The Use of Immersive Technologies in Assessment at Calderdale College

Project Report

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Calderdale College is the largest provider of further education post-16 courses and work-based learning via Apprenticeships and is the sole provider of higher education courses in their region.

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With a clinical background in general practice, Ann entered academia full time in 2006, delivering courses/modules for postgraduate clinicians. In 2012, she completed a Masters in Medical Education which was the catalyst in developing a passion for simulation-based education. In 2018, she started her own consultancy focusing on clinical skills and simulation working across a wide range of healthcare professional groups, universities, private education providers and industry. She is also a doctoral student researching learners experiences of using virtual reality simulation for high stakes assessment.

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Vanessa Barett

Vanessa is a Master of Public Health Advanced Practitioner with over 18 years working with all members of the public sector, in school based and community-based environments. Vanessa has got twelve years' experience working for the University of Huddersfield in their Sport and Fitness department. She is also a qualified teacher, gaining her PGCE in 2016, her role involves promoting health and sport, activities. Vanessa s background involves working abroad for TUI Sensatori, as a fitness and wellbeing instructor, where she combined her love for travel and fitness. She is now involved many research projects. Her role involves investigating various public health, gathering the data through mixed methods, and generating intelligence through data analysis. She has previously collaborated with services to investigate issues like asthma, covid, vaccinations, immigration and learning through immersive technology. She is now looking to further her development by embarking on a PHD.

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Michael Rimicans

With a background in Digital and Open-Source development, Michael entered academia from industry. He has been part of a team developing and delivering courses within the digital environment at Level 3 and above. As part of this project, he supervised the 2nd Year Digital Development and Production T Level learners in creating the original proof of concept.

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A dedicated professional with a diverse background in Biomedical Sciences, Healthcare, & Education. Joanne's education and early vocational experiences in the Health & Social Care sector fuelled her passion for working with people to empower them to make positive, informed choices around their health, wellbeing and career. More recently, her work in education and leadership has enabled her to foster change and innovation in student experience whilst contributing meaningfully to the development of educational practice.

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Aims

Key aims of the project were:

- To test the use of two immersive technologies (Virtual Reality (VR) and a Simulation Centre with manikins) in T Level Health assessment (NCFE, 2023) and L2 Transition Group (NCFE, 2023).

- To incorporate Care Certificate standards (Skills for Care, 2022) into the simulated scenarios, enabling Further Education (FE) to assess as well as employers.

- To test the theory that FE has a place in delivering the Care Certificate standards for employers.

- For digital technology students to jointly work with industry in developing the VR scenarios.

- To gain feedback from students, employers and key stakeholders with regards to the use of immersive technology in assessment.

Overview of Design

Three prototype scenarios were developed based on elements of the L3 T-Level Health and L2 Transition Group curriculum and incorporated Standard 15 of the Care Certificate, Infection Prevention and control.

These scenarios were designed and developed in iRIS software platform to aid adherence to the Association of Simulated Practice in Health (ASPiH) and the International Nursing Association for Clinical and Simulation Learning (INACSL) standards as well as collaboration across the development and project teams. The standards for simulation-based practice were created by ASPiH to

"supports learners, simulation practitioners and organisations to bolster simulation practice and patient safety, in benefit of patients, service users, families and communities."

Orientation sessions were delivered in both simulated environments prior to users undertaking the assessments themselves. A VR demonstration of the scenario was developed by the technical expert to further support users' use of VR by guiding them through the hand controls and how the scenario operated.

Research Team Roles

The project team consisted of eleven individuals each with their own area of expertise ranging from, project manager, clinical simulation expert, Unity and 3D modelling expert, digital developer, curriculum lead, tutors, researchers and employer/stakeholder engagement.

Methodology

This was a qualitative research project, where we evaluated student and employer/stakeholder focus groups and 1:1 interviews both pre and post scenario testing. Discussions were transcribed and template analysis applied.

Two sessions each took place each at Huddersfield Royal Infirmary's simulation centre and via VR sessions during the academic year 2022 to 2023. There was also one stakeholder and employer VR testing session, where a focus group took place following the session to capture initial feedback.

Pilot Findings

Students overall found the simulation experiences engaging and enjoyable. They felt they were realistic, and described new learning that had occurred through their participation in them. They were, though, more consistently positive about the Simulation Centre than the VR, with a small number of students quite hostile to the latter.

Students were impressed with the realism of the manikins in the Simulation Centre, felt well supported and liked being away from the college environment and working in a professional situation. In terms of VR, students found it to be relatively realistic considering that the products are still at the prototype stage and as such have an early technology readiness level. They recognised the potential value of VR for learning and appreciated the orientation session and support features integrated into the assessed scenario, which helped them feel well-prepared.. However, many found the initial

experience disorientating and those students who were most negative about VR did not see its relevance to the people-based nature of health and social work.

When we consider these findings, the contrast with traditional classroom learning is in all likelihood of central importance. Both simulations constituted novel forms of learning and a break from college routine that students found stimulating and enjoyable. The more consistent enthusiasm for the Simulation Centre can be understood in terms of the greater feeling of "being professional" it gave, due to its setting in a real hospital as well as the technical sophistication and realism of the manikins.

