TAFETalks 9 August 2023

Using immersive technologies to enhance learning

DEFINITIONS

Augmented Reality | AR

- Enhances the real world by overlaying digital information onto it
  - For example - MS Hololens or Smartphone AR

Virtual Reality | VR

- Immerses users into a completely virtual environment
  - For example - Oculus Quest 2

Mixed Reality | MR

- Combines the real and virtual worlds
  - For example - Apple Vision Pro or Quest Pro

POL

What is your organisation currently using VR / AR for, or plan to use it for?

- Soft skills training
- Hard skills training
- External conferences and events
- Internal team meetings and workshops
- Team bonding / wellness activities
- On boarding new employees
- Data visualisation
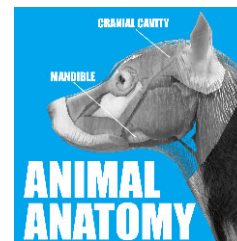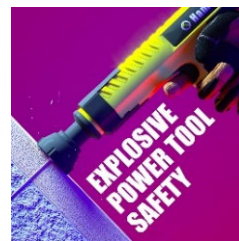- 3D design and reviews
- I don't know

TAFE NSW VR – QUEST APPS

5 VR applications (vignettes / tasters) developed across a variety of industries and deployed to Meta App Lab for (free) public use:

- Plumbing Safety

- Childcare Safety

- Explosive Power Tools Safety

- Personal Protective Equipment (PPE)

- Animal Anatomy

Available for use on any Meta Quest 2 / Quest Pro device

EXPLOSIVE POWER TOOLS

Explosive Power Tools (EPT) is designed to teach players **how to safely operate an EPT**, while avoiding dangers to themselves and others.

- Guided training process – players are **guided step-by-step through process** to safely use an EPT to fix timber to a concrete wall.

- Assessment mode – once guided training is complete, **players need to repeat the steps with no guidance** to test their knowledge.

TAFE NSW
AR LIVE DEMO
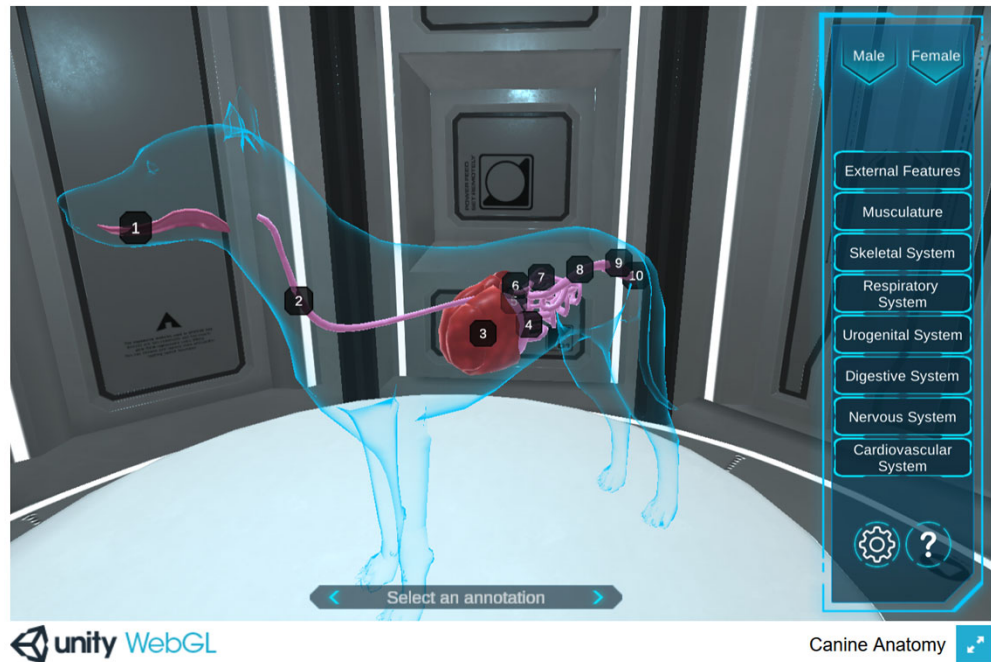
Scan the QR code to play along at home:

- QR code both a link and a tracking image

- Developed using Zappar

TAFE NSW IMMERSIVE 3D

3D WebGL canine anatomy explorer exportable as a SCORM package for embed directly in LMS:

- https://tafetstargimmersive3gmq.z8.web.core.windows.net/

- Developed using Unity and reusing resources from VR training module

POL

What challenges is your organisation currently facing regarding immersive technologies?

