Microscope

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BACKGROUND INFORMATION

Subject(s): Science

Topic or Unit of Study: Microscope

Grade/Level: 7

STANDARDS & ASSESSMENT

Standards:

NJ- New Jersey Core Curriculum Content Standards

- **Subject**: Science (2009)
- **Standard**: 5.1 Science Practices: Science is both a body of knowledge and an evidence-based, model-building enterprise that continually extends, refines, and revises knowledge. The four Science Practices strands encompass the knowledge and reasoning skills that students must acquire to be proficient in science.
- **Range/Grade Level**: By the end of grade 8
- **Strand**: B. Generate Scientific Evidence Through Active Investigations: Students master the conceptual, mathematical, physical, and computational tools that need to be applied when constructing and evaluating claims.

- **Cumulative Progress Indicator**: 5.1.8.B.2 Gather, evaluate, and represent evidence using scientific tools, technologies, and computational strategies.

Assessment Plan:

Teacher observation.

Class participation.

Mastery of microscope parts and function quiz.

Assessment/Rubrics:

IMPLEMENTATION

Goal(s):

Students will demonstrate the proper use of a microscope.

Students will be able to identify the parts of a microscope and explain their functions.

Students will understand lab rules associated with the microscope.

Objective:

The student will understand the importance of the
microscope to science and how it relates to everyday life.

Using microscopes students will learn proper use and name all parts—students will use a diagram to label a microscope and describe the function of all parts.

The student will learn lab rules associated with the microscope.

**Purpose:**

The purpose of this lesson is for the student to understand how technology has helped scientists to see the "invisible world".

The purpose of this lesson is for the student to learn how to use a piece of technology that will be used to comprehend more about the living world.

**Procedure:**

**Warm up question:**

"How has technology helped us see the "invisible world"?"

**Introduction:**

"How have microscopes helped us to learn more about life?"

Answer: "Scientists would not be able to study the invisible living world without the aid of microscopes."

**Developmental Activities:**

Microscope Basics Power Point displayed on the White Board.

Students will have a copy of the Microscope Basics Power Point handout for the lab activity.
Light and Electron Microscopes.

"Scientists today use two kinds of microscopes: light and electron microscopes."

Magnification and Lenses.

"The first property, magnification, is the ability to make things look larger than they are. The lenses in light microscopes magnify an object by bending the light that passes through them. If you examine a hand lens, such as the one on your lab table, you will see that the lens is curved, not flat. The center of the lens is thicker than the edge. A lens with this curved shape is called a convex lens. The light passing through the sides of the lens bends inward. When the light hits the eye, the eye sees the object as larger than it really is."

"Who can describe what happens to light rays as they pass through a convex lens?"

Answer: "Incoming light rays bend as they pass through a convex lens."

Compound Microscope.

"A compound microscope has two convex lenses. Since a compound microscope uses more than one lens, it can magnify an object more than one lens by itself. Light passes through a specimen and then through two lenses. The first lens, near the specimen, magnifies the object. Then a second lens, near the eye, further magnifies the enlarged image. The total magnification of the microscope is equal to the magnification of the two lenses multiplied together. For example, suppose the first lens makes an object look 10 times bigger than it actually is, and the second lens makes the object look 40 times bigger than it actually is. The total magnification of the microscope is 10x X 10x, or 400x."

Calculating: "If one lens has a magnification of 10x, and the other lens has a magnification of 10x, what is the total magnification?"
Answer: "100x"

Resolution.

"To create a useful image, a microscope must also help you see individual parts clearly. The ability to clearly distinguish the individual parts of an object is called resolution. Resolution is another term for the sharpness of an image. Good resolution is needed when you study cells."

Electron Microscopes

"The microscopes used by early researchers were all light microscopes. Since the 1930's, scientists have developed different types of electron microscopes. **Electron microscopes use a beam of electrons instead of light to produce a magnified image.** Electrons are tiny particles that are smaller than atoms. Electron microscopes can obtain pictures of extremely small objects--much smaller than those that can be seen with light microscopes. The resolution of electron microscopes is much better than the resolution of light microscopes."

"What do electron microscopes use to produce magnified images?"

Answer: A beam of electrons."

Lab Activity

This activity involves two parts: Rules for using the microscope and microscope basics lab task card.

