



Science & Technology

Small Organisms in Deep Sea Rocks Eat Methane

Lesson Plan

by Jill Robbins, Ph.D.

Level: Intermediate

Introduction

This lesson plan is to accompany the VOA Learning English **Science & Technology** article, *Small Organisms in Deep Sea Rocks Eat Methane*.

Depending on the length of the class period, this lesson may cover more than one session. The approach used in this lesson is based on the CALLA approach. See the end of the lesson for more information and resources on teaching with the CALLA approach.

Lesson Elements

Prepare

Present

Practice

Self-Evaluate

Expand

Prepare

Find out how much students know about the topic of “greenhouse gases” by asking questions such as:

- *What are the gases that trap heat from the sun?*
- *How can we reduce these gases?*

Lead a discussion on the topic. Then, make sure students know the key vocabulary words from this story. Try having students quiz each other on the words.

Vocabulary

gas – *n.* any substance that is not solid or liquid

byproduct – *n.* a secondary product made in the manufacture of something else

atmosphere – *n.* the gases surrounding any star or planet

trap – *v.* to catch or be caught by being tricked; to be unable to move or escape

deep – *adj.* going far down; a long way from top to bottom

Images Supporting the Article

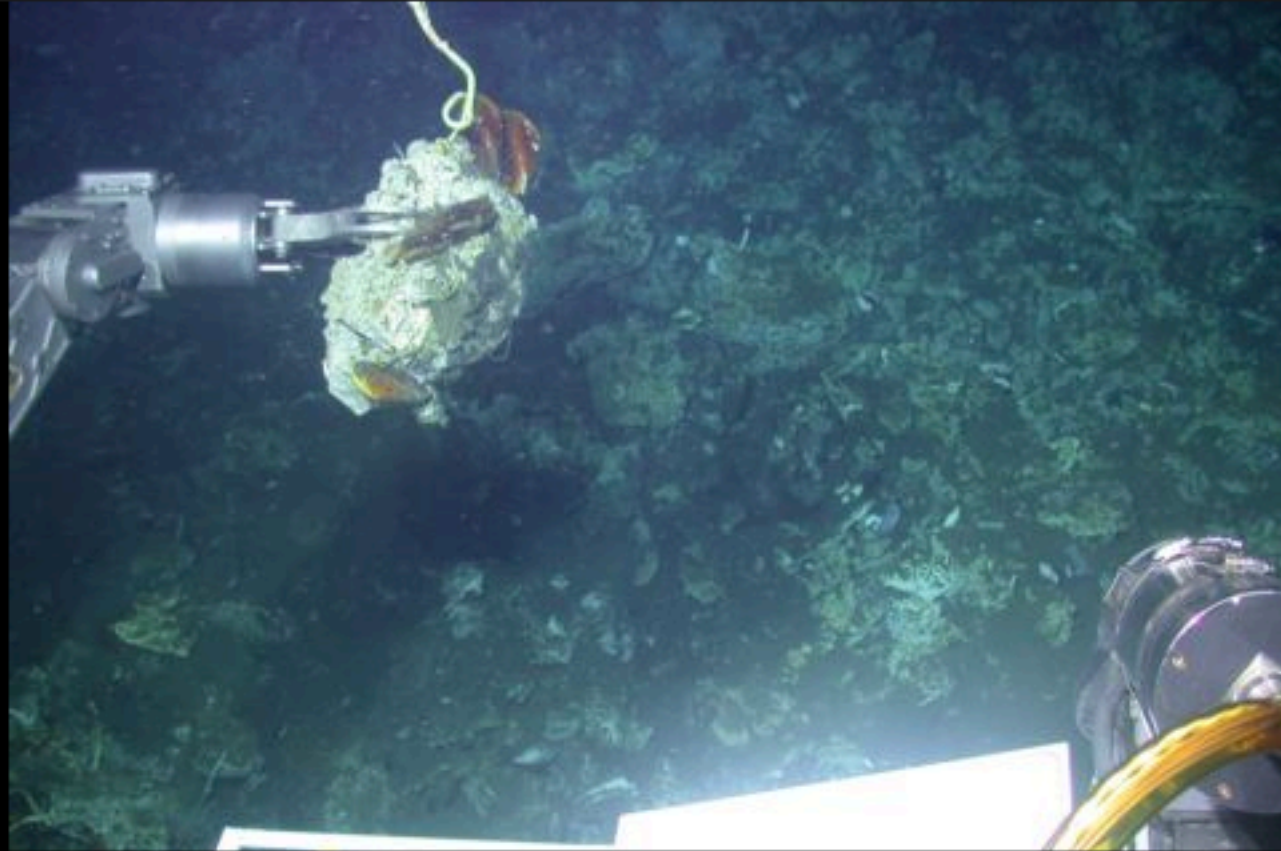
- Show the following images to help students understand the terms used in the article.

