Differentiated Elementary Science Instruction

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Archived Information
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?
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.
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.
“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.
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.