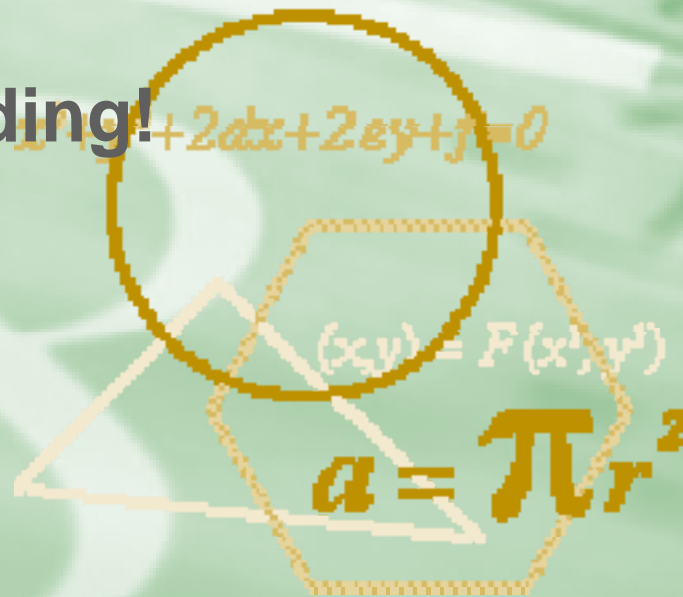
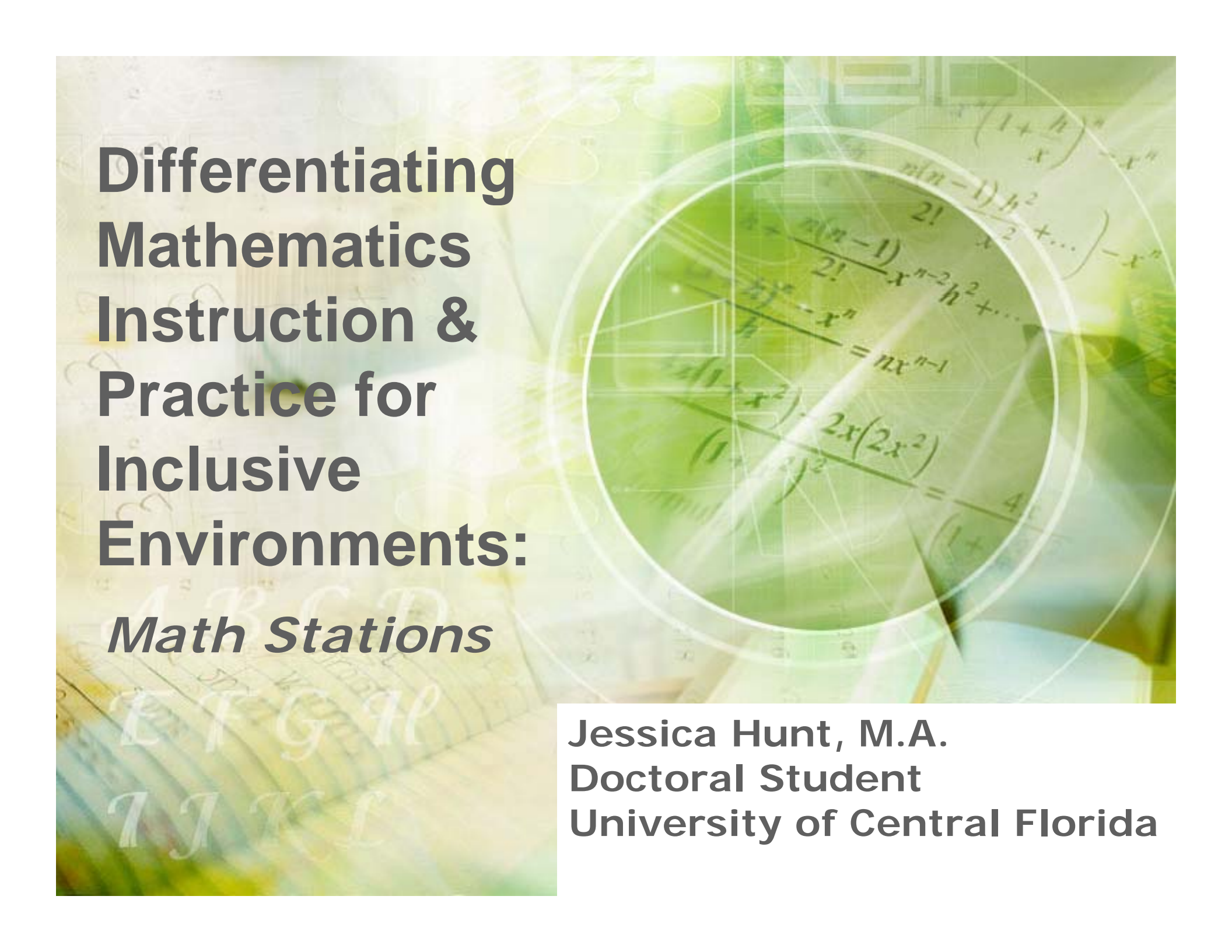


A PDF version of this power point can be found at:

<http://nctm-differentiation-presentation.wikispaces.com/>

Thanks for attending!





Differentiating Mathematics Instruction & Practice for Inclusive Environments: *Math Stations*

Jessica Hunt, M.A.
Doctoral Student
University of Central Florida

Advance Organizer

Overview

- Universal Design for Learning (UDL)
- Differentiation

Math Stations

- Basics
- Design – Remediation/Extension and Learning Styles

UDL Application

- Differentiating in a Universally Designed Environment



Overview

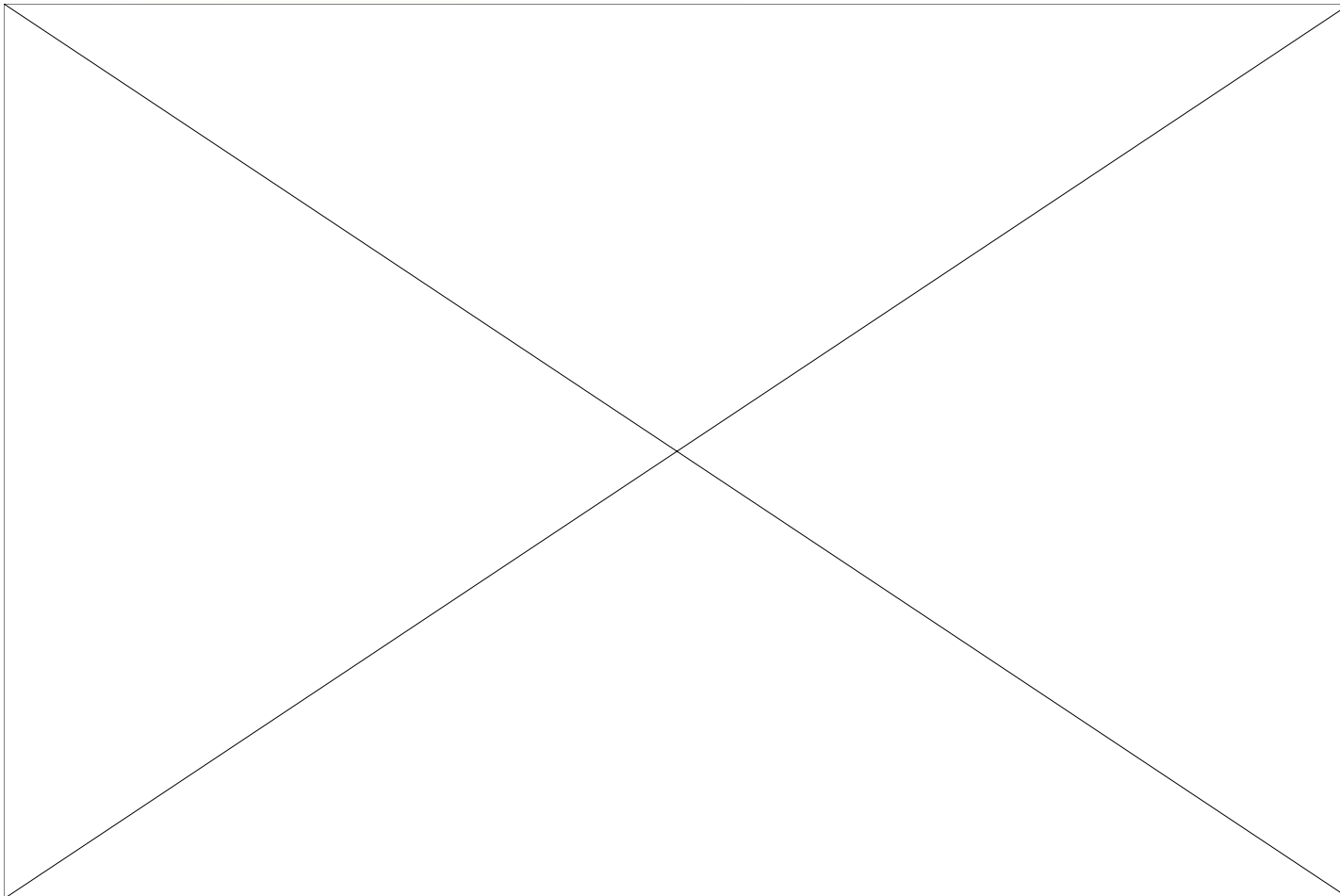
- Universal Design for Learning (UDL)
- Differentiation

Math Stations

- Basics
- Design – Remediation/Extension and Learning Styles

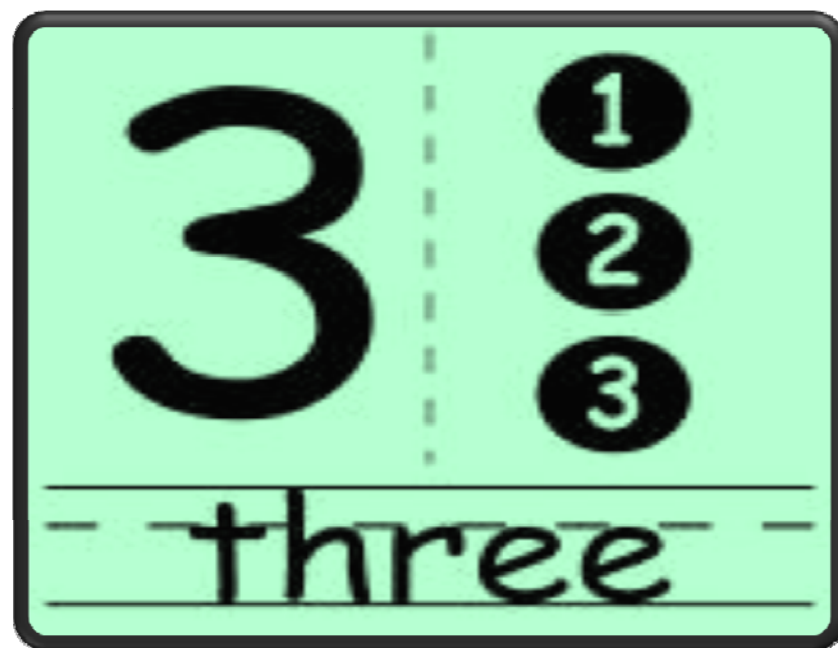
UDL Application

- Differentiating in a Universally Designed Environment





Reasons to Differentiate:



CHANGES IN STUDENT

2008 Children

(US Census, 2009)



62

- Minorities
- Caucasians



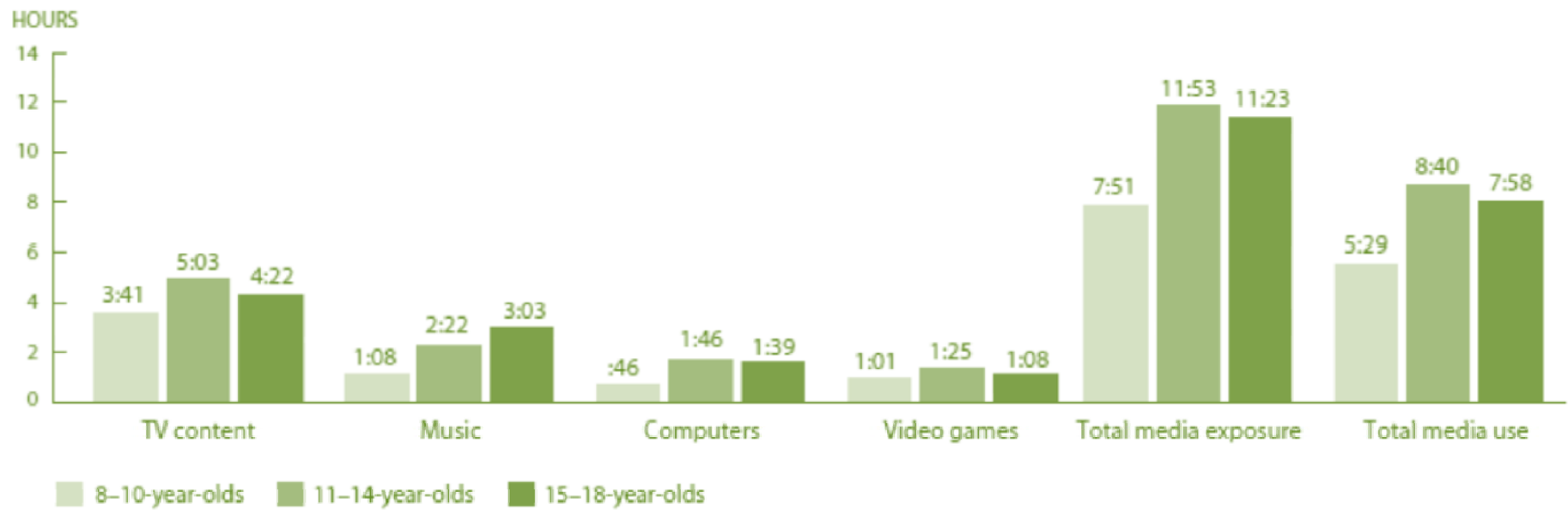
A Vision of K-12 Students Today

Students will use engaging technologies in collaborative, inquiry-based learning environments with teachers who are willing and able to use technology's power to assist them in transforming knowledge and skills into products, solutions, and new information.



Media Use, by Age

Average amount of time spent with each medium in a typical day:



~Kaiser Family Foundation, 2010



A diagram illustrating the components of Math Disabilities. A central yellow circle is labeled "Math Disabilities". Surrounding this central circle are four smaller yellow circles, each containing a component: "Language" at the top, "Visio-Spatial" on the right, "Memory" at the bottom, and "Number Sense" on the left. These four outer circles are connected by a thick, light-yellow circular band. The background of the slide features a blurred image of mathematical papers with handwritten formulas, including $n x^{n-1}$ and $2x(2x^2)$.

Language

Visio-Spatial

**Math
Disabilities**

Memory

**Number
Sense**





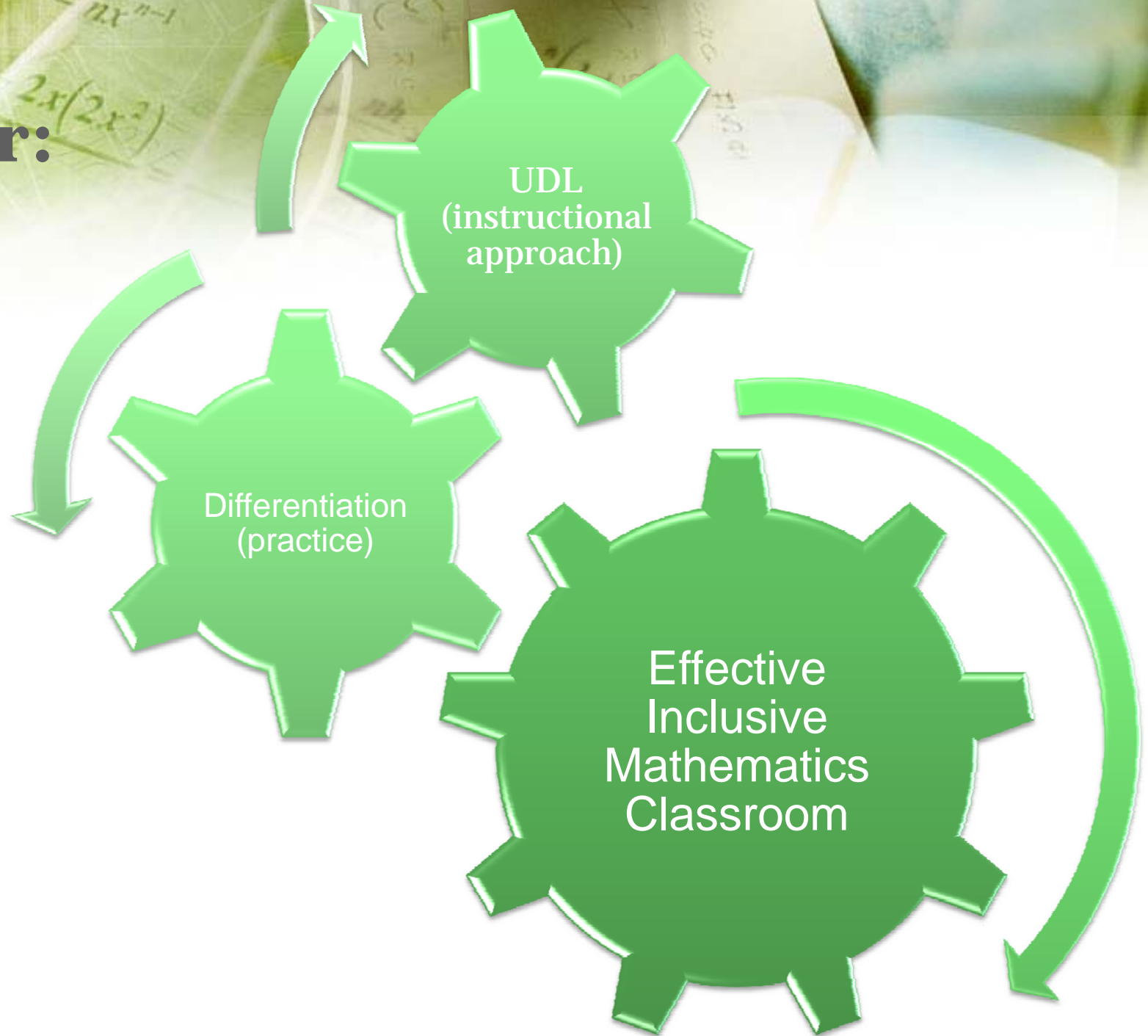
Meaning....

All of our students have individual needs



**How can Instruction
and Practice meet the
standards & be
meaningful but still
meet these needs?**

Answer:





Three Principles of UDL Framework for Instruction

- Provide multiple, flexible methods of **presentation**
- Provide multiple, flexible methods of **expression**
- Provide multiple, flexible options for **engagement**

Apply UDL Principles

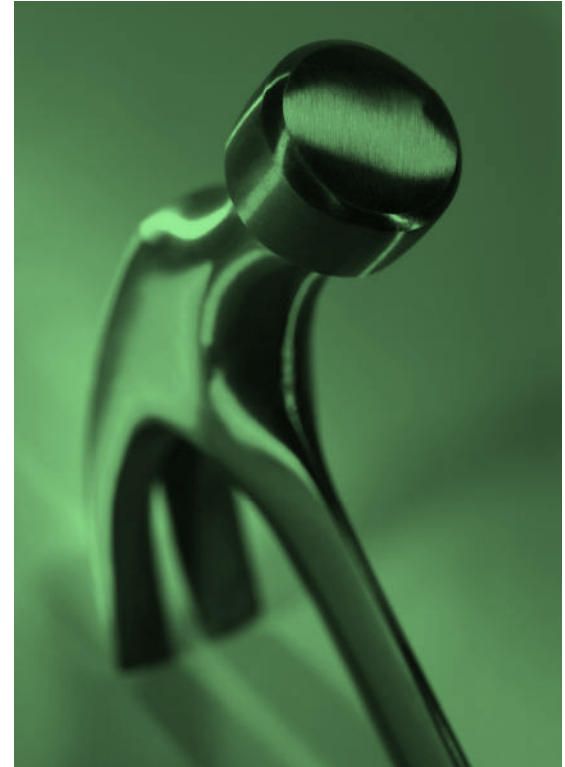
Representation Principle 1	Action and Expression Principle 2	Engagement Principle 3
Presenting information and course content in multiple formats so that all students can access it	Allowing students alternatives to express or demonstrate their learning	Stimulating students' interests and motivation for learning in a variety of ways



So, we plan assuming...

- You have a student who cannot talk
- Who cannot walk
- Who cannot see
- Who cannot hear
- Who cannot behave

This is universal design





Differentiated Instruction

“...allows all students to access the same classroom curriculum by providing entry points, learning tasks, and outcomes that are tailored to students’ needs.”