Implications for future practice and research

It is clear from this project that VR has the potential to be used effectively with FE students, although a number of challenges need to be addressed for it to be implemented effectively.

- In a simulated experience, the primary focus should be on achieving the intended learning outcome. In cases where a potential trigger or trauma could arise for staff or students, it is the responsibility of the faculty to implement necessary measures to prevent or mitigate such situations.
- Simulation practice and delivery should be embedded within curriculum content so that it is timetabled and becomes standard for FE students to avoid the sense of newness and novelty when using immersive technologies and to avoid orientation impacting negatively on the assessment period.
- The technical element of immersive technologies and simulated practice needs to be thoroughly implemented prior to using simulation for learning and assessment and fully embedded into college processes, systems and management.
- Training and orientation for students and staff needs to be timetabled at the beginning of the academic year.
- To affect a system change in the way assessments are undertaken, stakeholders, including those that 'own' the qualification, awarding bodies and employers must continue to be involved in the development and planning of a phase two impact study.

- The orientation stage for using immersive technologies, especially VR, must consider the socio-economic situation of students and staff, as assuming digital literacy is not always accurate.

- More personal interaction with virtual patients in scenarios is needed, so the personal aspects of care are not missed.

- The hybrid approach of the use of immersive technologies needs to be researched further, where scenarios take place within an immersive room, using professional equipment and uniforms whilst overlaying Mixed Reality (MR) scenarios to assess competencies where the student is unable to perform the task on an actual patient or actor.

- To effect real system change, stakeholders and employers must continue to be involved in the development and planning of the phase two impact study.

- Include scalability in a phase two of the project to research how immersive technologies can be used across multiple curriculum areas.

Introduction

The backstory of Simulation:

Simulated practice has been utilised in clinical education since the 1980s (Riley, 2008). Initially employed within high-risk industries such as aviation, the military and nuclear power, it was adopted by the medical profession and shortly after, nursing and allied health professionals with the intention of providing a safe domain to practice, learn from the experience and ultimately increase patient safety (Dismukes, 2000; Kneebone, 2016; McGaghie et al., 2010; Ross, 2014).

There is often a misconception that simulation relates to the use of a piece of equipment, such as a manikin, but it is a pedagogy within its own right. David Gaba's definition supports this:

"Clinical simulation is a technique, not a technology, to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner."
(Gaba, 2004 p14).

Linking closely with learning theories such as constructivism (Tryphon & Vonèche, 1996), experiential learning (Morris, 2020), cognitive apprenticeship (Tomsett, 2021) and deliberate practice (Ericsson et al., 2009), clinical simulation caters for a range of preferred learning styles (Kulkarni et al., 2022; Tutticci et al., 2016), enabling deep learning to occur (Wang & Ji, 2021). This is however, dependent on experienced simulation educators being involved in the development and delivery of the simulated experiences in order to ensure standards of best practice are maintained (Association for Simulated Practice in Healthcare and Health Education England, 2016; Health Education England, 2020; INACSL, 2021; Sunderland et al., 2017).

Simulation in Healthcare:

Simulation in healthcare utilises several different modes of delivery, with the most commonly used being simulated patients (trained actors portraying patients) or manikins (full size human patient simulators). Often simulated experience will take

place within a simulation suite in a university or hospital trust as using a realistic setting assists in allowing learners to naturally respond as they would in real clinical practice. In order for this to happen, learners need to engage in the phenomenon of "suspended disbelief," which is a semiconscious decision to put aside any skepticism in what is happening and accept the premise as being real (Kyle & Murray, 2007). The positive approach and attitude of faculty members also plays a large part in nurturing an appropriate environment (King et al, 2008).

 "The first rule of sim is to never admit to your public that anything they sense is fake." (Kyle, 2009 p2).

Fidelity:

The fidelity or realism of the scenario can be further enhanced by engaging more of our senses, with the addition of such things like background sounds, simulated smells, moulage (medical makeup to mimic wounds, vomit etc.) and touch e.g. taking a patients vital signs (Kent et al., 2016; Lyu et al., 2023). As technology has progressed, and student numbers on clinical courses have increased, particularly after the Covid epidemic, scalable modes of simulation have been required to assist in learning but also to help mitigate some of the inevitable pressure on placement provision (Wagg & Morgan, 2022) . This has led to the increased use of virtual reality (Luctkar-Flude & Tyerman, 2021). While this mode of delivery does not engage all the senses, one could argue that being able to see physical changes in the virtual patient in real time is an advantage over using a simulated patient for example, where this would be difficult to replicate. The fact that each repetition of the scenario in VR is consistent with no changes due to human error, better supports the concepts of repetitive practice and mastery learning (Peek et al., 2023).