Methane vent: (also called a seep) place on the ocean floor where methane gas escapes from under the earth.



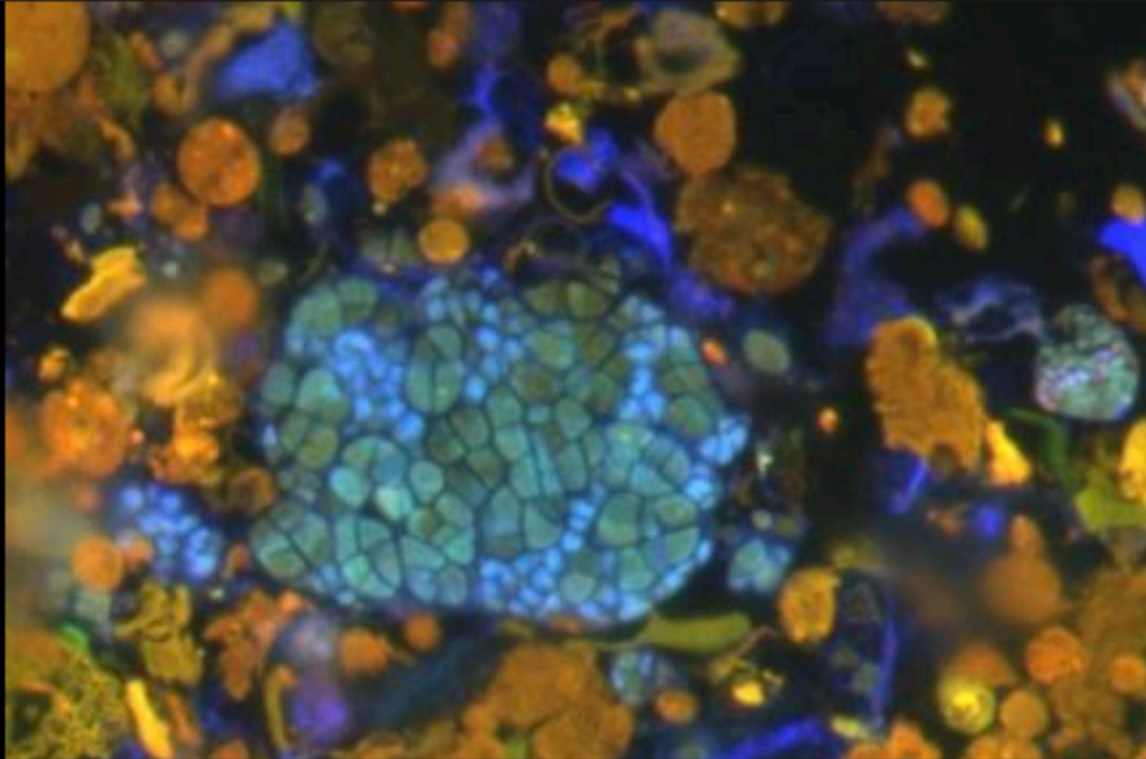
Mussels nestled within exposed carbonate mound in an active methane seep. Costa Rica Margin, 1,000 meter water depth. (V. Orphan)

