

STEM that changed Ireland

Lesson at a glance

Open by holding up two paper cups and string and posing the problem: send a spoken message across the table with no lip-reading. Groups talk ideas first, then build and improve a cup-and-string set-up, changing one thing at a time. Three groups show a live working set-up; land the tight-path idea, then pupils record problem, tries and the idea that worked in the Investigation Journal. Close with Marconi at Clifden and one group I-wonder slip on the class board.

Learning objectives

- Solve a simple engineering problem with limited kit and explain the idea that worked
- Connect the challenge to a real STEM breakthrough and how it changed everyday life in Ireland
- Pose a genuine I wonder question for the year's living-things and materials work

Before the bell: prep

Day before: punch a small hole in every paper cup base; cut ~2 m string per group. Pack one tray per group (two punched cups + string) plus one spare pair for the front demo. Print Investigation Journal pages and blank I-wonder slips. Clear noticeboard space for pinning.

Materials

Item	Qty	Per	Source	Low-cost substitute
paper cups with a small hole punched in the base	2	group	supermarket	clean yoghurt pots with a hole punched in the base
string, about 2 m length	1	group	classroom	wool or thin twine
tray to hold the cup-and-string kit	1	group	classroom	a large book or a lunchbox lid as a kit holder
demo cup-and-string pair for kit handling at the front	1	class	classroom	use one group tray briefly for the model, then return it
Investigation Journal pages	1	pupil	print from platform	a blank page headed with the problem, what we tried, what we changed, what worked
paper slips for I wonder questions	1	group	classroom	torn strips of scrap paper
pins or reusable putty for the noticeboard	1	class	classroom	masking tape on a wall space

Safety watch-point

String stays on the table run only: no looping around necks or wrists, no swinging cups.

Teaching moves

- **Getting Started:** Hold up one cup and the string only: no trays out, no working demo. Take two or three first ideas and leave them hanging. Say only that every group gets the same kit and the same problem.
- **How could we solve it?:** Keep kit off tables. One minute of group talk, then one idea from three groups. If tightness comes up, nod but do not confirm. Steer them to rule out lip-reading by facing away or covering eyes.
- **Send the message:** At the front, show threading, knotting, rim-hold and face-away only, never a slack-then-tight reveal. Send groups to trays; stay central and do not re-thread for them. After a few minutes prompt: change only one thing, test again, notice what changed.
- **Show the class:** Pick three groups with different stories while set-ups are still live. Keep each share under two minutes. Fold watchers in: is the string slack or tight when the word comes through? Revoice once: a tight string carries the spoken wobble; a slack one does not.
- **The idea that worked:** Land tight path from what groups just showed, then one plain STEM line. Use everyday words: speaking wobbles the cup base; the tight string carries it. Ask whether the string was a hollow tube: no. Hold breakthrough and Clifden for the next beat.
- **Record on your Investigation Journal page:** Hand out one journal page each. Whole class records together: problem, what they tried, one change, the set-up that worked, the idea that made the difference. Accept plain language for tight path; if a page only says it worked, ask them to add why.
- **Marconi at Clifden:** Walk the three on-screen beats in about two minutes: problem before, what Clifden did in 1907, why it mattered. Contrast gently: cups needed a tight string; Marconi's signals went through the air, not along a wire. Name breakthrough: a new solution that changes everyday life.
- **Our I wonder board:** One slip per group; two minutes to agree an I-wonder and pin it up. Pack-away runs under the pin-up: wind string onto cups, trays aside. Close on the chorus: the string had to be tight so the spoken wobble could travel.

What it should show

A quiet word reaches the listener only when the string is pulled straight and firm and cups are held by the rim. Slack string, base-hold, soft speech or lip-watching all fail. If a group still cannot hear, check the knot has not pulled out and that they release a short clear word into the cup rather than shouting past it.

Misconceptions & interventions

- **The string is a hollow tube the voice runs through.** After a working demo, ask: was the string a tube? Trace speaking → base wobble → tight string → other base → ear. Name it as a carried wobble, not a voice tunnel.
- **Shouting louder or watching the speaker's mouth is enough: the string does not matter.** Re-run with the listener facing away and a quiet word. Have them slack the string, then pull it firm, so only tightness changes what is heard.
- **Marconi's wireless worked like a giant cup-and-string phone.** State the plain contrast: our cups needed a tight path for a wobble; Clifden sent a different kind of signal through the air with no string or undersea cable.

Differentiation

Emerging	Developing	Proficient
• Pair at the teacher table with the spare front kit already threaded and knotted; coach rim-hold and face-away while they only try slack vs firm. • Journal scaffold: dictate one-line stems: the problem was...; we changed...; it worked when...	• Prompt a second deliberate one-thing change (rim vs base, or short word vs long phrase) and compare which helped more. • On the journal, add one sentence on why slack failed in their own words.	• Ask them to predict and then show what happens if the listener holds the base while the speaker holds the rim. • Stretch share: name one way the cup-phone and Clifden solved the same kind of gap problem with different kit.

Cross-curricular hook

Geography and History: locate Clifden, Connemara on a map of Ireland and place 1907 on a simple timeline of everyday communication.