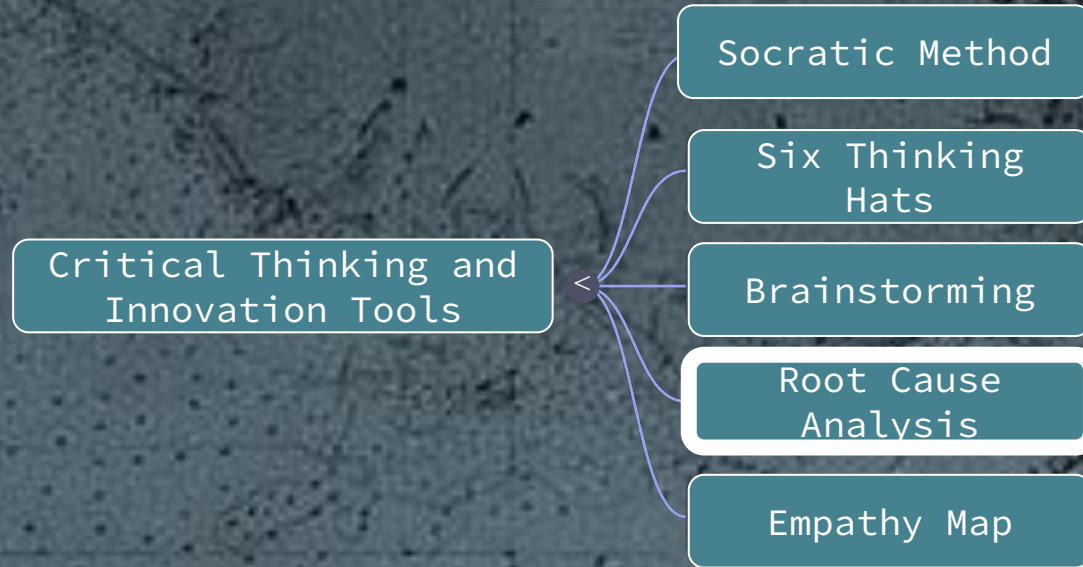


THINKING TOOL 3: ROOT CAUSE ANALYSIS

MAP OF OUR THINKING TOOLS

Let's explore a map of these tools. Select each of the tools to get a preview of what you'll learn here. By the way, you can use this list as a menu to navigate through the course.



Audio: This is the last of the tools on our list.

MAOMAO AVOIDS CONCLUSION BASED ON CONJECTURE

"Don't jump to conclusions based on conjecture."

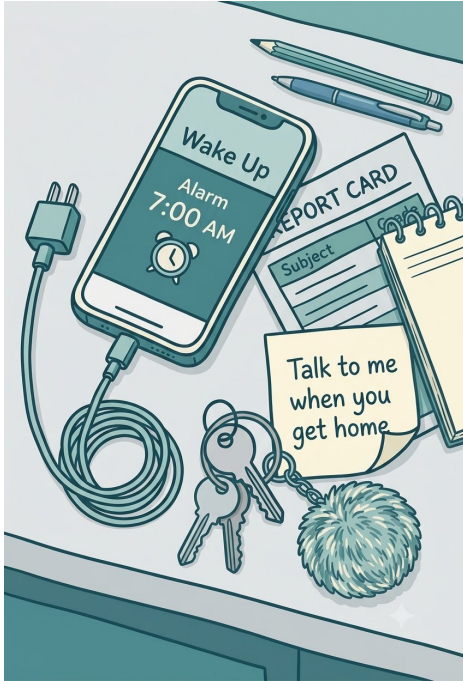
— Luomen, to Maomao, *The Apothecary Diaries*

Maomao spends the whole series solving palace mysteries by refusing to accept the first explanation someone offers her. Her foster father and mentor Luomen's advice here is basically Root Cause Analysis in one sentence: don't guess your way to an answer, gather the evidence first.



This line maps directly onto RCA Step 2 (gather information, don't assume) and Step 4 (find the actual cause, not the first guess). It's a good frame for the whole module, since Maomao's method, refusing easy answers, is exactly what students are about to practice.

WHY ROOT CAUSE ANALYSIS COULD MATTER TO YOU



Root Cause Analysis (RCA) isn't just for engineers and scientists. It shows up anywhere a problem keeps repeating:

- You keep losing your phone charger or house key.
- You keep getting into the same argument with a friend or sibling.
- Your grades in one class keep slipping no matter how much you "study harder."
- You're always late to first period, even when you set an alarm.

Select to reveal: In each case, doing the same quick fix over and over (buy another charger, apologize, cram, set an earlier alarm) treats the symptom. RCA asks: what's actually causing this, over and over.



Notes: Ground the concept in relatable teen scenarios right away, before introducing any fictional example, so students see this as a life skill and not just a "science class" tool.

WHAT IS ROOT CAUSE ANALYSIS?

Root Cause Analysis is a method for digging past the obvious, surface-level problem to find the real reason something is happening.

A symptom is what you notice. A root cause is why it's actually happening.