Carbonate: rock formed by small organisms that eat methane



Using the manipulator arm of the submersible Alvin to collect carbonate and associated animals from an active methane seep off the coast of Costa Rica. (L. Levin, SIO)

Microorganisms: small living things



Microscopic image of methane-oxidizing microbes recovered from deep-sea methane seep sediments. Methane-oxidizing Archaea are stained with DNA probe in green, associated symbiotic bacteria are stained in blue. The orange-yellow materials are sediment particles. (S. McGlynn, Caltech)

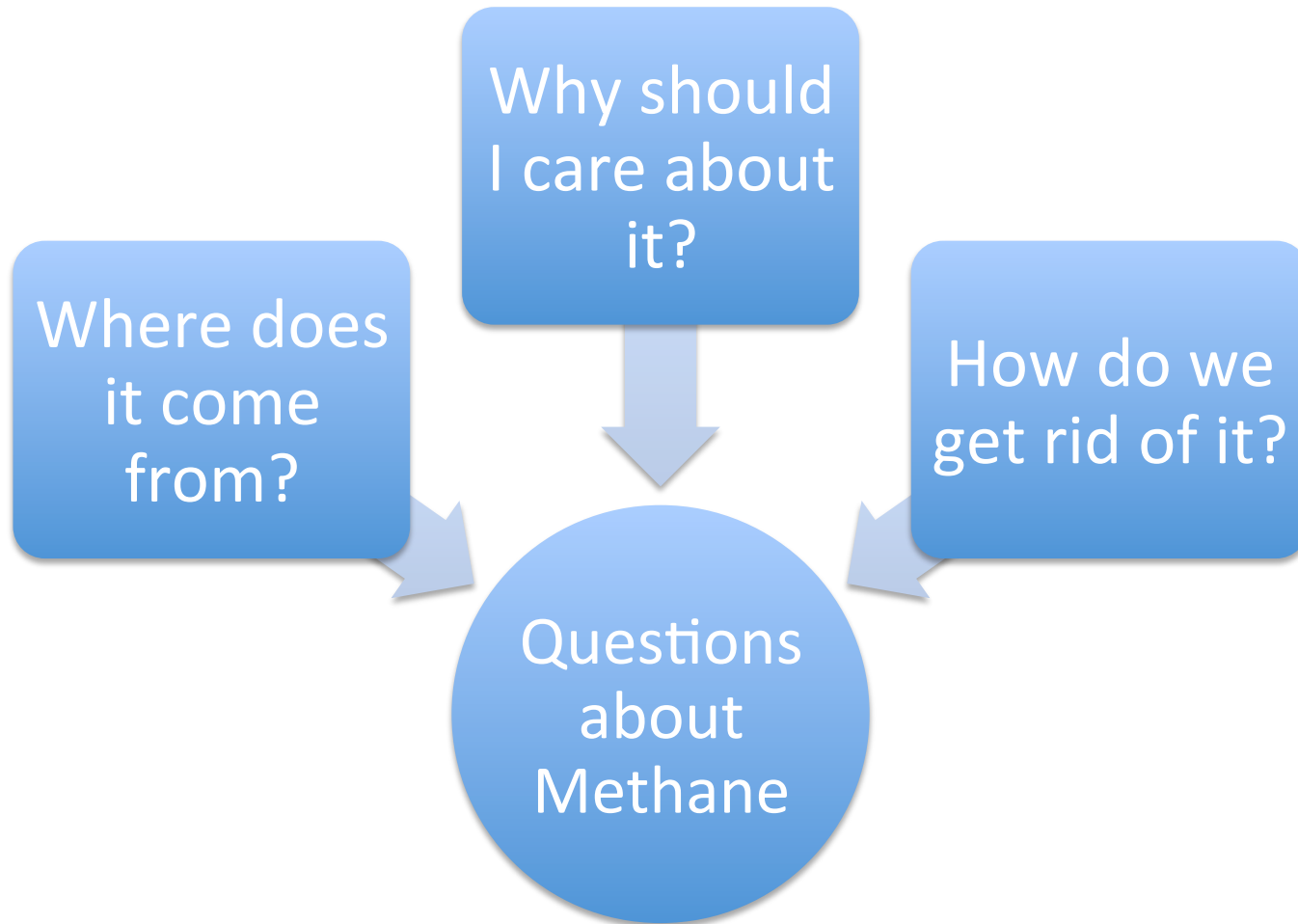
Present

Explain “Today we’re going to **create a graphic organizer** to help us understand a science article. This strategy helps by giving us a visual explanation of what we learn while reading or listening. A **graphic organizer** can be a word web, a circle diagram, a flow chart, or some other picture that helps you understand. Let’s see how **making a graphic organizer** can help us.”

Pass out sheets of paper with a blank web or ask students to take out their notebooks and draw one as seen on the next slide.

“Let’s start by writing the word ‘Questions about Methane’ in a circle in the middle of the page. Make three boxes around it and label these: Where does it come from? Why should I care about it? & How do we get rid of it?”

Idea Web



Say, “Let’s read the first part of the article. As we read, I’m going to pay attention to the information I need to fill in my web.”

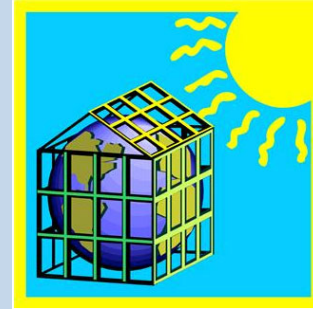
Play the article or read aloud to “They prevent heat from escaping into outer space.”

Say, “I learned that methane is a greenhouse gas. I already know that these gases make the earth hotter, and cause global warming, or climate change. I think we all are worried about this. [If a local event such as flooding or severe weather has recently occurred, mention it as a reason to care about greenhouse gases.] If you like, you can add a little picture to help you see the reason at a glance on your idea web.”

Show the next slide or draw the web on the board.

Idea Web

Why should I care about it? Methane adds to greenhouse gases in earth's atmosphere.



Where does it come from?

How do we get rid of it?