(Hall, Strangman, & Meyer, 2003)





How to Differentiate

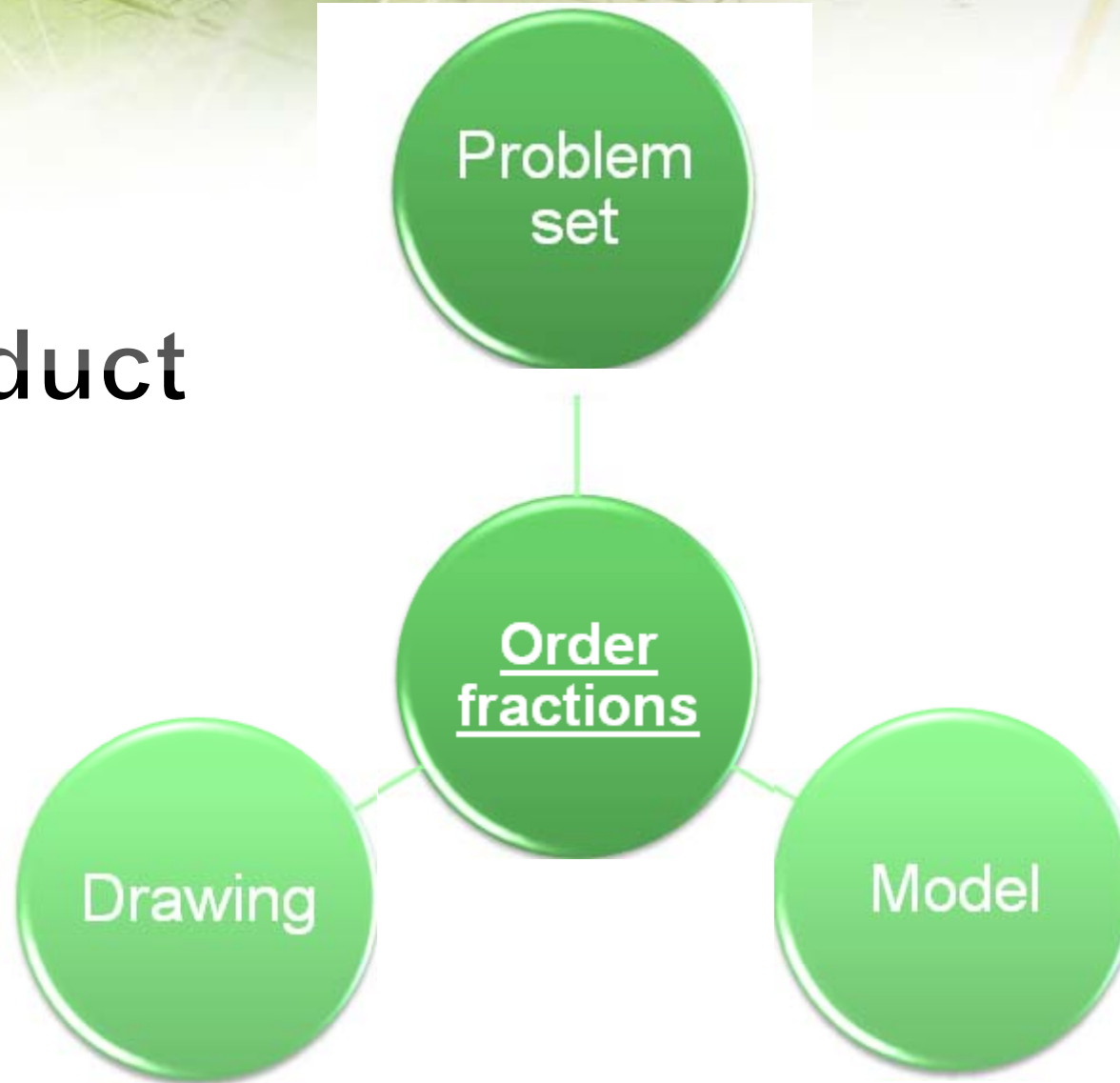
By level of understanding
By interests
By learning preferences
By providing choices
By learning modalities
By varying tools and methods



