Chapter 5

Reflection questions:

1. The chapter explores various approaches to designing effective STEAM instruction, including community-based inquiry, visual literacy, student-centered questioning, and sense making activities. How can you integrate one or more of these approaches into your STEAM instruction to create more meaningful and equitable learning experiences for MLs?
2. How do you currently address linguistic justice for MLs in your STEAM lessons? What additional differentiation and strategies could you implement to ensure their full participation and engagement?

Recommended activities:

1. Activity: Connecting Community, Culture, and Language in STEAM

What: Teachers explore ways to make STEAM teaching and learning meaningful and accessible for MLs by integrating their community, cultural, and linguistic knowledge.

How:

- Identify a local issue or phenomenon that is relevant to your MLs' communities (e.g., air pollution, local architecture, or urban gardening).
- Develop an open-ended inquiry question that encourages investigation (e.g., "How does our neighborhood's air quality impact our health?").
- Use the template provided in the chapter to develop differentiated support that activates and builds on MLs' cultural and linguistic assets and encourages translanguaging.
- If possible, implement a part of your plan in the classroom and reflect on how MLs engaged with the inquiry process.

2. Activity: Planning a STEAM Lesson with a Graphic Organizer

What: STEAM teachers use graphic organizers to plan accessible and engaging STEAM instruction for MLs.

How:

- Select a STEAM lesson concept and a graphic organizer (e.g., concept map, flowchart, or Venn Diagram) to structure your plan.
- Fill in the organizer with key components, including but not limited to the following:
    - Learning objectives (e.g., content, English, and translanguaging)
    - Student-centered inquiry (e.g., hands-on activities, guiding questions)
    - Differentiation and strategies for MLs (e.g., visuals, gestures, multilingual resources)
    - Multimodal assessment that provides evidence to achievement toward learning objectives
- Review the plan and reflect on:
    - How does it encourage critical thinking and student agency?
    - Does it provide linguistic justice for MLs?
- Compare organizers with colleagues, offer feedback, and refine your lesson.

Resources in the chapter which includes Extension of LP or detailed unit/lP (Templates)

1. Differentiation Template for MLs (Adapted from Fairbairn & Jones-Vo, 2010)

Content Objective	
ML Name & Language Proficiency Levels	
English & Translanguaging Objectives	
Differentiated Support	

2. Additional activities for the Oil Spill Unit

Activity 1: Designing and Constructing a Latch & Device with a Focus on Engineering

Key Engineering Questions:

- How can we use magnets or simple materials to create a latch that keeps a door shut?
- How can we design a device to prevent two moving objects from touching each other?

1. Designing a Door Latch:
    - Challenge: Ask students to think about how they would keep a door shut. Show them examples of simple latches on cabinets or doors.
    - Materials Provided: Magnets, string, cardboard, paper clips, and craft sticks.
    - Instructions: Students will work in pairs to design and construct a simple latch using the provided materials. For example, they can use magnets to hold a cardboard door to a frame or craft sticks to create a sliding latch.
    - Key Question: How does your latch keep the door closed? Can you explain how it works?
2. Creating a Device to Keep Moving Objects Apart:
    - Challenge: Have students think about how to prevent two moving objects from touching each other (e.g., how bumpers on cars work). Show examples such as bumpers or barriers.
    - Materials Provided: Toy cars, magnets, cardboard, and rubber bands.
    - Instructions: Students will design a device that keeps two toy cars from colliding, using materials like magnets or other barriers. For example, they can place magnets on the fronts of the cars so they repel each other and stay apart.
    - Key Question: How does your design keep the cars from touching? Why do the magnets push them away?
3. Testing & Reflection:
    - Allow students time to test their latches and devices. Encourage them to modify their designs if needed.
    - Discussion: Ask students to explain their design choices and how their latch or device works. Discuss how engineers use similar principles to solve real-world problems.

Activity 2: Exploring Magnetic Force through Art and Engineering

Key Engineering Questions:

- How do Maglev trains use magnets to move faster?
- What does it mean when magnets attract or repel each other?

1. Maglev Trains in China:
    - Show a short video or images of Maglev trains. Ask students: Why do Maglev trains float above the tracks? (Answer: Magnets repel each other, reducing friction).
2. Building a Simple Magnet Car:
    - Provide students with small toy cars and magnets. Ask: Can you make the car move without touching it using just magnets?

    - Have them explore how magnets push and pull objects.
3. Creative Magnet Art:
    - Give students iron filings and magnets to make creative designs. Ask them to describe the magnetic field patterns they observe. How do magnets create these patterns?

Related Resources

Oil Spills from California Coastal Commission:
https://www.coastal.ca.gov/publiced/oilspills.html

Magnetic Design Solution: https://thewonderofscience.com/3ps24 and
https://static1.squarespace.com/static/59c3bad759cc68f757a465a3/t/5e1f5a4c67c9856846e7780f/1579113042143/3-PS2-4+Magnetic+Design+Solution+%28Teacher+Edition%29.pdf

Oil Spill Short Performance Assessment:
https://docs.google.com/document/d/16uvH_kx8j40q2_Emkq2ytqbsuFCHiz6FcDKiWa8W4Qo/template/preview

Related readings

WIDA focus bulletin: TRANSLANGUAGING: Teaching at the Intersection of Language and Social Justice: https://wida.wisc.edu/sites/default/files/resource/Focus-Bulletin-Translanguaging.pdf