Questions about Methane

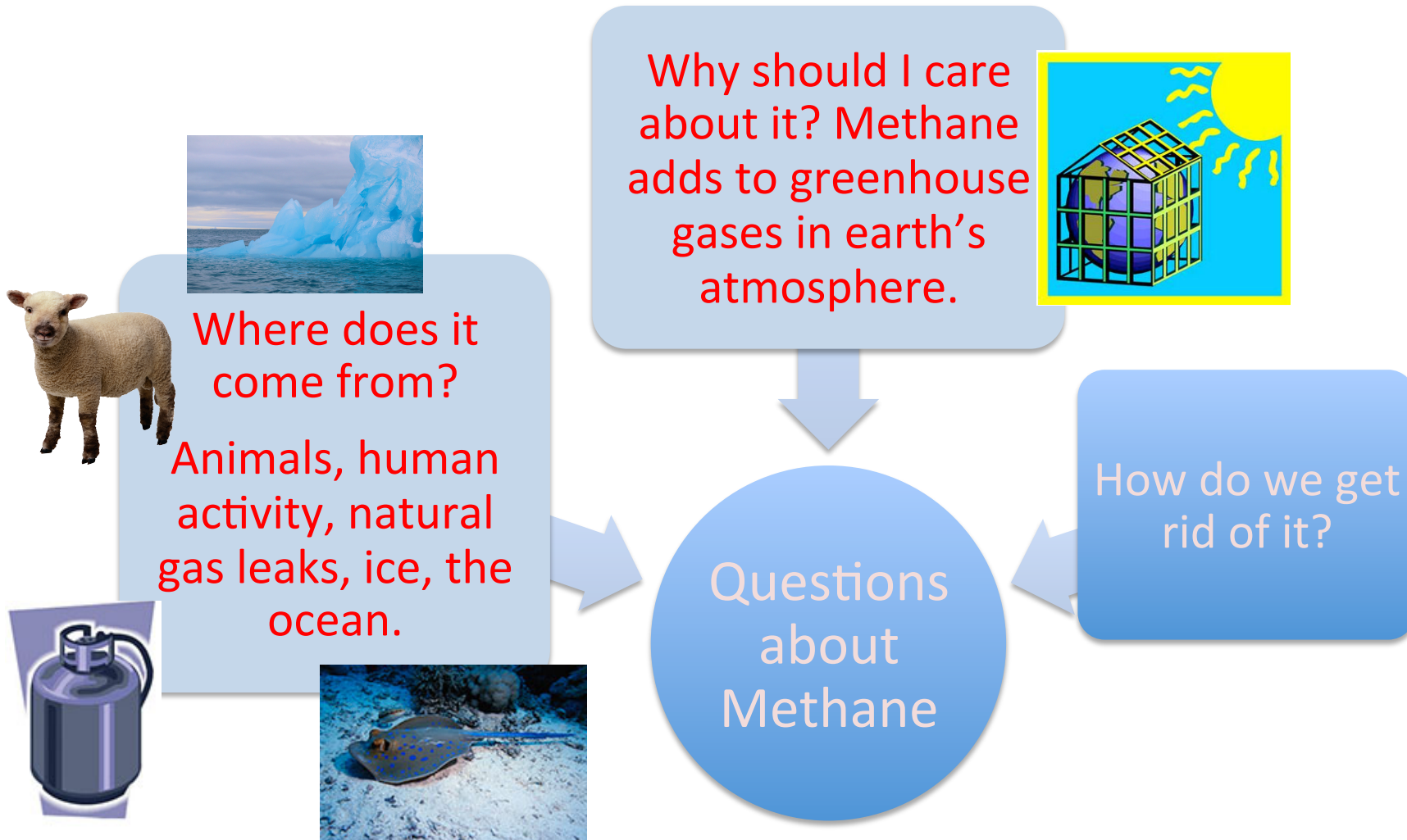
Practice

Say, “Now it’s your turn. Let’s read the next section. When you find an answer to one of our questions, write it on your paper.”

Play the story to “It can be found in ice, but also rises from deep within the earth through small cracks, or holes, in the ocean floor.”

Next, ask students to write any answers to their questions on the idea web. Have one or two share what they wrote. If the student has drawn something, ask them to draw it on the board or show a drawing on their paper. The next slide shows possible images.

Idea Web



Praise students, “Great. Now we’ll read the rest of the story. It’s a little long. So focus on finding the answer to your last question, so we can complete our idea web.”

Play to the end of the story.

Next, ask students to write the answers they found to the question, How can we get rid of it? Have one or two share what they wrote or drew. Add it to your on-screen chart or the classroom board.

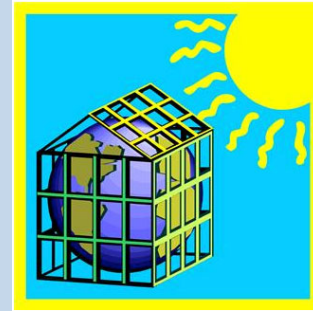


Where does it come from?

Animals, human activity, natural gas leaks, ice, the ocean.

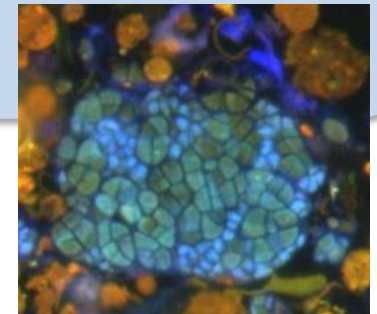


Why should I care about it? Methane adds to greenhouse gases in earth's atmosphere.



