ACTIVITY TITLE: A Journey through the Solar System with VR

Activity code: ncMPT01

DURATION	120 minutes
AGE RANGE	11-12 y/o
TOPICS	ASTRONOMY SOLAR SYSTEM VIRTUAL REALITY

Description of the project

In this immersive STEAM activity, students will embark on a guided virtual journey through the Solar System using ClassVR headsets. The purpose of the activity is to introduce learners to astronomy in an interactive and visually engaging way, enhancing scientific literacy while integrating technology and art.

As students virtually explore planets, moons, and the Sun, they will listen to narration that highlights key characteristics of celestial bodies such as composition, temperature, atmosphere, and orbital distance. These scientific observations will be paired with reflection prompts that foster critical thinking and encourage students to draw creative connections between planetary features and their artistic representations.

The activity places particular emphasis on spatial scale, planetary order, and the role of observation in science. Through guided exploration, group discussion, and visual expression, students will also examine the historical and current contributions of women in space science—integrating gender visibility and inclusive thinking into the session.

By the end of the activity, students will:

- Identify the planets of the Solar System and explain their relative order, composition, and size.
- Understand the concepts of orbit, temperature variation, and planetary structure using immersive digital tools.
- Express their scientific observations artistically through a creative drawing task.
- Reflect on gender inclusion in space science by learning about female scientists and promoting

equity through group roles.

Objectives: What will I learn?

- **Identify the planets of the Solar System and their correct order** by engaging in a guided VR exploration, to develop foundational astronomy knowledge that supports further scientific learning.
- **Describe key planetary characteristics** such as distance from the Sun, temperature, and composition by completing structured observation worksheets during the VR experience, to **compare celestial bodies and understand environmental diversity in space**.
- **Learn to apply observation and descriptive skills** by interpreting visual information during the immersive simulation, to enhance scientific thinking and accurate documentation practices.
- **Learn how Virtual Reality can function as a scientific and educational tool** by using ClassVR headsets to explore planetary environments, to develop digital literacy and confidence with emerging technologies.
- **Apply critical thinking, creativity, and empathy** by immersing in artistic interpretation and group discussion during and after the VR session, to develop holistic, socially aware perspectives on science.
- **Learn about the historical and current contributions of women in space science** by watching a short video and participating in reflection questions to promote gender equity and recognize the importance of diverse representation in STEAM fields**.**

Materials: What do I need?

1. **Provided by the teacher/institution:**
   - Charged and tested ClassVR headsets
   - Access to ClassVR portal with “Solar System” content
   - Prepared quizzes and printed worksheets (downloadable resources)
   - Projector (optional) for group discussion
   - Colored pencils or markers
   - A3-size paper for drawings and visual comparisons
   - Computers for research

2. **Provided by students:**
   - Pencil and eraser
   - Notebook or answer sheet

3. **Downloadable resources:**
   - Planet Chart template

- Profiles of female scientists
- Who gets to go to space
- Space Curiosities Quiz
- Space Curiosities Quiz answer sheet

Previous preparation

- **Introduce Purpose and Context**

  Begin by explaining the objective of the activity: to explore the Solar System using immersive Virtual Reality, combining scientific observation with artistic expression. Emphasize how this activity connects science, technology, and creativity to foster a deeper understanding of our place in the universe. Use the Space Curiosities Quiz to gather information about the knowledge of students about the theme.

- **Highlight Role Models and Equity Themes**

  Show a short 2–3 minute video on Mae Jemison or another female pioneer in space science. Use this moment to introduce themes of gender representation in STEAM. Ask:

  - *What challenges might women have faced in space science historically?*
  - *Why is it important that everyone sees themselves in STEAM roles?*

- **Activate Prior Knowledge**

  Conduct a brief classroom discussion or brainstorming session to recall what students already know about:

  - The names of the planets
  - Differences in temperature or composition
  - What "orbit" means
  - What Virtual Reality is and how it's used in real-life science fields

  Watch an introductory video about the Solar System to review planet names, differences in atmosphere, and orbital movement.

  Provide a short classroom explanation of what Virtual Reality is and how it is used in fields like education, medicine, and space exploration.

- **4. Organize Group Roles**

  Divide students into diverse, inclusive groups of 3–4 and assign rotating roles to ensure shared participation. Example roles:

  - *Navigator* (handles the VR headset)
  - *Recorder* (fills in the observation worksheet)
  - *Presenter* (shares group findings)
  - *Equity Ambassador* (ensures everyone's ideas are included and heard)

- **5. Technical and Material Setup**
- Charge and test all ClassVR headsets ahead of time.

