

Recommendations and Suggestions for Working with Linguistically and Culturally Diverse Students:

A Resource for STEM Teachers Working with English Language Learners (ELLs)

Introduction

Students who are in the process of learning English as a new language are referred to as English language learners or ELLs. According to the U.S. Department of Education, the population of school-age ELLs is growing faster than any other group of students in the United States. Recent reports estimate 10% of all K-12 students are ELLs (Garcia, 2009). It is widely recognized that the academic achievement of ELLs is significantly lower than English proficient students (Gandara & Hopkins, 2010). Given this achievement gap and the projected growth of school-age ELLs, it is imperative for all STEM teacher to be prepared to work with ELLs (Gort, Glenn, & Settlege, 2011). Furthermore, it is the teachers' responsibility to support ELLs so that they can access the STEM content and develop their English language skills.

ELLs are a diverse population with a variety of languages and cultures. The first task of STEM teachers is to become aware of their students' cultural and linguistic backgrounds, so as to understand their students' feelings, attitudes, and behaviors (Peregoy & Boyle, 2008).

Even though ELLs are a diverse group, they do share the common challenge of achieving academic standards while learning English. ELLs need to construct meaning from oral and written language as well as to express complex ideas and information. To achieve this goal, ELLs are expected to learn academic English and to become proficient in the four domains of language: listening; speaking; reading; and writing (WIDA resource guide, 2012).

English Language Development Standards

In order to promote students' English language acquisition and academic achievement, it is recommend that STEM teachers use the World-Class instructional Design and Assessment (WIDA) English Language Development Standards (WIDA, 2012; see wida.us/standards) to differentiate their science lessons for ELLs. The WIDA English Language Development Standards present five standards organized by grade level for ELLs K through grade 12. Standards 2 through 5 address the academic language required for success in four core content areas, including standard 4 which focuses on science content. In addition, these standards are organized by language domain so teachers can balance the integration of listening, speaking, reading, and writing within their teaching practice. WIDA's standards framework shows examples of how language is processed or produced within a particular context through Model Performance Indicators (MPIs). MPIs are meant to be examples and not fixed guidelines of the language with which students may engage during instruction and assessment. MPIs are presented for language proficiency levels 1–5. A strand of MPIs help teachers differentiate instruction and

assessment as ELLs progress from one level of language proficiency to the next. Below is a one example of a strand of MPIs for 8th grade students discussion of forms of energy (WIDA, 2012).

ELD STANDARD 4: The Language of Science **EXAMPLE TOPIC: Forms of energy**

CONNECTION: *Next Generation Science Standards, May 2012 Draft, Energy b–d (Middle School):* Use representations of potential energy to construct an explanation of how much energy an object has when it’s in different positions in an electrical, gravitational, and magnetic field. Plan and carry out investigations to show that in some chemical reactions energy is released or absorbed. Use and/or construct models to communicate the means by which thermal energy is transferred during conduction, convection, and radiation.

EXAMPLE CONTEXT FOR LANGUAGE USE: Students decide with peers the types of energy transfers that occur in various situations from everyday life (e.g., glow sticks, thunderstorms, simple engines) to demonstrate the conservation of energy.

COGNITIVE FUNCTION: Students at all levels of English language proficiency will ANALYZE energy transfer.						
SPEAKING	Level 1 Entering	Level 2 Emerging	Level 3 Developing	Level 4 Expanding	Level 5 Bridging	Level 6 – Reaching
	State how energy transfers using visual supports (e.g., “heat,” “light,” “sound”)	Give examples of how energy transfers using sentence frames and graphic supports	Describe how energy transfers using sentence frames and graphic supports	Compare and contrast how energy transfers using graphic supports	Discuss how energy transfers using graphic supports	
TOPIC-RELATED LANGUAGE: Students at all levels of English language proficiency interact with grade-level words and expressions, such as: energy transfer, conservation of energy, sound wave, kinetic energy, potential energy, thermal energy						

The third element of the MPI is the instructional support. It is always listed at the end of the MPI and illustrates the importance of scaffolding language development for ELLs (WIDA, 2012). In the above example, the support is “using visual and graphic supports.” WIDA categorizes supports as sensory, graphic, or interactive, with some examples of each below (WIDA, 2012).

Sensory Supports	Graphic Supports	Interactive Supports
Real-life objects (realia)	Charts	In pairs or partners
Manipulatives	Graphic organizers	In triads or small groups
Pictures & photographs	Tables	In a whole group
Illustrations, diagrams, & drawings	Graphs	Using cooperative group structures
Magazines & newspapers	Timelines	With the Internet (websites) or software programs
Physical activities	Number lines	In the native language (L1)
Videos & films		With mentors
Broadcasts		
Models & figures		

Educators are encouraged to modify or transform existing strands of MPIs to make them more relevant to their local curriculum or classroom instruction. The WIDA standards are not intended to replace a school district's content area standards. Instead, they show teachers how to address the needs of ELLs to help them access content concepts and skills (Peregoy & Boyle, 2008).

