Language Proficiency and Rigorous Science Instruction – What’s the Connection?

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Discussion Question

A colleague says,
“I have students who need to learn English before I can teach them science.”

How would you respond?
Focus Question

How are science instruction and language acquisition mutually supportive?
Encender una bombilla
Materiales

- Palito de madera
- Palito de metal
- Cuchara de metal
- Cuchara de plástico
- Cuchara de plástico
- Interruptor
- Alambre
- Pila
- Bombilla

Objetos para conectar
Tarea - Exploración

1. Predicción. Yo predigo que ...

2. Conecten cada uno de estos materiales, uno a la vez, a los dos lados del interruptor.
Datos

¿Que material hace que la bombilla se **encienda**?

¿Por qué?

¿Que material hace que la bombilla **no se encienda**?

objetos para conectar

madera  metal  plástico
Vocabulario:

Circuito eléctrico

Conductividad

Conductor: metal

Aislante: plástico, madera
Discusión: Causa y efecto

• Cuando conecto un objeto de ___, la bombilla ___ porque es un ___.
• Sé que un objeto de ___ es un ___ porque la bombilla ___.
Resumen: Conductores y Aislantes

• Los metales son **conductores** y permiten el paso de la corriente; el circuito está **cerrado**.
• El plástico y la madera son **aislantes** y no permiten el paso de la corriente; el circuito está **abierto**.
Debriefing the Experience

• What content was learned?
• How did the scaffolds support access and production of language?
Science isn’t on the California Dashboard (yet). But the ELPAC is.

Items also correspond to the Common Core State Standards Mathematical Practices and the Science and Engineering Practices in the California Next Generation of Science Standards. - ELPAC Blueprint
The English Language Proficiency Assessments for California (ELPAC) is California’s assessment system that is used to determine the English language proficiency of students whose primary language is not English.
In this task type, the student listens to a recording of an academic presentation while looking at a related picture or pictures. The student is then asked to summarize the main points of the presentation.

Aligned 2012 ELD Standards: PI.C.9, PI.B.5, PII.A.2, PII.B.3, PII.B.4, PII.B.5, PII.C.6, PII.C.7
In pairs:
Partner A: Summarize the information you heard. Be sure to:
  • explain conductivity
  • include all the steps in the demonstration
  • use relevant details and clear language
Partner B: Listen and take notes.
Assessment

Examine rubric descriptors

• What is this task assessing?
• What is it not assessing?
• Think of one of your EMLs. Where would they score now on an item like this? How would you move them to the next level?
SEPs are tied to language functions, so targeting those functions can increase student proficiency with both language and skills within the practices.
5th Grade NGSS Science and Engineering Practices with Corresponding ELD standards

6. Constructing explanations and designing solutions

- Students infer, explain, provide evidence, design, identify, apply, solve, compare
- Construct an explanation of observed relationships (e.g., the distribution of plants in the backyard)
- Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.
- Identify the evidence that supports particular points in an explanation.
- Apply scientific ideas to solve design problems.
- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. (NGSS Appendix)

General Strategies for all Students

- Mini-lesson on language structures and norms for engaging in academic discussions
- Writing frames for explanatory writing
- Start with diagrams and graphic organizers to formulate ideas
- Think Peer-Share to generate ideas
- Review engineering design process
- Concept Maps
- Use crosscutting concepts to think about science ideas with another lens

Corresponding ELD Standards


Emerging

- P1.A.1 Contribute to conversations and express ideas by asking and answering questions and listening to questions and responding using short phrases.
- P1.A.4 Recognize that language choices vary according to social setting, with substantial support from peers or adults.

Expanding

- P1.A.1 Contribute to class, group, and partner discussions, including sustained dialogue, by following turn-taking rules, asking relevant questions, affirming others, and adding relevant information.
- P1.A.4 Adjust language choices according to purpose (e.g., explaining a science experiment), and audience, with moderate support.

Bridging

- P1.A.1 Contribute to class, group, and partner discussions, including sustained dialogue, by following turn-taking rules, asking relevant questions, affirming others, adding relevant information, building on responses, and providing useful feedback.
- P1.A.4 Adjust language choices according to purpose, task (e.g., facilitating a science experiment), and audience, with light support.

Sentence frames:

- I observed...
- I think because...
- We think this is the best solution because...

Questions/Prompts:

- Are you saying...
- Does... mean that...
- Is... an example of...
- Do you think... is a result of...
- Which... caused...
- What... would result if...
- What approach did you use to...
- Is... the same or different from...

Sentence frames:

- Based on... I think...
- The relationship between... and... shows that...

Questions/Prompts:

- Explain in your own words.
- What does... mean?
- Give an example.
- What is the effect of...
- What would result if...
- What is... significant?

Sentence frames:

- Concise summaries of experiences using complete sentences and key words (e.g., from notes or graphic organizers).

Questions/Prompts:

- How can you apply what you learned about...
- How did... compare to...

Sentence frames:

- Concise summaries of experiences using complete and concise sentences and key words (e.g., from notes or graphic organizers).

Questions/Prompts:

- How can you apply what you learned about...
- How did... compare to...
Focus Question

How are science instruction and language acquisition mutually supportive?
Science and Language

- All students have science **prior knowledge** from interacting in the natural world.
- Real and relevant phenomenon taps into our **natural curiosity** and **engages** and **motivates** learners.
- Science is a **collaborative endeavor** and leads to social interactions.
- Doing science involves **multiple forms of language** use.
Shifts in Perspectives

➢ **Doing science** and engineering (developing models, constructing explanations, arguing from evidence) inherently involves language use (National Research Council, 2012; Lee, Quinn & Valdés, 2013).

➢ Language Learning occurs **not as a precursor but as a product of using language** in social interactions (Valdés, 2015).

➢ **Mutually supportive shifts** in science and language learning: promote a more socially-situated and practice-oriented view of learning in both fields (Lee, 2017).
Science Learning and Language Learning Mutually Supportive

Communication

“Doing science” and “Doing Language”

Moving beyond “knowing about” science to making sense of the world by “figuring out” phenomenon.

Supporting EL students to develop advanced proficiencies with academic English as they are also developing content knowledge.
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Gots and Needs

Please give us your feedback.

• On one post-it tell us what you “Got” from the session that will help you advocate for science teaching and learning.
• On the other tell us what you would still “Need” in order to share this topic in your system.