City College Plymouth (CCP)/CITB Immersive Learning Project

Final Report June 2022

Contents

1. Project Information

Project Dates:

01/02/2019 – 31/04/2022

Partners

Lead Partner: **City College Plymouth**

Plymouth Construction Training Group: Promote project and training style to local construction sector.

Kier Living: Partner with college to develop and promote VR training resource to design an immersive project-based learning resource.

Creative Experience Group: Provide technical knowledge on VR and share immersive learning knowledge with the HE/FE sector.

Willmott Dixon: Promote VR resources and immersive training as a creator of 'work ready' trainees.

Building Plymouth: Promote project and implications to enhance construction recruitment activities.

Plymouth City Council: Partner with college to address negative industry image and promote careers within the sector.

Contact details for main contact

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2. Project Summary

(Approximately 200 words that could be used on CITB's website)

City College Plymouth created two virtual environments (VEs), one to be used at marketing events by potential students and anyone interested in construction careers called 'Ocean City 2069' and one to be used for students and industry for Health, Safety and Risk Awareness training, our 'Site Experience'.

Using virtual reality headsets and controllers, users are able to navigate around the VEs carrying out tasks and exploring our construction sites to understand general responsibilities whilst visiting or working in the construction industry.

In Ocean City 2069, participants are taken to our future vision of our built environment with high rise living and working, incorporating innovative technologies and sustainable practices to help reduce the impact of our buildings in the future and preserve and protect the environment.

The site experience allows the participants to take their first day working on a housebuilding site and search for hazards and gain understanding of the risks involved when working around excavations, using power tools and working at height.

3. Introduction

Lance Chatfield, Executive of Technical Innovation secured funding from the Construction Industry Training Board (CITB) Flexible and Structured Fund (FSF) in 2018 to launch an Immersive Learning project. The project's objectives were primarily to assist with the recruitment drive for students interested in joining the construction and civil engineering courses available at the College and to provide a realistic construction site based Virtual Environment (VE), to assist our Further Education (FE) and Higher Education (HE) students with their learning.

The project will also expand the capacity and capability of immersive learning by promoting VR in construction at careers events, as well as deliver a programme of upskilling college staff and local employers in how to adopt and embed immersive learning.

4. Report – project development and findings

This project was designed to demonstrate the value of immersive learning to industry. It was built to expand the capacity of immersive learning by promoting VR in construction at careers events, as well as delivering a programme of upskilling college staff and local employers in how to adopt and embed immersive learning.

We wished to enhance the student experience at CCP by incorporating the use of technology by using VR in the classroom have a blended learning approach, and allowing tutors and lecturers to include using VR their scheme of work.

Also, attracting more students and using technology (VR) at events to encourage potential students to use the VR and to talk to college staff about the courses on offer.

When carrying out college open days, and attending apprenticeship fayres and employer engagement events, it was clear an innovative and modern approach was needed to encourage potential students to talk to the college construction staff. The draw of VR and the content of the VEs, we believed would assist in doing this.

The first was a future based environment for recruitment;

The project team worked with project partners 'The Moment' (part of the Creative Engagement Group) who assisted with software development of two VEs needed to meet the project objectives.

The project team held meetings early 2019 to brain storm the concept of the VEs, the team made up of Lance Chatfield and Ian Jenkin from CCP, Project Leader and software developers from the Moment to decide upon the content and feasibility of inclusion of the ideas to create 'Ocean City 2069', a vision of our built environment of the future.

This included existing and future technologies in construction and is also a fun and exciting virtual reality experience suitable for most ages. We intended to create a 'draw' for potential students, a circa 5 minute VR experience delivering a 'future-focused' VE to improve the perception the audiences of the construction industry.

The VE shows a modern and innovative side to construction, the participants carrying out tasks and interacting (virtually) with technologies that are now being used more commonly in construction such as recycled materials, 3D printing, drones and renewable energy production.

We hoped to attract technologically savvy candidates to the college's construction courses and improve diversity of within the industry by reaching out to wider audiences and targeting girl's school's to try and encourage more females to consider courses in construction.