Sheltered Instruction

Sheltered instruction is an effective approach to “teach content to ELLs in strategic ways that make the concepts comprehensible while promoting the students’ academic English language development” (Short & Echevarria, 2005, p. 10). The Sheltered Instruction Observation Protocol or SIOP model is a lesson planning and delivery approach that incorporates 30 strategies for sheltered instruction to support ELLs academic achievement and English language development. The following checklist depicts the SIOP Model components so you can begin to envision how these strategies support language development and positive social adjustment of ELLs. In this planning sheet, L1 refers to the student’s original language.

SIOP LESSON PLANNING SHEET

Name: _____ Date: _____ Assignment: _____

Lesson Preparation

- 1. Write **content objectives** clearly for students.
- 2. Write **language objectives** clearly for students.
- 3. Choose **content concepts appropriate** for age and educational background level of students.
- 4. Identify **supplementary materials** to use (graphs, models, visuals).
- 5. **Adapt content** (e.g., text, assignment) to all levels of student proficiency.
- 6. Plan **meaningful activities** that integrate lesson concepts (e.g., surveys, letter writing, simulations, constructing models) with language practice opportunities for reading, writing, listening, and/or speaking.

Building Background

- 7. **Explicitly link concepts** to students’ backgrounds and experiences.
- 8. **Explicitly link past learning** and new concepts.
- 9. **Emphasize key vocabulary** (e.g., introduce, write, repeat, and highlight) for students.

Comprehensible Input

- 10. Use **speech** appropriate for students’ proficiency level (e.g., slower rate, enunciation, and simple sentence structure for beginners).
- 11. **Explain academic tasks** clearly.
- 12. Use a **variety of techniques** to make content concepts clear (e.g., modeling, visuals, hands-on activities, demonstrations, gestures, body language).

Strategies

- 13. Provide ample opportunities for students to use **strategies**, (e.g., problem solving, predicting, organizing, summarizing, categorizing, evaluating, self-monitoring).
- 14. Use **scaffolding techniques** consistently (providing the right amount of support to move students from one level of understanding to a higher level) throughout lesson.
- 15. Use a variety of **question types including those that promote higher-order thinking** skills throughout the lesson

literal, analytical, and interpretive questions).

Interaction

- 16. Provide frequent **opportunities for interactions** and discussion between teacher/student and among students, and encourage elaborated responses.
- 17. Use **group configurations** that support language and content objectives of the lesson.
- 18. Provide sufficient **wait time for student responses** consistently.
- 19. Give ample opportunities for **students to clarify key concepts in L1** as needed with aide, peer, or L1 text.

Practice/Application

- 20. Provide **hands-on materials** and/or manipulatives for students to practice using new content knowledge.
- 21. Provide activities for students to **apply content and language knowledge** in the classroom.
- 22. Provide activities that **integrate all language skills** (i.e., reading, writing, listening, and speaking).

Lesson Delivery

- 23. **Support content objectives** clearly.
- 24. **Support language objectives** clearly.
- 25. **Engage students** approximately 90-100% of the period (most students taking part and on task throughout the lesson).
- 26. **Pace** the lesson appropriately to the students' ability level.

Review/Assessment

- 27. Give a comprehensive **review of key vocabulary**.
- 28. Give a comprehensive **review of key content concepts**.
- 29. Provide **feedback** to students regularly on their output (e.g., language, content, work).
- 30. Conduct **assessments** of student comprehension and learning throughout lesson on all lesson objectives (e.g., spot checking, group response.)

Comments:

Conclusion

Students who are in the process of learning English as a new language require instruction that scaffolds their learning so that they can access the STEM content. When STEM teachers differentiate instruction for language using the WIDA English Language Development Standards and/or sheltered instruction ELLs will have more success in the classroom.

References

- Gandara, P., & Hopkins, M. (2010). The changing linguistic landscape of the United States. In P. Gandara & M. Hopkins (Eds.) *Forbidden language: English learners and restrictive language policies* (pp. 7-19). New York, NY: Teachers College Press.
- Garcia, E.E., Jensen, B.T., & Scribner, K.P. (2009). The demographic imperative. *Educational Leadership*, 8-13.

Gort, M., Glenn, W.J., & Settlage, J. (2011). Toward culturally and linguistically responsive teacher education. In T. Lucas (Ed.) *Teacher preparation for linguistically diverse classrooms: a resource for teacher educators* (pp. 178-194). New York, NY: Routledge.

Peregoy, S.F., & Boyle, O.F. (2008). *Reading, writing, and learning in ESL*. New York, NY: Pearson.

Short, D., & Echevarria, J. (2005). Teacher skills to support English language learners. *Educational Leadership*, 8-13.

WIDA Consortium. (2012). *WIDA's 2012 Amplification of the English Language Development Standards, Kindergarten–Grade 12*.