



**Federation
University**



School
of Education

Virtual Reality

– what is its place in education?

- **A review of the Ballarat Science Teachers’ Professional Development session exploring Virtual Reality and its potential**
- **An opportunity to experience Virtual Reality as an educational tool with the FedUni IT student project ‘Moon Walk’ / ‘The EVA Experience’**

Bruce Schmidt and Chris Wines: School of Education, Federation University Australia

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This year is the 50th anniversary of the first Moon Landing, and this is the National Science Week theme for 2019

This was the impetus for planning which began in 2018 between the School of Education (Bruce Schmidt and Chris Wines) and the School of Science, Mathematics and Information Technology (Stephanie Davison and Evan Dekker), and the Ballarat Municipal Observatory and Ballarat Astronomical Society (Judith Bailey).

The Federation University Virtual Reality ‘Moon Walk’ experience started as a final year Federation University Information Technology students’ project in 2018, and was further developed by a second group of final year students in 2019

We are fortunate to have one of these students here today – **Wayland Bishop**

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The immersive virtual reality experience (VRE) that was developed by Bachelor of Information Technology students is on show today. Final Year IT students were asked to create an entertaining and educational VRE to celebrate the 1969 lunar landing. The VRE showcases some of the skills learned during studies in gaming technology including 3D modelling, texturing, game design and programming.

The goal for the Moon Landing VR experience is to be:

- an engagement tool (at Open Day, National Science Week etc)
- a science education experience and teaching tool (School visits, classrooms, teacher PL in Investigative Learning)
- a promotion of IT studies at Federation University
- a celebration of the Apollo 11 Moon Landing in July 1969 (held at Ballarat Observatory)

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The Science/STEM Teacher Network is an initiative of the School of Education (Science Ed) with the original research question being:

What is the effect of providing teachers with voice, agency and leadership when developing STEM units of work?

Ballarat Science and STEM Teachers' Network invites you to explore

Virtual Reality

1. International Space Station

2. Apollo 11

3. Moon Landing

Participants will explore these 3 VR experiences and share ideas for how these could best be used in a teaching program

Monday 1st April 2019

4.30-6.30pm

Ballarat Tech School


Albert St, Ballarat



Supported by BTS's Director Sofia Fiusco and Technical Support Albert Ferguson

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https://www.oculus.com/experiences/rift/1178419975552187/?locale=en_US
INTERNATIONAL SPACE STATION – Free Virtual Reality Experience (VRE)



MISSION:ISS

Mission:ISS
ESRB **3+** Ages 3+ ★★★★★ 869 Ratings

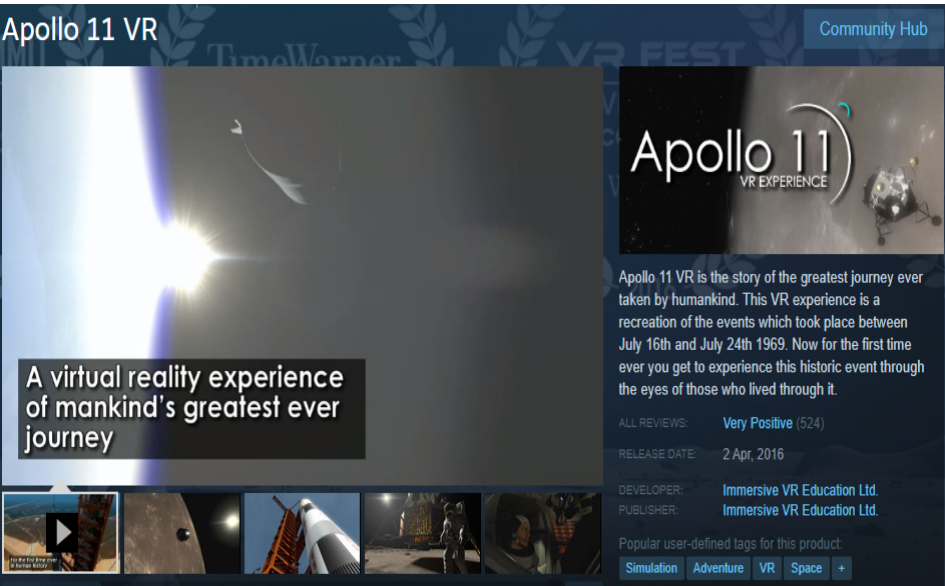
Take a trip into orbit and experience life on board the International Space Station! In this Emmy-nominated simulation, learn how to move and work in zero-gravity using Touch controllers. Dock a space capsule, take a spacewalk, and let real NASA astronauts guide you on the ISS through archival video clips.

