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Learning science In English

Brighter Thinking
Better Learning

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With

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Language

Talk

- Use open ended questions to extend students' thinking (How? / Why?)
- Comment on students' responses, but generate dialogue by asking other students to comment on them.
- Use group work, but give students clear roles, expectations and responsibilities, so everyone has a purpose and the group has a purpose.
- Use a concept cartoon to encourage classroom dialogue.
- Give students thinking time after asking a question
- Give praise to students for contributing to discussion
- Pair talk; two to four; listening triads; envoys; snowball; rainbow; jigsaw; spokesperson

Language

Reading

- Complete missing text, labels in diagrams, or read text to complete a table
- Sequence or classify pieces of text into categories (instructions, events in a scientific process, organs into different organ systems)
- Matching key words to definitions
- Predicting how sentences should end by completing the second half of a sentence
- Labelling part of a text (e.g. each force), highlighting key words, breaking text down into segments
- Answer questions about a piece of text; condense a text into key points; convert text into a flow chart, concept map, branching diagram; create questions form a mark scheme

Language

Writing

- Writing to learn
  - Answering questions
  - Preparing a summary
  - Writing questions for an end-of-unit quiz
- Writing to reason
  - Analyse and criticise evidence
  - Synthesise and evaluate ideas
- Writing to communicate
  - Encourage alternative tasks, including poems, storyboards, concept maps, cartoons, letters, newspaper articles etc.

Key Challenges for students

Language

- Students with English as an additional language will have challenges which Sally will talk about
- Learning scientific words is the equivalent of learning vocabulary in a foreign language.
- Some everyday words can have very different meanings in science (e.g. energy, work and power)
- Students can find everyday words difficult to use in science contexts (e.g. random, linear, abundant)
- Logical connectives are used a lot to justify scientific claims, but students find them difficult (addition (and); opposition (otherwise) cause (because), time (after)
- Science communication is multi-modal – graphs, formulae, diagrams
- Students may not understand command words

General challenges faced by learning science in English as an additional language

- anxiety of communicating in an additional language
- learners need more time to process information and instructions
- technical and academic vocabulary
- words differ in meaning depending on context
- insufficient structures to communicate ideas
- directions are often multistep
- too many concepts explained on a science text page
- visuals may be complex and difficult to understand
- complex sentence structure and the passive voice used in texts

Challenges in reading

Difficulty in understanding inferred meaning, for example:
wet hair, lather, rinse, repeat. (Instructions on a shampoo bottle)

We know that we don’t need to wet hair again on the second wash, and we know that we do not repeat indefinitely, but that we repeat just once.

Challenges learners face when reading in English:

- density of unfamiliar vocabulary
- grammar usage especially the "exceptions to the rules"
- word order, sentence structure and syntax.

Examples of challenges - key words in questions

A biologist keeps a potted plant in a laboratory.

Which feature of the potted plant shows that it is a living organism?

A It grows larger over time.

B It has green leaves.

C The compost in the pot dries after he waters it.

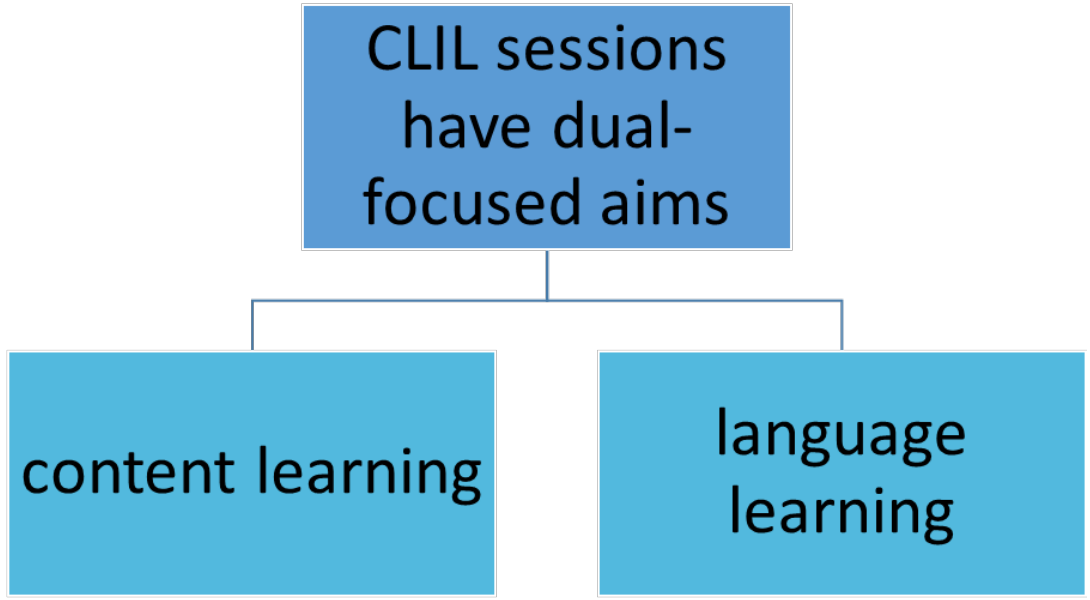
D The stems contain xylem.

