Promoting the Use of Educational Technology in Learning and Teaching in Science

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Content

- How do my practice and beliefs about teaching change before/after the project?

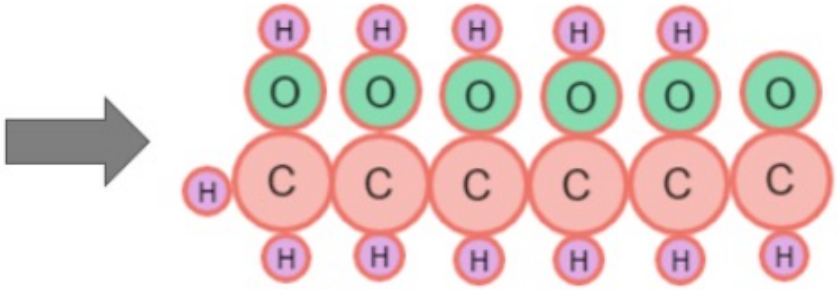
DragGame e-Learning activities designed and implemented

Construct a model to propose how the food is formed in photosynthesis by dragging the atoms provided below.

Materials used in photosynthesis
- Carbon dioxide (CO_2)
- Water (H_2O)

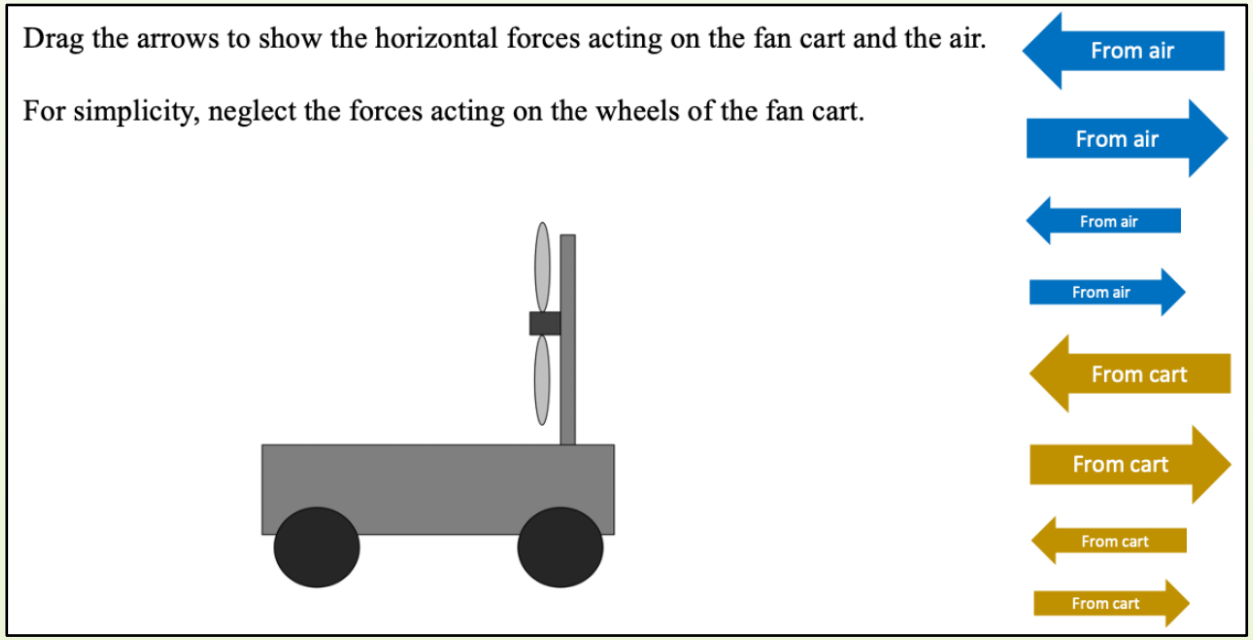
Food made in photosynthesis
- Glucose ($C_6H_{12}O_6$)

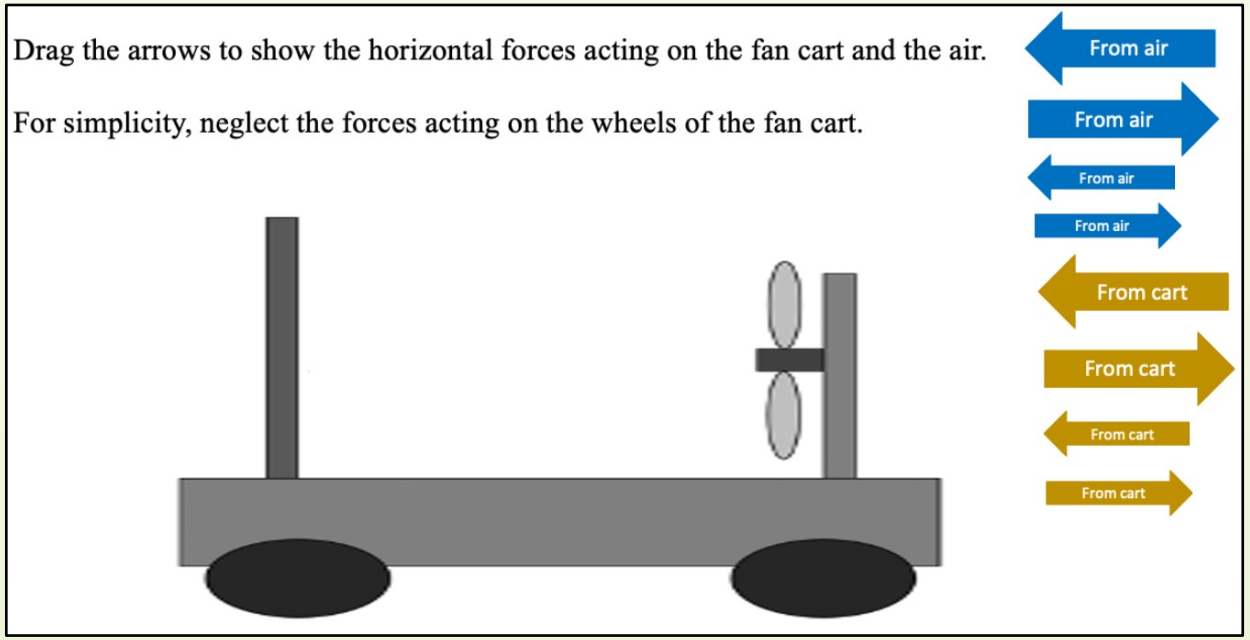
Guiding questions:
1. How does your model help you to make sense of how food is formed in photosynthesis?
2. How does your model help you to explain the source of mass of a plant?



