Diagnosing When You Need a RECAST Activity
GENERAL

Think about the source of the students' difficulties. Ask yourself, "Does it have to do with causal structure or other factors?" Here are some possibilities:

IN THESE CASES, YOU DO NOT NEED A RECAST ACTIVITY:

Misinformation or misunderstanding NOT related to causality:
Some confusions or misunderstandings are not related to causality.

Examples:
• Thinking that all wood floats.
• Thinking that only things that are cold can be frozen.

Cognitive challenges NOT related to causality:
Some concepts give students difficulty due to the nature of the thinking challenge.

Examples:
• Difficulty adopting the perspectives necessary to reason about Earth's motion.
• Reasoning about events on a geological time scale as opposed to familiar time scales.

IN THESE CASES, YOU DO NEED A RECAST ACTIVITY:

A simpler causal structure is substituted for a more complex one:
The student has reduced the phenomenon to a simpler causal structure than the scientifically accepted explanation.

Examples:
• Thinking of lightning as a one-way event instead of an attraction (such that one misses warning signs on the ground such as one's hair starting to stand on end.)
• Satellites have a force in them that "drives" them.

Non-obvious variable(s) contribute to a simpler model:
There are non-obvious variables that the student fails to notice and so he/she applies a simpler causal model.

Examples:
• Not recognizing the role of ambient air pressure when drinking from a straw.
• Not attending to the liquid when analyzing why something sinks or floats.

Missing information or misunderstanding a fact that is related to causality:
Misinterpreting a concept related to causality such that it reinforces simplistic models.

Example:
• Students often think that hurricanes have to do with high pressure (reinforcing a simple linear model) instead of the difference between high and low pressure.

Confusing two processes and applying the wrong causal model to each:
Students may apply a causal model from one concept to another where it doesn't fit.

Example:
• Students confuse the processes of energy transfer with the process of matter recycling. They think that energy from the sun is recycled following a cyclic causality instead of domino causality.

Not recognizing multiple possible causes:
Being efficient in searching out causes and stopping after finding one when there may be multiple possible causes, any one of which is sufficient for causing the outcome or two or more causes might work together.

Examples:

• Even when students accept that populations in a food chain are related, they may still see predations as a "specific eating event" for the benefit of the eater alone.

• Students tend to regard food which is eaten and used for energy as belonging to a food chain. Food which is incorporated into the body material of eaters is seen as something different and it is not recognized as the material which is the food of the next level.

• Thinking that boiling requires application of heat.