summer workshops

Differentiated Elementary Science Instruction

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No Child LEFT BEHIND

Differentiated Elementary Science Instruction

- **WELCOME!**
  - As you settle in for the session, complete the following task:
    - Write a set of directions you would follow to make a cheesecake.

Enduring Understanding

- **All students can learn rigorous academic material at high standards.**

Jon Saphier and Robert Gower: The Skillful Teacher

Essential Question

- **How can we best identify what students know and are able to do and subsequently plan for, instruct, and measure learner progress in mixed ability science classrooms in standards-based curriculum?**

Outcomes

- **By the end of this session, participants will know and be able to:**
  - define the foundations and key principles of differentiated instruction.
  - gain knowledge about differentiation strategies.
  - observe the connection between science inquiry and differentiated instruction.
  - explore differentiated science lessons based on Maryland State Standards.
  - explain the process for data-driven differentiated instructional planning.
  - create a differentiated science lesson plan.

The Betting Game
Topic: Differentiation

1. **There are three modes of differentiation: content, process, and product.**
2. **Whole class instruction is not a part of a differentiated classroom.**
3. **Assessment and instruction are inseparable in a differentiated classroom.**
4. **Differentiation is synonymous with individualized instruction.**
5. **Exit cards are a quick and easy strategy for assessing students.**
6. **Readiness, interest, and learning profile are factors in planning differentiated instruction.**
7. **Differentiation is chaotic.**

Why Differentiate?

- "One size fits all" instruction does not address the needs of all students.

- Children come in different shapes and sizes. They also differ in interest, readiness levels, and learning profiles.

Differentiating "How To"

- **How to Differentiate Instruction in Mixed Ability Classrooms – by Carol Ann Tomlinson**
  - Be clear on the key concepts and generalizations that give meaning and structure to the topic.
  - Lessons for all students should emphasize critical thinking.
  - Lessons for all students should be engaging.
  - There should be a balance between student selected and teacher assigned tasks and working arrangements.

Differentiation Key Message

- **Tomlinson tells us:**

  Instruction begins where the students are, not at the front of the curriculum guide.

What do students know and what are they able to do?

- **Pre- and on-going assessments drive instruction**
  - Products and work samples
  - Standardized tests
  - Questioning
  - Every pupil response
  - Writing prompts
  - Exit cards
  - KWL
  - Paper/Pencil tests
  - Drawings related to the topic

Differentiated Content

- **Input – what the students learn**
  - Use of multiple texts
  - Use of varied resources
  - Compact curriculum
  - Learning contracts

Differentiated Process

- **How students make sense of content**
  - Interactive journals
  - Tiered assignments
  - Learning centers
  - Cubing
  - Anchor activities

Differentiated Product

- **Output – how students demonstrate what they know and are able to do**
  - Product presentation uses varied modes of expression, materials, technologies
  - Advanced assignments that require higher order thinking skills
  - Evaluation by self and others
  - Authentic assessment

Pre-Assessment Data Implications

- **Cheesecake 911**
  - Direct Instruction
    - Provide varied text - content
    - Make task simpler - process
    - Provide small group instruction - process
- **Cheesecake Basics**
  - Guided Instruction
    - Provide step-by-step written instructions - process
    - Provide modeled lessons - process
    - Provide lab opportunity - content
- **Cheesecake Advance**
  - Independent Instruction
    - Provide opportunities for learners to expand their knowledge - content

Differentiating Science Instruction

- Three levels of science inquiry
  - **Structured**
  - **Guided**
  - **Open**

Structured Science Inquiry

- Students provided hands-on problem to investigate with procedures and materials
- Students discover relationships between variables or generalize from data
- Used to teach specific content, fact, or skill

Guided Science Inquiry

- Students provided materials and problem to investigate, and students compose their own procedures

- Teacher facilitates and encourages student generated questions

Open Science Inquiry

- **Similar to guided inquiry with the addition that students also formulate their own problem to investigate**

Sample Differentiated Science Lesson

- **Structured Inquiry**
  - Students are given testable question and verbal procedures – Are fingerprint and toe print formulas the same?
- **Guided Inquiry**
  - Students select a testable question from teacher list then plan and conduct investigation
- **Open Inquiry**
  - Students develop a testable question and investigation

Anchor Activities

- Reading to be Informed
- Inquiry Centers
- Structured Computer Work

Give It a Try

- **Paper Towel Investigation**
  - Develop a tiered science lesson for students to create and conduct well-designed investigations to determine the quality of several different paper towels.

Labor Intensive Strategies for Differentiation

- Assessment, data analysis, and diagnosis
- Flexible grouping
- Tiered tasks
- Anchor activities
- Differentiated learning encounters
- Learning contracts
- Independent study

Simple Strategies for Differentiation

- Study buddies
- Exit cards
- Student expert
- “Three Before Me”
- “The Doctor Is In”
- Mini-lessons
- Multiple text

Differentiation instruction is a critical element to…

Leaving No Child Behind.