Learning Outcomes:

Overall, the choice of mode of delivery is dependent on the specific learning outcomes for the session as well as availability of resources. Professional bodies such as the General Medical Council (GMC) and the Nursing and Midwifery Council (NMC), recognise and acknowledge the positive impact of simulation based education (SBE) has in providing a safe environment in which to learn (General Medical Council, 2015; Nursing and Midwifery Council, 2007). This has led to it becoming an integral

component of undergraduate education with the NMC for example, allowing up to 600 hours of the required 2300 clinical hours to be undertaken in simulation (Nursing and Midwifery Council, 2023). Its use within hospital trusts and higher education therefore is now well established, but this is less so in other healthcare and educational settings such as general practice, social care and further education (FE) colleges (Kajander-Unkuri et al., 2022; Katwa et al., 2020). Potential reasons for this may include the fact that emergency clinical situations are less frequent in these areas compared to secondary care, courses being delivered in FE have a less clinical focus than those delivered in higher education (HE), limited financial support and a lack of SBE awareness and training for FE educators. The absence of published evidence around the use of clinical simulation in FE, further supports this.

Lack of Research for the use of simulation in assessment:

As already mentioned, there is a plethora of evidence within healthcare and higher education that supports the use of SBE in teaching and learning. The picture is a little different however, when it comes to the use of simulation in assessment as this still appears to be in its infancy, with the exception of the use of simulated patients and manikins in objective structured clinical examinations (OSCEs) (Bach et al., 2023; Kassabry, 2023; Minty et al., 2022; Montgomery et al., 2021; Stirling & Henderson, 2021). With regards to VR, the limited published evidence to date, advocates that aligning the assessment purpose with a carefully designed scenario is paramount in making the assessment method valid and reliable (Sanchez et al., 2022).

VR in assessments:

The scope of VR assessments can be broadened by advances in technology and the improvements in hand tracking, which allows additional degrees of freedom, with users being able to use their hands and fingers to move objects or gesture more freely. There may also be cognitive benefits to the use of hand tracking.

"Since hand tracking allows for more natural interactions, it may help reduce the cognitive load when compared to using controllers. In particular, hand tracking is likely to reduce significantly the mismatch between visual feedback and proprioception."

(Jamalinan, Gillies, Pan, Fol Leymarie, Goldsmiths, University of London, 2022) ***Citation needs including in the alphabetical list at the end of the report, with the paper title The Effects of Hand Tracking on User Performance: an experimental study of an object selection based memory game.
URL: https://research.gold.ac/id/eprint/33107/

With the development of haptic technologies and gloves, the additional degrees of freedom would be further enhanced to allow the user to experience a more lifelike experience. Haptic gloves produce a realistic touch via microfluidic actuators across fingers and palms, which offers the wearer tactile feedback. The removal of hand controls would also allow the user to concentrate on performing tasks and not how to use the controls, and the use of artificial intelligence as this would allow more natural conversations between learners and VR patients (Dai & Ke, 2022; Thakker & Devani, 2019).

Project overview

With the Government's recent introduction of T level programmes (Department of Education, 2023) where employers and education providers collaborate to provide course content that meets both industry needs and prepares learners for entry into employment, an opportunity arose for Calderdale College to successfully apply for funding from the NCFE Assessment Innovation Fund (NCFE, 2021, 2022). This provided an opportunity to explore and pilot the introduction of bespoke simulated experiences into T level health and social care programmes as a method of assessment across both virtual reality and simulation suite environments. Considering the points already raised, the pilot project was developed with the overall aim to better prepare learners for the workplace or further education. Key aims of the project were:

- To incorporate Care Certificate standards (Skills for Care, 2022), enabling FE to assess as well as employers
- To test the use of two immersive technologies (VR and Simulation Centre with manikins) in T Level health assessment
- For digital technology students to jointly work with industry in developing the VR prototype scenarios

- To gain feedback from students, employers and key stakeholders with regards to the use of immersive technology in assessment.

Figure 1 provides an overview of the project stages, with the project running from May 2022 to October 2023. Participants were recruited from year 2 of the T Level Health programme (n=5) and the Level 2 Certificate in Preparing to work in Adult Social Care (n=14).

