5E Lesson Plan

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| **Teacher:** |
| **Date:** |
| **Subject / grade level:** Science, Grade 8, Lesson #5 |
| **Topic:** Waves |
| **Materials:**  Computer, COSMOS Technology Toolkit, Science Textbook |
| **Essential Question(s):**  How has technology changed the way we communicate? |
| **Standards (NGSS):**  MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.     |  |  |  | | --- | --- | --- | | **Science & Engineering Practices (SEPs)** | **Disciplinary Core Ideas (DCIs)** | **Crosscutting Concepts (CCs)** | | **Developing and Using Models**  Modeling in 6–8 builds on K–5 and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.  **Obtaining, Evaluating, and Communicating Information**  Obtaining, evaluating, and communicating information in 6-8 builds on K-5 and progresses to evaluating the merit and validity of ideas and methods. | **PS4.A: Wave Properties**  A simple wave has a repeating pattern with a specific wavelength, frequency, and amplitude. (MS-PS4-1)  **PS4.C: Information Technologies and Instrumentation**  Digitized signals (sent as wave pulses) are a more reliable way to encode and transmit information. (MS-PS4-3) | **Patterns**  Graphs and charts can be used to  identify patterns in data (MS-PS4-1)  **Influence of Science, Engineering, and Technology on Society and the Natural World**  Technologies extend the measurement, exploration, modeling, and computational  capacity of scientific investigations (MS-PS4-3)  **Science is a Human Endeavor**  Advances in technology influence the progress of science and science has influenced advances in technology (MS-PS4-3) |   **Common Core State Standards (CCSS):**  **SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.  **RST.6-8.9** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. |
| **Lesson Topic:** Digital Wave Signals  **Learning Target:** I will:   * Perform an activity to demonstrate the difference between digital AM transmissions and digital FM transmissions |
| **Differentiation strategies to meet diverse learner needs:**   * **Bodily kinesthetic learners** - Local and Express demonstration hands-on activity * **Audio and Visual learners** – Slide show, Visual representation of activity using computer, transmitter and receiver, The observations/data collected throughout the activity * **ELL/Low reader** - Guided notes printed for those who require them * **Technology**- Utilizing COSMOS Technology Tool Kit * **Extended time** for those who require it * **Small groups** according to levels, behavioral needs, and activity requirements |
| **ENGAGEMENT**   1. Discussion Question(s)   Do AM or FM radio stations sound better? Why?”   1. Teacher will use a short slide-show to explain about digital wave signals |
| **EXPLORATION**   1. Materials & equipment are set up on student’s desks. Students are in small groups & will assign roles to each other for the activity, e.g. note taker, reader etc. One student will read out loud from the handout and the group will perform the activity. 2. Activity: 3. Students will watch a digital video transmission using amplitude modulation AM and record their observations. 4. Students will repeat this procedure with a digital video transmission using frequency modulation FM. 5. Students will then make comparisons between the two videos. |
| **EXPLANATION**  After students complete their experiment there will be a discussion/share out with their observations and comments about their activities - facilitated by the teacher. Analyzing information collected on their handout and identifying any errors that may have been made and correct them. Explanation of digital signals using amplitude and frequency modulation and vocabulary words: *frequency, amplitude, modulation, amplitude modulation, frequency modulation,* are all clarified and strengthened. |
| **ELABORATION**  Students will extend their knowledge of analog wave signals by discussing the following question(s):  Digital wave signals have been illegally captured (robbed) on a regular basis in recent times. And it seems fairly easy for criminals to get around digital security measures. Should we then stop using digital signals? Should we go back to all analog signals? What do you think should be done? |
| **EVALUATION**   1. Teacher Observation 2. Correctly following procedures 3. Students complete the questions on their handouts |
| **HOMEWORK**  Research and write a short essay to explain how wireless technology works |