EDUC 540 Technology in the Classroom

INTERACTIVE CONCEPT MAPPING WITH INSPIRATION

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A CELL THEORY LESSON

This lesson incorporates concept mapping into a lesson for 10th grade biology students using *Inspiration* software. Mapping flow charts and web diagrams can support critical thinking skills, and in this lesson, *Inspiration* helped me to engage the students as a whole class in this process, encourage participation and praise students immediately on their brainstorming, and facilitate interaction and collaboration. *Inspiration* also allowed me to print off the final creations in each block for an organizer to aid visual learners and provide notes for struggling students.

Introduction

- Cell Theory
- One 90 minute block
- VA Standards of Learning

Bio 1. The student will plan and conduct investigations in which
a) observations of living organisms are recorded in the lab and in the field;
l) alternative scientific explanations and models are recognized and analyzed; and
m) a scientific viewpoint is constructed and defended (the nature of science).

Bio.2 The student will investigate and understand the history of biological concepts. Key concepts include
a) evidence supporting the cell theory; and
e) the collaborative efforts of scientists, past and present

Learning Objectives

As a result of this lesson, students will be able to (SWABAT)….

- Make predictions based on observations of natural occurrences.
- Describe the three main tenants of the cell theory formed by the late 1800s.
- Interpret past, recorded observations of cells.
- Evaluate the evidence used to support scientific hypotheses of the nature of cells and the origin of life.
- Organize the discoveries made by various scientists which were used to develop the cell theory.
- Draw observations of cell parts from microscope field views.

Materials and Advanced Preparation

All the handouts needed for this lesson will be attached following the lesson plan. Other materials teachers and students will need, include:
A computer with Inspiration software
A projector screen or Smart Board
Compound Light Microscopes
Slides for mounting microscope specimens
Onion
Video, *Inner Life of a Cell*, or Internet access to watch the video at http://multimedia.mcb.harvard.edu/
Handouts

- Half sheet handouts on spontaneous observation (one per student)
- Visual artifacts including pictures of slides of what cell scientists saw and what tools they used (one per group)
- Worksheets on scientists (a copy for each student in that particular group)
- Compiled notes or big group worksheets (one per student)

*Pre-lesson set-up will be needed for this lab, including setting up microscopes, slides, and being sure the technology (computer, software, projecting devices) are present and working properly

Teaching and Learning Sequence

This portion of the lesson plan should be divided into the segments below. Each segment should contain a bulleted list of detailed steps. **Detail the amount of time that should be spent on each portion**. *Provide any student handouts used during the lesson or for homework purposes.

- *Introduction/Anticipatory Set* – The teacher will introduce the topic of cell theory by engaging students prior knowledge and painting a picture of 16th century life in which the history of western cell theory really takes its roots.
  - ⇒ (10 minutes) Using the **Inspiration software** and an overhead projector or Smart Board, the teacher will help the class begin a graphic organizer that will be built on throughout the cell unit, will serve as a guide for students' questions, and can be used for studying the major concepts related to cells. The class will discuss what they know about theories and the teacher will create points on the web using Rapid Fire. The teacher will explain that the cell theory is used to explain what cells are, what they do, and where they are from.
  - ⇒ (5 minutes) The students will then be asked where living things come from through a series of questions. Students should be able to identify that cows come from cows, and humans from humans, and so on through the process of reproduction. Students will then be given **half sheet handouts** to

read which will explain what observations led many people in Europe in the 15th and 16th centuries to believe lower life forms could appear from nothing, or from the right combination of materials (spontaneous generation). The students may think the observations are silly and fun to read about, but the teacher will explain that our ideas on how the natural world work change over time through the process of doing science, and someday people may look back and think many of our own theories today are silly considering the knowledge they have available.

- *Lesson Development* – Through this portion of the lesson, the students will explore how early scientists began changing this perspective through scientific observations of cells. Students will understand how the development of the microscope and the independent observations and experiments of various scientists led to the rejection of the theory of spontaneous generation and, over time, the proposal of modern cell theory. Students will learn about the collaborative nature of science by studying the contribution of several independent observations to a single overarching theory, while participating in their own collaborative learning experience. The students will also be given the opportunity to independently explore cells using the microscope.
    - ⇒ The students will participate in a jigsaw activity to learn and teach each other about the major findings of key scientists about cells during the 1600s and 1800s. There will be five folders in different locations around the room. The students will be divided into small groups, assigned based on readiness level for this particular topic. The groups will study Anton van Leeuwenhoek, Robert Hooke, Robert Brown, Rudolf Virchow, and Matthias Schleiden & Theodore Schwann. In each folder there will be pictures of the objects these scientists observed, tools, used, and actual view through the microscope they drew.
        - (5 minutes) The students will try to draw a conclusion about cells based on the **visual artifacts**.
        - (2 minutes) Then they will each read a fictional **newspaper article** from the scientists' time describing their biography, research, conclusions, and interesting/quirky facts.
        - (8 minutes) The students will complete differentiated **worksheets** that each ask for the scientists' origin, major experiment or observation, and contribution to our knowledge of cells. The will discuss the answers to more complex questions with one another in their groups.
        - (15 minute) The students will then form two large groups of four or five, with at least one person from each pair in each group. They will share their discoveries and help one another compete a **worksheet** that compiles the information for each scientist.
        - (5 minutes [or as needed to get everyone in the same place again]) As groups finish, the students will begin exploring the appearance of cells under a microscope through observing **onion** cells and cheek cells using a **compound light microscope**. The students will draw diagrams of the views they see just as the scientists they studied earlier in the lesson did in their own research.
    - ⇒ (10 minutes) The teacher will go over the worksheet with the class, asking for their answers and elaborating. The teacher will ask students to summarize their findings and from their explanations, the teacher will pull out the major three tenets of the cell theory. Students will have a chance to copy these into their notes. As the class is discussing each scientist, we will add them to our **Inspiration** graphic organizer.
    - ⇒ (5 minutes) As a class we will then watch a **video**, *The Inner Life of a Cell*, produced by Harvard researchers to show that cells are not stagnant and to introduce the structures and functions of cells that will be studied in later lessons as active organelles that are constantly involved in processes that make cells work.

    - ⇒ *Closure Outline* – The teacher will use the video to show the class on the **Inspiration** graphic organizer where the class is heading next in the unit. The teacher will include connections to cell structures, functions, and diversity. The teacher will also introduce a project the students will do to analyze how cell research has affected or been influenced by society in modern or historical times. As the unit continues the graphic organizer will be added to and elaborated on as the students are able to Rapid Fire (respond in group discussions) more with what they have learned about cells.

References

All lesson ideas and formats are my own. The jigsaw setup is a strategy that has been referenced by several of my college professors. All of the handouts used in the course of this lesson, I produced. The textbook used to create the reading materials is below, as well as the video being shown in the lesson.

Johnson, G.B. & Raven, P.H. (2004). *Biology*. Holt, Rinehart, & Winston.

Viel, A. (2007) *Inner Life of a Cell*. Harvard University. Retrieved at http://multimedia.mcb.harvard.edu/.