***The goal is always mastery of the content it's the **“HOW”** not the **“WHAT”** that changes.

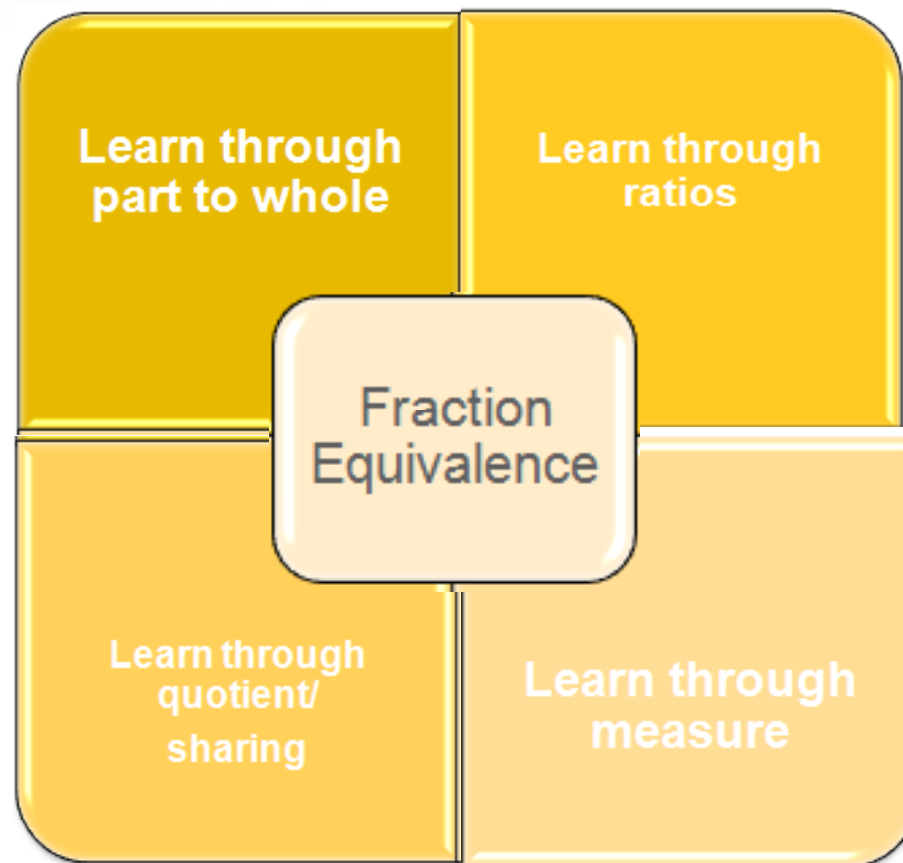
What to Differentiate

Product



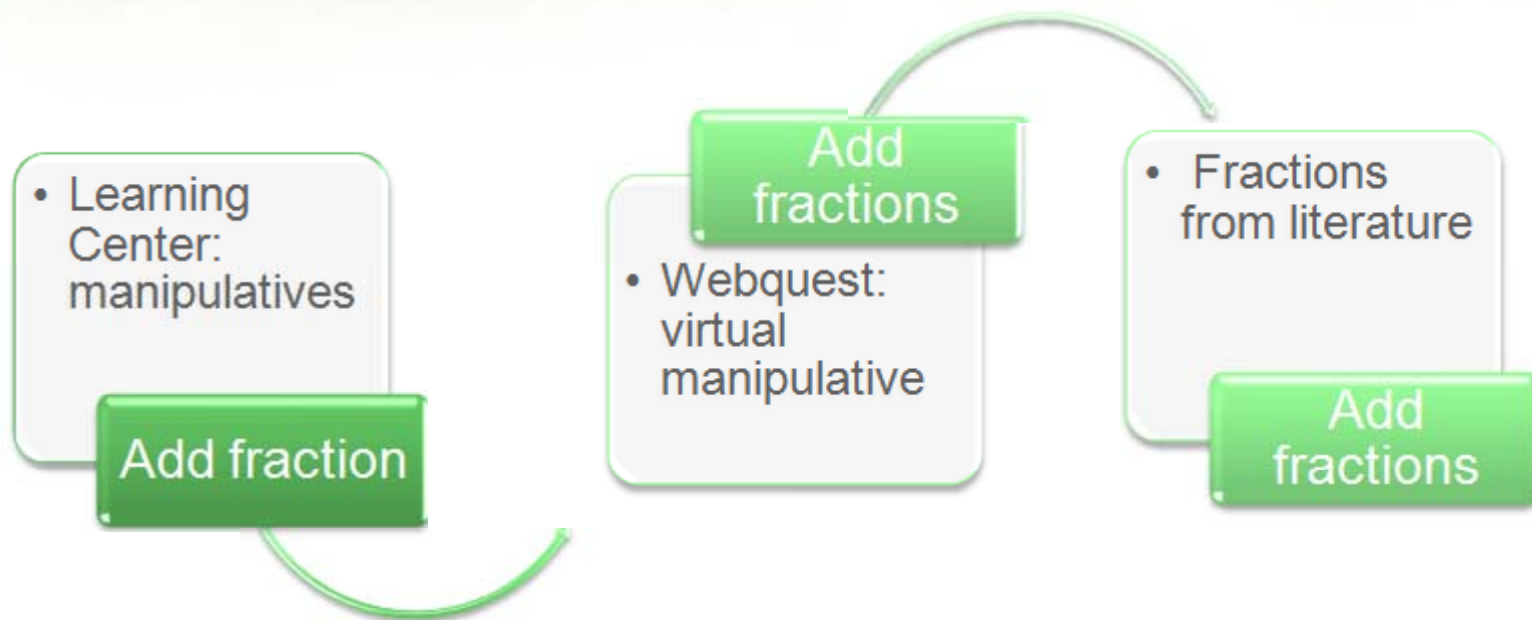
~ Tomlinson, 1999

What to Differentiate Content



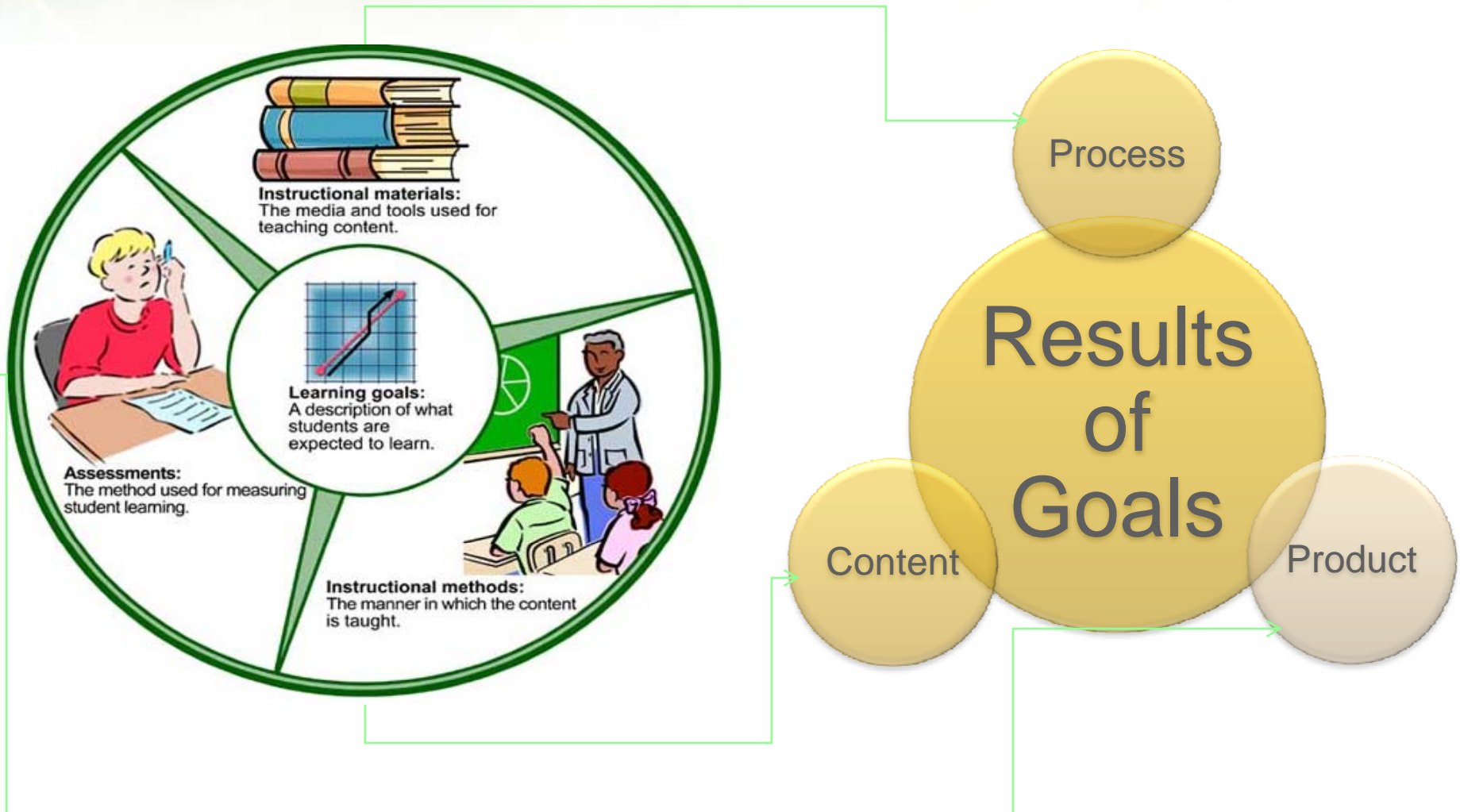
~ Tomlinson, 1999

What to Differentiate



Process

UDL and Differentiation





Overview

- Universal Design for Learning (UDL)
- Differentiation

Math Stations

- Basics
- Design – Remediation/Extension and Learning Styles

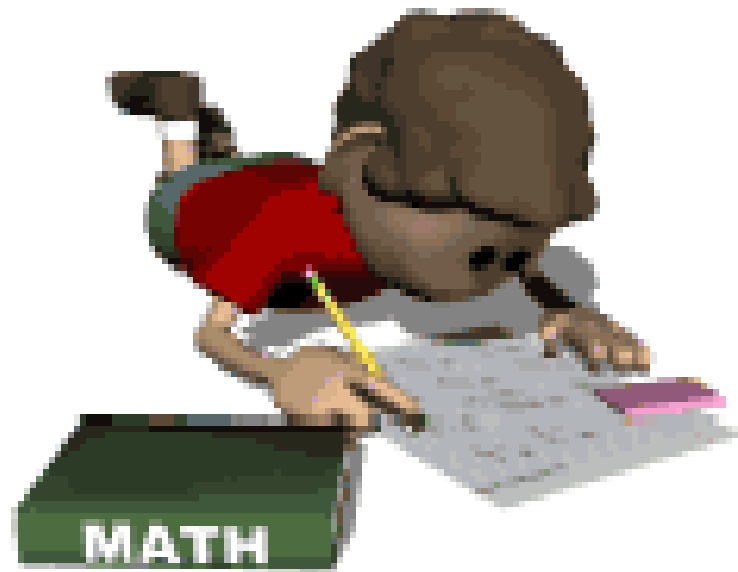
UDL Application

- Differentiating in a Universally Designed Environment

What are math stations?

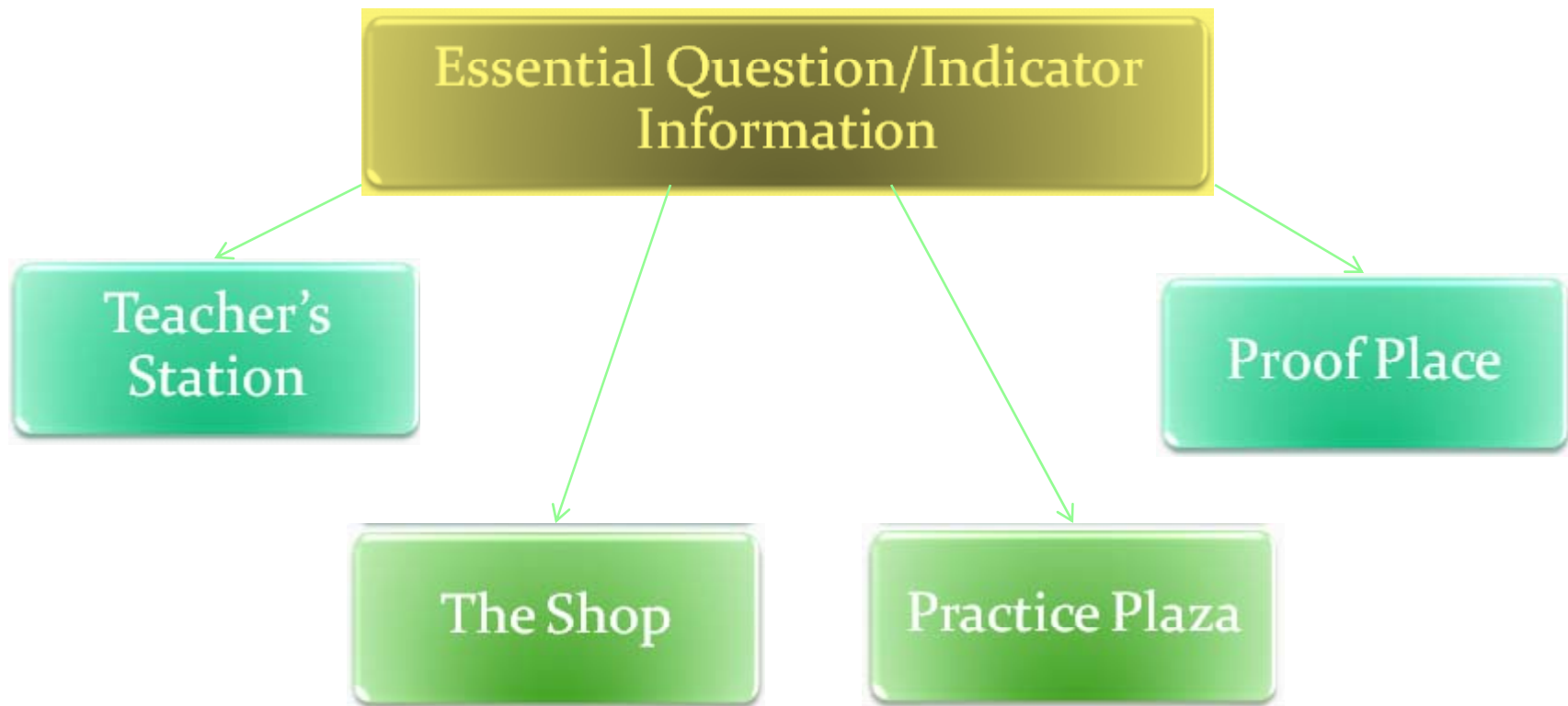
Math Stations:

- One form of differentiation
- Are set up as multiple locations in your room where students work on different activities relating to the same concept at the same time.
- Differentiate Content/Process/Product
- Actively Engage Students in their Learning





Math Station: General Setup Idea



~ Adapted from Tomlinson, 1999



How Do I Create a Math Station?



- Step 1: Take a concept that you are teaching or have finished teaching (example: comparing fractions)
- Step 2: Decide whether you will set up stations based on-
 - Learning style
 - Learning Preferences
 - To provide remediation/alteration or enrichment opportunities (skill)
- Step 3: Use indicator information to assign groups (or allow student choice)
- Step 4: Design tasks based on chosen style of differentiation.



COMPARING FRACTIONS

Decide which fraction is bigger in each box, and describe how you made your decision for each pair.

1.

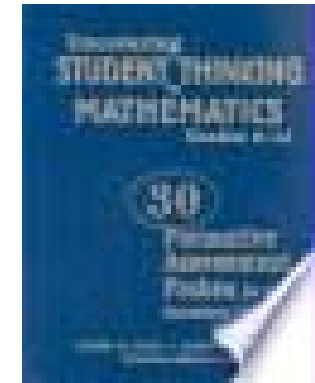
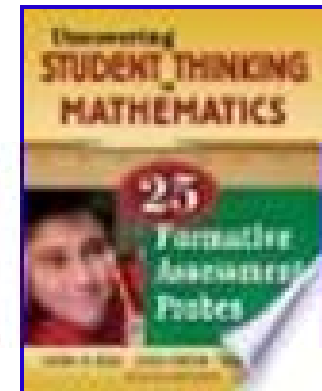
A. $\frac{5}{6}$ B. $\frac{5}{9}$

2.