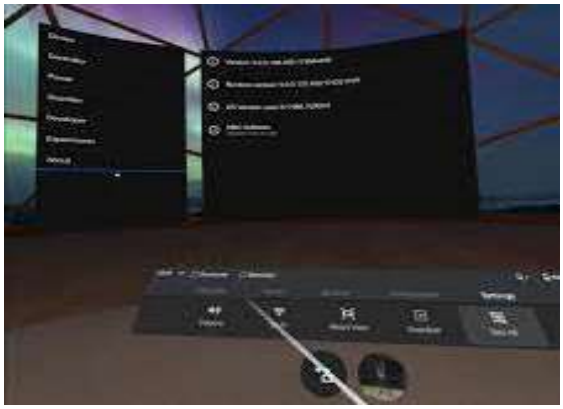
We invested on signage, TV screens and projectors to use during the project and started using the recruitment experience at events promoting CCP and the Immersive Learning project.

The hardware used originally were MSI 15" gaming laptops with the Oculus Rift VR headset and controllers as shown in the photo following;

The laptops were suggested and specified to us by The Moment, based on their experience and knowledge of the memory, display and performance to run the size of VEs we were creating. The laptops proved more than adequate and have successfully ran the VEs made, these are run via the Oculus desktop application. The app is 'VR software to a wide range of desktops and laptops allowing you to plug in the headset into your PC to configure and customise' (Meta, 2019).

The Oculus Rift VR headset was successful in terms of running the VEs, however, the sensors (which track the controllers) were on stands, as shown in the photo above, with USB leads to connect the sensors to the laptop. These stands with the leads were time consuming to set up for use and pack away. Fortunately, quite early on in the project the Oculus Rift S (launched in March 2019) shown right, came onto the market with sensors built into the headset (see photo right), making the VR set up quicker without the need for the USB leads and we invested in a number of these headsets.

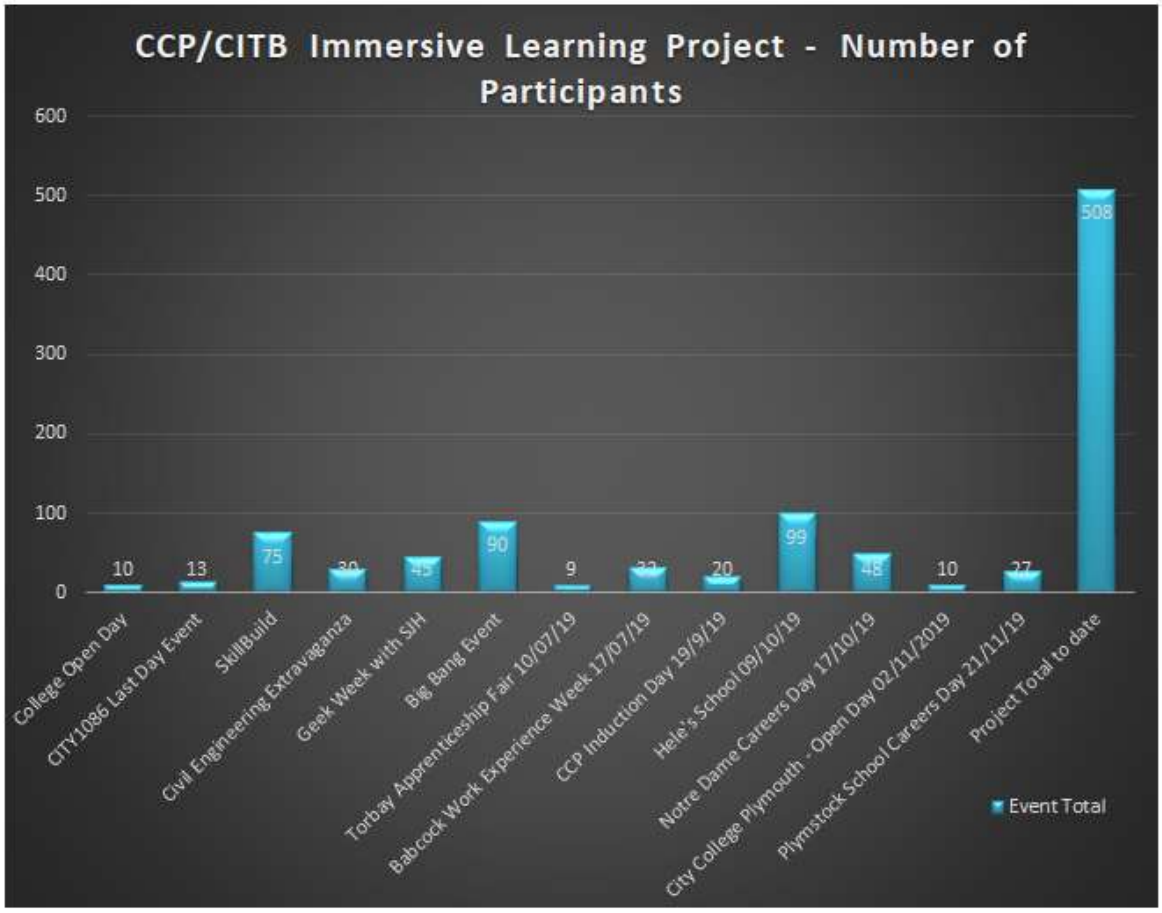
The VEs are available in the library section of the app and settings can be accessed via the app or from within the headsets when setting up.