DragGame e-Learning activity for Photosynthesis

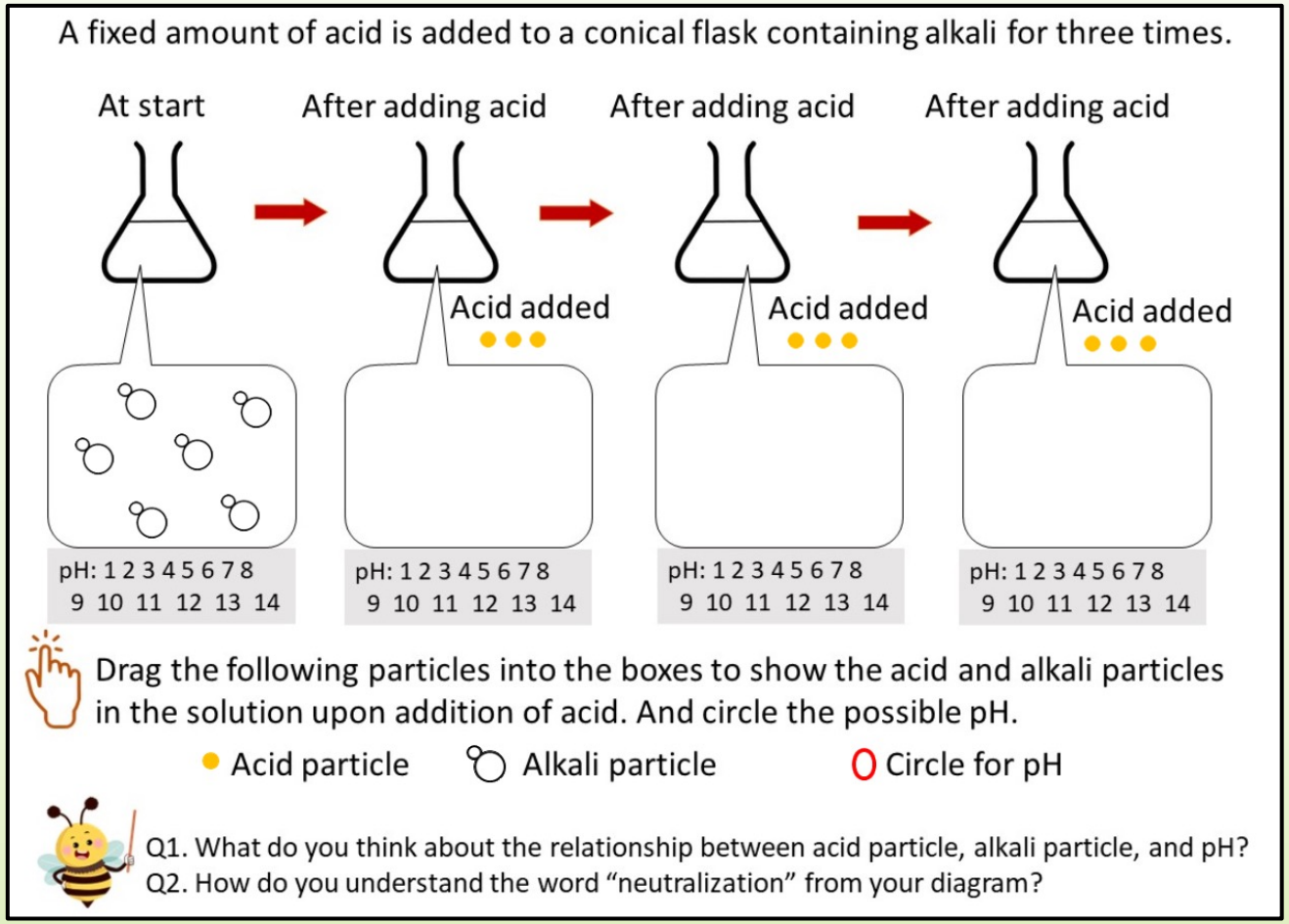
DragGame e-Learning activities designed and implemented