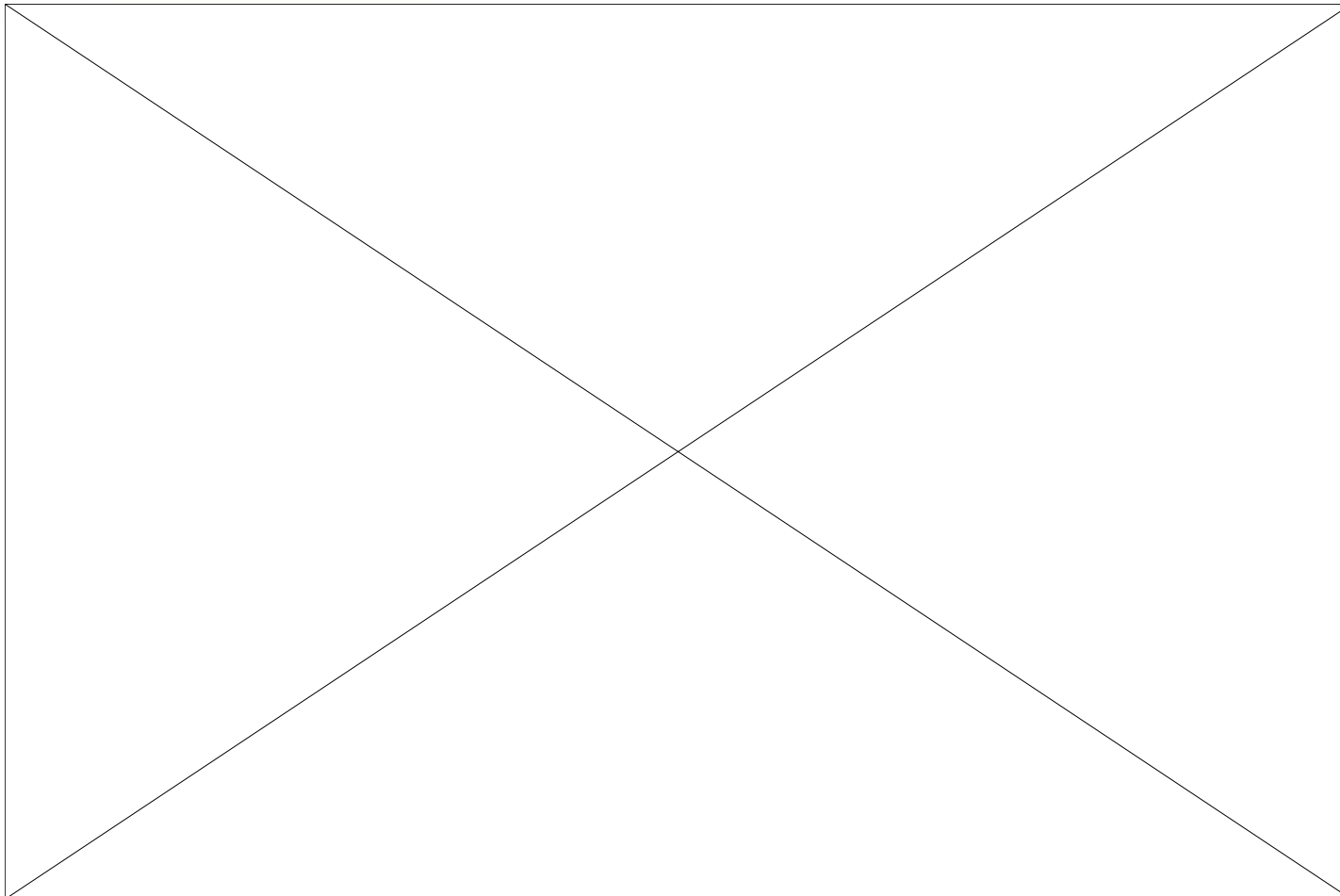
A. $\frac{2}{3}$ B. $\frac{2}{4}$

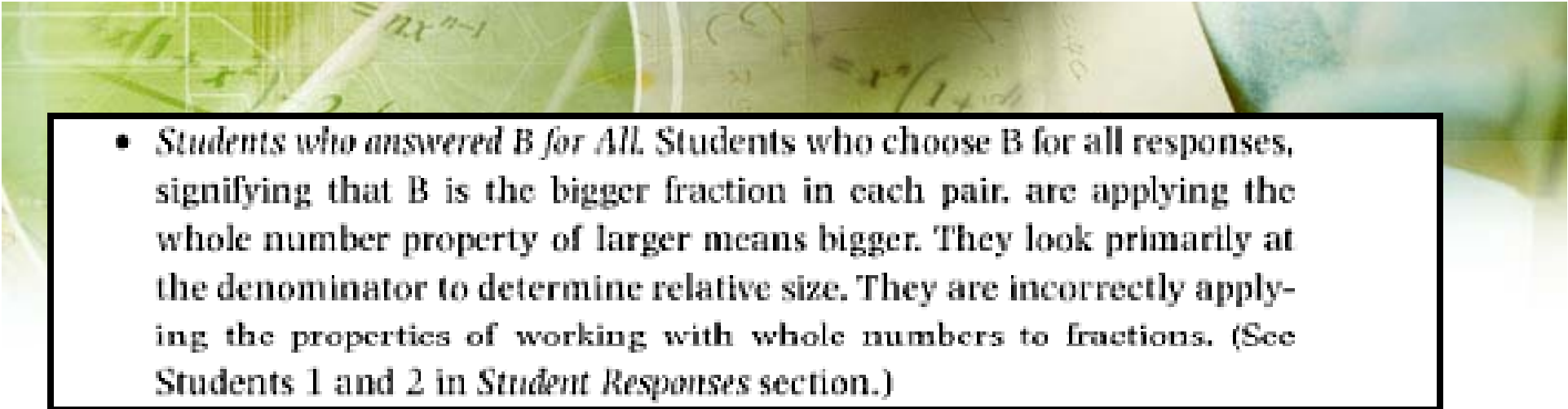
3.

A. $\frac{1}{5}$ B. $\frac{2}{10}$



Question/Indicator



- 
- *Students who answered B for All.* Students who choose B for all responses, signifying that B is the bigger fraction in each pair, are applying the whole number property of larger means bigger. They look primarily at the denominator to determine relative size. They are incorrectly applying the properties of working with whole numbers to fractions. (See Students 1 and 2 in *Student Responses* section.)

larger denominator means a larger fraction. (See Students 5 and 6 in *Student Responses* section.)

- *Students who answered B for All.* Students who choose B for all responses, signifying that B is the bigger fraction in each pair, are applying the whole number property of larger means bigger. They look primarily at the denominator to determine relative size. They are incorrectly applying the properties of working with whole numbers to fractions. (See Students 1 and 2 in *Student Responses* section.)
- *Students who answered 5/6, 2/3, 1/5, 2/3.* Students who choose 5/6, 2/3, 1/5, and 2/3 as the bigger fraction in each pair are using similar thinking in identifying the larger fraction. When deciding between 1/5 and 2/10, for example, students continue to apply the idea that the smaller denominator is the bigger fraction without considering the relationship between the numerator and denominator. (See Students 3 and 4 in *Student Responses* section.)



How Do I Create a Math Station?



- Step 1: Take a concept that you are teaching (example: comparing fractions)
- Step 2: Decide whether you will set up stations based on-
 - Learning style
 - Learning Preferences/Choice
 - To provide remediation/alteration or enrichment opportunities/Skill
- Step 3: Use indicator information to assign groups (or allow student choice)
- Step 4: Design tasks based on chosen style of differentiation.



How Do I Create a Math Station?



- Step 1: Take a concept that you are teaching (example: comparing fractions)
- Step 2: Decide whether you will set up stations based on-
 - Learning style
 - Learning Preferences
 - To provide remediation /alteration or enrichment opportunities
- Step 3: Use indicator information to assign groups (or allow student choice)
- Step 4: Design tasks based on chosen style of differentiation.



Indicator results: 5 students show understanding (A's); 4 students need enrichment (B's); 6 students need more guidance (C's)

C

Teacher's
Station

Proof Place

B

The Shop

Practice Plaza

A



1. Deliver practice using gaming:

1. <http://jamit.com.au/htmlFolder/app1005.html>
2. http://www.fractionbars.com/Fractions_Launch/fr_asteroids/application.html
3. http://www.fractionbars.com/Fractions_Launch/fr_tug/application.html

A



Rope Tug Fractions - Mozilla Firefox

http://www.fractionbars.com/Fractions_Launch/fr_tug/application.html

Jess Ed

$$\frac{5}{12}$$

five-twelfths

$$\frac{3}{3}$$

three-thirds

Jess, do you wish to replace your card or hold it?

Audio Off

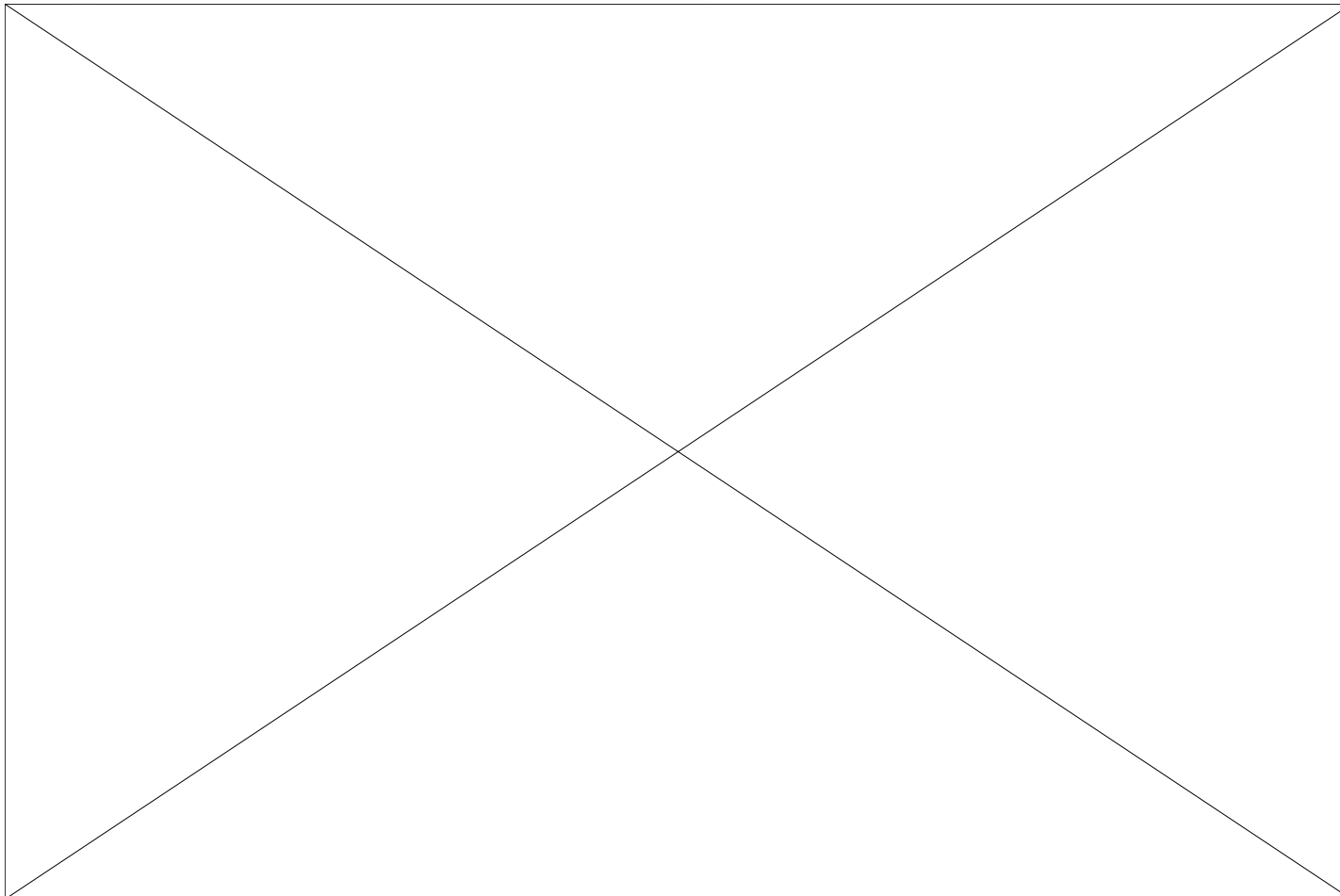
Hitting Asteroids - Mozilla Firefox

http://www.fractionbars.com/Fractions_Launch/fr_asteroids/application.html

HITS 1 MISSES 0

$\frac{2}{8} < \frac{1}{2}$

AUDIO ON





Universal Design w/technology

1. Have the student make a digital game
 1. www.quia.com
 2. <http://creators.xna.com/en-US/education/starterkits/>



Universal Design w/o technology

1. Have students make a game without technology
2. Have traditional options available for student practice
3. Allow students a choice in which they will do for practice



Etty Wanda says:

Mr. Groener asked my class which fraction was bigger, $\frac{3}{7}$ or $\frac{4}{11}$. Some kids said that $\frac{4}{11}$ was bigger, because 4 pieces is more than 3 pieces. Other kids said $\frac{3}{7}$ because sevenths are bigger than elevenths. Mr. Groener said you have to find a common denominator. I asked, why can't you find a common numerator? Then the ball rang, so I missed getting sent to the principal's office.