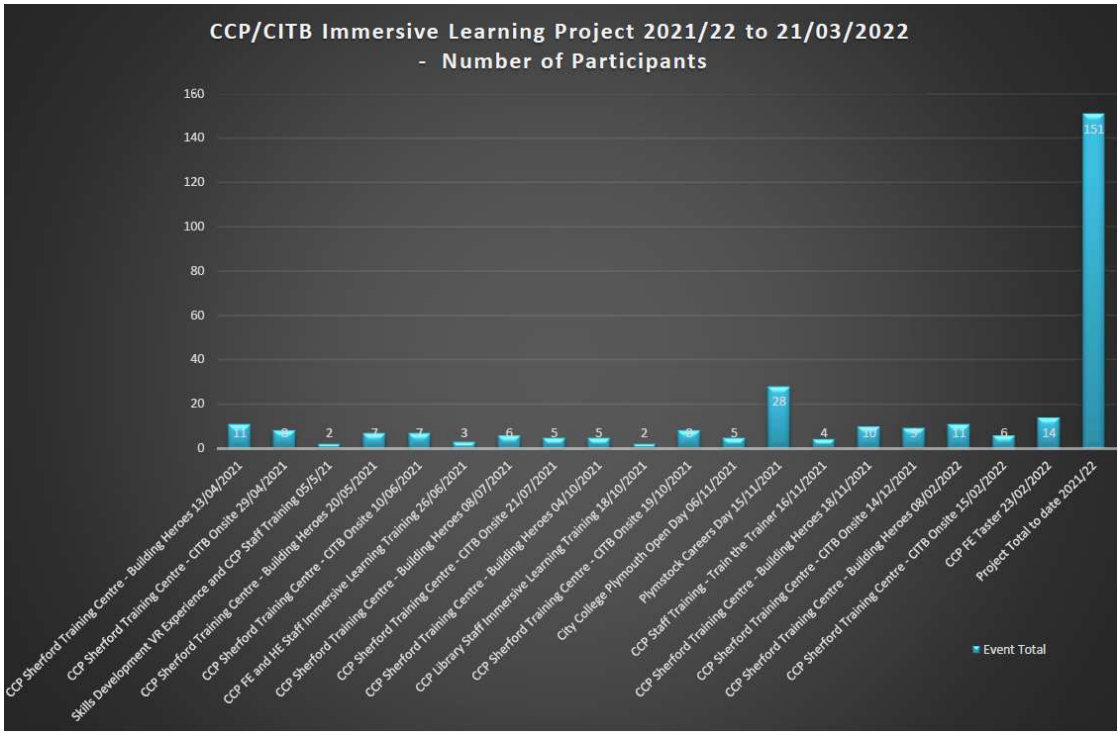
The project was now underway and were attending events with Building Plymouth, one of the project partners and engaging with potential students, people wishing to join the construction industry, employers, institutes and supporting the CITB at events.

