Lesson Plan: Cells, Science & Questions

**General Description**
This activity introduces students to asking questions. Students examine pictures and video of unknown cells and processes and develop hypotheses or explanations for what they see. In teams, students refine their guesses. This activity makes a good introduction to the course.

**Objectives**
1. Students should learn the names of some fellow students
2. Instructor should establish atmosphere of welcoming student input and questions
3. Students should learn the value of generating questions
4. Students should be able to propose educated guesses or hypotheses from observations

**Concepts**
1. Developing questions is central to the process of science.
2. Observations are primary in developing questions.
3. Being “right” is not the most important part of science.

**Time**
30-40 minutes depending on the amount of student discussion.

**Prerequisite Skills**
None

**Materials**
Student handouts
Cells overhead
Cells video or DVD
UTI Instructions: Cells, Science & Questions

Introduction:
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Procedure:
1. Briefly introduce yourself to the class.
2. Explain to students that an important part of science is generating questions based on observations. To practice this they will make some observations of several cells. Students should examine the first cell shown and make some observations about the cell, recording these observations in the left column on the handout. Then they are to suggest a function for the cell based on structure. Note that formal language (terminology) isn’t important. Also note that their suggestion doesn’t have to be correct, but does have to be thoughtful. Allow about two minutes for them to record their thoughts.
3. Students should then pair with someone they don’t know. They should introduce themselves, share majors, most recent vacation, etc. Then, students should share their thoughts or reasoning about function and make a best guess in tandem with the partner. This best guess and the associated reasoning should be recorded in the center column on the handout. Allow about four minutes for pairs to make a joint suggestion. Circulate around the room, observing the interactions in the pairs. Reward meaningful suggestions or contributions with attention and/or praise. If a pair appears to be done before the allotted time, encourage that pair to think of alternatives and the associated support for the alternatives.
4. Student pairs should then find another pair of students to repeat the process of sharing and decision-making about possible function. Again, the team’s best guess and the associated reasoning should be recorded in the right column on the handout. Allow about four minutes for the teams to make a final decision on function. Again, circulate around the room, observing the interactions in the teams. Reward meaningful suggestions or contributions with attention and/or praise. If a team appears to be done before the allotted time, encourage that team to think of alternatives and the associated support for the alternatives.
5. Randomly select a team to share their decision and reasoning. Ask if any particular observation was especially important. Record the student responses on the board. Ask the class if any teams reach another conclusion. Record these suggestions as well. Note any important observations in these conclusions. Reward all meaningful suggestions, even if you know that the suggestion is “wrong”.
6. Repeat steps 2-5 for each cell type. As the students become more familiar with the process, the time required for each step will lessen.
7. Direct student attention to the video clips (play the same clip continuously). Explain that these clips depict different processes of cells. Students should examine the first video clip and make some observations as they did previously. This time, they should suggest what activity is being depicted. Note that formal language (terminology) isn’t important. Observations and reasoning should be recorded in the left column.
8. Repeat steps 3-5 for the first video clip.
9. Repeat steps 7-8 for the remaining video clips. Stop the activity with about 8 minutes remaining. Students should reflect on the day’s activity using the printed questions as a guide. They do not have to respond to every question, but their responses should be thoughtful.
10. Collect handouts before students leave.
All the cells are shown with the relative dimensions they would have if magnified approximately 500 times.
Pre-Activity Worksheet: Cells, Science & Questions

General Description
In the activity you will do this week during your learning/discussion group, you will be examining different cells and relating their form to their function. In order to be prepared for this activity, complete this worksheet.

Reading
Browse the “Introduction to Animal Structure and Function” chapter in your text. Pay particular attention to figures 40.1, 40.2, and 40.4. Read the section on functional anatomy beginning on pg. 834.

Definitions
Write a definition of the following words. Use your text, textbook glossary, and your previous knowledge to create the best definition possible. Remember to connect your definitions to cells.

1) tissue

2) fiber(s)

3) blood

4) muscle

5) cartilage

Questions
Answer the following questions. You will explore your answers to these questions in-depth during learning/discussion group.

1) Which type of tissue is the most important in the human body? Why do you think this?

2) What is the most common type of cell in the human body? Defend your answer.

3) What features or properties differentiate organs from tissues?
### Cells, Science & Questions

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<th>your thoughts</th>
<th>partner thoughts</th>
<th>team thoughts</th>
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Thought questions: Do you feel that some questions are harder to answer than others? Why or why not? How important do you think questions are in the process of science? What strategies do you think scientists could use to develop questions? Did each group you worked with think in the same way? Were there questions or observations that you felt unsure about? How did you resolve any disagreements within your different groups?

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Demonstrate your new understanding of cells by answering the following question:

Many biologists characterize cell and molecular biology as “structure equals function”. In the context of the cells you examined today, is this an appropriate characterization? Defend your answer in four or five sentences; specifically use the cells from today’s activity to support your answer.