DragGame e-Learning activities for Action and Reaction

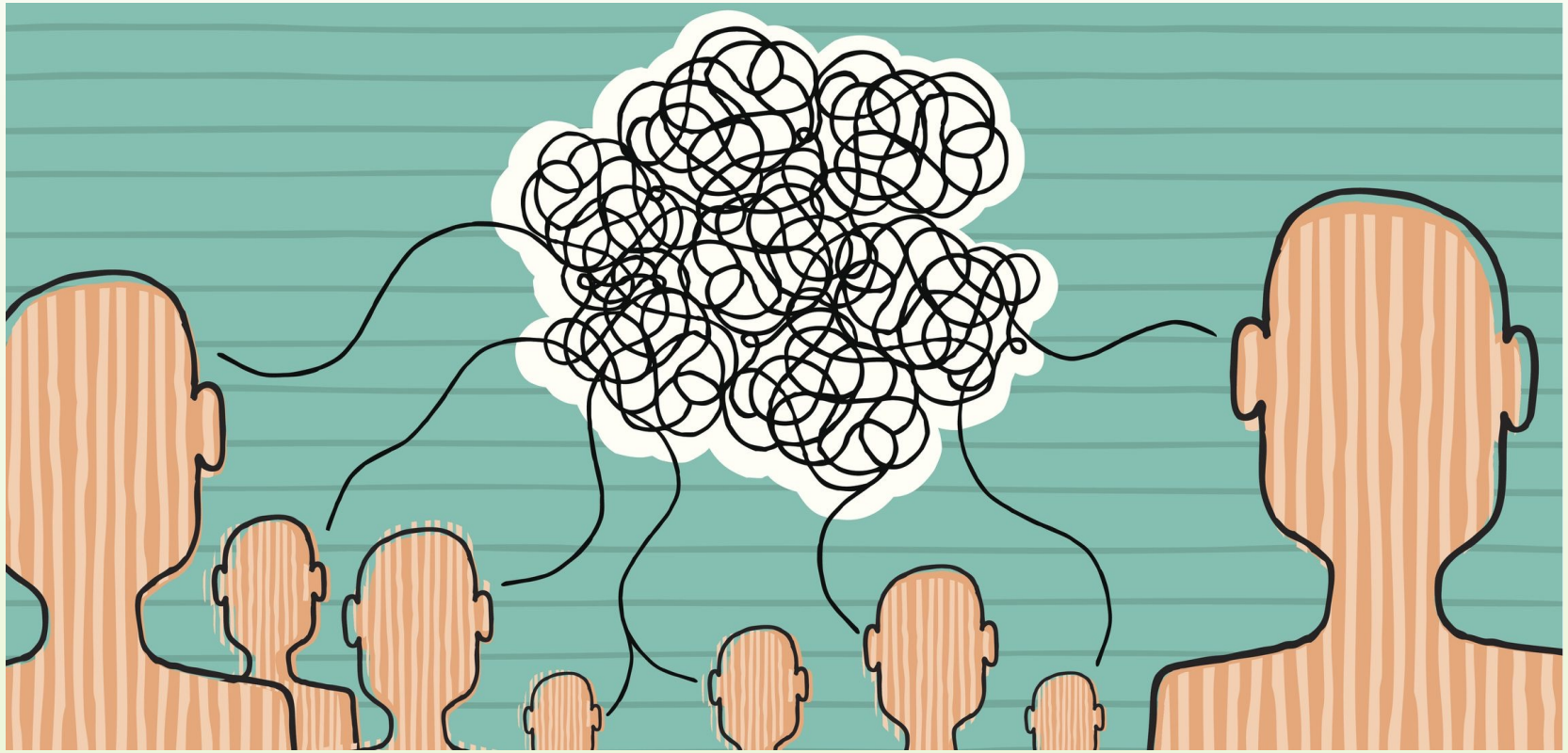
DragGame e-Learning activities designed and implemented



DragGame e-Learning activity for Neutralization

How do my practice and beliefs about teaching change after the project?

- Alternative conceptions
- Design of scientific inquiry activities
- Teacher's assumptions and scaffolding



What would you do after a student has presented an **incorrect** answer?

Alternative conceptions

- Encourage students to **elaborate**
- Invite other students to **comment** (strength and growth opportunity)
- Ask students to **propose** a modification

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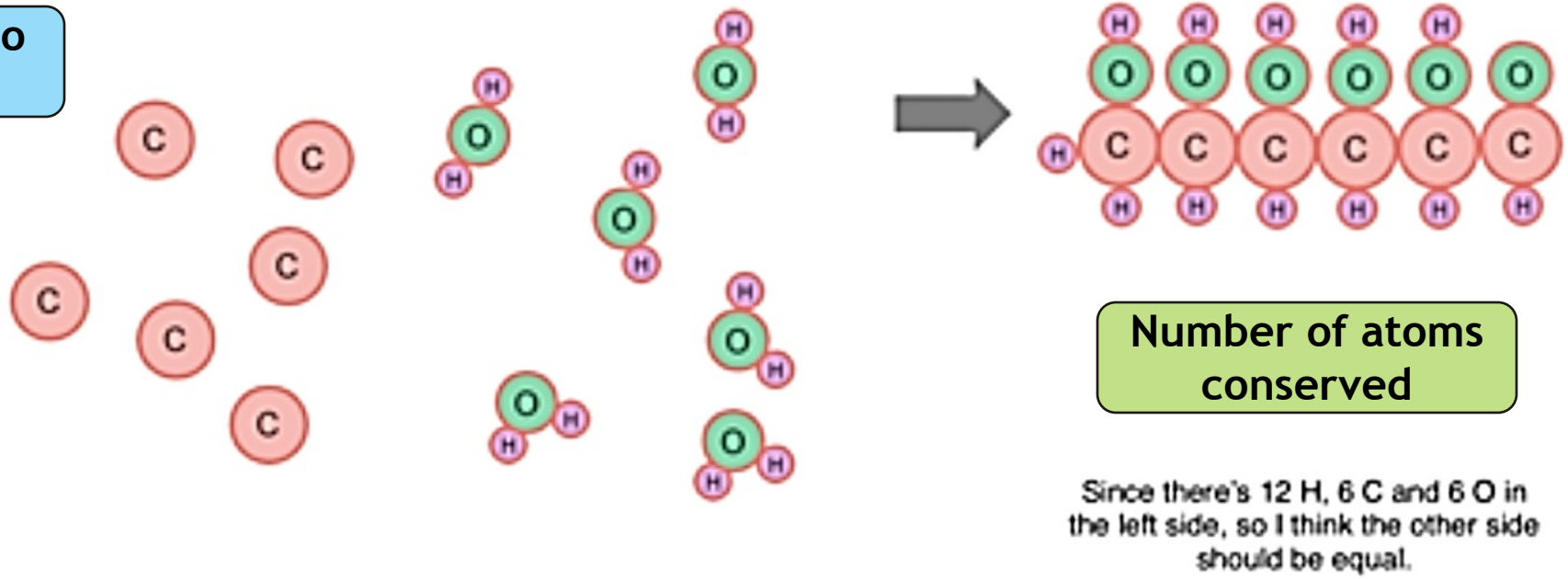
Food made in photosynthesis
- Glucose ($C_6H_{12}O_6$)

