Lesson Plans

CMST Institute

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How Cells Obtain and Use Glucose Modeled with AgentSheets

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How do cells obtain and use glucose?

* **Can students use agent sheets to model the processes by which glucose is obtained and used?**

Why Agentsheets?

- Seemed to be the best choice for modeling biological processes.

- Allowed for relatively good physical resemblance of cell parts.

- Working with logic style programming statements will help students when they are learning logic in math classes.

ABSTRACT

- The Living Environment curriculum requires students to know how the cell membrane functions as a selectively permeable membrane It will allow certain substances to diffuse across while keeping others out. The substances are then to be used inside the cell. The cell also creates waste products that must be eliminated. Students need to know where inside the cell certain substance are used and/or produced. The problem chosen for this project involves glucose and oxygen that must enter the cell by crossing the cell membrane via appropriate parts of the cell membrane and then the cell must process the glucose and the oxygen. Students will investigate what can happen to the glucose once it is inside the cell. The students will build a model of intercellular and extracellular space separated by a cell membrane that functions by allowing for diffusion of molecules needed by the cell as well as molecules created as waste products within the cell. When the model is complete it should show movement of molecules in the direction of net movement of each specific molecule. The molecules include: Glucose, Oxygen, Carbon Dioxide and Water.

Goals

- Students will learn how the cell membrane functions to diffuse molecules into and out of a cell.

- Students will work with agent sheets to create a functioning model of how molecules related to respiration move into and out of the cell.

The *Agents!*
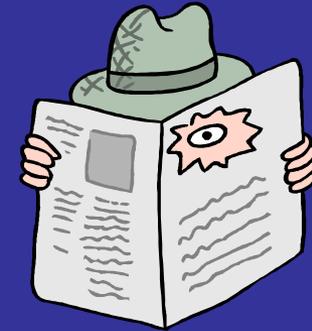
- **Glucose- Move into the cell to be stored or converted into ATP in the mitochondria.**
- **Oxygen-Enters body through cells and is needed for cellular respiration in the mitochondria**
- **Carbon Dioxide- Waste produced during cellular respiration must be eliminated in the lungs.**
- **Water- Waste produced during cellular respiration must be eliminated through lungs.**
- **Lungs- Bring needed gases into the body and excrete waste products of cellular respiration.**
- **Storage- When excess glucose is in the cell it must be stored, animals store glucose as glycogen.**
- **Mitochondria- Site of cellular respiration**
- **Maltose – Two glucose bonded together forms maltose.**
- **Glycogen- Many glucose bonded together form glycogen in animal cells.**
- **Cell Membrane – A phospholipids bilayer allows for diffusion for oxygen, carbon dioxide, and water into or out of cell.**
- **Channel Proteins- Allow for the diffusion of larger molecules such as glucose into and out of the cell.**

Students Learned

- First and foremost, students learned many of the functions of the cell membrane.
  - Diffusion across the phospholipid bilayer
  - Diffusion through the cell membrane using channel proteins
  - Respiration in the mitochondria
  - Storage of glucose as glycogen
  - Cell communication using receptor proteins
  - Interesting tid bits

THE END