- Lack of awareness / understanding
- Technical deployment challenges
- Expected cost of deployment too high
- No challenges – we're seeing great results
- Others
- I don't know

**Immersive Technology Strategy -** a plan for the sustainable implementation of immersive technologies

- Guiding investment decisions
- Device, user and App management
- Knowledge aggregation and collaboration
- Capability building for educators
- Pilots

TAFE QUEENSLAND IMMERSIVE TECHNOLOGY

MAKE GREAT HAPPEN

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Foundation Program

- Apprentices enrolled in a range of trade areas

- High-risk safety courses

- Complementing units of competency & TQ course material

- Goals for implementation include:

  o Fulfilling learning objectives and assessment requirements

  o Simulating real-world scenarios otherwise difficult to replicate in a training environment

  o Improving learner engagement through increased mental stimulation and physical movement (90% feel more engaged)

VR for HARD SKILLS TRAINING
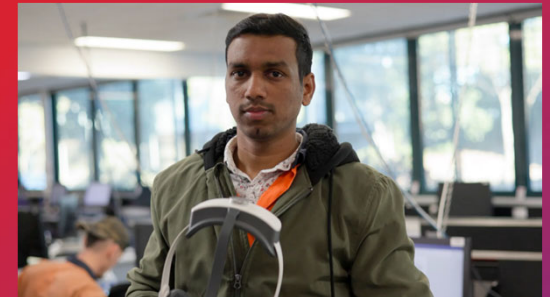
Virtual Business College

- Talespin immersive learning content
- Multi-platform (headsets and browser)
- Five modules for Cert III Business and Dip Business and Dip Leadership and Management
    - Communicating effectively, Customer relations and professional mannerism, Effective team consultation' Handling sensitive information, and Adaptability (OTS)

- Goals for implementation include:
    - Supplementing online learning materials with interactive and engaging experiences
    - Simulating role plays difficult to replicate with geographically dispersed students in virtual delivery model
    - Helping students prepare for practical observation assessments

VR for SOFT SKILLS TRAINING

AR Welding

- TQ first implemented in AR welding technology in 2019
- Currently have 44 units in various key locations
- Traditional welding training – time, expensive, emissions, high-risk
- Simulated welding via AR - safe, efficient and without time-limitation
- Beginners introduction to welding and re-training experienced Welders into the new ISO 9606 welding standard for future Defence and Advanced Manufacturing

AR for WELDING APPLICATIONS

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TQ World

- Engage XR metaverse for education
  - o Meets Information Privacy and security requirements
  - o Multi-platform (headsets and browser)
  - o Virtual classrooms and events

- For teachers
  - o Ability to stream pre-recorded video
  - o Interactive whiteboard
  - o Ability to control student avatars

- POC will showcase
  - o Study areas, integrating with the TQ website course information
  - o Student work (Gallery space and 3D models)

TQ WORLD A TRULY VIRTUAL CAMPUS

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CONSTRUCTION SITE SAFETY: WORKING AT HEIGHTS

Construction Site Safety: Working at Heights was an initiative commercially funded by icare NSW Injury Prevention in Construction (IPIC) Fund. The program goals were:

1. To improve the safety knowledge of apprentices

2. To increase apprentice safety awareness

3. To increase the confidence of teachers using VR technology, training apprentices using VR technology, and support continuing VR training in TAFE NSW

The program had a particular focus on preventing falls from heights less than 4m (majority of falls occur in this height range – Safework NSW data)

One of the best apprentice resources I have seen. Integrated the main causative factors and key messaging for falls in construction.

- Industry Stakeholder

KEY FINDINGS

87%
GAIN SAFETY KNOWLEDGE

The project **upskilled 38 teachers** across six campuses to gain skills in using and applying VR technology in an educational context. **332 students completed the online learning experience** (94% completion rate), and **163 students completed the VR experience** (100% completion rate).

Students and teaching participants **saw value** in the project, recognised VR as an **engaging and effective learning tool** and felt that **VR could be used more widely** for training.

VR enabled students to develop a **greater appreciation of risk** and the consequences of their decisions.

Students **improved their ability to identify worksite risks**, unsafe instructions given by others and gained safety knowledge required to inform safety conscious decisions.

Students reported improved safety work readiness and **positive changes relating to safety-conscious decisions such as risk taking, speaking up and reporting safety issues.**

Teaching participants **developed capability, increased confidence, and recognised the efficacy of VR** technology for training students now and into the future reporting willingness to participate in, and advocate for, incorporation of VR into existing delivery.

