New VR Study

This three-year project involved a partnership of leading researchers from QUT and industry experts from Next World Enterprises, with support from several RTOs.

VIRTUAL REALITY

CONSTRUCTION TRAINING

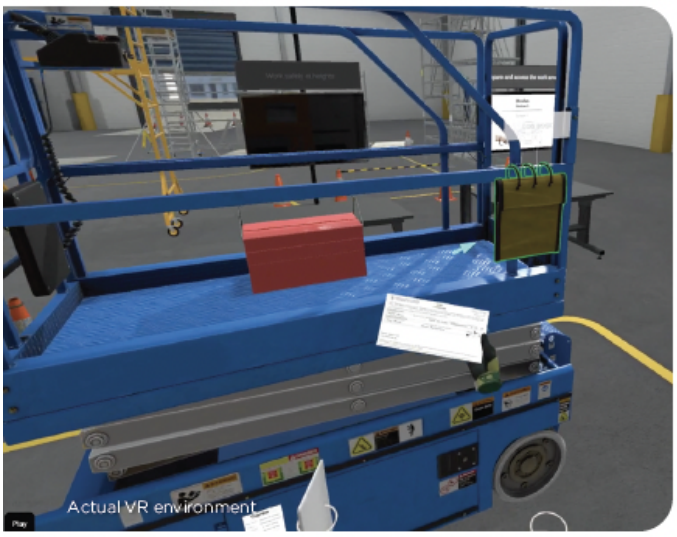
RESEARCH

Construction Skills Queensland's research project – Virtual Reality Training in Construction – is the first study in Australia to assess the effectiveness of construction training delivered in VR compared to conventional (face-to-face) training.

This three-year project involved a partnership of leading researchers from QUT and industry experts from Next World Enterprises, with support from several RTOs.

The study:

- used everyday construction workers
- was done onsite with accredited RTOs
- custom built VR training to match traditional delivery
- assessed a real competency in Australian vocational training
- compared learning for more than 100 trainees
- compared retention one month post-training



Four basic steps were followed:

1. A 20-minute 'Work safely at heights' VR simulation using materials and instructors from an accredited RTO was developed.
2. 59 construction workers signing up for conventional heights training were given this simulation, and issued a nine item assessment (the same used for conventional training) along with interviews about their experience.
3. VR assessment outcomes were compared to outcomes from 50 trainees doing conventional heights safety training.
4. One month later both VR and conventional trainees were assessed again on the nine items, plus asked to recall steps in a heights activity.

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KEY FINDINGS:

VR can be as effective as conventional training

- Assessment scores for both groups were comparable across most questions asked straight after training.
- VR trainees performed on par with traditional trainees in six of the nine items. This included strong comparability in hazard awareness, personal protective equipment (PPE) knowledge and fall prevention.
- Traditional trainees scored higher on three items, mainly related to a scissor lift component of the training.
- At the one-month follow-up stage, the VR group had achieved near equal training outcomes compared with conventional training.
- The VR trainees performed on par with traditional trainees on the three assessment items on which they originally lagged behind (although some loss of knowledge occurred for a different item).

VR as effective as conventional training for most items, especially after one month

Assessment task 1	Assessed immediately after training	Assessed 1 month after training
Define hazards	✓	✓
Hazard controls	✓	✓
Define PPE	✓	✗
PPE Types	✓	✓
Fall prevention device types	✓	✓
Safety harness & equipment checks	✗	✓
Tools & equipment in EWP basket	✓	✓
Operating the EWP	✗	✓
Lowering the platform	✗	✓

Source: CSQ, QUT (2022). Ticks means VR trainees performed as well as traditional trainees. EWP Elevating Work Platform (ie scissor lift).

VR training was well retained

- The VR training was still effective after one month. A retention test showed that the trainees in the VR group were able to describe the procedures concerned with clearing the work area, disposing of materials, and clearing, checking, maintaining and storing plant, tools and equipment better than those in the non-VR group. The trainees in the non-VR group were able to describe the tools and equipment better than those in the VR group.

VR trainees performed as well as conventional trainees on this recall task

Assessment task 2	Assessed 1 month after training
Step 1: Select right tools	✓
Step 2: EWP Checks	✓
Step 3: Set-up EWP	✓
Step 4: Operate EWP	✓
Step 5: Park/shut EWP	✓
Step 6: Post-use EWP checks	✓
Step 7: Processes and procedures	✓

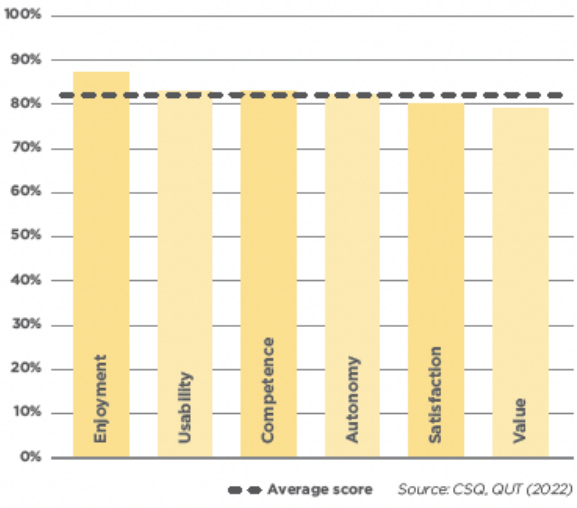
Source: CSQ, QUT (2022). Ticks means VR trainees performed as well as traditional trainees. EWP Elevating Work Platform (ie scissor lift).

The VR training proposition

The study generated some compelling insights about VR:

- VR training worked with novices to the technology. Around 60% of VR trainees had never really used virtual technology before – but training was still effective.
- Even a brief VR simulation had powerful learning effects. VR trainees showed comparable assessment scores to conventional training after only a 20-minute simulation (the conventional trainees took 4-6 hours).
- VR training was effective for various construction tradespeople. Occupations included boilermakers, carpenters, operations technicians, electricians, builders, and estimators.
- The VR experience was highly rated, particularly for its enjoyment.
- The VR experience didn't have to be perfect to be effective. Minor issues were raised, like motion sickness, hardware issues, or poor usability – yet these did not overshadow the positive experience or compromise effectiveness.

The VR experience in general was highly rated



Source: CSQ, QUT (2022)

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