Lesson Plan with Technology Integration

Teacher Name: Justin Brittle
Lesson Title: The Electromagnetic Spectrum – Waves of Energy
Target Grade/Subject: 7th grade Physical Science
Length: 2 90-minute block periods

VA SOL: PS.9 – The student will investigate and understand the nature and technological applications of light. Key concepts include:
   a) the wave behavior of light (reflection, refraction, diffraction, and interference);
   b) images formed by lenses and mirrors; and
   c) the electromagnetic spectrum.

Essential Questions:
• What are the characteristics of this type of radiation (wavelength, frequency, key facts)?
• Where is this type of radiation located on the electromagnetic spectrum in relation to other kinds or radiation? What properties of the wave define why it is found within this area of the spectrum?
• How is it used or found in our everyday lives or in certain industries?

Objectives:
• Students will identify the seven types of electromagnetic waves classified on the electromagnetic spectrum, and recognize they are organized according to their wavelengths.
• Students will examine how each of the types of electromagnetic radiation is used or found in our everyday lives.
• Students will develop a script and produce a video that demonstrates their knowledge of the properties of the electromagnetic spectrum and its relevance to our everyday lives.

Tools and Resources
• Computer with Internet access
• Research materials on the electromagnetic spectrum (articles, magazines, books, textbook readings)
• Poster or picture of the electromagnetic spectrum
• The Electromagnetic Spectrum Tutorial
• Video camera

Preparation
Technology/Classroom Arrangement and Management Strategies:
• Regular classroom setting with Internet connectivity.
• Additional research materials available such as articles, magazines, books, encyclopedias, and textbooks.
• Groups of three or four students depending on class size.

Prerequisite technology skills needed by students:
• Basic Internet skills to use a search engine.
• Word processing, spreadsheet, or presentation skills to create and manage notes.
• Working knowledge of iMovie (or similar software) to produce a short video.
Lesson Development
Focus and Review of previous work/knowledge:

- Prior to this lesson, students should have an understanding of the two kinds of waves that exist in nature: compression (or longitudinal) and transverse waves. They should be able to identify the characteristics of each wave and how they differ.
- Begin by asking students what they know about transverse waves and compression waves. Work with students to create a t-chart on the board and compare and contrast the two types of waves. Identify key concepts associated with each wave. It may be helpful to create this chart on transparency or chart paper for later reference and reinforcement.

Anticipatory set:

- What is radiation? What type of waves does the Sun transmit?
- Show students a short music video of the Electromagnetic Spectrum to get the energy and “juices” flowing about ideas for their videos.

Instructional Activity:

- Expand on introductory discussion to establish key concepts of electromagnetic waves or radiation. Students should make connection that electromagnetic waves are transverse waves and can travel in a vacuum such as outer space.
- Show a picture or diagram of the electromagnetic spectrum and discuss the seven main categories of waves.
- Explain that electromagnetic radiation is classified according to wavelengths and frequencies; however, they all travel at the same speed – the speed of light or 186,000 miles per second.
- Separate students into seven groups of three or four per group depending on class size. Each group is randomly assigned one of seven types of waves from the electromagnetic spectrum.
- Each group of students will start their research by using the Electromagnetic Spectrum Tutorial from which they should take notes of their assigned wave type.
- Students should continue to research to answer the guided questions using the Internet or other relevant resources. Students should gather “visuals” or props needed for their videos. Explain to students that groups must work together on their form of radiation and will be assessed not only on their information, but also on their specific contribution to the group.
- Each group should collect their information and write a script for an informative video.
- Once the group has written their script and collected their “visuals” they can begin production of their video. Each member must have a part in the video and all of the essential questions must be addressed.
- After all videos are produced, students will present videos to the class and posted to a class PBwiki page for student reference.

Guided practice and checking for understanding (student activities):

- Students will research the following questions and create organized notes so that they can prepare a script for a video.
- They should also collect related “visuals” from Internet or other sources to include in their video.
- What are the characteristics of this type of radiation (wavelength, frequency, key facts)?
- Where is this type of radiation located on the electromagnetic spectrum in relation to other kinds of radiation? What properties of the wave define why it is found within this area of the spectrum?
- How is it used or found in our everyday lives or certain industries? Identify and explain at least two uses.
Independent practice (student activities):
  • Student groups will work collaboratively to write the script, film, and produce their EM video.
  • Students will collect and/or create all props used as visuals during the video.

Closure:
  • Student groups will present their videos to the class.

Evaluation Procedure
Assessment of objectives:
  • Does the student show mastery of the essential questions and the electromagnetic spectrum?
  • Collaboration/group evaluation.
  • Student self-evaluation of their contribution to the group’s product.
  • Group video about assigned type of electromagnetic radiation.

Rubric:
  • Focuses on the students’ work including addressing the essential questions, developing an organized script, producing a good video, and other criteria.
  • Please see file “EM_rubric.xls.”