formats, such as audio or video recordings. This gives them the chance to express their understanding without the added stress of writing.
Lastly, using visual aids such as graphic organizers can significantly help students structure their thoughts, particularly in subjects like math and engineering where

handwriting is critical. By implementing these strategies, we can create a more inclusive and supportive learning environment.

Slide 41:
First, breaking down projects into small, manageable steps can make tasks less overwhelming. Clear and concise directions for assignments are also crucial, as they help students understand exactly what is expected of them.
Supporting students' organizational skills is another key strategy. Using tools like checklists, timers, or reminders can help them stay on track and manage their time effectively.
It's also beneficial to create a clutter-free classroom environment.
Reducing distractions can help students focus better. Furthermore, providing regular opportunities for physical movement is important, and students should have the option to opt out if they need to.
This can help them manage their coordination challenges without added pressure.
Lastly, allowing students to wear headphones when they are not directly communicating with others can help reduce sensory input and support their proprioception, making them feel more comfortable in the classroom.
By implementing these strategies, we can create a supportive and accommodating environment for students with dyspraxia, allowing them to thrive academically and socially.

Slide 42:
As we wrap up our presentation, I'd like to highlight the key takeaways we've discussed today.
Importance of Differentiation:
Differentiation is crucial in our classrooms as it allows us to tailor our instruction to meet the diverse needs of our students. By doing so, we can significantly enhance student engagement and their mastery of mathematical concepts.
Strategies for Success:
We explored various strategies, including using different instructional methods and resources, fostering an inclusive environment, and emphasizing the importance of vocabulary development. These strategies will help our students connect better with mathematical concepts.
Empowerment and Growth:
Supporting neurodivergent students is vital. By employing targeted strategies, we not only empower these students but also encourage collaboration and peer learning, which builds their confidence and enhances their learning experience.
Continuous Improvement:
I encourage all of you to reflect on your current practices and consider how you can adapt them based on your students' needs. Continuous improvement is essential, so seeking feedback and engaging in professional development opportunities is key.
Call to Action:

Finally, I challenge each of you to implement at least one new strategy in your classroom this week. Let's also share our experiences and insights with our colleagues to foster a community of learning and support.
Closing:
Thank you for your attention and participation today! I hope you leave with actionable strategies that can make a real difference in your teaching.

Slide 43:
Citations

Slide 44:
A few words about The MathImagine Foundation before we finish.. MathImagine was founded by Celia Baron (I introduced at the beginning) and is now a Foundation in Celia's memory with the objective to improve numeracy through education, her resources, and outreach.

Slide 45:
We have developed a really great set of sessions and have a team of exceptional teachers that teach these session to give you the tools you need for teaching numeracy in your classroom. We do virtual and in person sessions. Every year we work on refining and improving the sessions based on feedback, So please provide feedback on this session.

Slide 46:
We also sell Celia's resources, These are resources made with teachers in mind, little prep, fun for students, effective and using the key concepts for learning numeracy including models, baby steps, cumulative practice. We update these resources regularly.

Slide 47:
We appreciate your time and hope you found this presentation informative.
If you have any questions or would like to learn more, please don't hesitate to ask.
You can also reach us through our website (address is on the bottom of the slide) and on X at @mathimagine2.
We look forward to seeing you at our upcoming events!
Please take a moment to fill out our feedback form using the QR Code above!