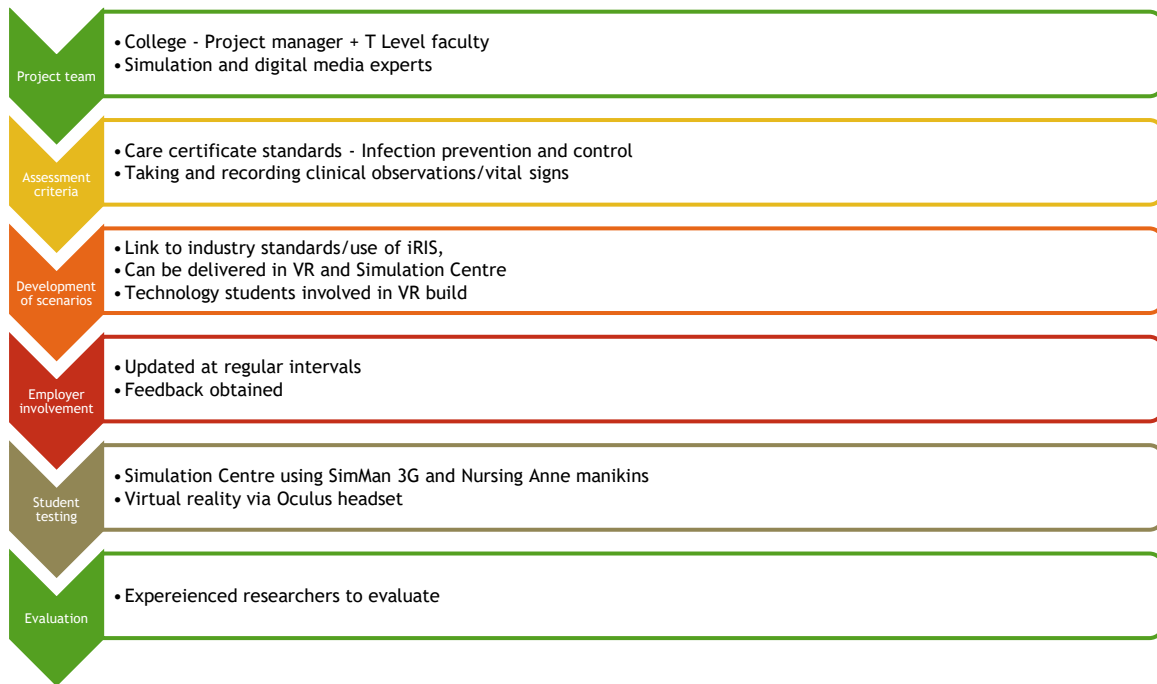| Project team	• College - Project manager + T Level faculty • Simulation and digital media experts
Assessment criteria	• Care certificate standards - Infection prevention and control • Taking and recording clinical observations/vital signs
Development of scenarios	• Link to industry standards/use of iRIS, • Can be delivered in VR and Simulation Centre • Technology students involved in VR build
Employer involvement	• Updated at regular intervals • Feedback obtained
Student testing	• Simulation Centre using SimMan 3G and Nursing Anne manikins • Virtual reality via Oculus headset
Evaluation	• Expereienced researchers to evaluate

Figure 1: Overview of project stages

Three scenarios were developed using iRIS simulation authoring platform (iRIS Health Solutions Ltd, 2023). This allowed all team members to contribute to the development of the scenarios on a shared platform. It also allowed for seamless integration with standards of best practice (Association for Simulated Practice in Healthcare and Health Education England, 2016; INACSL, 2021). Industry experts in digital technology worked with college students to build the VR scenarios, using the information on iRIS to build the VR environment, clinical equipment and actions required by the learners. A basic feedback/scoring system was integrated, based on the "golden path" or "ideal" student actions, in order to provide timely learner feedback (Lee et al., 2021). Learner actions were time-stamped providing the basis of discussion within the debrief following the simulation experience. Each scenario was designed to run within a ten-minute time frame. The iRIS platform also enabled the same scenarios to be delivered to learners within a Simulation Centre of the local hospital. At key points throughout the project, the project team, researchers,

employers, learners and NCFE met to discuss progress to date and any potential changes required to the scenarios and processes involved.

Scenario design

Three scenarios were developed in total, the content of which was aligned to the T Level in Health and Certificate in Preparing to work in Adult Social Care units (see Appendix 1 – Mapped content scenario document). The VR environment mimicked a real hospital setting, with equipment mirroring that used in the local healthcare trust. Each scenario required learners to interact with the patient, identify differing infection control and prevention hazards, appropriate use of personal protective equipment, to take and record the patient's clinical observations, record them on a national early warning score (NEWS2) chart (Royal College of Physicians, 2017) and answer questions relating to the patients presenting problem and clinical history.

Table 1 provides an overview of the scenarios with the scenario planning documents developed in iRIS being presented in Appendix 2. Automated scoring then provided immediate feedback for the learner once the scenario ended. In practice, this would be integrated into a debriefing session with faculty to allow guided reflection on practice. Haptic feedback was also integrated into the hand controllers, allowing learners to feel the patient's pulse, rather than just being told what the heart rate was. This allowed for the learners to synthesise physiological data as well as highlighting the need for accuracy in measurement and added to the fidelity or realism of the scenario as suggested by Thakker and Devani (2019). Initially, it was hoped that a number of the Care Certificate standards could be integrated into the scenarios, but it soon became apparent that this would be limited due to the timeframe of the pilot project and its associated budget, hence the focus being on infection prevention and control, standard 15 (Skills for Care, 2022).

Table 1: Scenario overview

	Scenario 1	Scenario 2	Scenario 3
Patient's name	Joe Binns	Sophia Shaw	Lisa Riley
Age	62	20	42

Presenting problem	Chest infection	Self-harm	Sepsis /deterioration
Hazard/s	Open tablet bottle hazardous spillage	Used sharps	Blood-stained bedding

Simulation delivery/methods

Students were invited to attend a simulation session at the local hospital's Simulation Centre and a VR session held at the college. It should be noted that due to the timing of the project, students attended the Simulation Centre after the taught element of their respective programmes had finished, as they were not integrated into the curriculum. This potentially had an impact on attendance and subsequent engagement.