Students will work with their assigned lab partner to label the parts of the light microscope and answer the questions about the microscope on the Microscope Basics lab task card.

Rules for using the microscope.

"Please take a look at the handout labeled Rules for using the microscope. We will go over the rules together."
"Thank you. Are there any questions? Does everyone have a clear understanding of these lab rules?"

"Please look at the image on the White Board of the parts of the microscope. Please look at the Power Point handout labeled Microscope Basics. We will now answer question #s1-12, the parts of the microscope, together. Once we are finished, you will work with your lab partner to answer questions 13-20."

"You will have 20 minutes to work on this lab activity. I will come around to each lab team to help you and answer any questions that you may have. Please get to work, thank you!"

**Conclusion/Closure:**

"What does a microscope enable people to do?"

"What is magnification?"

"Contrast the way light microscopes and electron microscopes magnify objects?"

**Exit Card:**

"A compound microscope has two lenses. One lens has a magnification of 10x and the other lens has a magnification of 40x. What is the total magnification of the microscope?"

Answer: "400x"
Special Needs Component
[modification(s)]:

Work with a buddy or partner.

Extra time and appropriate help to complete the assignment.

Monitor and check student work prior to completion of assigned task.

Provide frequent feedback, praise, and motivation to keep student on task and focused on assignment.

Modified quiz with word bank.

Sample Student Products:

Attached.

Model(s) of Instruction:

Discovery/Inquiry learning.

Direct instruction.

Time Allotment:

1 class period. 45 Min. per class.

Author's Reflection(s)/Critical Analysis:

On Wednesday, March 16th, I taught a science lesson on the proper use, parts, function, and lab rules associated with the microscope to Mrs. Lichtenstein's 7th graders at the Jordan Road School. I think that this lesson went very well. I was prepared, and the students were focused on what they were supposed to be doing. One of the most successful measures of the lesson was the high level of engagement shown by the students. They did an excellent job in sharing their answers and thought processes and answering the questions posed by me.

During the explanation portion of the lesson, I was successful at demonstrating the activity and instructing the students to focus on the lesson. My questions ranged from simple one to two word answers to more comprehensive questions that required a higher level of thinking on the students' parts. The wrap-up activity was meaningful for the students, and concluded the lesson by reinforcing the concepts that were introduced.

As I look back and reflect, one of the main ideas that I have learned about teaching is that all the theories and...
activities planned look absolutely great on paper. Yet, they do not translate as nicely to the classroom. Creative ideas that I assumed would be a great learning tool for the students sometimes end up not working or taking too long, negating the educational benefits of the lesson. What appears great on paper, doesn't always translate well in practice.

It is hard, as a science teacher, to break from the teaching mold from which you came from. I went through my education taking notes and listening to lecture. I am cognizant of the fact that lecture is not an effective means of teaching, yet breaking from the mold is easier said than done. The use of visual aids, such as graphic organizers, helps students with the abstract concepts of the lesson, and students show improved comprehension through their own personal applications.

One area of lesson planning that I need to remain cognizant of, is to avoid trying to cover too much material in a single class period. With this in mind, I thought the lesson plan was well written and consistent with curriculum standards. It is my goal, as a teacher, to be clear and consistent in my lesson planning and execution. I feel that it is important, at the beginning of the lesson, that the students have a clear understanding of the lesson objective and what is expected of them.

Working with Mrs. Lichtenstein, we rearranged the classroom seating to accommodate the technological needs of the lesson. The lab tables were set up as a large rectangle facing the center of the room. This arrangement worked out very well as instruction could easily take place and everyone could see without obstruction.

Overall, I am pleased with how successful the lesson was. Although there is always room for improvement, the students were engaged and learned the important elements of the microscope. I have also come to understand that effective teachers need to constantly review the information being given to students, I noticed that students do not process and internalize the new concepts on day one. Therefore, there always needs to be reinforcement of knowledge on a regular basis.
MATERIALS AND RESOURCES

Instructional Materials:

- Rules for using the microscope handout.
- Microscope Basics lab task card.
- Microscope Basics Power Point handout.

Resources:

- Materials and resources:
  - Paper
  - Pencils
  - Microscopes
  - Microscope Basics Power Point.
- Technology resources:
  - PowerPoint
- The number of computers required is 1.