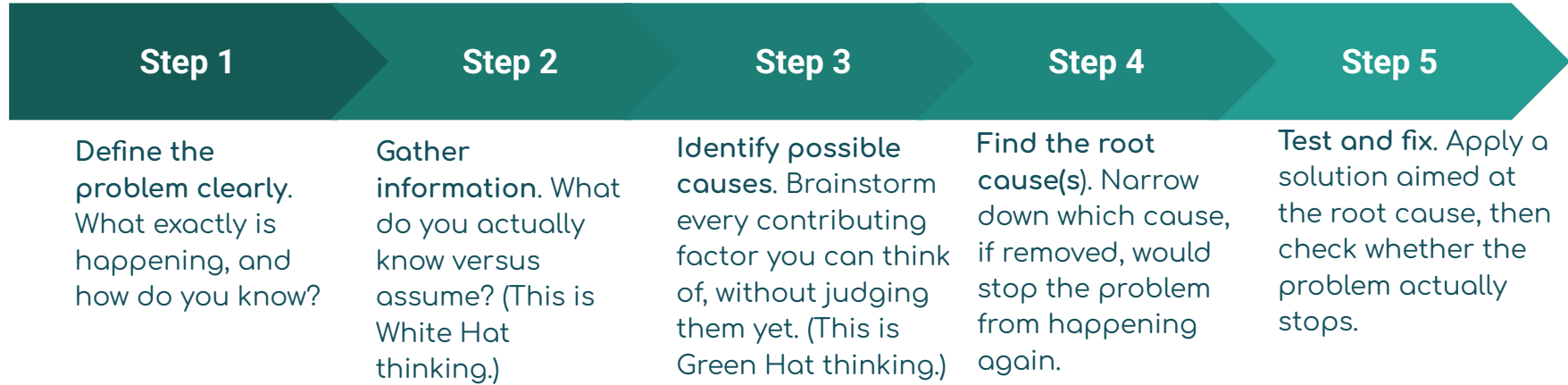
See an example

If you only fix the symptom (cram harder the morning of), the problem comes back. If you fix the root cause, it tends to stay fixed.



Pop up reveals this text: Symptom: "I keep failing pop quizzes." Possible root cause: "I only review notes the morning of the quiz, so nothing makes it into long-term memory."

Root Cause Analysis generally follows five steps:



Notes: Point out the callbacks to the Six Thinking Hats module here (White Hat for step 2, Green Hat for step 3), reinforcing that these thinking tools work together rather than in isolation.

In *The Apothecary Diaries*, Maomao is a servant in the rear palace with deep knowledge of herbs, medicine, and poison. When something strange happens, an illness, a collapse, a death that doesn't add up, she doesn't accept the first rumor or the most convenient explanation. She traces symptoms back to their actual physical cause, one clue at a time.

We'll follow an original mystery inspired by her world: why several maids keep fainting during afternoon tea in the Jade Pavilion.

You'll see that you can use tools like the Fishbone Diagram and 5 whys to solve a mystery like Mao Mao.



Notes: This is an original scenario built in the spirit of the series rather than a retelling of a specific case from the show, which keeps it flexible for teaching and avoids leaning on plot details students may or may not have seen.

THE MYSTERY OF THE JADE PAVILLION FAINTING TEA

Select each image to learn more.



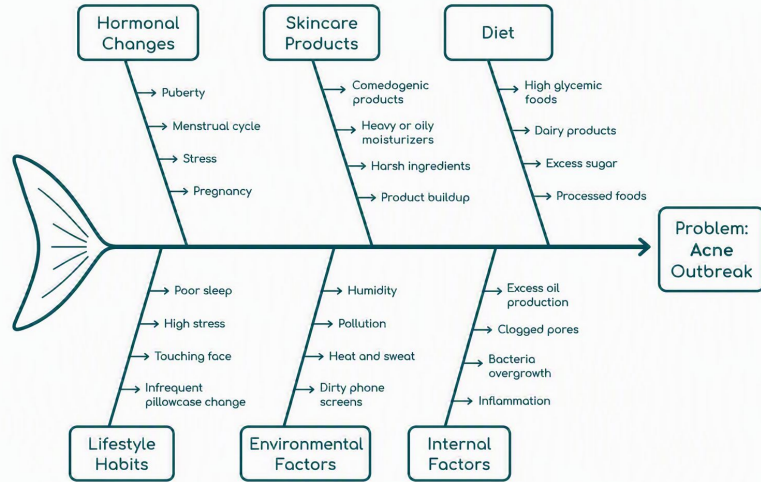
1

Define the problem: Three maids have fainted within an hour of drinking afternoon tea, each on a different day.



Notes: The story items are listed below in the slide notes.