- Load the "Solar System" experience from the ClassVR portal.
- Print and distribute:
  - Planet Chart Template
  - Profiles of female scientists
  - Who gets to go to space
  - Space Curiosities Quiz

RESEARCH

Have a look at these resources

Why This Matters – Context and Relevance

At first glance, learning about planets might seem like memorizing names and facts—but understanding the Solar System helps us make sense of Earth's uniqueness, climate challenges, and our future in space exploration. Today, space science is not only about astronauts: it brings together engineers, artists, programmers, scientists, and thinkers from around the world to explore the unknown.

In this activity, we will use Virtual Reality to journey through space as scientists, designers, and storytellers. The immersive experience allows us to examine planets from up close and imagine new futures for exploration—while also reflecting on who gets to explore, who is remembered, and why visibility in STEAM matters.

Real-World Examples: Why It's Relevant Today

- NASA uses VR training to prepare astronauts for weightlessness and complex repairs.
- Women like Mae Jemison and Alyssa Carson have challenged stereotypes and expanded the vision of who belongs in space science.
- Planetary scientists compare Mars and Earth to understand climate change and the possibility of sustaining life.
- Space artists like Chesley Bonestell used creative illustrations to inspire the first missions to the Moon.
- VR is used in museums and education to make space accessible even to those who can't travel or afford telescopes.

Key Questions to Spark Inquiry and Engagement

- What do we gain from exploring planets beyond Earth?
- In what ways does Virtual Reality change how we experience science?
- Why is it important to see diverse scientists—especially women—in space research?
- How can we represent scientific ideas using creativity and art?

- Which planet would you choose to visit or study—and why?

CREATE

Some things you need before beginning

Before you start creating your planetary artwork and completing your scientific observations, let's take a moment to discover why space exploration, and the science behind it is so powerful in both our daily lives and our future.

- Planets are not evenly spaced: The distances between them grow exponentially. For example, Mars is about 78 million km from Earth, but Neptune is 4.3 billion km from us!
- Venus is hotter than Mercury even though Mercury is closer to the Sun. Why? Venus has a thick atmosphere that traps heat, just like a giant greenhouse.
- Jupiter has 95 moons (and counting). Some of them, like Europa, might even have oceans under their surface.
- Space science helps us understand our own planet. For example, we study Mars to learn more about Earth's climate and history.
- Satellites and space technologies, originally developed for space missions, now help us with GPS, weather forecasting, and communication every day.
- Exploring the Solar System reminds us that we are part of something much bigger and that science helps us explore the unknown.
- Astronauts train with VR to prepare for spacewalks and practice in zero gravity.
- Scientists use VR to walk through Martian landscapes using data from rovers like Perseverance.
- Artists, designers, and engineers use VR to prototype everything from buildings to vehicles—without building them in real life first.
- For many years, women and people from underrepresented groups were excluded from space programs. Today, astronauts like Christina Koch, Jessica Watkins, and Sian Proctor are changing that.

Now, follow these steps

Step 1. Define Your Mission

- Now that students are familiar with the Solar System and have met key figures in space science, invite them to take ownership of their exploration. Ask teams to review their group roles briefly and recall one key fact about any female scientist they just learned about.
- Ask the following questions so each group reflect on:
  - Which planet are you most curious to visit first, and why?
  - What kind of data do you think will be useful to collect?

- Distribute the Planet Chart Template and explain how they will use it:
  - They'll research and document scientific features (distance, temperature, surface) from the chosen planet.
  - They´ll use the VR to see that planet.
  - They'll record their emotional response to each planet during the VR journey. This doesn't mean just saying "I liked it" or "it was cool." Instead, students will choose a color, shape, or symbolic image that represents how each planet *felt* to them. For example:
    – *"Jupiter felt chaotic, so I chose a spiral shape and red-orange color."*
    – *"Neptune made me feel calm and cold, so I drew a smooth wave and picked deep blue."*
    These emotional impressions will later inspire the artistic interpretation they'll create, showing how scientific facts and human feelings can come together to express knowledge visually. Encourage them to think of textures, moods, and metaphors—not just facts.
- Explain that each team will later transform one planet into a work of art and defend their interpretation, blending science and creativity.