- a) Was anyone in this discussion right? Justify your claim in words (i.e. using a logical explanation rather than a calculation.)
- b) For those you think are wrong, why are they wrong?
- c) Can you think of any other methods to answer Mr. Groener's question? Justify them using a logical explanation.
- d) Compare the methods that are correct. Do what are the pros and cons of each method?

(from *Measuring the World*, by Susan Addington and David Dennis, 2008)

(from *Measuring the World*, by Susan Addington and David Dennis, 2008)

B

- d) Compare the methods that are correct. Do what are the pros and cons of each method?



Universal Design w/technology

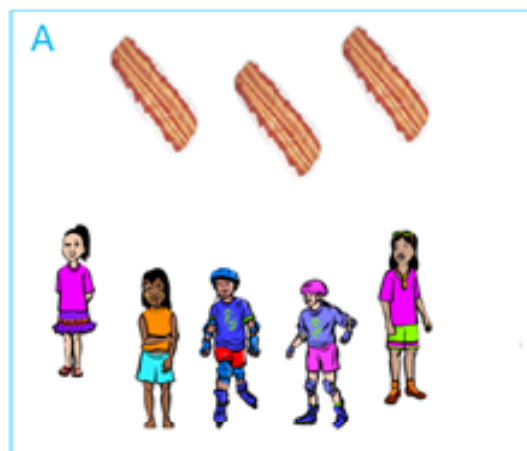
1. Post your answer to:
 - **Blogspot.com** using either
 - Text
 - Voice thread
 - Video thread
 - Digital story telling software



Universal Design w/o technology

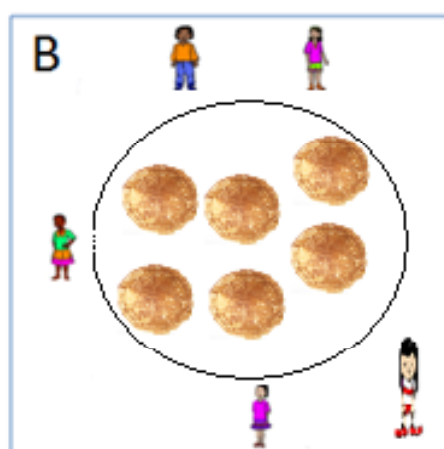
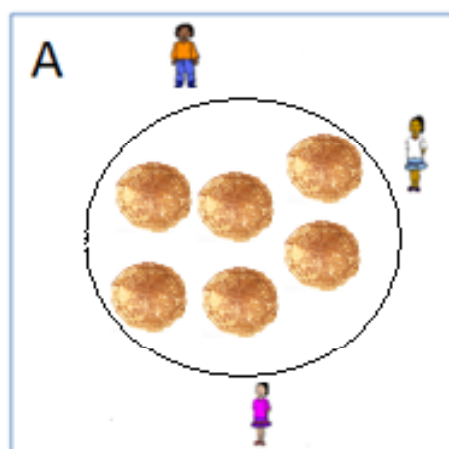
1. Show your answer using
 - Poster
 - Powerpoint w/ voice over
 - Create a play...continue the story

2. In which group would you receive more to eat?



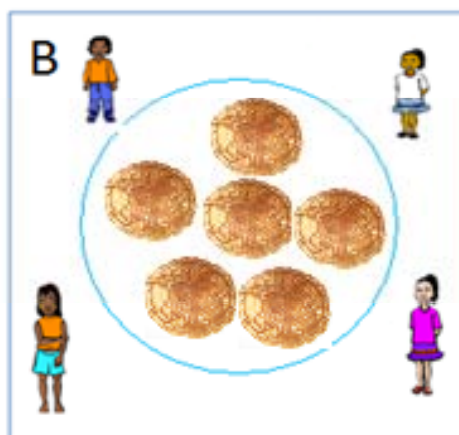
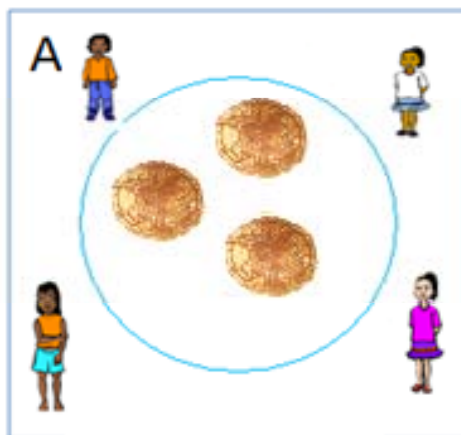
Explain your reasoning.

3. In which group would you get more to eat?



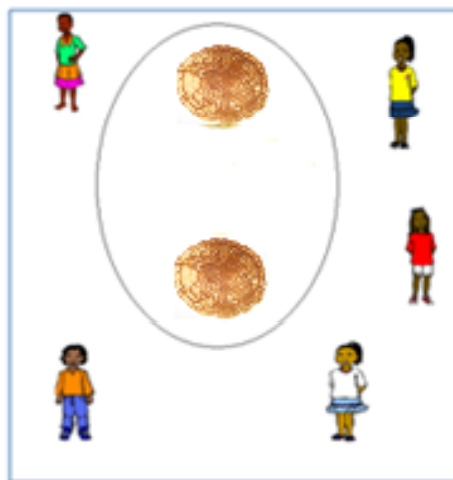
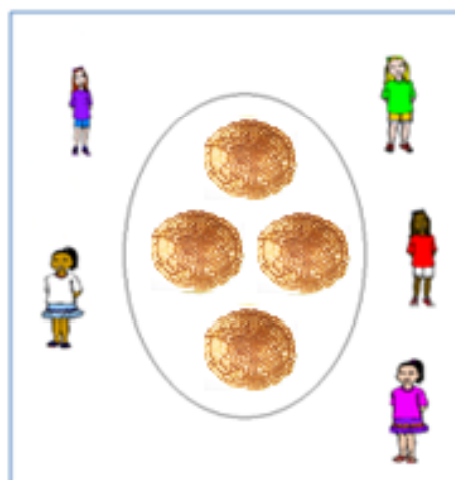
Explain your reasoning.

4. At which table would you get more to eat?



Explain your reasoning.

5. At which table would you get more to eat?



Explain your reasoning.