Prior to each session, students were orientated to the methods used as follows:

- Simulation Centre session – Students were introduced to the environment and the equipment by the simulation technicians prior to undertaking the scenario.
- VR session – A crib sheet was developed by Taran3D that highlighted how to use the hand controls as well as the controls on screen within the VR platform (see Appendix 3), and a built-in orientation scenario was designed to be used via the VR headset prior to attempting the scenario.

When starting the VR scenario, the learners were presented with a reminder of the learning objectives and a written case history while in the waiting room. They then entered the patient's clinical room to undertake the required tasks. Figures 2 to 4 provide examples of these environments.

Feedback from learners was captured immediately after the sessions in the form of questionnaires. These were then followed up with 1:1 interviews 3 days after the simulation session. These were recorded, transcribed and analysed using template analysis.
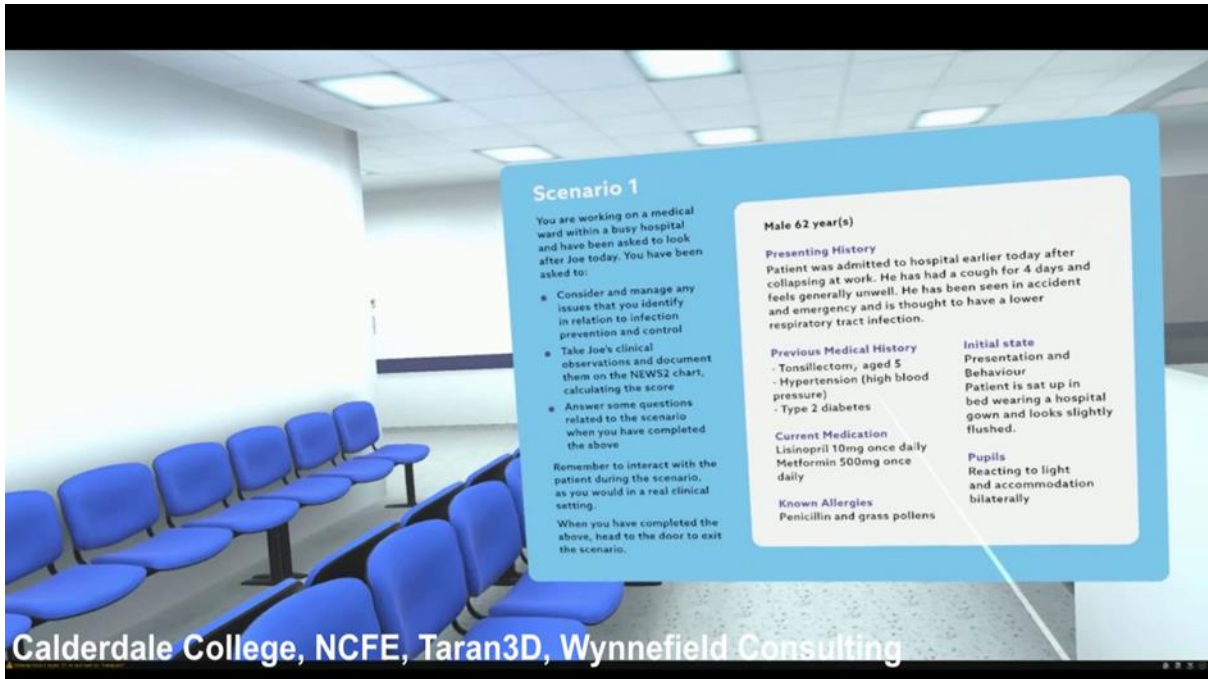
Figure 2: The waiting room and case history

Figure 3: The patients' clinical room

Figure 4: Wide view of the patients' room

Focus groups with potential employers/stakeholders took place throughout the duration of the project, which were also recorded and transcribed.

A timeline of the project and its related data collection points, is demonstrated in Appendix 4.

Research Methodology

Overview

A qualitative approach was utilized to evaluating student responses to the two simulation activities in which they participated during the academic year 2022 to 2023. This is appropriate, given the focus on capturing students' immediate responses to the simulations and the relatively small numbers of participants involved.

The simulation activities the students engaged with were:

(1) Visits to the Simulation Centre at Huddersfield Royal Infirmary. Participating students took part in two sessions; an initial induction to the Centre and follow-up which included an informal assessment of their skills in a range of health care tasks.

(2) Two sessions at Calderdale College, using the VR material described in the section above; the first an orientation session, the second including a formative assessment.

Data were collected after each activity, in the form of written and verbal feedback; these were transcribed verbatim and analysed using the Template Analysis style of thematic analysis.

Participants

We sought to elicit responses from all students attending each of the sessions. In a small number of cases, students could not stay for feedback or chose not to. A total of 15 students took part in the evaluation study. Table 1 shows demographic data for all participants, plus details of the sessions for which they provided feedback.

Students given pseudonyms.