HOW CAN WE APPLY THE ROOT CAUSE ANALYSIS TOOL - FISHBONE DIAGRAM



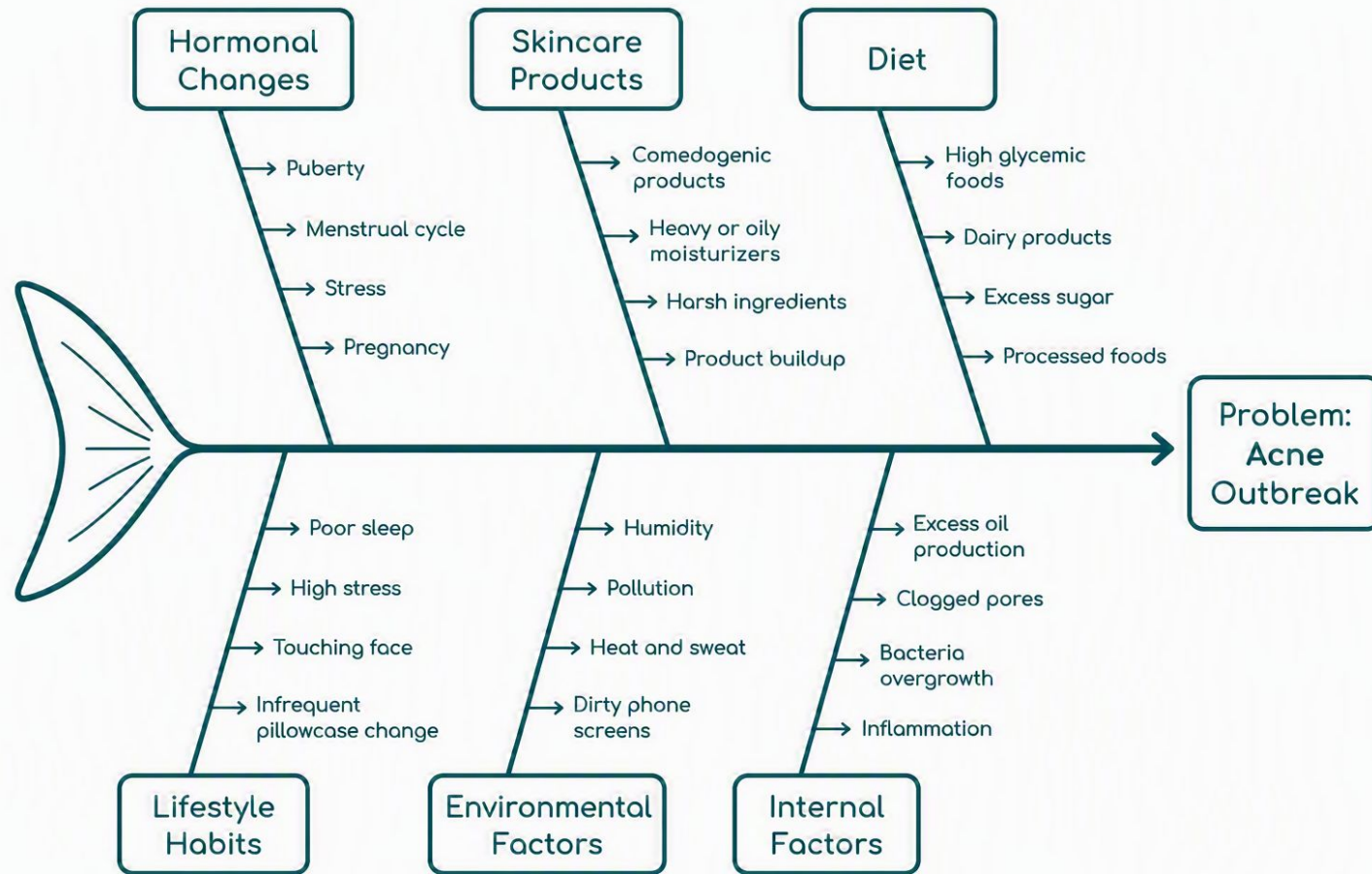
**Look at the
Fishbone in Detail**

A fishbone diagram, also called an Ishikawa diagram, is a visual tool for organizing all the possible causes of a problem so you can see them clearly before narrowing down to the root cause.

It looks like a fish skeleton:

- The problem sits in a box at the fish's head.
- A long spine runs from the head to the tail.
- Several bones branch off the spine, one for each category of possible cause.
- Smaller details branch off each bone.



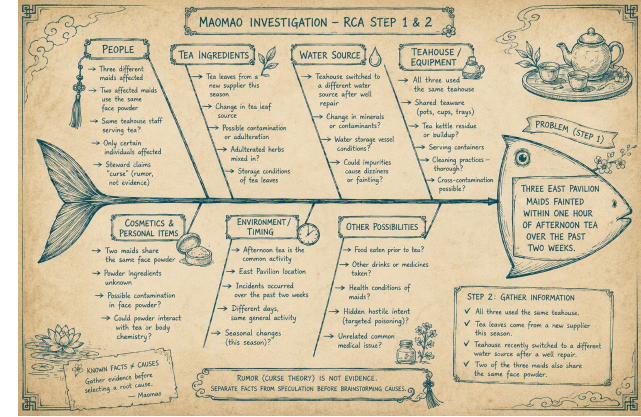


MAO MAO'S FISHBONE DIAGRAM IN A NUTSHELL

Now, let's look at Mao Mao's fainting mystery sorted into a fishbone diagram:

- Problem (head): Maids fainting during afternoon tea.
- Bone: Materials → new tea supplier this season, unknown leaf source; shared face powder.
- Bone: Environment → teahouse recently switched water sources after a well repair.
- Bone: People → all three maids serve the same shift, so they share meals and routines.
- Bone: Timing → fainting happens within an hour of tea, always in the afternoon.
- Bone: Mindset → staff assume it's a curse, so no one has tested the water or the powder directly.

