5E Lesson Plan

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| **Teacher:**  |
| **Date:** |
| **Subject / grade level:** Science, Grade 8, Lesson #4 |
| **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.

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| **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 toidentify 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 computationalcapacity 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:** Analog Wave Signals **Learning Target:** I will: * Perform an activity to demonstrate the difference between analog AM transmissions and analog FM transmissions
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| **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
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| **ENGAGEMENT** 1. Discussion Question(s)

Why do some radio stations sound better than others? 1. Teacher will use a short slide-show to explain about analog wave signals
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| **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 listen and observe the analog sound being played using amplitude modulation AM and record their observations.
4. Students will repeat this procedure with an analog sound using frequency modulation FM.
5. Students will then make comparisons between the two sounds
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| **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 analog 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): Do you think that the old radios your grandparents used were very reliable? Why or why not?  |
| **EVALUATION** 1. Teacher Observation
2. Correctly following procedures
3. Students complete the questions on their handouts
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| **HOMEWORK** Research and write a short essay to explain how technology has allowed farmers to increase their production yield in their crops over the last 5 decades.  |