Pseudonym	Course	Ethnicity	Gender	Sim Centre Induction?	Sim Centre Assessment?	VR Orientation	VR Assessment?
Charlotte	Level 2 transition	White British	F	Yes	Yes	No	Yes
Bella	Level 2 transition	White British	F	Yes	Yes	Yes	No
Sarah	Level 2 transition	White British	F	Yes	Yes	Yes	Yes
Will	Level 2 transition	Mixed Black Caribbean / Other	M	Yes	Yes	Yes	Yes
Dariya	Level 2 transition	Pakistani	F	Yes	Yes	Yes	No
Marla	Level 2 transition	White British	F	Yes	Yes	Yes	No
Nicki	Level 2 transition	White British	F	No	Yes	No	No
Amir	Level 2 transition	Pakistani	M	No	Yes	No	No
Diane	Level 2 transition	White British	F	Yes	Yes	Yes	No
Fiona	Level 2 transition	White British	F	Yes	Yes	Yes	No
Hana	Level 2 transition	Pakistani	F	Yes	Yes	Yes	Yes
Rosa	Level 2 transition	White British	F	No	Yes	Yes	No
Jack	Level 3 year 2 T Level	White British	M	Yes	Yes	Yes	Yes
Tahir	Level 3 year 2 T Level	Arab	M	Yes	No	Yes	No
Kelly	Level 3 year 2 T Level	White British	F	Yes	No	Yes	No

Data collection

Simulation Centre

After the induction session, students were asked to complete an open-response questionnaire, asking them about their impressions of the activity (see Appendix 5 for a copy of the questionnaire). Twelve students of the seventeen present completed this.

Following the second session, which included the informal assessment, students were invited to provide verbal feedback in the format of a semi-structured interview with the Research Assistant. Thirteen students of the sixteen present completed this.

VR activity

Students were invited to give verbal feedback after the Orientation session and again after the Formative Assessment session. All twelve students present for the Orientation session provided verbal feedback. Five of the seven who took part in the Formative Assessment session provided verbal feedback. The two students that didn't

provide feedback were involved in a matter with Student Services at the time and so were unable to participate in a post session interview.

Data analysis

Data was analysed thematically, using the Template Analysis approach (Brooks et al, 2015). This involves the development of a coding template on a subset of the data – in this case the initial open-ended questionnaire after the first Simulation Centre session – which is applied to further data, modified as required in an iterative cycle until a final version is produced. The final template is shown below, in Figure 5.

Figure 5. Final coding template

1. Emotional responses to simulation environment

- 1.1 Positive and energized
- 1.2 Scary
- 1.3 Disengaged

2. Developing confidence.

- 2.1 Confidence now
- 2.2 Confidence for the future

3. Safety of environment

- 3.1 Ability to ask questions
- 3.2 Simulation allows safe practice
- 3.3 Feeling supported / guided
- 3.4 Risk/Lack of safety in environment

4. Impact of realism on the session

- 4.1 Realistic simulation
- 4.2 Wish to be as realistic as possible
- 4.3 Playing the role as a professional
- 4.4 Value of being in a real/ professional setting
- 4.5 Limits of realism

5. Simulation vs traditional learning

- 5.1 Feeling professional in simulation
- 5.2 Preference for 'real' hands-on learning
- 5.3 College setting cf simulation
- 5.4 Simulation enhances learning/development
- 5.5 Not knowing what to expect
- 5.6 Challenges with equipment
- 5.7 Positives about equipment
- 5.8 Sim Centre cf VR

6. What the learner brings

- 6.1 Personal characteristics as a learner
- 6.2 Interest in / experience of gaming
- 6.3 Dislike of / disinterest in VR
- 6.4 Value of visual learning
- 6.5 Disability impact on learning
- 6.6 Personal history in health and social care
- 6.7 Mood on the day

7. New Learning from VR/ SIM

- 7.1 Learning relating to technology
- 7.2 Learning about communication and/or cooperation skills
- 7.3 Learning other skills

8. Changes suggested to VR SESSIONS

- 8.1 Nothing to improve
- 8.2 More of the same -
- 8.3 Physical environment
- 8.4 Improvements to technology

9. Assessment concerns and issues

- 9.1 Time pressure
- 9.2 Need for practice/preparation before assessment
- 9.3 Anxiety with regards to assessment
- 9.4 Value of inbuilt learning aids
- 9.5 Value of tutorial before assessment

Figure 5: Final Coding Template

See Appendix 6 for full Final Coding Template

Additional material

In addition to collecting the student responses as described above, we also obtained insights into the simulation activities from three other sources. Firstly, the Research Assistant (VB) kept personal observational notes during her visits to the Simulation Centre and the College VR sessions as the students took part in the activities. Secondly, we conducted a focus group with three representatives of the residential care sector immediately after they had watched some of the students using the Simulation Centre. Thirdly, we conducted a further focus group at Calderdale College with stakeholders involved in social care education in FE, the development of VR, and/or the running of this particular project. It is beyond the scope of this report to formally analyse these sources, but we will draw on them in interpreting key findings in the Discussion section.

Findings

We will present the findings from each of the main themes identified in the template analysis in turn, highlighting links between themes where appropriate. We will use direct quotes from participants by way of support.