Step 2. From defining your mission to virtual Solar Safari

- Each student takes a turn using the ClassVR headset to visit the planets in the guided Solar System journey (they will see all but focus on the one chosen in step 1).
- After each visit, students pause to observe, discuss, and record information in their Planet Chart Template. Then, they´ll research further information on the internet.
- The Data Analyst leads the group in documenting:
- Scientific observations: orbit, temperature, atmosphere, surface, moons
- Visual features: color, shape, textures
- Emotional response: as defined in Step 1 (e.g., using color, metaphor, or symbol)
- Encourage analytical reflection**:**
  - What patterns do you notice between planets?
  - How do their characteristics affect the way we imagine them?

Step 3. "Who Gets to go to space?"

- Teams will investigate and present findings about (use the worksheet "Who gets to go to space" to gather the information):
- How much does it cost to go to space? Include different types of missions (e.g., NASA astronaut, SpaceX tourist, Virgin Galactic).
- Who has actually been to space?
  - What is the percentage of women?
  - What regions or countries dominate space travel?
  - Are private citizens going to space more often now?
- What are the environmental impacts of space travel?
  - Carbon footprint of launches

- Space debris and its consequences
- Reusable rockets and eco-friendly innovations

- Reflect on:
  - Is space travel just for the rich?
  - How could we design a more inclusive and sustainable future in space?

Step 4. Plan Your Design – From Data to Expression

- Before beginning their artistic creation, groups complete a design planning sheet, in which they:
  - Choose a shape or pattern to organize their artwork. This could be:
  - A circle to show orbit
  - A spiral to show movement or chaos
  - A line of growing sizes to show scale
  - A symmetrical layout to show balance.
- Choose a quote, story, or achievement from the female scientist biography sheet they read earlier. They'll integrate this figure into their artwork through:
  - A written or visual reference
  - A symbolic tribute (e.g., using Mae Jemison's color palette, a constellation in the scientist's honor, etc.)
  - A brief written reflection: "What does her story add to our understanding of space?"
- Reflect on the accessibility and sustainability of space travel and relate it to their chosen planet (based on Step 3 research):
  - How is traveling to this planet a privilege for a few rather than an opportunity for all?
  - How sustainable would that trip be for the environment?
  - Then propose a solution: "How would you make traveling to this planet more accessible and sustainable?"

Step 5. Scientific-Artistic Synthesis – Create Your Planet Portrait

- Each group selects the planet they have been working on through the activity.
- The Creative Lead guides the group in creating a scientific-artistic portrait using A3 paper, collage materials, or digital tools.
- The artwork must include:
  - Key scientific facts from the Planet Chart Template
  - Emotional symbols and artistic elements (color, shape, layout)
  - At least one shape or pattern chosen in step 3 (a circle, a spiral, a line...)
  - Include cultural and gender elements by integrating:
    - A style or symbol inspired by a cultural space worldview (e.g., Mayan astronomy, Greek constellations)
    - A quote or contribution from a female space scientist (e.g., "Mae Jemison once said…")
- A visual or textual element that reflects their solution for making space travel to their chosen

planet more accessible and sustainable**,** based on their reflection in Step 4. This could be:

- A symbolic design (e.g., bridge, renewable rocket, open portal)
- A slogan or quote that promotes equity and sustainability (e.g., "Equal access to the stars" or "Green rockets for all")

COMMUNICATE

Now it's time to share your team's Planet Portrait and explain the story behind it, how science, emotion, art, and inclusion came together in your design.

Each group will present their artwork to the class or as part of a classroom gallery walk. The Presenter will explain:

- Why did your group choose this planet?
- What scientific data did you include—and how did you show it visually?
- What shape or structure did you use (spiral, symmetry, orbit, etc.) and what does it represent?
- What emotion did your group associate with this planet—and how did you express it through color, pattern, or layout?
- What cultural symbol or influence did you use—and why?
- Which female scientist did you include in your design—and how did her story inspire you?

After all groups have presented, in journals or on a digital form, students answer:

- What design decision most clearly communicated your emotion?
- What did you learn about expressing emotion mathematically?
- How could this kind of work be used in careers (e.g., design, psychology, communication)?
- How did different teams interpret the same planet differently?
- What was the most creative or surprising artwork you saw?
- How did gender, science, and culture appear in the artworks?