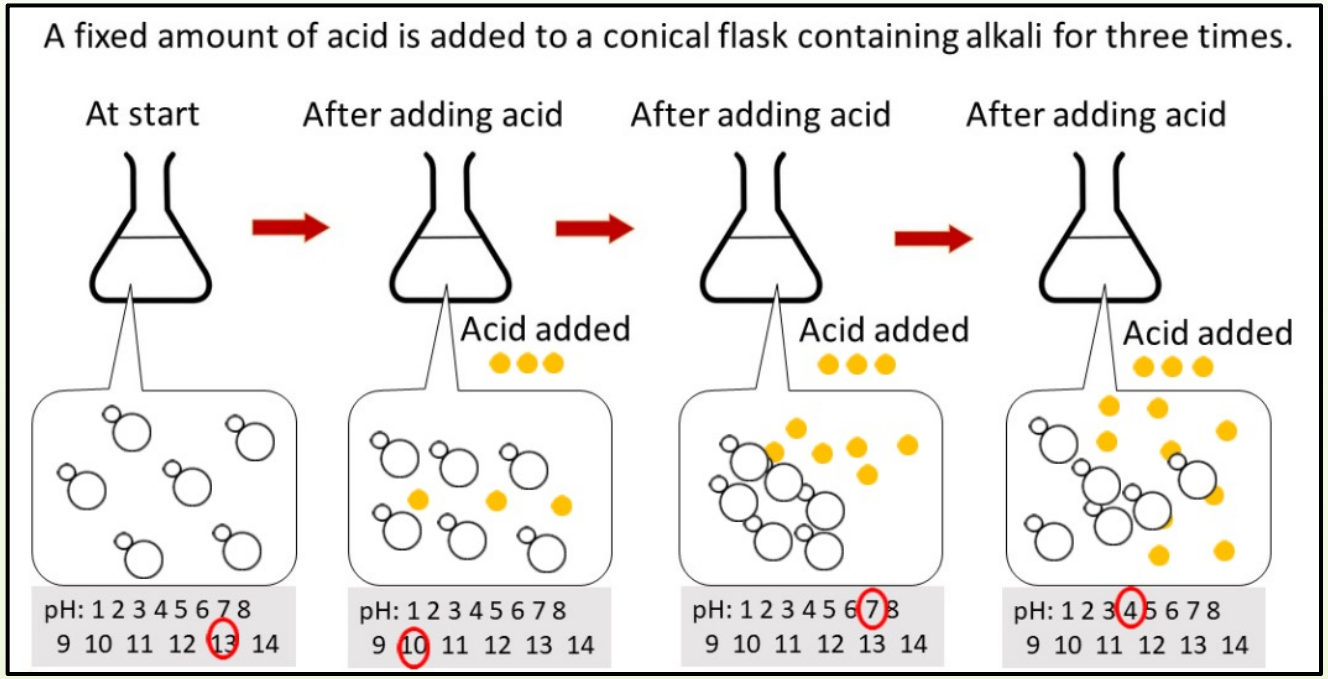
Raw materials do not match

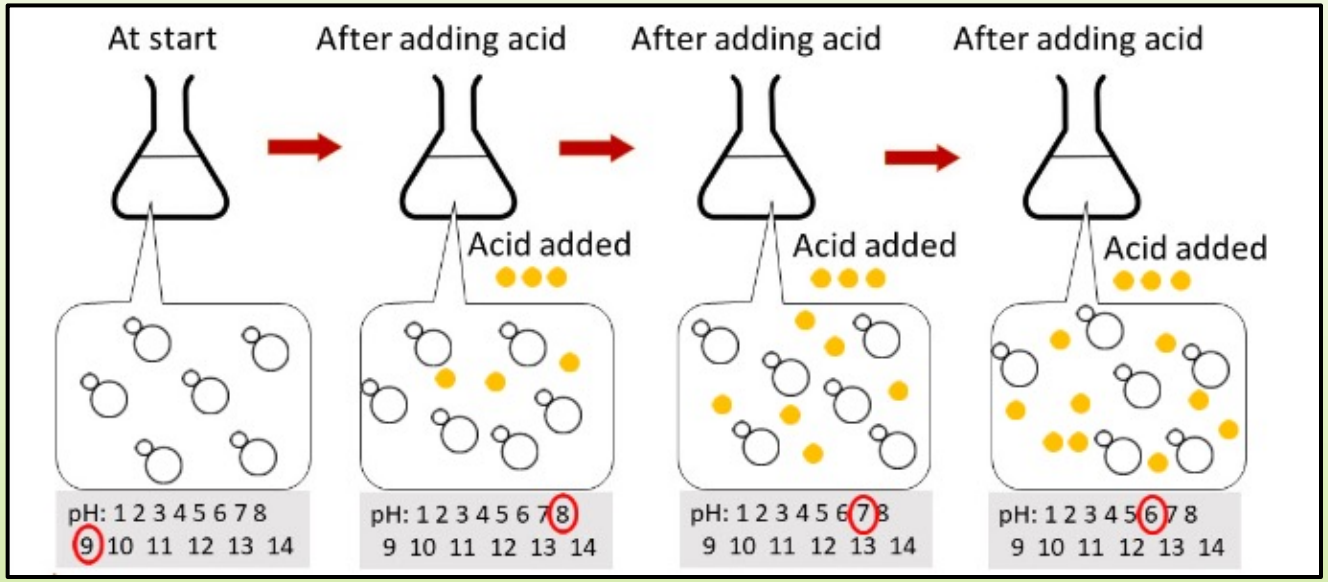


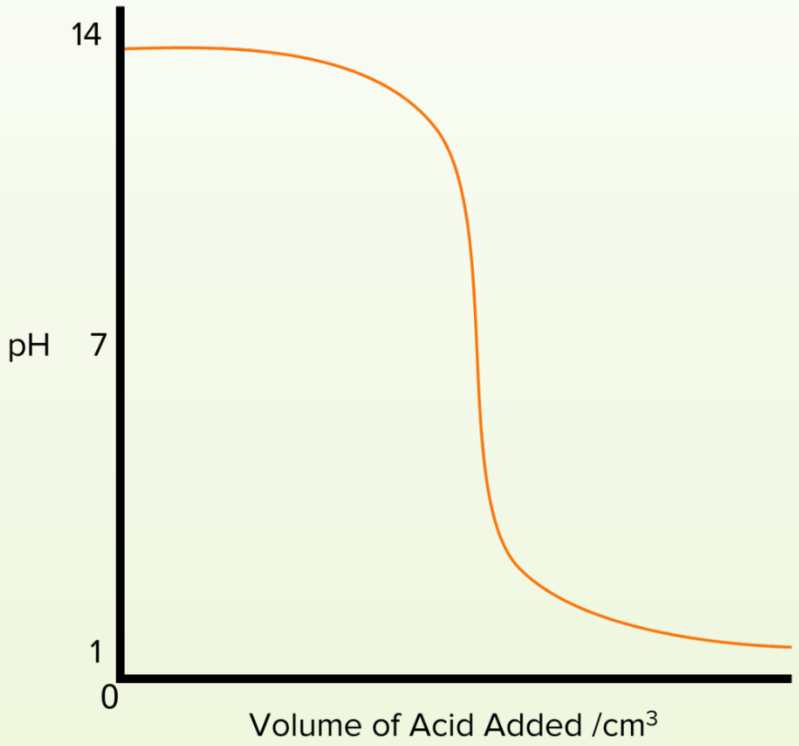
Number of atoms conserved

Since there's 12 H, 6 C and 6 O in the left side, so I think the other side should be equal.

Alternative conceptions



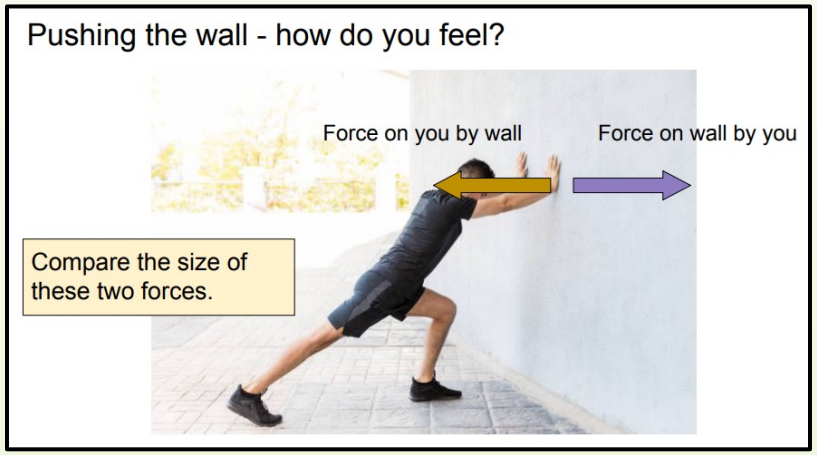