Free

- + Add to Wishlist
- Share
- Comfort: Moderate**
- Supports Rift

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https://store.steampowered.com/app/457860/Apollo_11_VR/
APOLLO 11 - \$14.50 to buy this Virtual Reality Experience (VRE)



Apollo 11 VR

Community Hub

A virtual reality experience of mankind's greatest ever journey

Apollo 11 VR is the story of the greatest journey ever taken by humankind. This VR experience is a recreation of the events which took place between July 16th and July 24th 1969. Now for the first time ever you get to experience this historic event through the eyes of those who lived through it.

ALL REVIEWS: **Very Positive** (524)
RELEASE DATE: 2 Apr, 2016
DEVELOPER: Immersive VR Education Ltd.
PUBLISHER: Immersive VR Education Ltd.

Popular user-defined tags for this product:
Simulation Adventure VR Space +

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Federation University – Final Year Project: Information Technology students

This project was originally entitled **Moonwalk VR** during the 2018 development. Since the group in 2019 significantly updated and improved the project the name was changed to **The EVA Experience: An Apollo Celebration** to better reflect its purpose and content.



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Federation University – Final Year Project: Information Technology students

BACKGROUND: The EVA Experience: An Apollo Celebration

Name change

This project was originally entitled Moonwalk VR during the 2018 development. Since the group in 2019 would be significantly updating and improving the project the name was changed to The EVA Experience: An Apollo Celebration to better reflect its purpose and content.

The meaning of EVA.

EVA (Extra Vehicular Activity) is a term used in the space industry to denote any kind of activity performed by a human, that is performed outside of a vehicle, spaceship or otherwise not inside the Earth's appreciable atmosphere. This term has been used for both spacewalks performed in low earth orbit and the surface on the moon.

Project Overview

The EVA Experience is an interactive learning experience for all ages. The experience mainly focuses on being a useful tool for students and kids to use to experiment and discover what other planets are like according to today's science. The user will be able to do a range of activities and experiments which will produce similar results to real life. Students can use their experiences within the experience to build upon their knowledge of space.

The base experience which was created last year originally contained few experiments and was only based on the moon. We plan to expand this concept to mars and earth but also add a larger variety of activities to entertain the users thus creating a brand new experience.

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Federation University – Final Year Project: Information Technology students

BACKGROUND: The EVA Experience: An Apollo Celebration

Experiments: These can be conducted on the **Moon**, or **Mars**, or **Earth**

Interacting with the objects in the environment

Teleportation

Beam yourself to different locations

General object manipulation

Planet attributes

Explore different planets

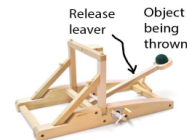
Every object in the experience that the user can interact with will develop a yellow glow when the user is capable of picking up or interacting with the item, this is achieved by simply approaching the object and extending one's hand to the object. Aside from picking objects up, actions may include pulling levers, adjusting controls, and more.

Drop Rig

The Drop Rig experiment consists of a rig to drop two objects simultaneously
You can also try the feather and hammer experiment from Apollo 15 (Galileo's exp't)

Catapult

Objects can be placed in the bowl by the user and launched by interacting with the release lever.