Optionally, photograph the final artworks and short captions, and create a physical gallery in the hallway or a digital class exhibition (via Padlet, Jamboard, or shared drive).

It is time to share!

Share your amazing work and inspire others!

#SolarSystemWithVR

- LinkedIn: https://www.linkedin.com/company/steambrace-project/posts/?feedView=all
- Instagram: https://www.instagram.com/steambrace_eu/
- X: https://www.instagram.com/steambrace_eu/

KEEP ON LEARNING

How can I make a similar project by myself?

- **Can you design your own fictional planet?**
- What would the surface, atmosphere, and temperature be like?
- What kind of creatures or robots could live there and what emotions would this planet make people feel?
- What shape or layout could represent the planet's mood or energy?
- **Can you make a space-inspired visual story or comic?**
- Use color, shape, and symbols to tell a story about someone traveling through your planet system.
- Could your main character be inspired by a real-life female space scientist?
- **Can you research a woman in space science from your country or region?**
- What did she study? What were her challenges?
- How could you share her story through an artwork, poem, or short video?
- **Can you use math and design to build a 3D planet model?**
- Try using recycled materials to build your planet.
- Use scale to compare the size to Earth or build the whole Solar System to scale!
- **Can you create a visual guide to "What emotions each planet makes me feel"?**
- Choose a format: a digital poster, mini-book, or drawing series
- Use color and shape to express the emotional side of each world
- **Can you create a short podcast or voice note about one planet and one woman who helped us learn about it?**
- What makes them interesting? How do they connect?

Which are other connected projects?

1. **Design a Mission Patch**

- Every space mission has a patch, like a logo with symbols that represent its goal.
- Design your own patch for a fictional or real planetary mission.
- Include:
  - Symbols that show the science of the mission (orbit, type of planet)
  - A color or shape that expresses the emotion or challenge of the mission
  - A tribute to a woman in space science (e.g., initials, silhouette, quote, star)
  - Add a short explanation of what each symbol or color means.

2. **Space Culture Podcast**

- Create a short audio episode (3–5 minutes) about:
  - One cultural belief or myth about space or planets (e.g., Aztec Venus, Hindu moon stories)
  - One scientific fact that relates to it
  - Your reflection: *"What does this story help us feel or understand about space?"*
  - Add a segment highlighting a woman explorer or scientist connected to this idea.

3. **"Draw the Invisible" – Visualizing Space Concepts**

- Choose one invisible space concept (e.g., gravity, time, vacuum, magnetic field)
- Create an artwork that tries to visually show what it would feel like if that concept could be seen.
- Use:
  - Lines to show force
  - Color to show energy
  - Shapes to express pressure, tension, or balance
  - Include a sentence explaining your choices—and one way this concept affects space travel.

4. **Interplanetary Coin Design**

- Imagine every planet had its own money or currency. Design a coin or bill that represents one planet.
- Include:
  - A scientific symbol or feature (e.g., volcano on Venus, rings of Saturn)
  - A cultural design from a civilization that studied the skies
  - A woman scientist from Earth whose name is on the coin
  - Reflect: *What would be "valuable" on another planet? What ideas are worth sharing across space?*

5. **STEAM Fashion from the Future**

- Design a space-themed clothing or costume item that represents your chosen planet.
- Use patterns, shapes, and colors based on:
  - Planet temperature or atmosphere
  - Cultural space art (e.g., Yoruba star maps, Japanese moon prints)
  - Gender-inclusive design—who gets to wear it? Why?
  - Bonus: Build a prototype with fabric scraps or draw it digitally!

LINKS FOR FURTHER INFORMATION

- **NASA Solar System Exploration**- *Official NASA site with facts, photos, and interactive models of planets and moons* - https://solarsystem.nasa.gov/
- **ESA Kids – European Space Agency** - *Fun and clear explanations about space, planets, astronauts, and satellites* - https://www.esa.int/kids/en/home

- **NASA SpacePlace** - *Games, articles, and activities about space science and technology*- https://spaceplace.nasa.gov/
- **NASA Women-** *Inspiring stories and interviews with women working in all fields of space science*- https://women.nasa.gov/
- **SciGirls (PBS) -** *Videos and role models to help girls explore STEM topics*- https://pbskids.org/scigirls/
- **Native Skywatchers -** *Projects that share Indigenous astronomy knowledge and sky interpretations*-https://www.nativeskywatchers.com/

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