Grade : 4th
Strategy : Predicting
Technique : Mind Mapping
Text Type : Science

What is a Spacewalk?

Aims of the lesson:

- To help students develop their ability to make predictions while reading about spacewalks and astronauts.
- To engage students with the narrative through critical thinking and connections to real-world scientific concepts.
- To foster a deeper understanding of the roles and experiences of astronauts.

Text for the lesson:

Any time an astronaut gets out of a vehicle while in space, it is called a spacewalk. A spacewalk is also called an EVA. EVA stands for extravehicular activity. The first person to go on a spacewalk was Alexei Leonov. He was from Russia. The first spacewalk was on March 18, 1965. It was 10 minutes long. The first American to go on a spacewalk was Ed White. His spacewalk was on June 3, 1965, during the Gemini 4 mission.

White's spacewalk lasted 23 minutes. Today, astronauts go on spacewalks outside the International Space Station. Spacewalks usually last between five and eight hours, depending on the job. The world record for the most spacewalks is held by Russian astronaut Anatoly Solovyev.

The astronaut Anatoly Solovyev spent more than 50 hours outside in space.

He has been on 16 spacewalks and spent more than 82 hours outside in space. That's almost 3 ½ days of walking in space! NASA astronaut Michael Lopez -Alegria holds the U.S. record for the most spacewalks. He has done 10 spacewalks and spent more than 67 hours. Why Do Astronauts Go on Spacewalks? Astronauts go on spacewalks for many reasons.

Spacewalks let astronauts work outside their spacecraft while still in space. Astronauts can do science experiments on a spacewalk. Experiments can be placed on the outside of a spacecraft. This lets scientists learn how being in space affects different things. Spacewalks also let astronauts test new equipment. They can repair satellites or spacecraft that are in space. By going on spacewalks, astronauts can fix things instead of bringing them back to Earth to fix. How Do Astronauts Go on Spacewalks?

When astronauts go on spacewalks, they wear spacesuits to keep themselves safe. Inside spacesuits, astronauts have the oxygen they need to breathe. They have the water they need to drink. Astronauts put on their spacesuits several hours before a spacewalk. The suits are pressurized. This means that the suits are filled with oxygen. Once in their suits, astronauts breathe pure oxygen for a few hours. Breathing only oxygen gets rid of all the

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nitrogen in an astronaut's body. If they didn't get rid of the nitrogen, the astronauts might get gas bubbles in their body when they walked in space. These gas bubbles can cause astronauts to feel pain in their shoulders, elbows, wrists and knees. This pain is called getting "the bends" because it affects the places where the body bends. Scuba divers can also get "the bends.

Process Phase 1: Planning (Teachers' perspective)
During this stage, the teacher prepares:

- The text "What is a Spacewalk?" for reading.
- Prediction activities and corresponding questions.
- Materials for journaling and group discussions.

Cognitive Stage 1 (Students' perspective)
Step 1: Initial Predictions
Activity:

- Present the title "What is a Spacewalk?" and ask students what they think a spacewalk entails based on the title alone.
- Encourage them to write down their predictions in their journals and be forewarned to share with a partner.

Process Phase 2: Vocabulary Exploration
Step 2: Vocabulary Building
Activity:

- Provide a vocabulary list: extravehicular, astronauts, surface, equipment, and mission.
- Ask students for their interpretations of these words and prompt them to think about how they connect to the story.

Cognitive Stage 2 (Students' perspective)
Step 3: Using Context Clues for Predictions
Activity:

- Read the text up to the point where it introduces Alexei Leonov's first spacewalk.
- Pause and ask the students to predict what will happen next:
    - Circle one of the predictions:
        - A. The second spacewalk will be longer than the first.
        - B. The astronauts can face various challenges.
        - C. Astronauts train in simulations for spacewalks.
- Discuss their choices as a class and compare predictions to the actual events.

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Process Phase 3: Exploring Emotional Responses
Step 4: Reflecting on the Experience
Activity:

- Once they learn about the challenges astronauts face, ask students to imagine how they would feel if they were in space doing a spacewalk.
- Prompt discussion using questions:
  - What gives them a sense of bravery?
  - What emotions might they be experiencing?
- Students write their reflections in their journals.

Cognitive Stage 3 (Students' perspective)
Step 5: Predicting the Importance
Activity:

- Discuss the significance of spacewalks in scientific research shared in the text.
- Have students predict how specific spacewalks contribute to future space exploration and technology development.
- Compose their predictions regarding the benefits of conducting experiments in space and how it might inspire future astronauts.

Process Phase 4: Concluding Predictions
Step 6: Alternate Endings and Future Impacts
Activity:

- As you read toward the conclusion of the text, ask students how they envision the impact of spacewalks on humanity and technological advancements.
- Challenge them to provide predictions on how future spacewalks could evolve and improve:
  - What innovations might come from these experiences?
  - What new challenges will astronauts face?
- Encourage students to write or discuss their predictions in groups.

Ways of Communication:

- **Interpretive** - Students interpret the meanings behind the text's content, relating it to scientific understanding and predictions.
- **Interpersonal** - Students engage in discussions with peers, enhancing communication and collaboration.
- **Presentational** - Students present their predictions and reflections, helping develop confidence in sharing ideas.

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