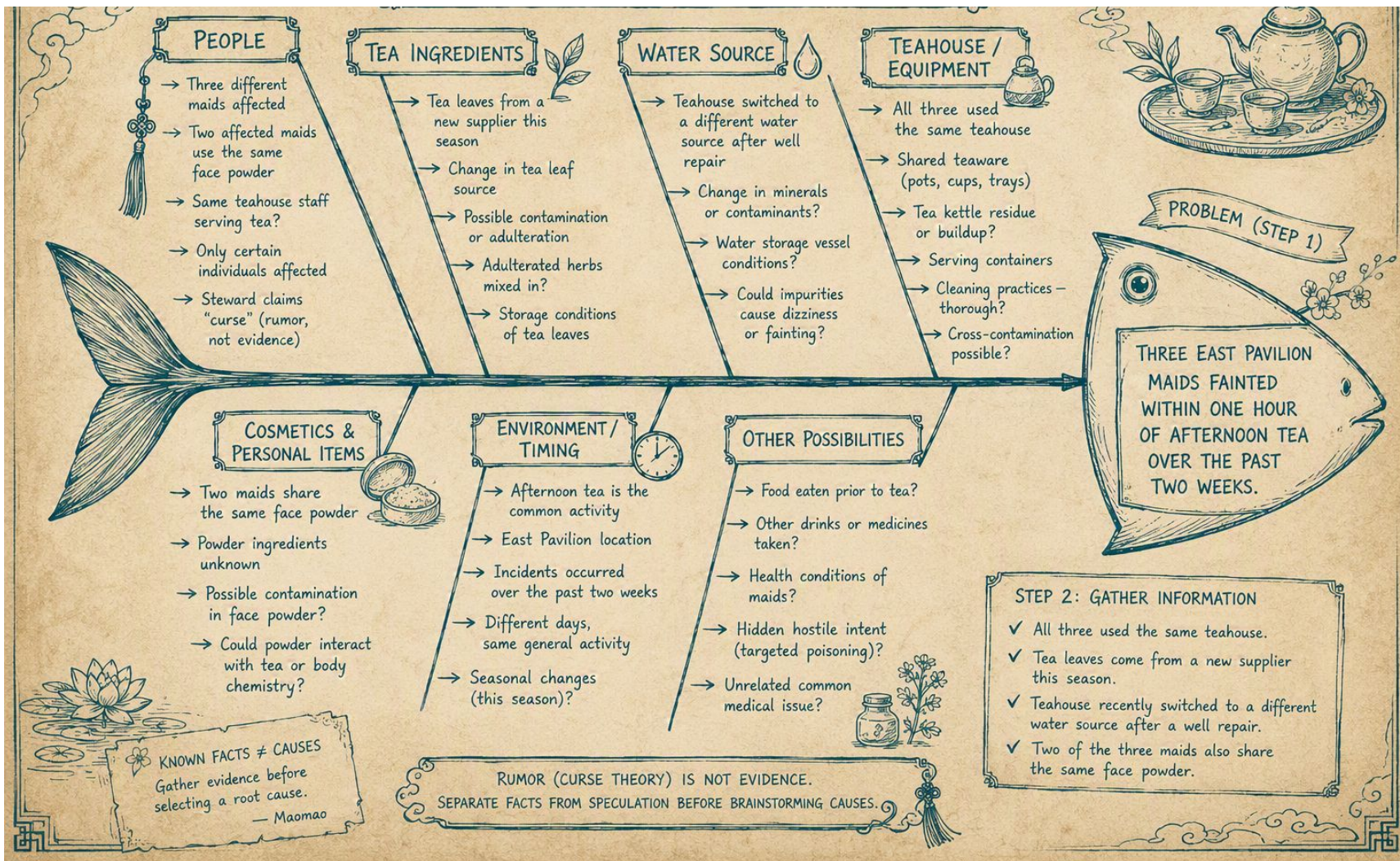
Looking at all five bones together, the shared face powder and the new water source both stand out as stronger candidates than "curse." A true apothecary would test both before settling on one.



Look Mao Mao's Detailed Fishbone Diagram



Notes: Show the completed fishbone diagram as an image if possible, with the categories as clearly labeled bones. This models what a finished diagram looks like before students attempt their own in Slide 14. Note that a fishbone diagram doesn't always point to one single cause. Sometimes it narrows the field to two or three strong candidates that then need testing, exactly like Maomao would test a substance rather than guess.



WHAT DO YOU THINK?

Stop to reflect on Mao Mao's fishbone diagram.

