

## English Language Development Strategies in Science

1. **Group Work.** This could be through partners or cooperative groups. Group work provides frequent opportunities for students to communicate, to share observations and insights, test hypotheses, and jointly construct knowledge. In this method, students of different linguistic and educational backgrounds and different skill levels work together on a common task for a common goal in either the language or the content classroom. Depending on their language proficiency, students can be assigned various roles as facilitator, recorder, reporter, or illustrator. The teacher might consider heterogeneously grouping by language for some activities: students can learn both science and English from their peers. Group reports can be helpful as this provides frequent restating and expansion of important concepts.
2. **Use of Graphic Organizers.** Graphic organizers are an instructional tool that visually organizes and presents information so that it can be understood, remembered, and applied. Graphs, concept maps, concept webs, KWL charts, tables, maps, flow charts, timelines, and Venn diagrams are used to help students place information in a comprehensible context and make connections between existing knowledge and new concepts to be learned. They enable students to organize information obtained from written or oral texts, develop reading strategies, increase retention, activate schema as a pre-reading or pre-listening activity, and organize ideas during the prewriting stage.
3. **Activation of Prior Knowledge.** Connect learning objectives to the students' background experiences and knowledge. Students can be expected to share their prior knowledge through short verbal responses or by making a nonverbal choice from pictures or realia. This can be done by simply asking students what they already know about a subject. It can also be done through primary language discussions, creating visuals like 'semantic webs', language experience stories, or free-writing on a topic. The key is to engage students in making connections between what they are learning in class and their own interests and experiences.
4. **Use of Academic Language Scaffolding.** Language Scaffolding is a step-by-step process of building students' ability to complete tasks on their own. Students identify science vocabulary by participating in an introductory activity. Scaffolding consists of several strategies used in conjunction to "shelter" curriculum content for ELLs. These strategies include modeling the use of academic or technical language; contextualizing academic or technical language through the use of visuals, gestures, graphic organizers, and demonstrations; and using hands-on learning activities that involve the use of academic or technical language.

5. **Context Clues through Visual Scaffolding.** The teacher uses concurrent verbal explanation and physical demonstration of directions or concepts by using gestures, visuals, and demonstrations while giving directions. Gestures or actions in addition to graphs, visuals and other props can be used to communicate meanings. The teacher can display drawings or photographs while giving directions or to use as non-linguistic representation of science concepts. Students can respond by physically acting out or visually modeling their responses using gestures or realia.
6. **Realia, Manipulatives, and Materials.** Science lessons for ELL students should include activity-based lessons with all students having hands on access to materials. Using concrete objects in the classroom creates cognitive connections with vocabulary, stimulates conversation, and builds background knowledge. The use of realia gives students the opportunity to use all of their senses to learn about a subject. Laboratory equipment, measurement tools, rocks, plants, or any real object that relates to the language objective of a lesson can be used as realia. When real objects are not available, photographs, illustrations, and artwork make effective substitutes for realia.
7. **Task-based or Experiential Learning.** This provides appropriate contexts for developing thinking and study skills as well as language and academic concepts for students of different levels of language proficiency. Students learn by carrying out specific tasks or projects: for example, "doing science" and not just reading about it.
8. **Leveled Questions.** The teacher adapts the level of questions asked to the English Learners' language acquisition stage. Alternatively, the teacher can differentiate student responses, based on language proficiency.
9. **Multiple Intelligence Strategies.** The teacher employs instructional techniques that address the multiple intelligences present in each student. Teachers use a myriad of multiple instructional strategies to target the varied intelligences of English Learners. This method allows the student to actively use his own personal strengths in order to gain confidence in his abilities.
10. **Assessing All Students' Performance and Understanding:** Teachers should observe students in the process of accomplishing academic tasks; a form of authentic assessment. Student use of materials can be one indicator of involvement and understanding. When questioning, teachers need to be sure to provide adequate wait time and give students the option of responding through nonverbal signals. Teachers should give serious consideration to performance-based assessments for formal evaluation. They might also consider accepting drawings and primary language as indicators of learning within a science journal.