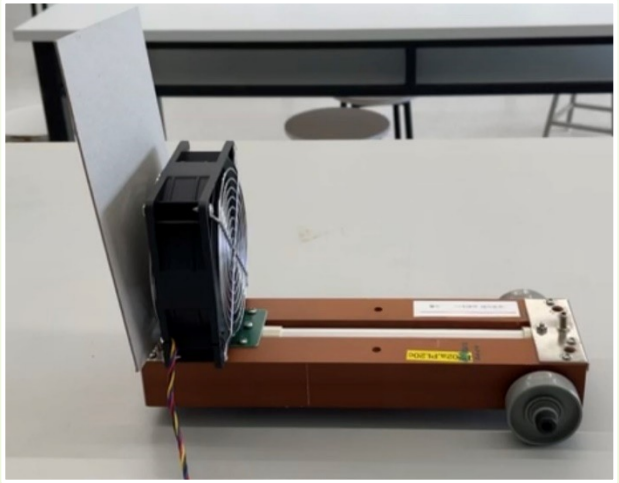
- Welcome and recognize alternative conceptions
- Understand how students think
- Use these alternative ideas as learning opportunities

Design of scientific inquiry activities

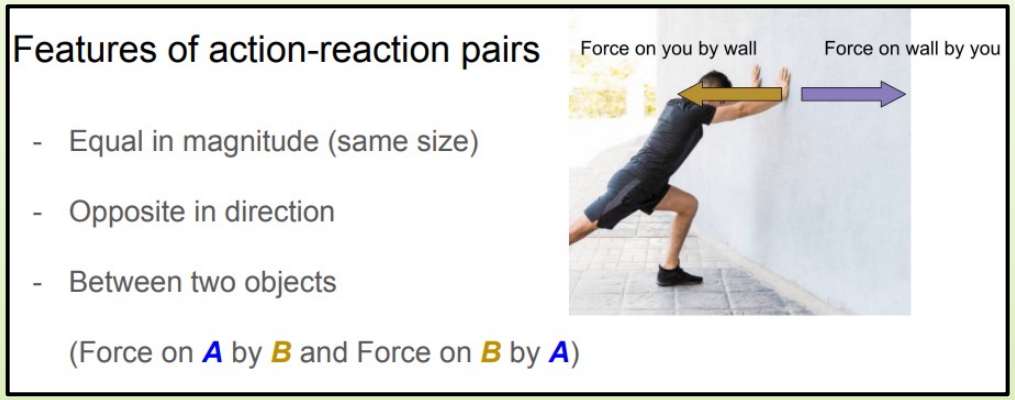
How would you ***sequence*** the following activities?