What did you notice?

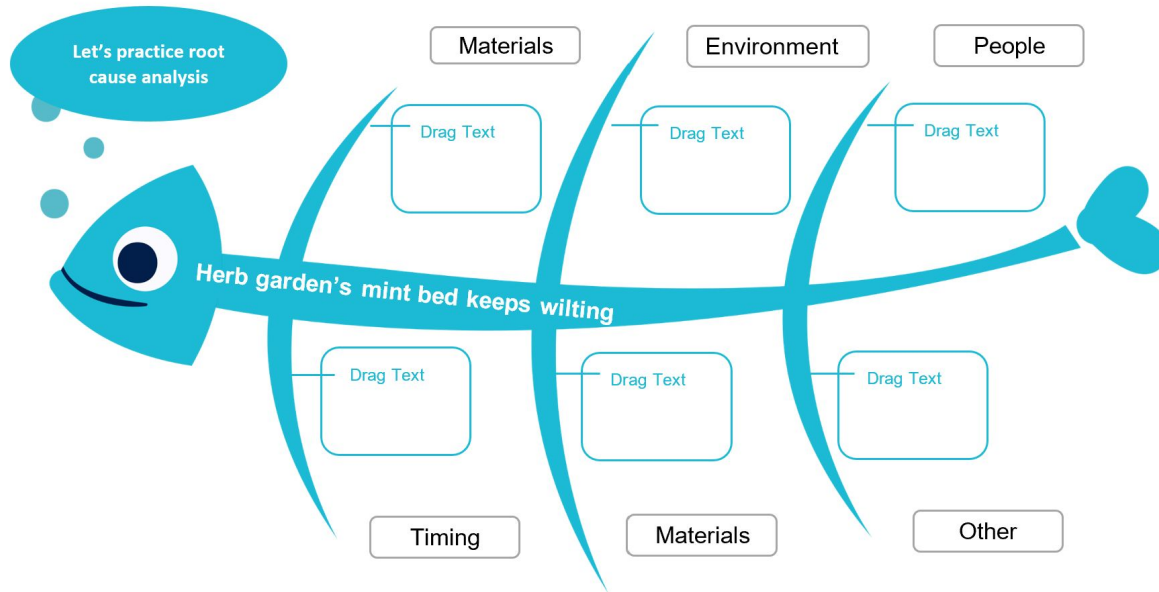
What details seemed more important to solving the problem?

What information seemed irrelevant?



SOLVE IT YOURSELF

Drag each cause below into the correct fishbone category for this problem: "The herb garden's mint bed keeps wilting no matter how often it's watered."



The seedlings were planted too close together this season.

A drainage pipe nearby was rerouted last month.

Whoever waters the bed skips it when they're called away

There's no fixed watering schedule, so the bed gets soaked one day, dry for three.

The soil hasn't been refreshed with compost in a year.

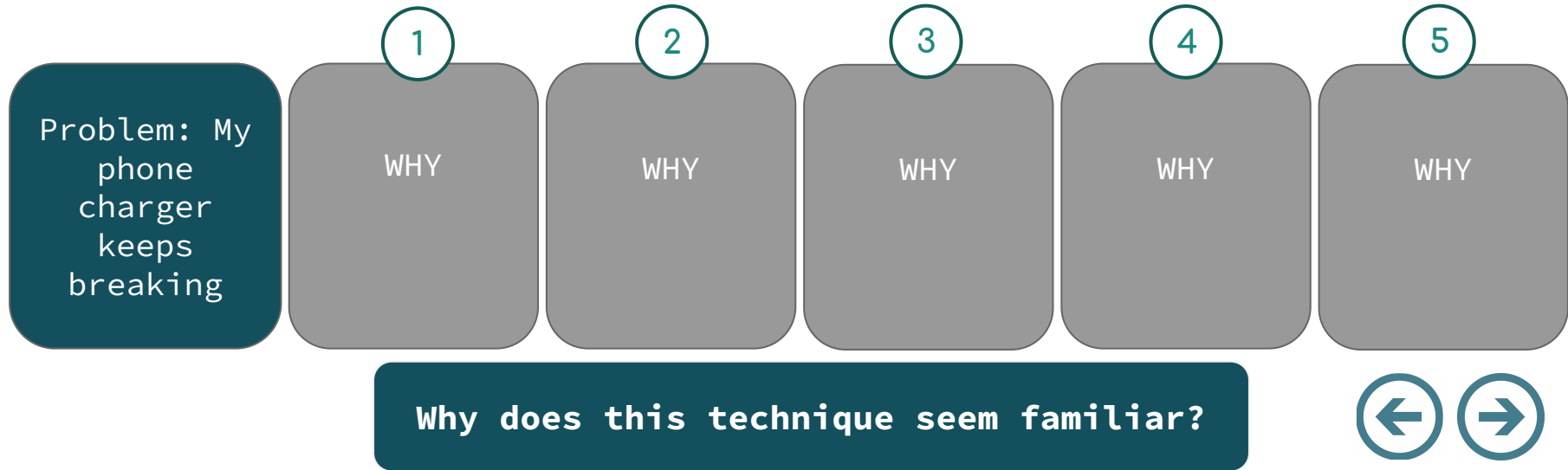
No amendments like vermiculite were added to the soil



Notes: This is a drag-and-drop sorting activity. Suggested groupings: Materials = 1 and 5, Environment = 2, People = 3, Timing = 4. Allow some flexibility in feedback since fishbone categorization is often a judgment call.

