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 and independent practice | 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. Discuss the challenges of updating Voyager’s software and relate it to modern technology. | | | | |
| **Warm-up and Objective Discussion (10 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 and practice listening for details and big ideas." | | | | | |
| **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** (15 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. * Extensive Listening (Top-Down): Play 1:27-2:33 (Voyager’s computer system and updates). Ask students to answer open-ended questions in pairs: * What are the three main computers on Voyager responsible for? * Why did NASA rewrite Voyager’s code after Neptune? * Discuss answers as a class to ensure comprehension. | | | | | |
| **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? * Activity: In pairs, students write a short paragraph (4-5 sentences) summarizing how NASA updates Voyager’s software, using at least 3 vocabulary words from the lesson. * Speaking: Each pair shares their summary with another pair, practicing fluency and reinforcing content. | | | | | |
| **Assessment [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) * Extensive Listening (Top-Down): Ask students to write a short answer (2-3 sentences): * Why is it amazing that Voyager’s computers still work after 50 years? * Speaking Assessment: Call on 2-3 students to share their answers orally to assess fluency and comprehension. | | | | | |