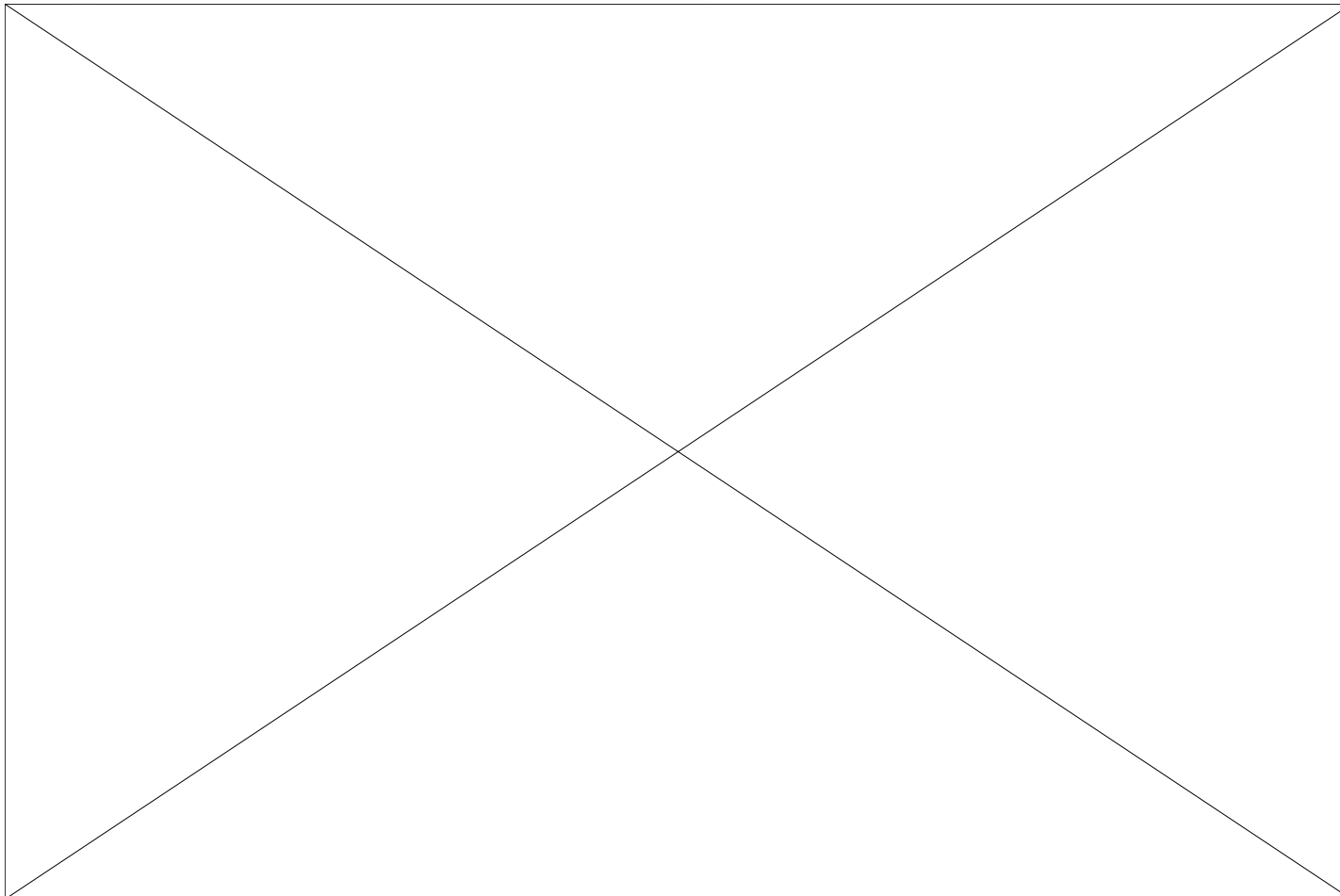
Universal Design w/ and w/o Technology

- PP with voice overlay
- Blog
- Polleverywhere.com



Universal Design w/o technology

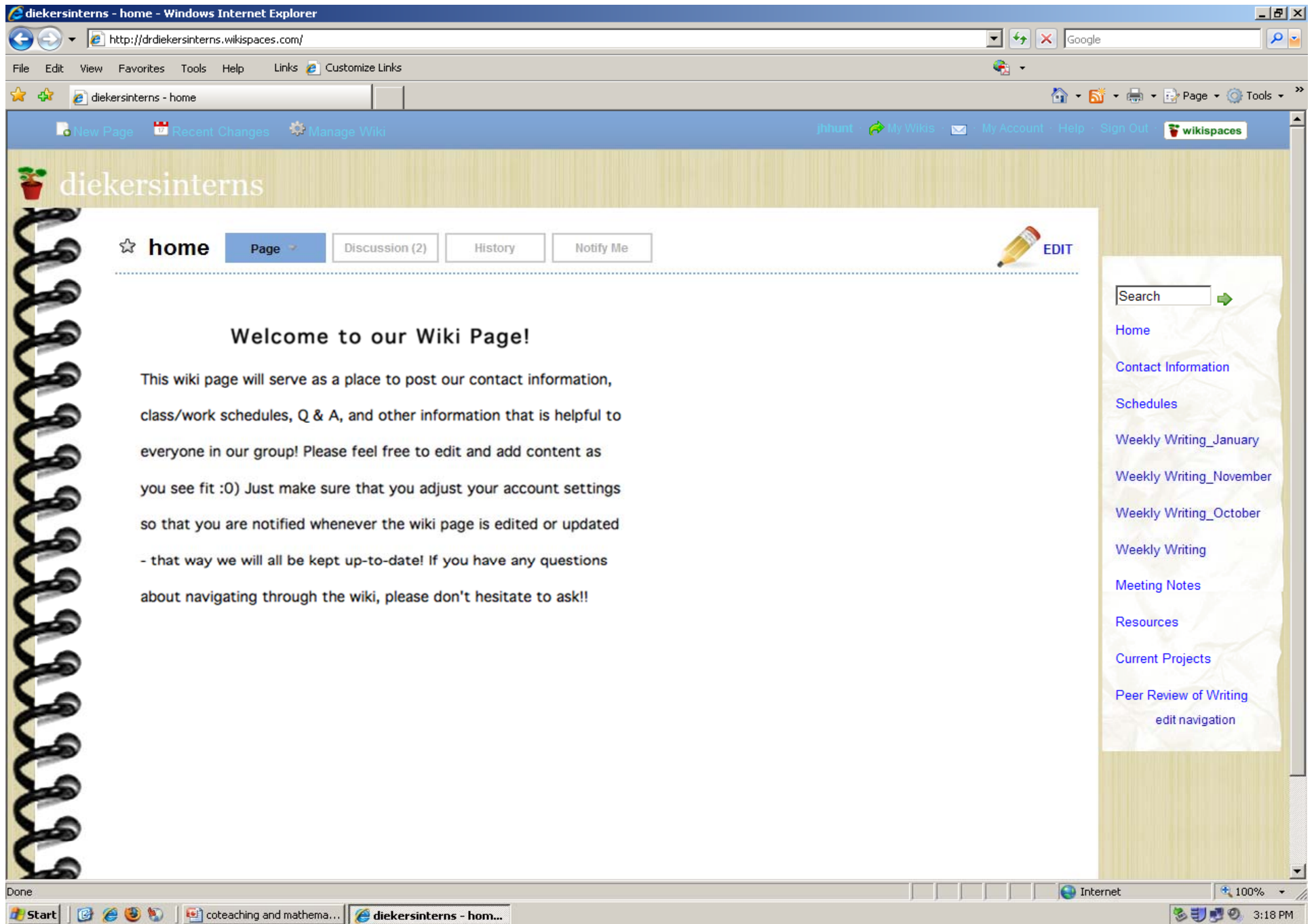
- Manipulatives that can be torn and distributed
- Explain with picture/manipulatives/symbols
- Computer or word processor versus writing
- Voice record with a tape recorder versus writing the explanation





Consider this....

- Most wikis, blogs, etc are FREE
- A lot of AT is FREE on internet
- Powerpoint comes with voiceover technology
- Some immersion games (e.g. Timez Attack) are FREE
- Polleverywhere.com is FREE



MathEBD_JHH3_15_PB - Google Docs - Windows Internet Explorer

http://docs.google.com/a/mail.ucf.edu/Doc?docid=0AeoYBHe3Otr8ZGQzaDdoZmNFNThkbTVxYzdjMg&hl=en

File Edit View Favorites Tools Help Links Customize Link

MathEBD_JHH3_15_PB - Google Docs

Start Page Calendar Documents Sites

Google docs MathEBD_JHH3_15_PB

Updated 3/16/10 1:21 PM by Pena Bedesem Saved Share

File Edit View Insert Format Table Tools Help

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EBD and Math

Running Head: EBD AND MATH

Effective Mathematics Instruction for
Students with Emotional and Behavioral Disorders

Peña Lasiste Bedesem
Jessica H. Hunt
Jackie Rodriguez
University of Central Florida

Abstract

There is a strong, reciprocal relationship between behavior and academic achievement for students with emotional and behavioral disorders (EBD) (Gable, Hendrickson, Tonelson, & Van Acker, 2002; Reid et al., 2004; Wehby, Lane, & Falk, 2003). As such, these students need to be educated by individuals who are knowledgeable in core academic subjects, such as mathematics, as well as the unique learning needs of this population. This article explores the academic and behavioral needs of students with EBD and the issues surrounding their education in the critical content of mathematics. First, background information on students with EBD is provided. The link between behavioral and academic achievement for the population is discussed. Next, the academic area of mathematics is illuminated through a discussion of the National Council of Teachers of Mathematics (NCTM) *Curriculum Focal Points*, and areas of concern related to students with EBD and the knowledge of general education and special education teachers is presented. Finally, suggestions and solutions to improve learning outcomes in mathematics for students with EBD are presented.

Students with EBD

Done

Internet 100%

Start coteaching and mathema... Novell GroupWise - publi... University of Central Flor... Mail From: <pbedesem@... MathEBD_JHH3_15_P... 3:23 PM

Blogger: Create your free blog - Windows Internet Explorer

https://www.blogger.com/start

File Edit View Favorites Tools Help Links Customize Links

Language: English


Blogger™


Sign in to use Blogger with your Google Account


Username (Email): Password: (?)

☐ Remember me (?)

Create a blog. It's free.

 **Your blog.** Share your thoughts, photos, and more with your friends and the world.

 **Easy to use.** It's easy to post text, photos, and videos from the web or your mobile phone.

 **Flexible.** Unlimited flexibility to personalize your blog with themes, gadgets, and more.

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Blogs of Note

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[Terms of Service](#) | [Privacy](#) | [Content Policy](#) | Copyright © 1999 - 2010 Google

Start | coteaching and mathema... | Blogger: Create your f... | Internet | 100% | 3:25 PM

Technology Resources

Blogs & wikis



Blogger

Learn what a blog is and how to create your own in three easy steps at www.blogger.com.

pbwiki

Get an ad-free wiki started with pre-made templates, free videos, and lots of help. <http://pbwiki.com/>

Presentation software



Add voice to presentations, pictures, or text with VoiceThread.

www.voicethread.com

CENTER
for DIGITAL
STORY
TELLING

Use digital stories to motivate students to share their stories in a unique and creative way. Digital stories can be used as alternatives for projects, summaries, and presentations. <http://www.storycenter.org/>

Technology Resources

Podcasts



Search from among thousands of podcasts at the Apple store. Browse by category, review descriptive summaries, and read ratings and reviews.

<http://www.apple.com/itunes/store/podcasts.html>

FREE TECHNOLOGY FOR TEACHERS

A REVIEW OF FREE TECHNOLOGY RESOURCES AND HOW TEACHERS CAN USE THEM. IDEAS FOR TECHNOLOGY INTEGRATION IN EDUCATION.


TUESDAY, MARCH 16, 2010

Freshman Fund - The College Savings Registry



Freshman Fund is essentially a gift registry for 529 college savings plans. Users can register on the website to receive contributions to their 529 plan.

This service looks like it could be a good way for "long lost" relatives to donate to a child's college savings fund. As graduation season approaches over the next couple of months and "that" uncle or aunt asks what they should give to your child you can direct him or her to Freshman Fund through which they can make a contribution to your child's 529 savings plan.

POSTED BY MR. BYRNE AT 12:00 PM 0 COMMENTS [LINKS TO THIS POST](#) 

LABELS: [COLLEGE PLANNING](#), [COLLEGE PREPARATION](#), [FRESHMAN FUND](#), [TEACHING WITH TECHNOLOGY](#), [TECHNOLOGY INTEGRATION](#)

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Search

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FREE GUIDE TO TECHNOLOGY
INTEGRATION

Twelve Essentials for Technology Integration

A free resource from Richard Byrne, author of Free Technology for Teachers.
Permission is granted for non-commercial reproduction of this document.

This resource has been submitted to Teachers			
Creating Documents and Presentations This resource can help you create documents and presentations for your students and parents. Page 1	Communicating with Students and Parents This resource can help you communicate with students and parents. Page 2	Plans to Create Multimedia Programs This resource can help you create multimedia programs for your students and parents. Page 3	Resources to Teachers This resource can help you find resources for your students and parents. Page 4




How Do I Create a Math Station?



- Step 1: Take a concept that you are teaching or are finished teaching (ex: **Addition of fractions**)
- Step 2: Decide whether you will set up stations based on-
 - Learning style
 - **Learning Preferences**
 - To provide remediation/alteration or enrichment opportunities (skill)
- Step 3: Use indicator information to assign groups (or allow student choice)
- Step 4: Design tasks based on chosen style of differentiation.

Product



Results show majority of student understanding:
need for assessment.

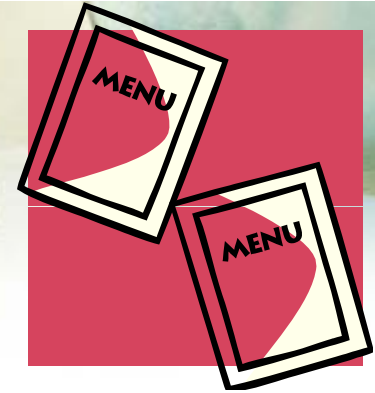
Teacher's
Station

Proof Place

The Shop

Practice Plaza

Example: Menu



- Use the measuring cups, water, and graduated container to demonstrate the addition of $\frac{1}{2}$ and $\frac{3}{4}$. Draw pictures and directions to explain and justify how you found the answer. Use the container markings to check your answer.