66

It's not until you actually do the virtual reality, and you see the danger – I ended up falling off the ladder and having that virtual episode where I caused injury to someone – that made me realise gee this is genuinely serious. The VR reinforced that I am not [in]fallible

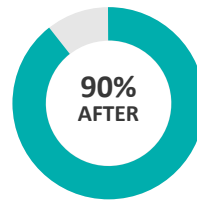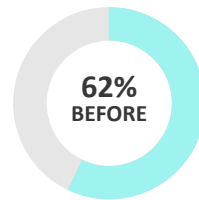- Apprentice D, Clear Horizon interview

STUDENT OUTCOMES

Both student End of Project Outcomes were successfully met:

- **87% of apprentices increased their WHS safety knowledge** by the end of the project

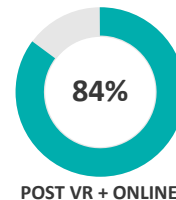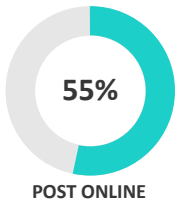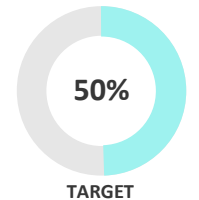- **84% of apprentices reported improved safety work readiness** by the end of the project
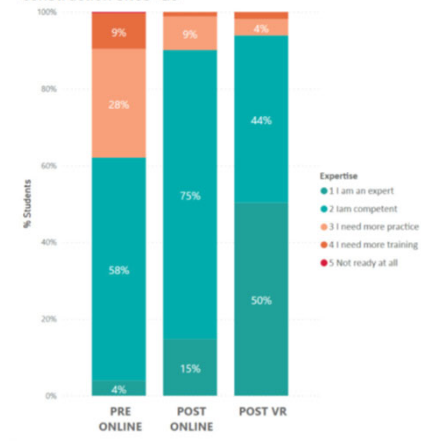
Identify work site risks

62% BEFORE | 90% AFTER

Identify unsafe instructions

68% BEFORE | 90% AFTER
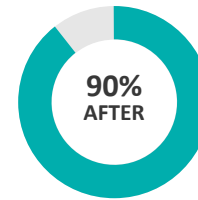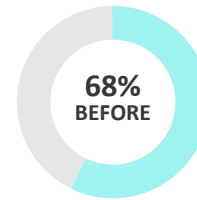
Report increased safety work readiness

50% TARGET | 55% POST ONLINE TRAINING | 84% POST VR + ONLINE TRAINING

Readiness to identify working at heights risks on construction sites-Q6

Expertise
- 1 I am an expert
- 2 I am competent
- 3 I need more practice
- 4 I need more training
- 5 Not ready at all

> ❝
>
> *When they fell off the ladder, off the scaffold... it shows them how real this could be... it's more than what we could show through just a video or reading notes. If you have a fall like that, you might not get up from that and that's what hits home. **Not only do you get to see and feel it [through VR], you get to walk away and try again** without having that sort of impact on yourself with an injury.*
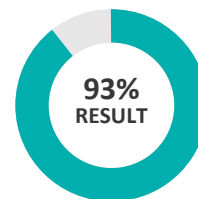>
> *- Head Teacher, Clear Horizon interview*

TEACHER OUTCOMES

Teaching participants developed capability, increased confidence and recognized the efficacy of VR technology for training students:

▪ **The confidence of teaching participants increased exponentially** after they had the received training and had the opportunity to practice with the equipment

▪ **Most participants immediately recognized the value-add** that VR learning experience could provide for students
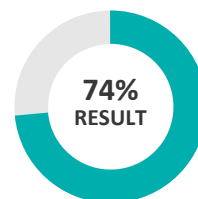
Participate in future VR rollout

50% TARGET   **93%** RESULT

Increased confidence using VR tech

70% TARGET   **93%** RESULT
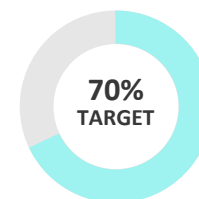
Advocate for VR rollout

50% TARGET   **74%** RESULT

Increased confidence training using VR

50% TARGET   **80%** RESULT

TAFE IMMERSIVE LEARNING NETWORK (TDA)

- Share knowledge and collaborate across TAFE sector to establish better practice

- Experience and evaluate various immersive technology platforms and HMDs to inform choice of technology platform

- Assist in the alignment and implementation of AR/VR technologies

Thanks!