Voyager's 15 Billion Mile Software Update

**** Basic **** Intermediate ****  Advanced

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| **Business/Materials** | **Lesson Objectives** | | | | |
| * YouTube video: "Voyager's 15 Billion Mile Software Update" (8:06 min) * Laptop/projector with speakers for video playback * Handout with vocabulary list and comprehension questions (prepared in advance) * Whiteboard/markers * Printed worksheets for guided practice * Role-play scenario cards (prepared with roles like NASA engineer, mission control, or journalist) | By the end of the lesson, students will be able to:   1. Identify and use 5-7 key technical vocabulary words related to space probes and software updates (e.g., telemetry, thrusters, memory, code). 2. Demonstrate understanding of the main ideas and specific details from the video through intensive and extensive listening activities. 3. Engage in interactive speaking activities to discuss and role-play scenarios related to Voyager’s software challenges, using key vocabulary. | | | | |
| **Warm-up and Objective Discussion (8 minutes)** | | | | | |
| * Activity: Start with a short discussion to activate prior knowledge. Write "Voyager Space Probes" on the board and ask: * Have you heard of Voyager 1 or 2? What do they do? * What challenges might engineers face when working with 50-year-old computers? * Show a picture of Voyager (from the web, if possible) to spark interest. * Explain the lesson objectives: "Today, we’ll listen to a video about how NASA updates Voyager’s ancient computers from 15 billion miles away. We’ll learn new words, practice listening for details, and discuss and role-play the challenges of this mission." | | | | | |
| **Instruct and Model** (10 minutes)[R, L] | | **** R | **** W | **** L | **** S |
| * Intensive Listening (Bottom-Up): Introduce 5-7 key vocabulary words from the video (e.g., telemetry, thrusters, memory, code, software update, FORTRAN, Assembly). Provide definitions and examples on a handout. * Example: "Telemetry means data sent from a spacecraft to Earth. For example, Voyager sends telemetry about its position." * Play the first 0:00-0:42 of the video (stop before "Just last year..."). Model how to listen for specific details: * "Listen for two programming languages mentioned. Write them down." (Answer: FORTRAN, Assembly) * Check answers and clarify pronunciation/meaning. | | | | | |
| **Guided Practice** (12 minutes)[L, W] | | **** R | **** W | **** L | **** S |
| * Intensive Listening (Bottom-Up): Play 0:42-1:27 (problems with Voyager’s thrusters and telemetry). Provide a worksheet with gap-fill sentences: * Example: "Voyager 1 started sending back \_\_\_\_\_\_ telemetry data about its orientation." (Answer: garbled) * Students listen and fill in the blanks. Replay if needed. * Speaking Activity: Pair Discussion (Top-Down): After listening to 1:27-2:33 (Voyager’s computer system and updates), students work in pairs to discuss: * "Imagine you’re NASA engineers. What would you say is the biggest challenge in updating Voyager’s code? Use at least 2 vocabulary words (e.g., telemetry, memory)." * Model a sample response: "The biggest challenge is fixing garbled telemetry because Voyager’s memory is so old." * Pairs share one idea with the class, practicing fluency. | | | | | |
| **Independent Practice** (15 minutes)[L, W, S] | | **** R | **** W | **** L | **** S |
| * Extensive Listening (Top-Down): Play 4:00-6:47 (how Voyager’s software works and updates). Students take notes on the main ideas: * How does NASA send updates to Voyager? * What is special about Voyager’s memory system? * Speaking Activity: Role Play: In pairs, students receive scenario cards with roles (e.g., NASA engineer explaining an update to mission control, or a journalist interviewing an engineer). Example scenario:   1. Engineer: Explain to mission control how you’ll fix a “bit flip” in Voyager’s memory using telemetry data.   2. Journalist: Ask questions like, “Why is Voyager’s code so hard to update?”   3. Students prepare a 2-minute dialogue using at least 3 vocabulary words. Pairs perform for another pair, who provide feedback on clarity and vocabulary use. | | | | | |
| **Assessment (10 minutes) [L, W, S]** | | **** R | **** W | **** L | **** S |
| * Intensive Listening (Bottom-Up): Play 6:47-7:40 (Voyager updates and patches). Provide a multiple-choice quiz (4 questions) to test specific details: * Example: What happened in 2010 to Voyager’s memory? a) A bit flipped from 0 to 1 b) The memory was full c) The computer shut down (Answer: a) * Speaking Assessment: In small groups (3-4 students), conduct a Discussion Circle. Each student answers:   1. "Why is it amazing that Voyager’s computers still work after 50 years? Use at least 2 vocabulary words."   2. Example response: "It’s amazing because Voyager’s memory and telemetry systems still work despite being 50 years old."   3. Assess fluency, pronunciation, and vocabulary use (based on a simple rubric: e.g., 1 point for fluency, 1 for vocabulary, 1 for clarity). | | | | | |