The Shop

- Produce a rap or poem that explains and justifies how to solve the word problem below:

*Jon has $\frac{1}{2}$ of a candy bar. Shawn has $\frac{3}{4}$ of a candy bar.
What is the total amount of candy?*

Practice Plaza

- Draw number lines, circles, or sets to show the addition problem $\frac{1}{2} + \frac{3}{4}$. solve the problem. Be sure to explain and justify your results.

Proof Place



UDL w/technology

- Virtual manipulatives as an alternative to measuring cups and water
- Digital storytelling for rap or song
- PP voiceover for rap or song
- Text to speech for voice or song
- Drawing software/GeoGebra or Geometer's Sketchpad
- Computers instead of writing
- AND MORE!!!



Practical Words on UDL

- Look at your learning goals, materials, teaching methods, and assessments.
- If you are only offering one way for students to interact in these areas, you are not meeting UDL principles 😊



Rethinking with UDL

Mrs. Hunt had the following learning objective for today's class on comparing and ordering fractions:

Representation barriers:

- Printed text
 - Some students with certain visual impairments and certain physical disabilities may have difficulty accessing information.
 - Some students may struggle with decoding text.

...ler fractions through problem solving situations and will
m sol

Action and Expression barriers:

- Writing
 - Some students may have difficulty with cursive handwriting.
 - Some students may not be able to effectively organize their thoughts and put them on paper

Engagement issues • Children with auditory processing disorders or reading disabilities may be overwhelmed

Rethinking Teaching Materials

Traditional Materials

Text-based materials
(textbook/ handouts)

Audio-based materials
(lectures/ video)

Image/ graphic-based materials
(video/ handouts)

Barriers

Requires students to:

- See
- Decode and comprehend written text
- Process visual information

Requires students to:

- Hear
- Identify key points
- Process aural information
- Be physically or cognitively able to take notes

Requires students to:

- See
- Process visual information





Etty Wanda says:

Mr. Groener asked my class which fraction was bigger $\frac{3}{4}$ or $\frac{4}{5}$. Some kids said that $\frac{4}{5}$

Requires students to:

- See
- Decode and comprehend written text
- Process visual information

Requires students to:

- Hear
- Identify key points
- Process aural information
- Be physically or cognitively able to take notes

d) Compare the methods that are correct. Do what are the pros and cons of each method?

(from *Measuring the World*, by Susan Addi

08)

Printed or digital textbook

Three-dimensional models

Interactive computer-based programs to learn and practice



Rethinking with UDL

Mrs. Hunt had the following learning objective for today's class on comparing and ordering fractions: Students will compare fractions using pictures and algorithms.

REVISED Goal: Students will learn about and present information on to comparing and ordering fractions.

Representation barriers:

Students are still required to learn but now use alternate methods for accessing that information (e.g., audio, digital text, video).

Action and Expression barriers:

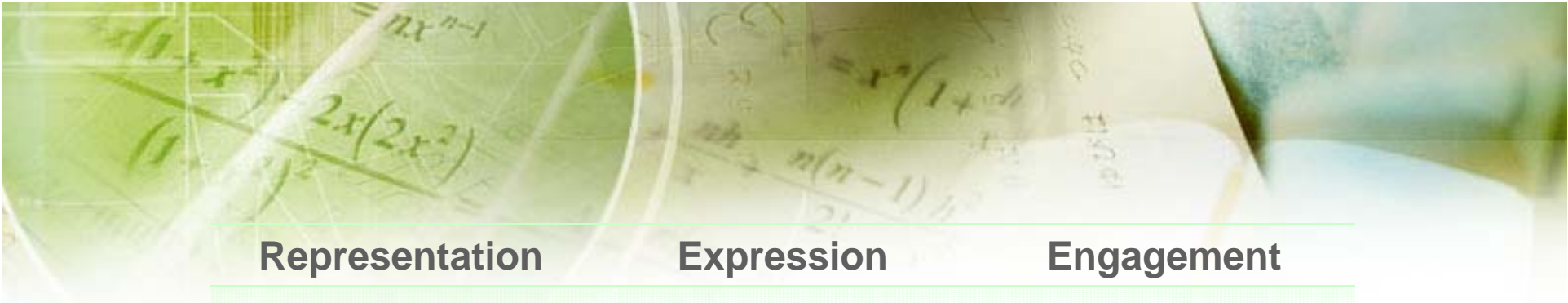
The students still need to demonstrate that they learned about but they now have options for doing so (e.g., handwriting a report, making a film, recording a presentation, creating a diorama).

Issues with **engagement** are addressed in how students choose to access the content and how they demonstrate their knowledge. Students will complete the assignment in accordance with their learning need or preference (i.e., visual, auditory, tactile, kinesthetic).

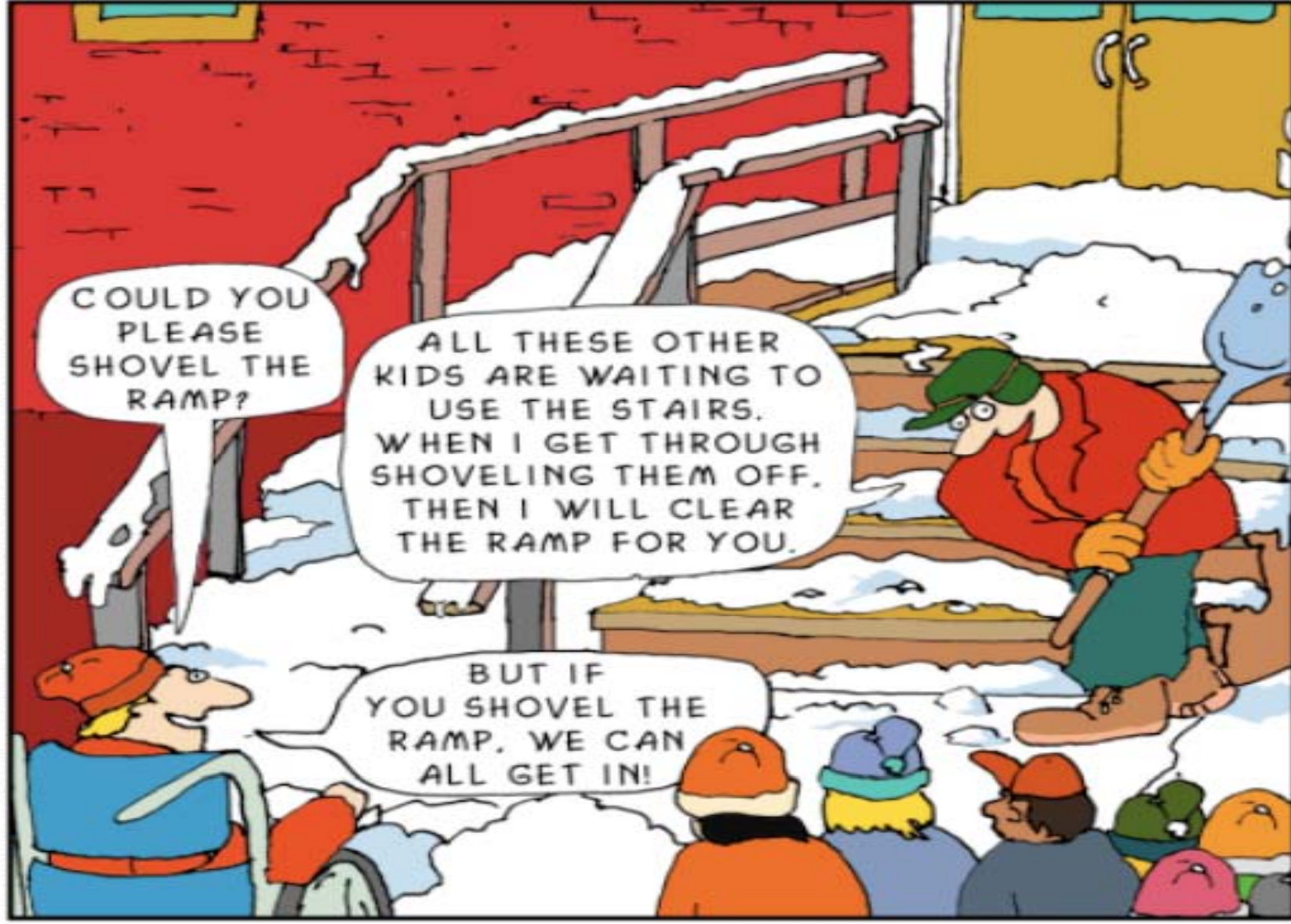
Rethinking Materials

Traditional Materials	Potential Barriers
Lecture and chalkboard	Requires students to: <ul style="list-style-type: none">• See• Hear• Process visual information• Process aural information
Textbook	Requires students to: <ul style="list-style-type: none">• See• Process visual information• Decode and comprehend written text
Overhead projector	Requires students to: <ul style="list-style-type: none">• See• Process visual information• Decode and comprehend written text

UDL Materials	Rationale for Use
Interactive computer-based programs to learn and practice	Allow access for more students, are more engaging for most students, and often provide embedded information and corrective feedback
Printed or digital textbook	Allows choice of material when accessing the content to address issues of accessibility and learning preference
Three-dimensional models	Provides alternate materials to address issues of accessibility and learning preference



Representation	Expression	Engagement
- Provide multiple examples <input checked="" type="checkbox"/>	- Model skills in a variety of ways <input checked="" type="checkbox"/>	- Offer choices of content and tools <input checked="" type="checkbox"/>
- Highlight important information <input checked="" type="checkbox"/>	- Provide opportunities to practice with supports and scaffolds <input checked="" type="checkbox"/>	Provide adjustable levels of challenge <input checked="" type="checkbox"/>
- Present content utilizing multiple media and formats <input checked="" type="checkbox"/>	- Provide corrective feedback <input checked="" type="checkbox"/>	- Allow students to choose from a variety of reinforcers <input checked="" type="checkbox"/>
- Build or activate background knowledge <input checked="" type="checkbox"/>	- Allow alternates for students to express or demonstrate their learning <input checked="" type="checkbox"/>	- Allow options for the learning environment, context, or grouping situations <input checked="" type="checkbox"/>





Insights from Van de Walle

“There is no need to change the content of the curriculum for students with learning disabilities. What must be done is what all good teachers do – pay close attention to the child and how he or she learns and design instruction (not content) that maximizes the strengths of the child while minimizing the impact of weaknesses.”

~ Van de Walle, 2004, pg 93

More Information?

Jessica H. Hunt

jhhunt@mail.ucf.edu

University of Central Florida

PDF of presentation at:

<http://nctm-differentiation-presentation.wikispaces.com/>