How do we get rid of it?

Small organisms that live in rocks attack the gas; crabs, worms, other creatures eat it.



What I know about Methane

Self-Evaluation

Explain to students: “**Creating a graphic organizer** can help us in many ways. How did it work for you? Let’s see if it helps you to summarize the main ideas of the article. ”

Have students turn to a neighbor, and use the **graphic organizer to** summarize the article. When each student has practiced summarizing with a partner, ask a few students to summarize for the class. Ask the class to tell if the organizer helped.

Expand

Wrap up the lesson by asking students to think of other times they can **create a graphic organizer** to understand and remember information.

Possible answers are ‘listening to a lecture, getting instructions, or studying for an examination.’

Encourage students to go home and **create a graphic organizer** with a homework assignment or material being learned in their next class.

More Resources

Graphic organizers are easy to find on the web. Here are a few links for getting ideas:

<http://www.eduplace.com/graphicorganizer/>

<http://my.hrw.com/nsmedia/intgos/html/igo.htm>

You can use the 'Smart Art' graphics in Microsoft Word or PowerPoint to create a graphic.

About the CALLA Approach

The Cognitive Academic Language Learning Approach (CALLA) is an instructional model for second and foreign language learners based on cognitive theory and research.





CALLA integrates instruction in priority topics from the content curriculum, development of the language skills needed for learning in school, and explicit instruction in using learning strategies for academic tasks.

The goals of CALLA are for students to learn essential academic content and language and to become independent and self-regulated learners through their increasing command over a variety of strategies for learning in school. CALLA can be used in ESL, EFL, bilingual, foreign language, and general education classrooms.





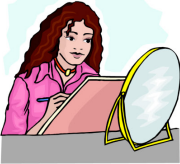
CALLA was developed by Anna Uhl Chamot and J. Michael O'Malley, and is being implemented in approximately 30 school districts in the United States as well as in several other countries.

Below is an illustrated list of language learning strategies.







Metacognitive Strategies

CALLA CONTENT AND LANGUAGE LEARNING STRATEGIES		
STRATEGY	DESCRIPTION	
METACOGNITIVE STRATEGIES		
Plan / Organize	 Planner	Before beginning a task: -Set goals. -Plan the task or content sequence. -Plan how to accomplish the task (choose strategies). -Preview a text.
Monitor / Identify Problems	 Check	While working on a task: -Check your progress on the task. -Check your comprehension as you use the language. Do you understand? If not, what is the problem? -Check your production as you use the language. Are you making sense? If not, what is the problem?
Evaluate	 I did it!	After completing a task: -Assess how well you have accomplished the learning task. -Assess how well you have used learning strategies. -Decide how effective the strategies were. -Identify changes you will make the next time you have a similar task to do.
Manage Your Own Learning	 Pace Yourself	-Determine how you learn best. -Arrange conditions that help you learn. -Seek opportunities for practice. -Focus your attention on the task.


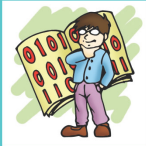
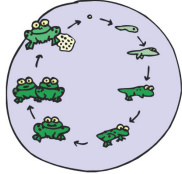
Task-Based Strategies

CALLA CONTENT AND LANGUAGE LEARNING STRATEGIES		
STRATEGY	DESCRIPTION	
TASK-BASED STRATEGIES		
		
Use Background Knowledge	 I know.	<ul style="list-style-type: none"> -Think about and use what you already know to help you do the task. - Make associations between new information and your prior knowledge. -Use new information to clarify or modify your prior knowledge.
Make Inferences	 Use Clues	<ul style="list-style-type: none"> -Use context and what you know to figure out meaning. -Read and listen between the lines. -Go beyond the text to understand its meaning.
Make Predictions	 Crystal Ball	<ul style="list-style-type: none"> -Anticipate information to come. -Make logical guesses about what will happen in a written or oral text. -Make an estimate (math). -Make a hypothesis (science).
Personalize	 Me	<ul style="list-style-type: none"> -Relate new concepts to your own life, to your experiences, knowledge, beliefs and feelings.