Data Collected

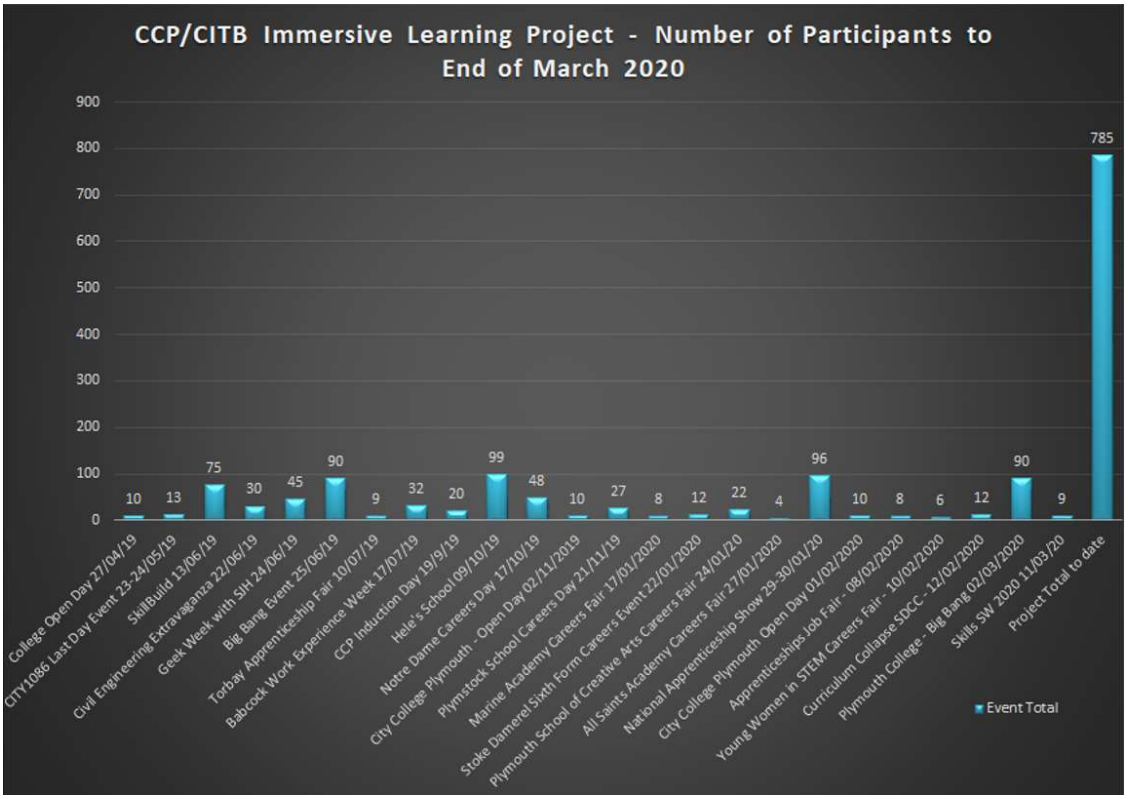
As shown by the table below we had 508 participants in 2019, with some incredibly busy events:



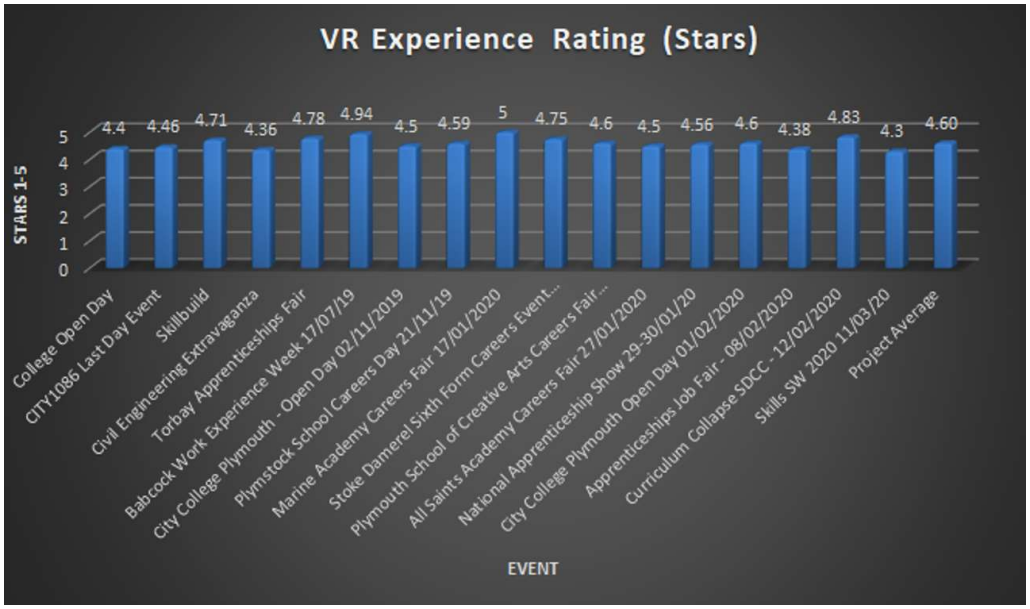
The data was collected using Survey Monkey the online data platform using an iPad for each participant to complete a multiple choice set of questions, designed to be completed quickly, for the project data required by the CITB and feedback information on the VE from the participants.



The 2021/2022 data was slightly different, due to the COVID-19 pandemic many of the events stopped or went online, slowing down the participant numbers after March 2020;



We achieved 785 participants to date until the project paused due to coronavirus lockdown, feedback during 2021 was very good with the recruitment experience scoring an average rating of 4.6 out of 5 from the participants;



As a result of the social distancing restrictions imposed due to Covid, the events did not happen as previously and the remainder of 2020 no participants were recorded, the college operated with remote delivery to students during this period.

The second VE, the site experience, was based on the following:

- Outputs
- Suitability
- Standarisation
- Occupational Safety

In order to create a relevant immersive learning tool suitable for the college and industry.

The project team worked with house builders Kier Living, whom allowed access to one of their working sites to base the environment on. During these site visits the construction activities, building phases and the site were photographed to be used to create a realistic as possible virtual building site.

We used Kier's CAD (computer aided design) drawings of one of their houses to create a 3D model using Revit (Autodesk Building information Modelling (BIM) software) and incorporating this with images of a real life site, a 'true to life' VE was created enabling City College Plymouth students can use VR to explore the areas on the site safely and observe site activities and carry out hazard identification and risk assessments.

Using Unity, a VR development package, The Moment imported the 3D model and copied duplicates which were rendered to create the VE containing the houses in different construction phases, excavations, equipment etc. as shown below;

This VE has been used in the college, by project partners and in industry, to provide an insight into being on a construction site.

The student groups targeted were the 16-18 year old FE students and 18-24 HE students– 'high risk' in terms of lack of experience to potentially dangerous or hazardous work environments and any older students who had not visited and/or worked on a construction site before.

Based around the CITB Health, safety and environment test required for construction staff and operatives to gain a CSCS card, the VE content was created to make participants aware of their individual responsibilities for their own safety and the safety of others eg.;

- Typical construction hazards and how these are controlled
- How everyone can help achieve better practical standards of safety on site
- Legal requirements and liabilities
- Working at height
- Manual Handling
- Fire prevention
- Work equipment
- Occupational Health
- Safety Signage

Behavioural safety training modules have been developed at each stage of construction taking in the key areas for consideration linked to the top ten health and safety incidents, for example: working at height, slips trips and falls and power tool safety in initial stages.