THE POWER OF THE 5 WHYS

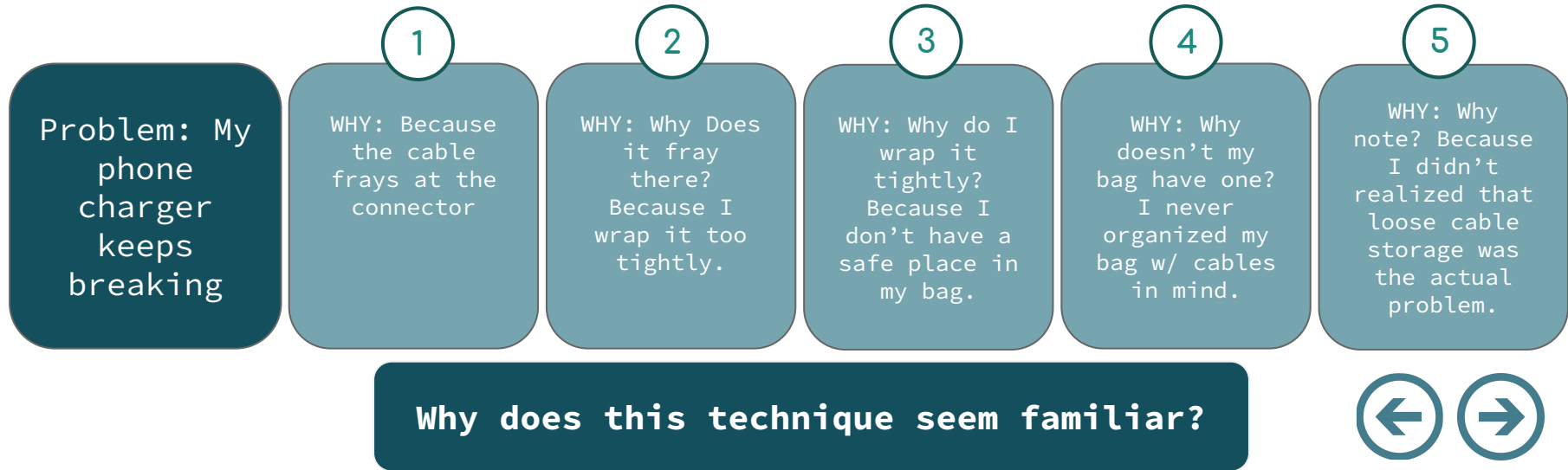
The 5 Whys is a second RCA tool. Instead of sorting causes into categories, you simply ask "why" repeatedly, using each answer to dig one level deeper, until you hit a true root cause. Select each gray card,



Notes: <Learner flips each card to view the question> <Pop up reveals:> If this technique seems familiar, it is. It's just a simplified and more direct version of the Socratic questioning we covered in Module 2. Five is a guideline, not a hard rule. Some problems reach a root cause in three whys, others need six or seven. The point is to keep asking until further "why" answers stop revealing anything new, the same instinct behind Luomen's warning not to jump to conclusions.

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SOLVING THE JADE PAVILLION MYSTERY WITH THE 5 WHYS

Let's run the fainting mystery through 5 Whys instead of a fishbone diagram:

1. Why do the maids faint? Because they feel dizzy shortly after drinking tea.
2. Why do they feel dizzy? Because something in what they're consuming or wearing is affecting them.
3. Why would that be new, if they've had tea before? Because two things changed recently: the tea supplier and the water source.
4. Why hasn't anyone tested either one? Because the staff assumed it was a curse and never looked for a physical cause.
5. Why did they assume a curse instead of testing something? Because there was no one on staff trained to investigate physical causes, until Maomao was asked to look.

Root cause: an untested environmental or material change, hidden behind an assumption that stopped anyone from investigating further. Notice this points to a slightly different angle than the fishbone diagram did.



Notes: Deliberately show that the 5 Whys and the fishbone diagram can surface different, and both valid, angles on the same problem. This sets up the comparison on the next slide.

WHEN TO USE: FISHBONE DIAGRAM VS. 5 WHYS

Both tools are used for Root Cause Analysis, but they work differently:

	Fishbone Diagram	5 Whys
Best for	Complex problems with many possible categories of cause	Simpler, more linear problems
Style	Branches out sideways into categories	Drills straight down, one why at a time
Strength	Good for group brainstorming, sees the whole picture at once	Fast, simple, good for solo use
Watch out for	Can get cluttered with too many minor branches	Can stop too early or follow only one narrow path

Some investigators use both: fishbone first to map out categories, then 5 Whys on the strongest branch to drill down further, which is close to how Maomao actually works. She surveys everything that changed, then digs hard into the one or two leads that hold up under questioning.