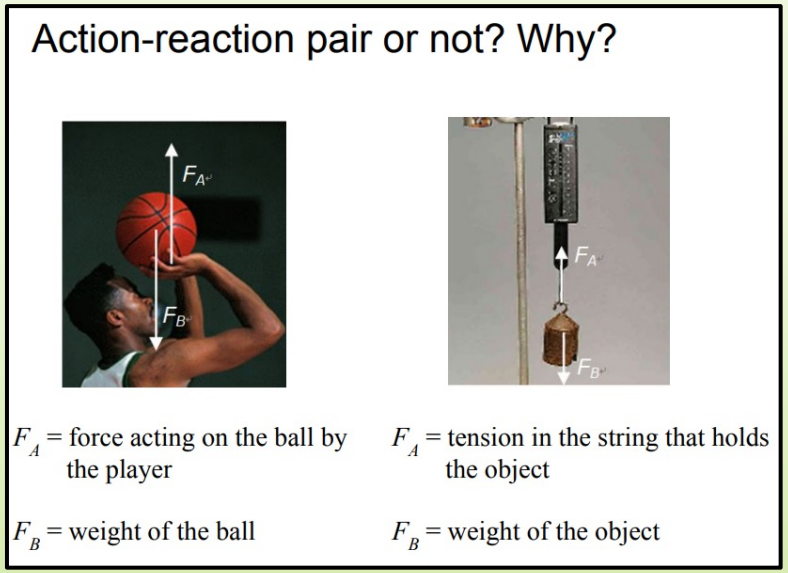
A. Daily life experience



B. Unexpected observation



C. Introducing a concept



D. Application of a concept

Design of scientific inquiry activities

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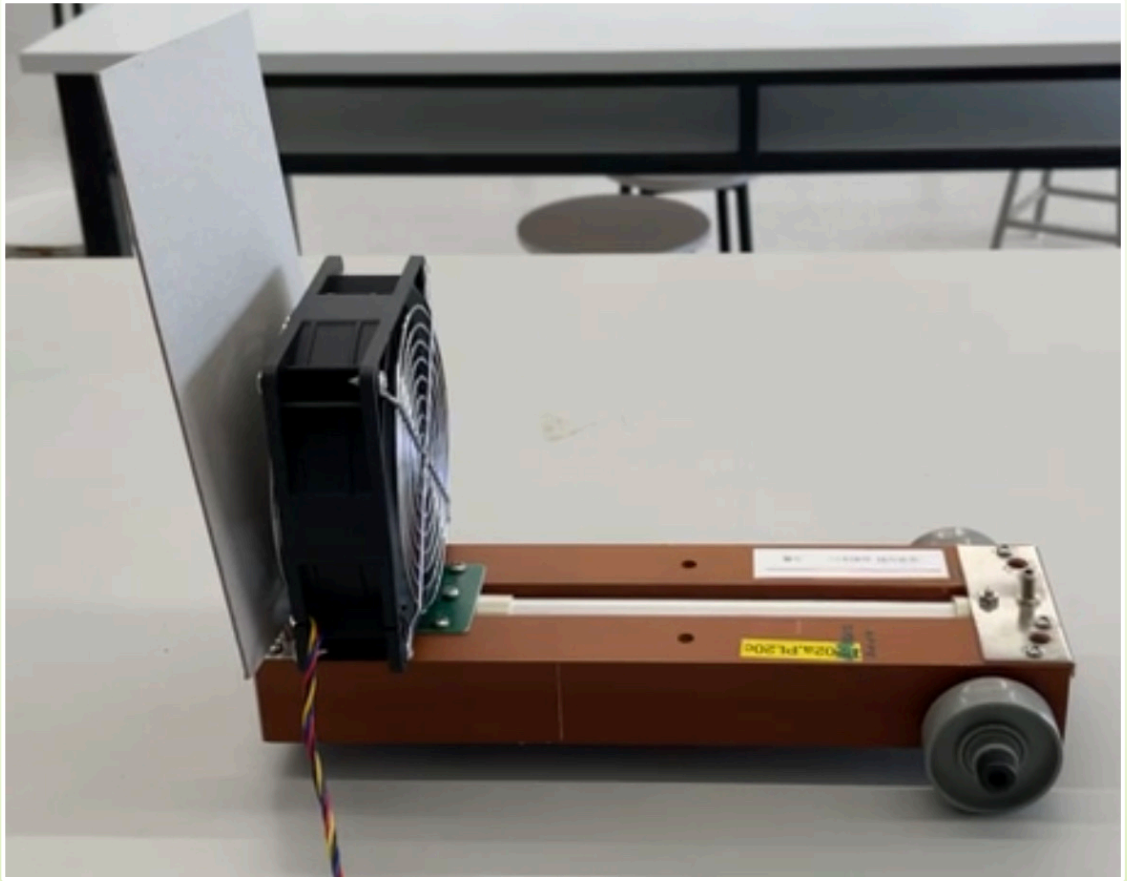


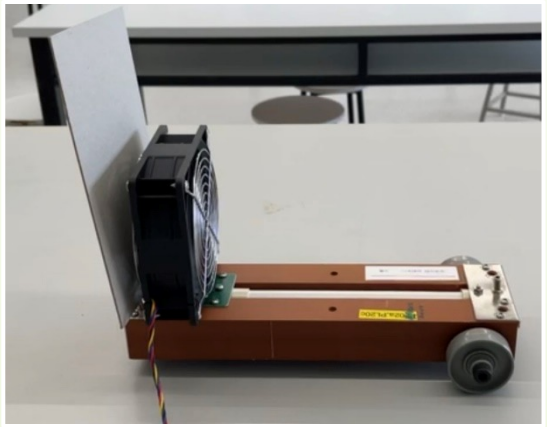
1st:

Unexpected observation

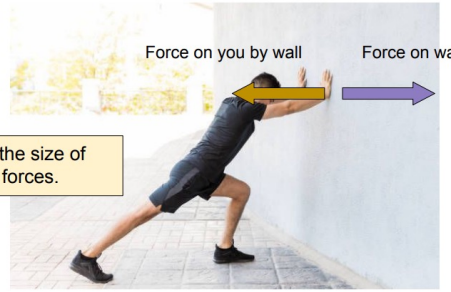
As an **anchoring phenomena**, instead of a verification of a concept

Arousing students' interest and motivate them to ask **why**

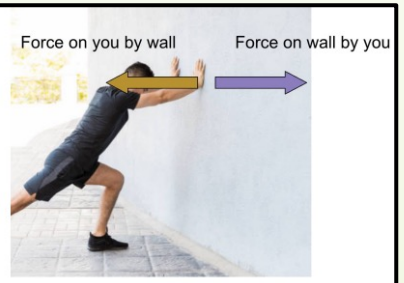
Design of scientific inquiry activities



Pushing the wall - how do you feel?



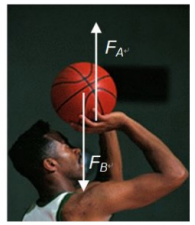
Features of action-reaction pairs



- Equal in magnitude (same size)
- Opposite in direction
- Between two objects

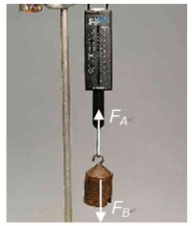
(Force on ***A*** by ***B*** and Force on ***B*** by ***A***)

Action-reaction pair or not? Why?



F_A = force acting on the ball by the player

F_B = weight of the ball

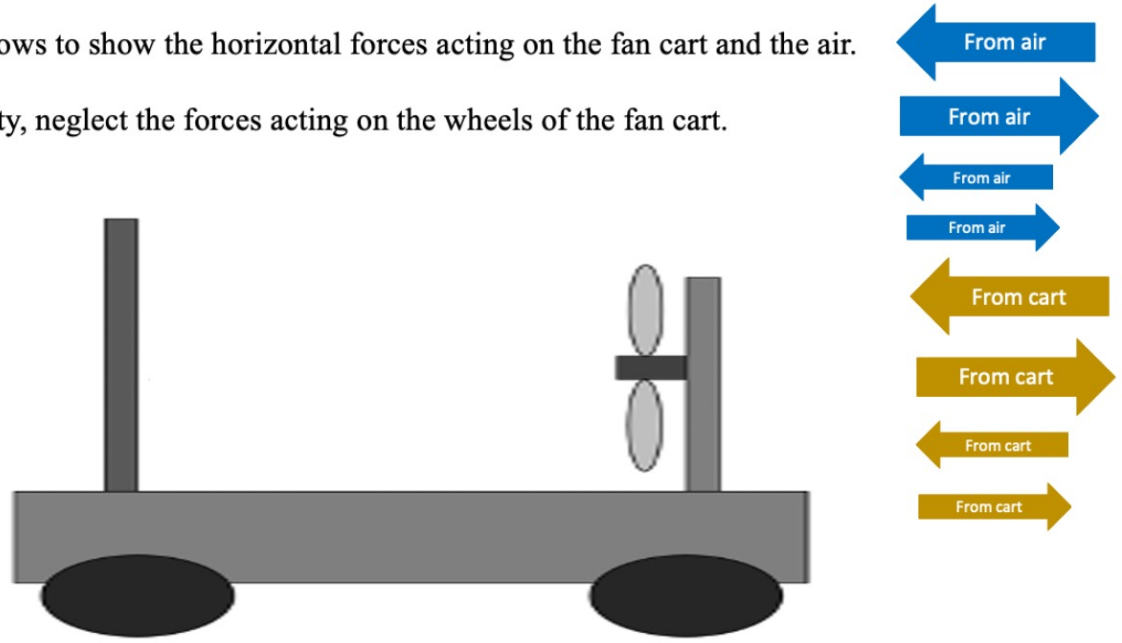


F_A = tension in the string that holds the object

F_B = weight of the object

Drag the arrows to show the horizontal forces acting on the fan cart and the air.

For simplicity, neglect the forces acting on the wheels of the fan cart.



Design of scientific inquiry activities

Alternative?

Conditions necessary for photosynthesis

Verification of the fact

Consolidation / Extended understanding

Construct a model to propose how the food is formed in photosynthesis by dragging the atoms provided below.

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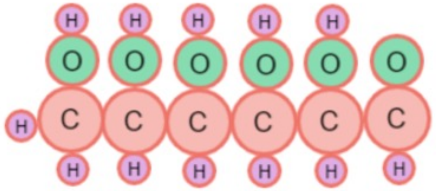

$$\text{carbon dioxide} + \text{water} \xrightarrow[\text{chlorophyll}]{\text{light}} \text{carbohydrate} + \text{oxygen}$$

Introduced as a fact

Design of scientific inquiry activities

Conditions necessary for photosynthesis

Investigating the conditions

Making sense with the investigation results

Construct a model to propose how the food is formed in photosynthesis by dragging the atoms provided below.