There are 3 modules of the site experience:

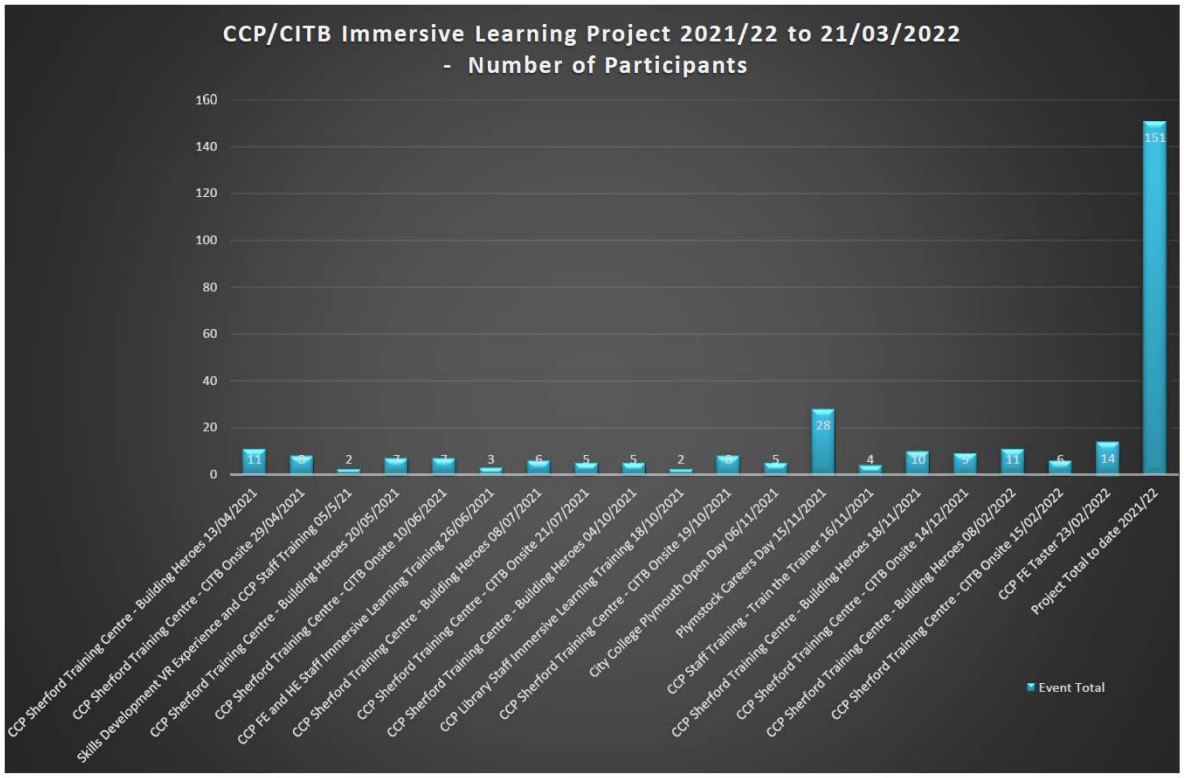
- Site and Walkways
- Power Tools
- Working at Height

The modules have been mapped to the CITB Level 1 Health and Safety course and there is a free roam area to allow site inspections of activities to help aid completion of risk assessments for students. The project focussed on the following areas;