Notes: Help students see these as complementary tools rather than competitors. Encourage them to pick whichever fits the shape of their own problem in the upcoming project.

SOLVING THE JADE PAVILLION MYSTERY WITH THE 5 WHYS

Let's run the fainting mystery through 5 Whys instead of a fishbone diagram:

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Based on what you've learned about Root Cause Analysis, fishbone diagrams, and the 5 Whys, take a quiz that checks your understanding of the steps, the tools, and how to tell a symptom from a root cause.

A student says, "I keep getting a C on math tests, so I'm going to start bringing extra snacks to eat during the test." Which best describes what's happening here?

Options:

- A. The student has correctly identified the root cause.
- B. The student is treating a symptom without knowing the root cause yet.
- C. The student has completed a full Root Cause Analysis.
- D. The student skipped Step 1 of RCA by not defining the problem.

1 of 5

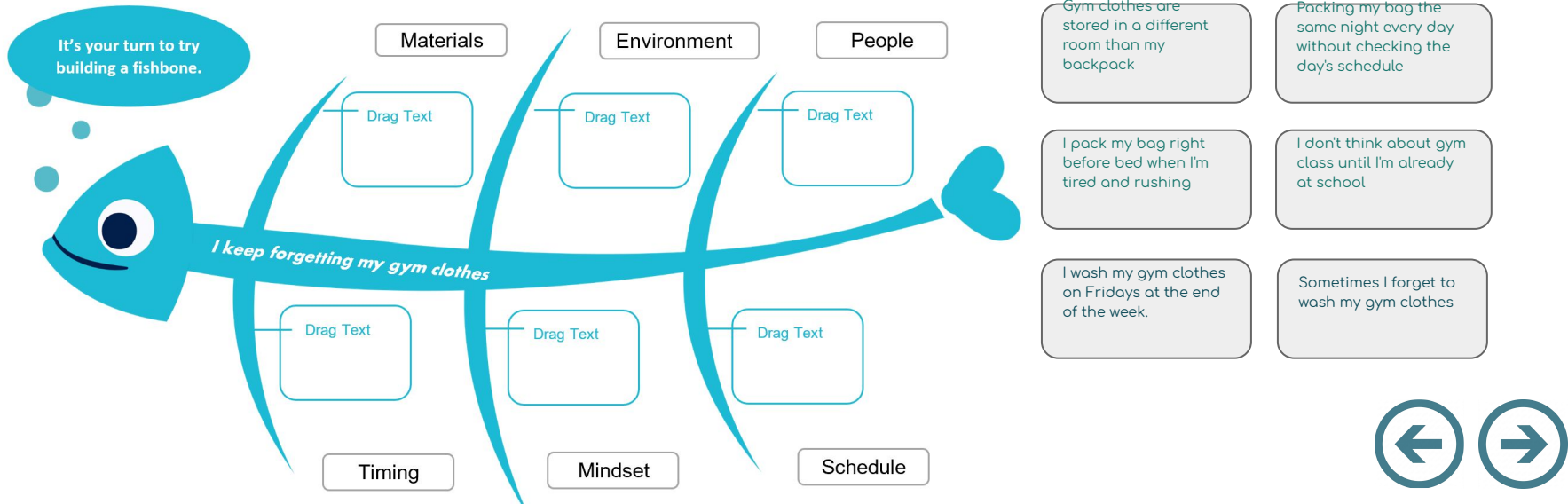


Link to Quiz Questions:

https://docs.google.com/document/d/1WP099IwyB2U00CawyotCQJW1b7SAWBn-fP_PQV5ZA50/edit?usp=sharing

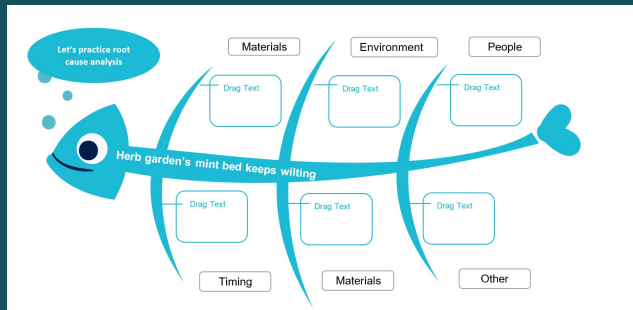
PRACTICE - USE YOUR OWN FISHBONE

Let's build a fishbone diagram together for this problem: "I keep forgetting to bring my gym clothes on gym days." Which bone looks like the strongest root cause candidate? Remember Luomen's advice: don't jump to conclusions before weighing all four.



Notes: Learners practice using a different situation.

NOW YOU TRY IT - QUICK PROJECT



Objective: Apply Root Cause Analysis to a real, repeating problem or mystery from your own life, such as always losing an item, a recurring disagreement, a habit you can't seem to break, or a task you keep putting off.

