Science and the English Learner: Ensuring that ELs Obtain, Evaluate, and Communicate the Language of Science

Phenomenal Friday Webinar
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Collaborating Today

• Ariana Magee, Ed.D.
  Title IIIA/ESOL PL Specialist, ariana.magee@doe.k12.ga.us
• Amanda Buice
  Science Program Manager, abuice@doe.k12.ga.us
• Keith Crandall
  Science Program Specialist, kcrandall@doe.k12.ga.us
• Renee Shirley-Stevens
  Content Integration SpED/Science Specialist,
  renee.shirley-stevens@doe.k12.ga.us
What is our goal for our students?

We want **all** our students to be successful learners!

Curiosity  Investigate

Obtain  Explanations

Reasoning  Evidence

Evaluate  Communicate

Science practices

Problem solving
Making the Language of the Standard Meaningful

Important words to think about...

• Explain
• Describe
Scale, proportion, and quantity
Stability and change
Cause and Effect
System and system models
Structure and function
Energy and matter
Patterns
Cutting Concepts
Cross
Science & Engineering Practices:

- Asking Questions
- Making ideas public
- Developing and using models
- Helping students deepen their reasoning
- Analyzing and interpreting data
- Marking and/or emphasizing ideas
- Engaging in argument from evidence
- Helping students to apply their thinking to others’ ideas
- Obtaining, evaluating, and communicating information

Student Moves:

- Planning and carrying out investigations
- Using mathematics and computational thinking
- Helping students clarify their thinking
- Constructing explanations
- Helping students to make ideas public

Teacher Moves:
Repeated, Multiple, and Deep

• English learners need:
  o **Repeated** exposure to language
  o **Multiple** experiences that elicit language
  o **Deep** experiences

• **Meaning is not stored language; meaning is stored in experience,** and English learners will build meaning through multiple related experiences. (MacDonald, Cook, & Miller, 2014)
## Science for English Learners

<table>
<thead>
<tr>
<th>A Traditional Approach</th>
<th>A Re-imagined Approach</th>
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<tbody>
<tr>
<td>Vocabulary as a prerequisite:</td>
<td>Language is a product of engaging in science practices – it happens in the context of doing</td>
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<tr>
<td>Pre-teaching and frontloading of vocabulary</td>
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<tr>
<td>Simplify content, simplify language</td>
<td>Keep content, amplify language</td>
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Science for English Learners

How changing one thing makes a difference...

When you think about the traditional approach to science and ELs versus the re-imagined approach—how do you think this empowers our students?

Vocabulary List

- Adaptation
- Camouflage
- Predation
- Mutation
- Natural selection
- Peppered moth
- Survival of the fittest
- Genetic variation
- Population
Think of a Tree

• Imagine your favorite tree, a tree you recently saw, or whatever pops into your head when you hear the word "tree." Think about it in your mind for a bit.

• Now take a minute to grab a piece of paper, a napkin, or a post-it and put that tree on your paper – make your thinking visible.

• How many of you wrote the name of your tree? How many of you drew it?
Looking at a 3-D Lesson

Phenomenon:
What *patterns* do you see on the leaves in the next few slides?

Add the patterns that you notice in the chat box or raise your hand to verbally contribute.
Leaves
Leaves
Leaves
Looking at a 3-D Lesson

• Have students develop two or three questions to help gather evidence for the causes of the top side of a leaf being a different shade of green than the bottom of the leaf.

• There are multiple ways of knowing and showing. Do what is best for you – drawing, speaking, writing, modeling, etc.
**Obtain, Evaluate & Communicate**

- Students *obtain information* from reliable sources for how the *structure* of a leaf *functions* to meet the needs of the plant.
- Rewordify.com
- Google translate

*Some resources are available in the chat. Also, take a minute to try out rewordify on a resource you find.*
Obtain, **Evaluate** & Communicate

• Students *construct an initial explanation (based on experience, readings, and discussions)* in their groups supported by evidence for how the leaf *structure* (darker green on top) is consistent with the *function* of the leaf as part of the plant system.

• Remind students of words/phrases you've read about and discussed.
Obtain, Evaluate & Communicate

Plant Cell

Chloroplast

Photosynthesis

Energy
Looking at a 3-D Lesson

• Now students *refine an explanation* supported by evidence for how the leaf *structure* (darker green on top) is consistent with the *function* of the leaf as part of the plant system.

• Does anyone have a good idea for a sentence frame we could provide for students?

• Leaves are darker green on the side that *faces* the sun because.......
Reflect on the Leaf Activity

Agree or Disagree (GoTo poll)

• It is important for students to have a chance to talk before they write. If students can say something, they will have an easier time writing it.
• Effective science writing is much more likely to occur when students have had interesting experiences and investigations.
• Everyday language to express their ideas can help students concentrate on communicating ideas clearly, even if spelling and grammar aren’t perfect.

Experiences

- La hoja
- La hoja
- La hoja

Meaning is not stored language; meaning is stored experience, and English Learners will build meaning through multiple related experiences. (MacDonald, Cook, & Miller, 2014)
The Power of a Phenomenon

• In elementary and secondary grades, local phenomena promote ELs’ access to science and inclusion in the science classroom by engaging all students, including ELs, to use their everyday experience and everyday language from their homes and communities (Lee and Miller, 2016; Lee et al., in press; Lyon et al., 2016; Tolbert, 2016).

• They offer access to science and inclusion in the science classroom.

• Phenomena engage students in the science content and practices to figure out.

• Phenomena don't have to be phenomenal!
ELP and WIDA Can-Do Descriptors

- WIDA defines students’ development of academic English Language Proficiency (ELP) on a continuum of six levels.
  - ELP is measured yearly on the WIDA Access for ELLs.
  - Students’ overall composite proficiency level (CPL) is derived from four language domain scores: Listening, Speaking, Reading, and Writing.
- Students’ CPL indicates what words, sentences and discourse ELs can use in English.
- WIDA Can Do Descriptors provide examples of what ELs can do at various stages of English language development.
  - Organized by four Key Uses for language: Recount, Explain, Argue, and Discuss.
Supporting EL Students

A Compilation of Strategies for Supporting English Learner Students During Distance Learning

- Provide opportunities for EL students to amplify their voices
- Chunk content
- Collaborate! EL + Science = Learning for ALL!
Additional Resources

- **STEMTeachingTools**: Engaging ELs in the Science & Engineering Practices
- **Word Catcher**
- **Doing and Talking Science**
- **Rewordify**
- **Crosscutting Concepts Sentence Frames**
- **Integrating Language While Teaching STEM**
- **GaDOE Science**
  - [Sentence Frames for Reading, Writing, and Forming Science Knowledge: For Elementary School and ESOL Teachers](#)

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