Balloons experiment

Balloons have H₂, CO₂, O₂, or He – what reaction will happen when you use a lighter on them?

Jenga game

Jenga blocks can be picked up and moved by interacting with (grabbing) the pieces

Laser Experiment

The laser experiment can be used to measure the distance between the Moon and the Earth using a laser beam

Federation University Flag

The Federation University Flag is present in all scenes and can be interacted with by the player. There are physics attached to the flag so that when moved they simulate movements similar to that of a real flag.

Golfing simulator

Practise your swing – how well can you hit the golf ball?

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When you try the VR experience, consider these prompts:

PLUS What are some of the positives about using this VR experience?

MINUS What are some of the problems and issues that may arise with this VR experience?

INTERESTING What is most interesting about this VR experience? Are there some other experiences that could be incorporated? What VR experiments might work well?

TEACHING and LEARNING

How would you use this tool as an educational experience for students?

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Feedback from the teachers' professional learning session at Ballarat Tech School

POSITIVES	ISSUES
Engaging Realistic Fun Sensory Experiential – depth of experience Feeling of weightlessness Experience what it is like to be an astronaut Lots of possibilities for T&L <ul style="list-style-type: none"> • Engage / Explore (inquiry phases) • Discussion development opportunities • Experiments and investigations Potential for VR in other areas e.g. exploring the human body	Motion sickness (ISS and Apollo 11) Needs to be interactive and have good graphics to keep students engaged Time <ul style="list-style-type: none"> • To get all students involved • Set up time • Learning how to use it • You can only be in the VR environment for a limited amount of time Logistics <ul style="list-style-type: none"> • Space required • Equipment for a full class • Technical expertise Sensory and information and cognitive overload

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Effects of ongoing VR use

Ballarat Tech School endorses a DET recommendation of a maximum of 20 minutes at a time for students to be in a VR learning environment.

The makers of the most popular VR headsets, the Oculus Rift and HTC Vive, recommend taking "at least a 10 to 15 minute break every 30 minutes, even if you don't think you need it." <https://www.businessinsider.com/virtual-reality-vr-side-effects-2018-3?r=AU&IR=T#nausea-4>

Possible issues that can arise:

- Loss of spatial awareness of the physical world that you are actually in
- Motion sickness – vertigo / nausea / dizziness / loss of balance
- Increased risk of seizures if you are prone to them – epileptic fits / dizziness, seizures, eye or muscle twitching or blackouts triggered by light flashes or patterns
- Eye soreness and trouble focussing – short-term eye strain while in VR is very normal, and very similar to the experience of looking at a computer screen or TV for too long
- It's different for everyone – some individuals experience no side-effects even with pro-longed VR experiences
- ABC 'Catalyst' presenter on VR, Dr Jordan Nguyen, is a visionary on the potential of VR. Nevertheless he found prolonged periods in VR caused fatigue requiring time to recover

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There are fundamental attributes to VR to be acknowledged for T & L: (Huang, Rauch & Liaw, 2010)

IMMERSION – mental (engagement) immersion and physical (or sensory) immersion.

INTERACTION - see and manipulate graphic objects, experience responses to actions in real time.

IMAGINATION – the VR environment can engage the mind creatively in problem-solving to address issues and situations

- **ACTIVE PARTICIPATION** – Virtual Reality enables experiential learning , learning by doing, active participation, Predict/Observe/Explain experiments
- **ROLE PLAYING** – e.g. be an astronaut!
- **PROBLEM SOLVING** – active cognitive decision-making is required to be involved in the different challenges, experiments and experiences

Huang, H.-M., Rauch, U., & Liaw, S.-S. (2010). Investigating learners' attitudes toward virtual reality learning environments: Based on a constructivist approach. *Computers & Education*, 55(3), 1171–1182. <https://doi.org/10.1016/j.compedu.2010.05.014>

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Thank you



<https://apod.nasa.gov/apod/ap190206.html>

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