Emotional responses to the simulation

There were many positive responses made to the simulations (both types), with most students saying (often several times) that they found the session fun, were excited by the technology and enthusiastic about using it in the future. So, regarding the Simulation Centre, Bella says; "It was a new, fun experience, that I won't forget." Hana is enthusiastic when asked whether she would recommend the Simulation Centre to other students;

"I would urge people to give it a go. There is no point in not trying it when you have access to all this amazing equipment, I'd say just go for it, you might really enjoy it. I personally really enjoyed it."

Turning to the VR, Bella replies when asked whether she found the try-out session interesting; "…oh God, yeah, it makes it miles more interesting learning this way." Will is very excited by using VR in the hospital-based Assessment scenario;

"…it's more fun [than conventional classes], it's not like you are doing actual work. It's like coming to college and actually being part of something you like to do in your spare time, lol! Like, I'm just chilling."

His reference to "spare time" here relates to his interest in video-gaming, an issue we will return to later.

Although positive emotional responses were predominant in the data, every student made at least one comment describing a more negative emotion in relation to either or both of the simulations. A common response was to highlight some aspect of the

simulation(s) as "scary". Such comments were made in relation to both types of simulation, though there are differences when we look in more detail.

For the Simulation Centre, this often related to the "realism" of the setting, especially the manikins. Rosa remarks; "I thought the manikins were a bit creepy, er, weird". Such feelings tended to be in response to initial exposure to the manikins, and students quickly got used to them, as Dariya's comment illustrates; "I found them really creepy, but then when I got over that, really intriguing."

Regarding the VR sessions, some students highlighted the "novelty" of the medium as a source of scariness. Kelly says; "I don't like the idea of not knowing what I am doing, not knowing my surroundings." Charlotte says; "I got a bit warm and flustered, I felt a bit anxious before I went in, because it is new." As with the students who found the Simulation Centre manikins "creepy", in most cases concerns about the novelty of the VR environment reduced as they engaged more with it; "Well, at first it was quite complicated, but I got there in the end" (Hana).

The other type of negative emotional response described was a feeling of "disengagement" from the simulation. All of the comments about this related to the VR. Students who appeared to be disengaged tended to dislike the whole VR format and to be disinterested in the specific tasks they were asked to complete. Rosa explains that she is simply not interested in the medium, preferring a "real" setting; "No, I think I'm more of a 'hands-on and be there', do you know what I mean? Just not through technology, it's just not me. It's not my sort of thing."

Note that these "disengaged" students were a minority of those who had participated in one or both of the VR sessions (4 out of 13), and two students in particular account for most of the "disengaged" comments.

Developing confidence

There were many comments from students about developing confidence through participation in the simulations. We divided these into two main subthemes, relating either to feeling confident regarding the immediate simulation activity itself

("Confidence now") or for future challenges ("Confidence for the future"). Students felt that their simulation experiences gave them an immediate feeling of confidence. This was somewhat more evident for the Simulation Centre than the VR, though even in the latter the majority of students mentioned feeling confident. In her feedback following the Simulation Centre session, Diane says;

"I think it was a really good experience and I really enjoyed doing it, I feel like if I did not do it, I wouldn't have the confidence now that I can do it. It's a definite plus to the course."

Reflecting on how quickly she picked up what was required for each of the simulations, Diane says; "…when I did it before at the hospital [Simulation Centre], I was a bit slow with it all, but I think this [VR] is the opposite. It will definitely get easier the more I use it."

References to the simulation(s) giving students "confidence for the future" were made by all the students, somewhat more frequently in relation to the Simulation Centre than the VR. Students widely felt that simulations gave them confidence for future roles and practice, whether in general or for specific skills and tasks;

"It has shown me what any future [role] would be like…I have been experiencing what needs to be done in my future role." (Kelly).

"So, this [VR session] helps not just for now, but when you go out into the real world, and you are working in a role in healthcare. So, yes, I feel if you were in a hospital environment you will remember all of these little pointers from this work." (Jack)

When we look at other aspects of confidence gained through simulation, "confidence in career choices" only appeared in data relating to the Simulation Centre, which could be attributed to the students working with professional simulation practitioners within an actual hospital. In contrast, comments about "confidence in succeeding on my current course" were made somewhat more often in relation to the VR than to the Simulation Centre.

Safety of the environment

Almost all the comments within this theme were about feeling safe, rather than unsafe. Many highlighted how simulation – especially the Simulation Centre – enabled safe practice compared to working with real patients/clients; "…you know that if something goes wrong you are not going to kill the patient. You can go back over, do it again and again, until you get it right." (Nicki)

Students also referred to personally feeling reassured by having members of staff present to support and guide them. Again, such points were mostly made about the Simulation Centre, but three students also said the same about the VR sessions.
"So just having that person [Simulation Centre staff] there, with all that knowledge, made it better, because sometimes in that situation you don't know what to do, and a room filled with people too makes it a bit more scary." (Amir)

"…if the person [i.e. tutor] hadn't been there to guide me, it [VR] would have felt a lot more complicated and a bit scary." (Hana)

Three students referred to issues of "risk/lack of safety" after the VR Orientation session, and two after the VR Assessment Scenario. These almost all related to concerns about falling or tripping over things, and in most cases they got over these fears with practice. Jack, for example, says;

"Well actually, when I stood up on the training, I actually ended up bumping into things. Going outside of the circle quite a lot. You walk around, so I lost my sense of direction, if I just sat down, I could just use the sticks like I would the controller at home. This just made it easier for me."

