



Differentiated Elementary Science Instruction

Archived Information

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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.