Suggested approaches

BICS – basic interpersonal communication skills

CALP – cognitive / academic language proficiency

CLIL - Content and Language Integrated Learning



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Suggested approaches

Think about the following areas.

- What advance preparation is necessary?
- What teaching techniques best serve additional language learners?
- What learning strategies do ESL learners need to develop?
- How can teachers accurately monitor learners' English comprehension?
- How can a classroom be more effectively organised for content instruction?
- How can teachers design assessment for ESL learners?

Suggested approaches

- Directly teach learning strategies.
- Demonstrate how to select the main idea and supporting details, and how to sequence and summarise.
- Encourage techniques such as marking essential concepts and vocabulary with a highlighter, labelling diagrams, using word banks, and organising information on various types of graphic organisers.
- Active learning rather than passive recipients of information to be memorised.

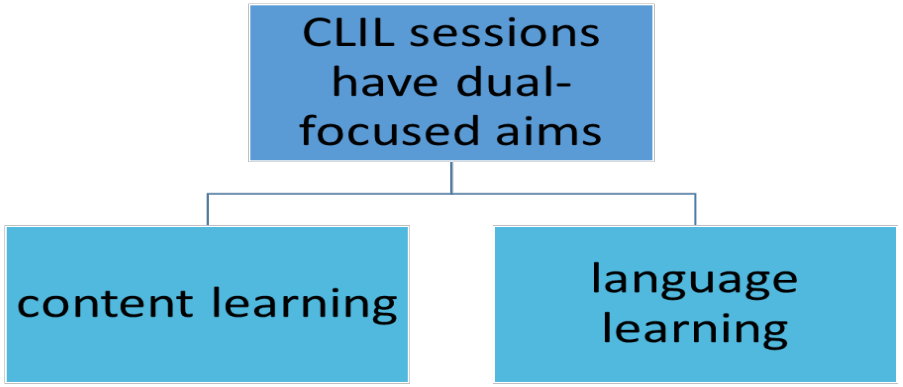
Planning

When you teach science in English, planning is key! Ask yourself:

- What science topic am I covering?
- What English words and structures will my learners need to use?

This is where CLIL is so important.

CLIL is: "**C**ontent and **L**anguage **I**ntegrated **L**earning." And this is what it looks like:



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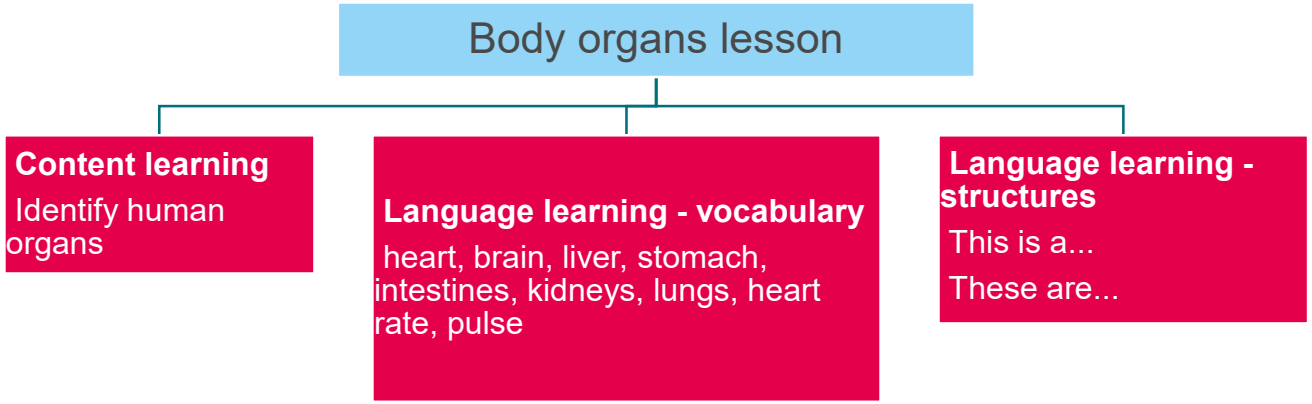
Learning objective:

"Use scientific names for some major organs of body systems."

Example CLIL lesson content:



Vocabulary

Learners need to know what key words mean and how to use them in science

Here are some key strategies to use when helping students learn science vocabulary in English:

- learn words in context
- present words visually
- play games with science words

Learning words in context

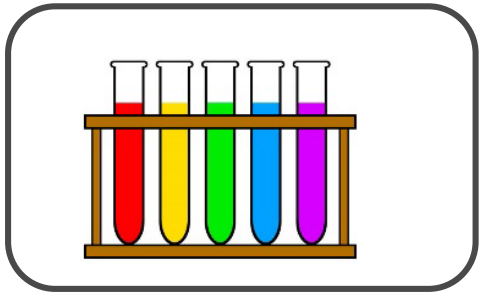
Example task:

- Using a list of human organ words, give learners a short text to read and ask them to highlight the key words (learners see the key words in context).

Presenting words visually

- Link words to pictures or visuals to help learners to remember and understand words.
- Make flashcards with words and pictures separately (learners can make the flashcards too).
- Hold the picture up and ask, “What is this?” or get your learners to match the word cards to the picture cards.
- Build up to using the picture cards as prompts for learners to write the word in sentences.

Here is an example:



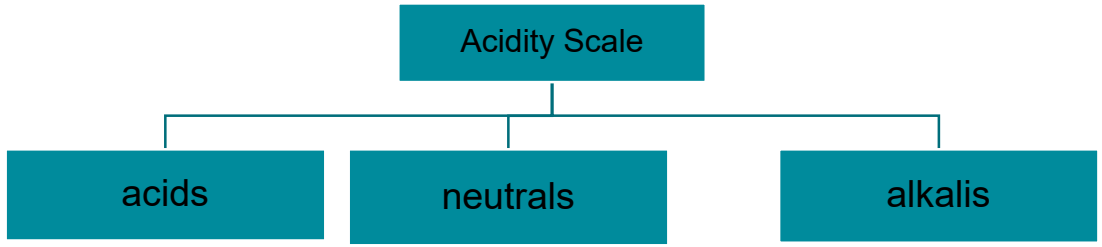
Test tubes

Flash-cards

There are many ready-made resources and flashcards on the internet that you could use. I would also recommend:

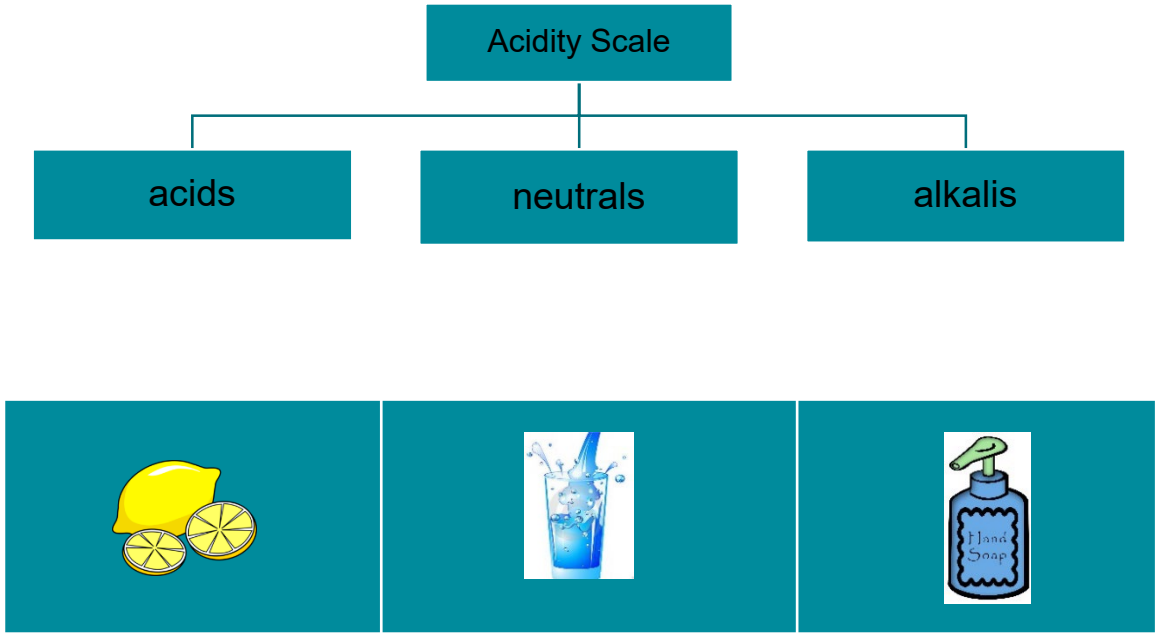
- labelling all equipment in your classroom
- displaying science posters (in English)
- encouraging learners to use graphic organisers

Below is an example of a graphic organiser. They are visual and it helps learners to group things together.



Graphic Organiser

Below is an example of a graphic organiser. They are visual and it helps learners to group things together.



Playing games with science words

There are many games you can play with science words. You can use the games as an introduction or revision, use them before the class as exposure to vocabulary in preparation for the next class (flipped classroom) or as homework. The word games can all be extended to lead into writing sentences or discussions about topics or vocabulary.

Here are a few ideas:

- quizzes
- crosswords
- word searches
- taboo
- bingo
- jeopardy

Other useful vocabulary activities

Learners need help with task instructions and key words used in test questions. It is important that learners know what these instruction words mean so that they can answer questions appropriately.

Useful phrases for common instructions are:

- Predict - I think that…
- Explain - how or why something happens
- Describe - this may involve describing the colour, temperature, shape etc.
- Suggest - You should…….

Common task instructions include:

- Question and answer
- Draw a circle
- Tick the box
- Complete the sentence

General Question Words

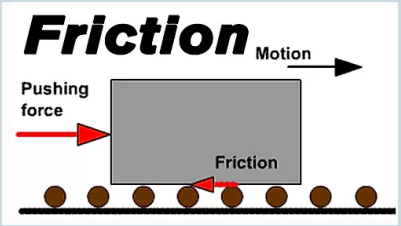
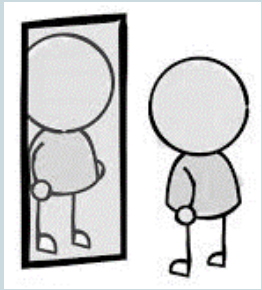
Also, help learners with general question words:

- What - (information about object)
- Which - (the same as “what” but when you have a smaller group to choose from).
- Where - (information about place)
- Why - (the reason for something happening)

Science Dictionary

- Encourage your learners to keep a personal science dictionary, including the key words from the lesson and any other new words they discover and want to record

Science Dictionary

Word	Pronunciation	Picture	In my language
friction	frik-shen		
magnetic	mag-net-ik		
reflect	re-fle-kt		

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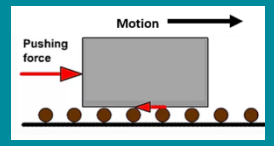
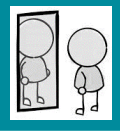
Repetition

It is important for learners to use the words repeatedly if they are really going to learn them. The table below gives learners this opportunity and is also useful for you to check if they can use the words accurately and have understood the meaning well.

Word	Write a sentence
	
	
	

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