Result: Choose one tool and complete it:

- **Option A, Fishbone Diagram:** A problem statement at the head, with at least four bone categories and at least two causes listed under each.
- **Option B, 5 Whys:** A problem statement, followed by at least five rounds of "why," ending in a root cause that feels genuinely different from the original symptom.

Remember Luomen's rule as you work: don't jump to conclusions based on conjecture. The first "why" is almost always a symptom, not the root cause.

[Download Fishbone Template](#)

[Download 5 Whys Template](#)



Notes: Students can fill out either or both of the templates and apply to their own problem, situation, or dilemma.

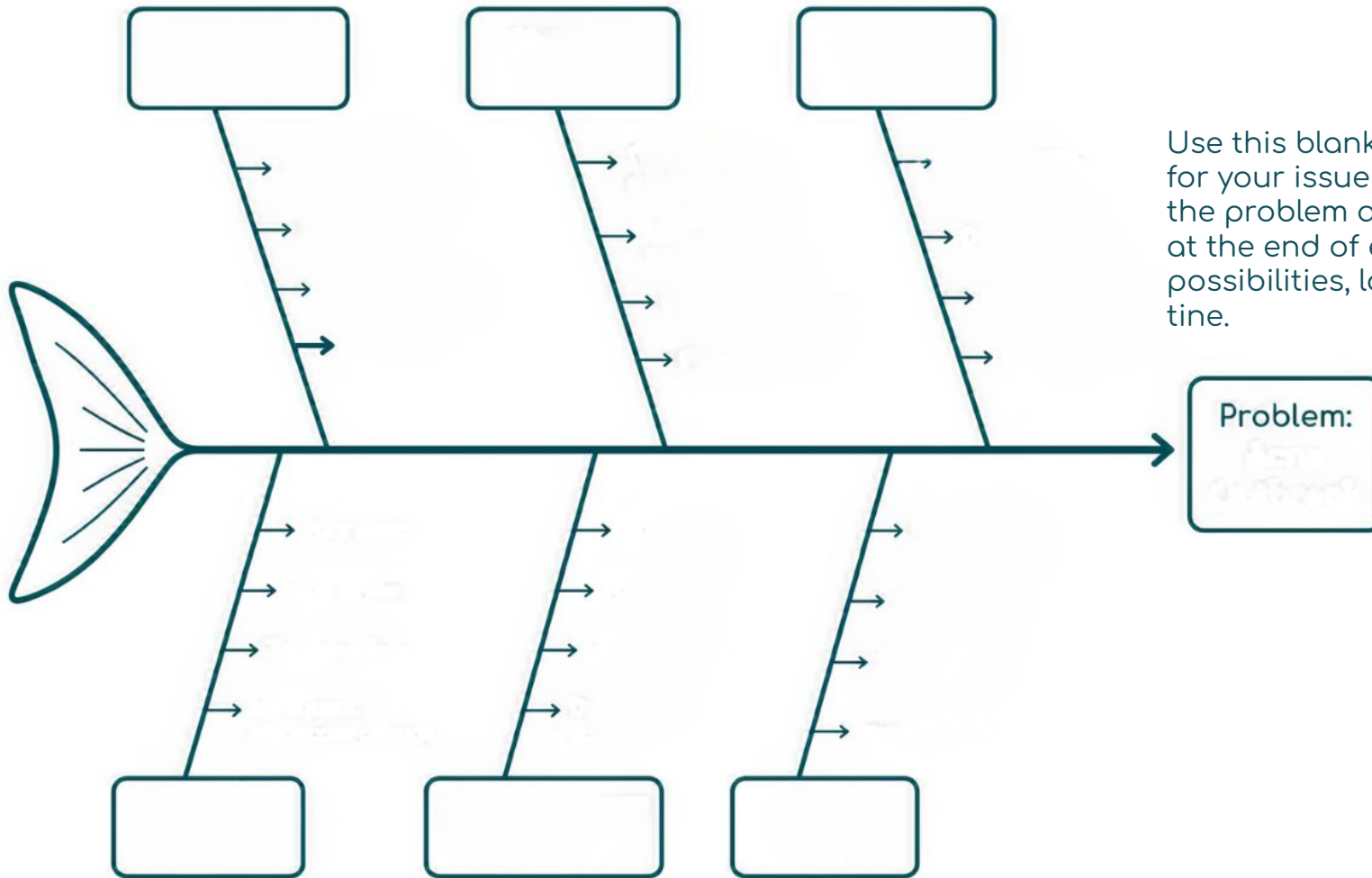
THE POWER OF THE 5 WHYS

The 5 Whys is a second RCA tool. Instead of sorting causes into categories, you simply ask "why" repeatedly, using each answer to dig one level deeper, until you hit a true root cause. You can add your why questions here.

	1	2	3	4	5
Problem:	WHY:	WHY:	WHY:	WHY:	WHY:
	Answer:	Answer:	Answer:	Answer:	Answer:

FISHBONE DIAGRAM

Use this blank fishbone diagram for your issue or dilemma. Fill out the problem and list the categories at the end of each bone. Add the possibilities, logic to each fishbone tine.



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