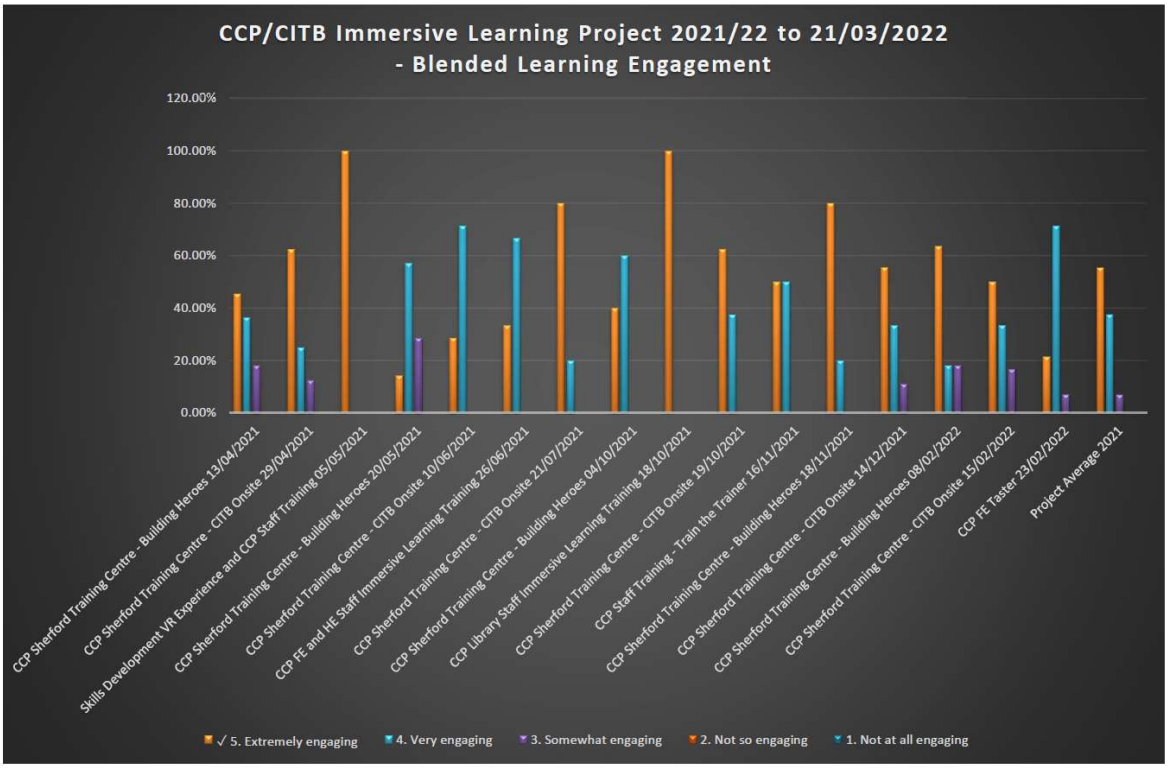
- Housebuilding
- H&S (hazard awareness)
- H&S (behavioural)
- Craft occupations
- Supervisors / managers
- FE / HE / Trailblazer
- VR modules in 3D digital home, high realism
- Careers experience
- IL upskilling modules

We partnered with Sherford Training, a CCP training provider at the Sherford Housing Project providing 5,500 homes over the next 20 years. Using the site experiences we provided health and safety training on each of their courses, for CITB Onsite and Building Heroes, participant numbers were lower but the majority of participants were students or hoping to work in industry;

Of the 151 participants, 31 were from events on the 6/11/21 and 15/11/21;



The feedback was very positive on the site experience VE with over 90% of the participants reporting the session to be extremely and very engaging as shown on the table following;



We began CCP staff training during 2021 for FE tutors and HE lecturers to give them an understanding of the VE content created and to help incorporate the VR into curriculum. Since then a number of staff within the digital village and marketing, as well as the curriculum staff have been trained.

The laptops containing the VEs and the headsets/controllers are intended to be held centrally within the college post-funding, a booking system allowing staff to arrange a space and the equipment to use

There is a shift towards using VR in industry as already 'Medical, military, science, education and architecture professionals are already using VR to disrupt their industries while also reducing costs. VR has the potential to greatly change almost every industry in the next number of years, not least the education sector (ENGAGE, 2019)'.

"Through virtual reality, we can create a fabulous distributed classroom where anyone in the world with the internet can access a classroom and teaching. We can examine concepts that are difficult to recreate in other ways.

Students can experience what it is like at the top of Everest or get inside a locomotive to see how it works up close."

- Pixar co-founder & VR enthusiast, Loren Carpenter

6. Products

The virtual environments created by City College Plymouth are:

1. Ocean City 2069 (recruitment experience)
2. Site Experience – Site and walkways
   Tool Safety
   Working at height
   Free Roam

7. Acknowledgements

Lance Chatfield and Ian Jenkin would like to thank the following for their help and assistance with the project;

Nathaniel Cooke and Roy Imeson of the CITB for their support

Andy Parkin and the team at The Moment, Plymouth for their assistance in helping to realise the ideas for our VEs

Chris Arkins and Darren Wills of Kier Living for giving access to their housing site

Emma Hewitt of Building Plymouth for allowing us to join their events

Steve Ricketts at Sherford Training Centre for supporting the project