“Promoting the Use of Educational Technology in Learning and Teaching in Science (S1-3)”

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Project details
Project Details

Topic:
S3 Biology – Digestion of starch
- Explain the needs of digestion in humans in terms of the type of substances to be absorbed.
- Distinguish between mechanical and chemical digestion.

DragGame e-learning activities
Classroom dialogue without using DragGame e-learning activities
Key Questions to students

1. What is the importance of digestion?
2. What happen to food substances in mouth cavity?
Dialogue Flow

1. What is the importance of digestion?

2. What happen to rice in our mouth cavity?
   - broken down into smaller pieces physically.

3. Anything else happen?
   - Tastes something sweet (a new substance is formed.)

4. What is the new substance formed? How to test it?
What can students learn from the above dialogue?

- Break down of large food substances into small food substances by physical and chemical digestion

- Small food substances = new chemicals → sugar, supported by the sweetness taste and the evidence from the tests
Reflection on students’ learning outcome

Students may not know the changes at the molecular level, hence they may not know

polysaccharide $\rightarrow$ dissaccharides $\rightarrow$ monosaccharides
Examples of classroom dialogue using student-generated representations with different teaching purposes
Teaching purpose:
Extend students’ understanding to the molecular level & Apply the concept in different scenarios

From: Recognise the formation of sugar

To: Recognise under the aid of enzyme, how does sugar form and what kind of sugar is formed in the molecular view

polysaccharide → dissaccharides → monosaccharides
Design of the DragGame e-learning activity

1. Drag the monosaccharide particles to represent the process of breaking up of starch (polysaccharide) in the mouth.
2. Drag the word labels to relevant part.
Classroom dialogue for clarifying the representation of symbols/ supplementing prior knowledge

1. Drag the monosaccharide particles to represent the process of breaking up of starch (polysaccharide) in the mouth.
2. Drag the word labels to relevant part.

1. Brown symbol = enzyme
2. 1 circle symbol = monosaccharide
   vs
2 circle symbols = monosaccharide

Question: e.g.,
if you use 2 circles to represent a monosaccharide, how about disaccharides?
How many circles should we use?
Classroom dialogue for recognising the function/ features of enzyme

Question:
- e.g., Why would you arrange the circles inside the enzyme in this way?
- How do you find out what are the products in this digestion?
Let’s have a guess on how students’ thought~
Let’s have a guess on how students’ thought:

**Student A:** Diagram is about physical digestion

**Student B:** Diagram is about physical digestion
Classroom dialogue for clarifying students’ understanding on physical and chemical digestion

S: This diagram is about physical digestion. because chewing takes place in mouth cavity

T: Apart from chewing, anything else happen in the mouth cavity?

S: Starch turns into glucose.

T: Which type of digestion is it ?

S: Chemical digestion. But it looks like teeth, so i think it’s representing chewing.
Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only.

Chewing

Diagram showing digestion process.
Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only.
Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only.

**Macroscopic Level**

Chewing

**Molecular Level**

T: Can chewing break down a cup of rice into smaller pieces?

T: Is it possible to have only 1 polysaccharide in a bowl of rice?

T: Can chewing break down a long polysaccharide into a shorter one?
Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only.
Classroom dialogue for showing contradiction in their diagram and explanation, emphasising the diagram represents chemical digestion only.
Classroom dialogue for recognising the function/features of enzyme

Question:
  e.g., Why would you arrange the circles inside the enzyme in this way?
  How do you find out if disaccharide or monosaccharides are the product in this digestion?
Personal insights and Reflection

- **Drag Game design:**
  - Scientific concept accuracy VS Level of complexity of symbols
  - Simple but scientifically accurate symbols

- **Classroom dialogue:**
  - Choices of Ss’ works to fulfill lesson objectives
  - Scaffoldings

- Develop students’ understanding in molecular view by visualising the molecular structure

- Elicit students’ thinking effectively with oral and diagrammatic representation
Thanks!

Do you have any questions?

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