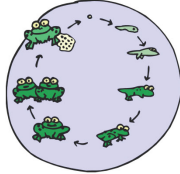
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CALLA CONTENT AND LANGUAGE LEARNING STRATEGIES		
STRATEGY	DESCRIPTION	
TASK-BASED STRATEGIES		
Transfer / Use Cognates	 Coffee/Café	<ul style="list-style-type: none"> -Apply your linguistic knowledge of other languages (including your native language) to the target language. -Recognize cognates.
Substitute / Paraphrase	 Make it work	<ul style="list-style-type: none"> -Use a synonym or descriptive phrase for unknown words or expressions.
  USE YOUR SENSES		
Use Images	 See it in your mind	<ul style="list-style-type: none"> -Use or create an actual or mental image to understand and/or represent information. -Use or draw a picture or diagram.
Use Sounds	 Sound Out	<ul style="list-style-type: none"> -Say or read aloud a word, sentence, or paragraph to help your understanding. -Sound out/vocalize. - Use your "mental tape recorder" to remember sounds, words, phrases, and/or conversations.


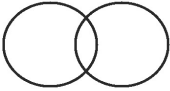


Task-Based Strategies

CALLA CONTENT AND LANGUAGE LEARNING STRATEGIES		
STRATEGY		DESCRIPTION
TASK-BASED STRATEGIES		
Use Your Kinesthetic Sense		<ul style="list-style-type: none"> --Act out a role, for example, in Readers' Theater, or imagine yourself in different roles in the target language. -Use real objects to help you remember words, sentences, or content information.
  USE YOUR ORGANIZATIONAL SKILLS		
Find/Apply Patterns	 abacus	<ul style="list-style-type: none"> -Apply a rule. -Make a rule. -Recognize and apply letter/sound, grammar, discourse, or register rules. -Identify patterns in literature (genre). -Identify patterns in math, science, and social studies.
Classify/Sequence	 Life cycle	<ul style="list-style-type: none"> -Categorize words or ideas according to attributes. -Classify living things; identify natural cycles. -Identify order and sequences in math, science, and social studies. -Sequence events in history.





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Task-Based Strategies

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TASK-BASED STRATEGIES		
Take Notes	 <p>PDA</p>	<ul style="list-style-type: none"> -Write down important words and ideas while listening or reading. -List ideas or words to include in speaking or writing..
Use Graphic Organizers	 <p>A Venn diagram</p>	<ul style="list-style-type: none"> -Use or create visual representations (such as Venn diagrams, time lines, webs, and charts) of important relationships between concepts.
Summarize	 <p>Main Idea</p>	<ul style="list-style-type: none"> -Create a mental, oral, or written summary of information.
Use Selective Attention	 <p>Focus</p>	<ul style="list-style-type: none"> -Focus on specific information, structures, key words, phrases, or ideas.

Task-Based Strategies

CALLA CONTENT AND LANGUAGE LEARNING STRATEGIES		
STRATEGY	DESCRIPTION	
TASK-BASED STRATEGIES		
 		
USE A VARIETY OF RESOURCES		
Access Information Sources	 <p>Look it up!</p>	<ul style="list-style-type: none"> -Use the dictionary, the internet, and other reference materials. -Seek out and use sources of information. -Follow a model -Ask questions
Cooperate	 <p>Together</p>	<ul style="list-style-type: none"> -Work with others to complete tasks, build confidence, and give and receive feedback.
Talk Yourself Through It (Self-Talk)	 <p>I can do it!</p>	<ul style="list-style-type: none"> - Use your inner resources. Reduce your anxiety by reminding yourself of your progress, the resources you have available, and your goals.