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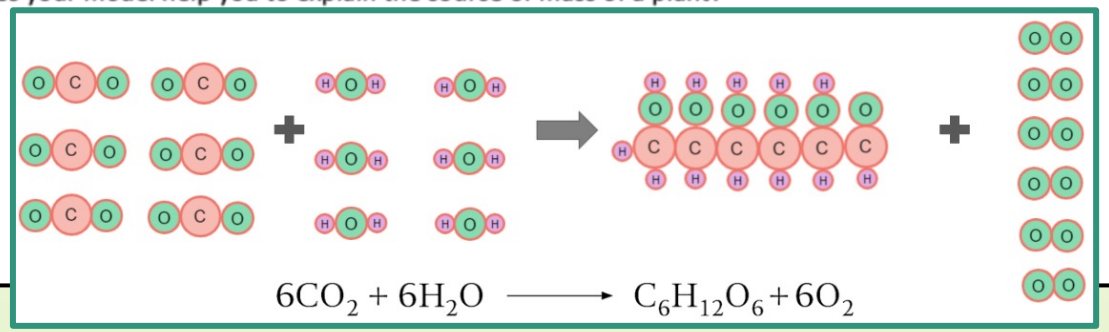

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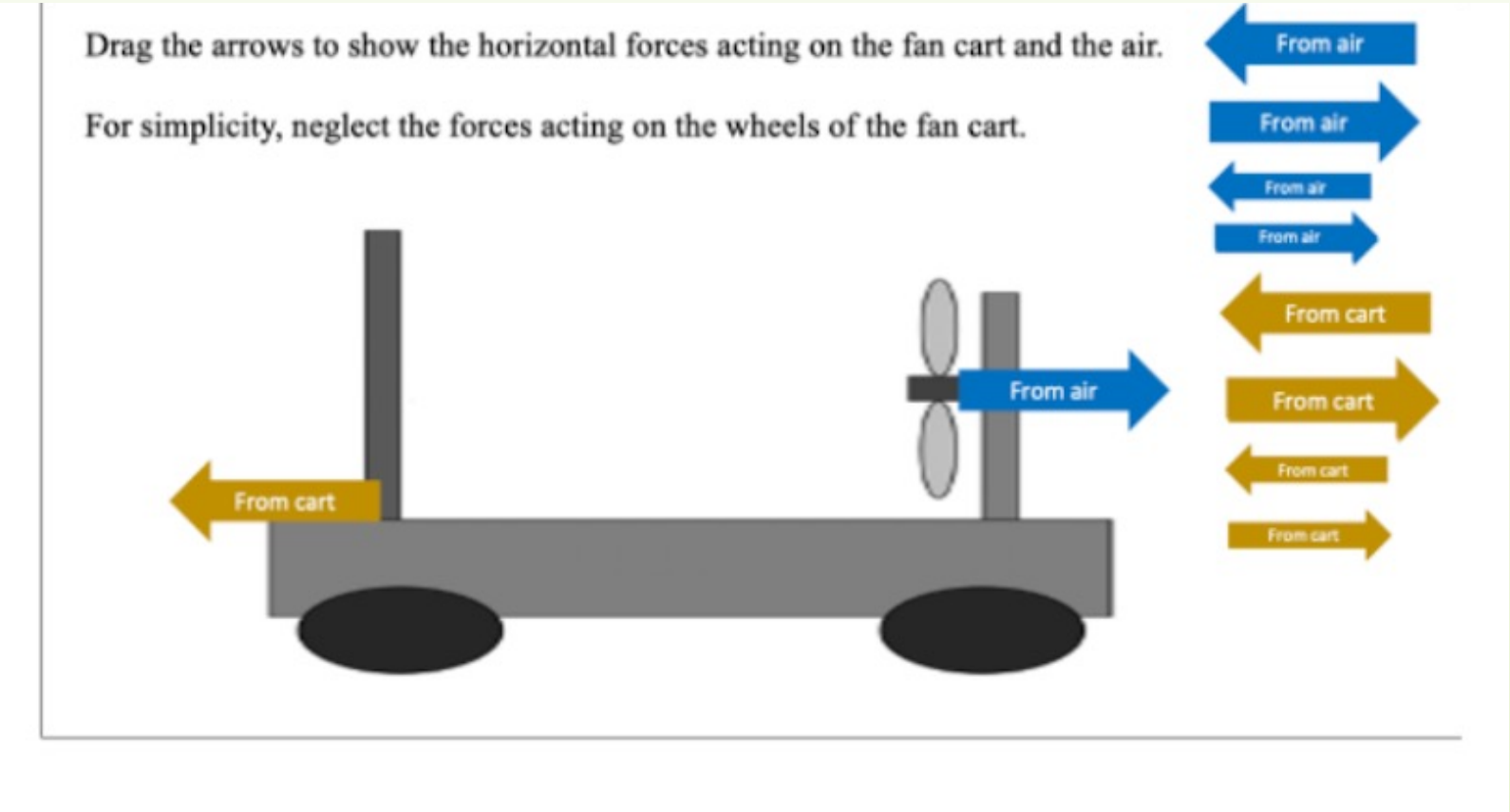
Reaching a consensus

Teacher's assumptions and scaffolding



A student work

- Are students able to consider the cart, the fan, and the board as one system?
- Do students really understand what "From cart" and "From air" mean?
- Do students remember/ understand that ***at rest*** means ***no unbalanced force***?
- Are students confused with the terminology "**card**board" and "**cart**"?

How do my practice and beliefs about teaching change before/after the project?

	Before the project	After the project
My view toward alternative conceptions	Ideas to be **corrected** and **clarified**	**Opportunities** for understanding and learning
My design and sequence of scientific inquiry activities	Practical work and scientific inquiry activities mainly as **verification** of concepts	Make use of **anchoring phenomena** and **inquiry-based approach**
My assumptions in teaching and scaffolding for students	May have wrongly **assumed** students have certain understanding → become **obstacles** to learning	More **attention** to and **prediction** of the obstacles that student may face Provide **appropriate scaffolding** and **instructions** to students

Thank you!

Please feel free to contact me at:

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