


Math in Many Ways

Using MSTAR Data to Differentiate Instruction

Research in Mathematics Education

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Portrait of a Classroom



Lawrence-Brown (2004)




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Goals of Workshop



- Discover how differentiated instruction can be implemented in your classroom
- Understand how data from *Middle School Students in Texas* (MSTAR) assessment system can be used to help differentiate instruction



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Why Differentiate?


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What is Differentiation?

- Pedagogical approach centered on students
 - Interest
 - Readiness level
 - Learner preference
- Modification of curriculum content, process, and products

(Stradling and Saunder, 1993)




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Differentiation can...

- Engage the learner by expanding upon their interests
- Dignify the learner
 - Respect learning and cultural differences
 - Provide targeted instructional support to address individual students learning needs at the students' readiness level
- Challenge teachers to create rigorous and relevant lessons
 - Strategize to adjust content, process, and/or product to meet individual learning needs and preferences

(Gavin & Moylan, 2012)



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Differentiate by Content

- Content selection focuses on readiness levels
 - Enrich content to meet the needs of gifted and talented students
 - Adjust content to meet students' needs in conjunction with the RtI support system
- Content selection can be driven by interest
- Remember, one size does not fit all!



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Differentiate by Process

- Incorporate student preferences and learning styles
 - Determine how a student comes to understand and assimilate facts, concepts, and skills and teach him/her in a way to grow understanding
 - Provide small groups for explicit, direct instruction
- Differentiation by process could look like
 - Flipping your classroom
 - Project Based Learning
 - Cognitively Guided Instructional Theory
 - Self-pace or self-direct learning of content



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Differentiate by Product

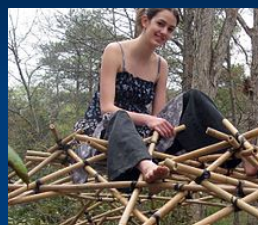
- Creating a model or representation
- Presenting a report or teaching a lesson
- Identifying and extending a pattern
- Classifying and ordering
- Making inferences and drawing conclusions
- Interpreting data
- Creating and testing a hypothesis
- Journaling a process



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A differentiated approach to a circle constant



VI Hart
A song about a circle
constant



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Summing Up: Differentiation in Math

- Differentiation can help to develop deep mathematical understanding while accommodating a diverse range of student abilities, interests, and prior experiences.
- Differentiation is the process of teaching that maximizes student growth through curricula that are individualized in content, process, and/or products.
- This process enables teachers to meet each student where they are, thereby strengthening their learning process.



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Differentiation Checklist

- Begin with data to make instructional decisions
- Analyze mathematics standards
- Develop the content
- Engage the students
- Explore
- Explain
- Elaborate
- Evaluate



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Step 1: Data

- Begin with data to make instructional decisions.
 - Use tools such as the MSTAR Universal Screener and Diagnostic Assessment to determine how to differentiate content to increase student learning.

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Texas Algebra Ready Initiative

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MSTAR Initiatives

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MSTAR Professional Development

- Provide connections to and strengthen participants' knowledge of CCRS, ELPS, RtI; and
- Available via face-to-face and online professional development courses.

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Additional Online MSTAR Courses

- MSTAR Introduction: An Executive Summary
- MSTAR Academy I: Fraction/Decimal Relationships and Operations
- MSTAR Academy I: Review and Needs Assessment
- MSTAR Academy I: Lesson Study Model Implementation
- More about Tier II for the Math Learner
- Addressing the G/T Math Learner through RtI
- Addressing the College and Career Readiness Standards in Math

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MSTAR Initiatives

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Purpose of the MSTAR Universal Screener

- Identify students who are at-risk for struggling with algebra-related core instruction
 - Determine *IF* interventions are needed
 - Determine *DEGREE OF INTENSITY* of the intervention needed
 - Monitor students' *RISK STATUS*
- Not intended to provide diagnostic information
- Guides instructional decisions
- Designed to be administered in fall, winter, and spring

Course: MSTAR Universal Screener Overview

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Response to Intervention Model

Tier III: Intensive Instructional Support	B: 1-3 rd Percentile Rank A: 6-14 th Percentile Rank
Tier II: Strategic Instructional Support	B: 15-24 th Percentile Rank A: 25-39 th Percentile Rank
Tier I: Minimal Instructional Support	B: 40-49 th Percentile Rank A: 50-99 th Percentile Rank

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MSTAR Universal Screener Reports

- Class Performance Summary Report
- MSTAR Comparison Reports
 - Comparisons over time
 - Comparisons across classes
 - Comparisons across grades
 - Comparisons across teachers

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MSTAR Initiatives

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Purpose of the MSTAR Diagnostic Assessment

- Given as needed to address the learning needs of struggling students in Tiers 2 and 3 *after* the MSTAR Screener
- Identify *WHY* students are struggling with algebra-related core instruction
 - Identify students' current level of understanding in key algebra-related content
 - Identify students' persistent misconceptions in key algebra-related content
- Provides information that can be used to plan supplemental instruction
- Not intended to provide screening information

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MSTAR Initiatives

- The MSTAR Universal Screener can be accessed through the Project Share Gateway at www.projectsharetexas.org
- It can also be accessed directly at <http://mstar.epsilon.com>.

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Step 5: Explore

- ❑ How will students develop their conceptual understanding?
 - Will students actively learn through large group or small group instruction?
 - Will they be given a real-world problem to solve, inquiry, or a project?

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Looks Like

- Grade 6 Measurement and data TEK
- Apply mathematical process standards to use numerical or graphical representations to analyze problems

Survey Project

- Problem: The editor of our class newsletter requests that you and your partner gather information about your classmates to be used in feature articles about our team. With your partner, **you are to create, implement, and analyze the results of a survey**, using the mathematical knowledge you have gained this week. (Remember, your math journal is a great reference!!)

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Step 6: Explain

- ❑ How will students verbalize, write, and explain their conceptual understanding?
 - What will the product look like?
 - Can students use their preferences to meet product requirements?

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Looks Like

What Do You Do With the Data?

- Make a graph to represent your data
- Use the graph to describe the center, spread, and shape of the data distribution
- Summarize numeric data, include
 - Mean and median (measures of center) and the range
 - Interquartile range (IQR) (measures of spread)
- Use these summaries to describe the center, spread, and shape of the data distribution
- Summarize categorical data, include
 - Mode
 - Percent of values in each category (relative frequency table)
 - Percent bar graph
- Use these summaries to describe the data distribution

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Step 7: Elaborate

- ❑ Are there additional activities that encourage students to think beyond the grade level skill?
 - Can students' interests, readiness levels, and preferences be applied?

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Looks Like

Grade 7 – Measurement and data. The student applies mathematical process standards to use

(A) Compare two groups of numeric data using comparative dot plots or box plots by comparing their shapes, centers, and spreads;

(B) Use data from a random sample to make inferences about a population; and

(C) Compare two populations based on data in random samples from these populations, including informal comparative inferences about differences between the two populations.

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