Note that there were several other students who referred to "disorientation" due to the VR, but did not describe it as in any way feeling risky or unsafe. We will return to this issue later. There were no cases where the students referred to feelings of risk or lack of safety in relation to the Simulation Centre.

Impact of realism

Students generally found the simulations "realistic" and "convincing", including all but two of those who participated in the Simulation Centre and eight out of thirteen who participated in the VR. Regarding the Simulation Centre, many comments were about the realism of the manikins Sarah says "…the manikins could do everything, like a real person. They were very realistic." Similarly, Marla comments very enthusiastically about the realism of the manikins;

"The dummies were realistic, I mean really surprising, how they can do everything that a real person could do. They were so real, it's untrue. I loved working on them and practicing like the real staff here do."

The last part of the above quote highlights another important aspect of "realism" for many students; that working in the Simulation Centre made them "feel professional". Fiona says "I loved being in that real-life scenario, I felt professional." Tahir says; "It was an amazing experience to see and work where the real professionals work." Turning to the VR sessions, many students expressed surprise at how realistic and immersive the simulation was: "I think it was awesome, to be honest, really life-like" (Charlotte); "It felt real. I felt immersed in it all" (Hana). Diane directly compares the perceived realism of the VR with that of the Simulation Centre; "It was like, you know, when we went to the Simulation Centre and the manikins. Like that, but in a unique way, using technology, not real life."

There was one student, Rosa, who was adamant that VR could never replace "real-life" learning, in contrast to the Simulation Centre. Of the former she says;
"It's like sitting behind a screen, or like playing a video game on your computer. You are not getting that experience in full, you're not really learning from it, so I just don't see the point."

In contrast, she says about the Simulation Centre; "Yes, I think the manikins are fantastic. Such a good way to teach you professionally, it's the closest thing to a person."

While Rosa was the only student who strongly and unambiguously dismissed the realism of the VR simulation, most other did acknowledge some limitations to its realism, even if overall they were positive about it. Jack, for example, while generally very positive about the VR sessions, questions whether it can ever replicate the "person-centred" nature of care; "The person-centred bit I think might be a bit tricky, and I'm not sure how that will be managed." Fiona points to difficulties with picking up objects in the simulation as limiting its realism;

"I walked around and picked something up and then I dropped something on the floor, and I couldn't pick it up. It was, you know, that little box of tablets – basically I tried to pick it up, however, I couldn't."

Many students described the VR sessions as feeling game-like ("gamified") but it is worth noting that this was not necessarily in conflict with a sense of the scenario as realistic. Rather, several of them described shifting perceptions of the experience as authentic and as game-like;

"You forget it is actually not real life, and you're in there thinking…. Then you realise, it's just a game! Plays with your mind a bit!" (Sarah)

"It did look like I was in a real hospital though. I felt kind of like I was in a game but in a hospital. It was a bit strange but yes both." (Fiona)

"You can obviously tell you are in a game […] but the environment and everything else, like the patient, the way he moves and stuff, it is all very very good." (Jack)

Simulation vs traditional learning

The great majority of students felt that the simulations were a positive change from traditional classroom learning. This was more evident with regard to the Simulation Centre than the VR, reflecting the fact that students very much valued being away from college in a real hospital setting; "Because I get to do more stuff and learn there. Also, I get out of college and enjoy spending the day in a medical environment." (Sarah)

Several specifically highlighted how much more realistic the manikins in the Simulation Centre were, compared to those they have in college;

"So, the ones at college do not make noises and stuff, but the ones in the hospital are controlled by a computer and you can get them to do way more stuff, like even say yes and no and stuff like that." (Diane)

Many referred to the hospital setting as helping them to feel "professional". Charlotte said; "I felt professional and it is so near to real life". Likewise, Marla said; "It made me feel confident, also like real life and professional.". They also described the Simulation Centre as constituting "hands-on learning" which was not a term applied to the VR, even though as we have just seen many did find the VR realistic. For instance, Nicki says; "I think it was good, it was hands-on learning, so you are actually practicing and building your knowledge to do more."

A minority (four students) of those attending one or both VR sessions also commented positively about it being "away from College";

"It's not like you are coming to college and like sitting in a classroom for hours. It's like you are learning but you are having fun at the same time." (Will)

"It's better than sitting in a classroom and you do get a genuine experience." (Hana)

Students did not just appreciate the simulations as a break from college routine. Almost all the students thought that the use of simulation in the Simulation Centre enhanced learning/development, as did about half of those who experienced the VR;

"It's going to show us how to do different procedures, as many of us have not done it before. It totally gives us hands on experience." (Sarah)

"It gives you an insight into a hospital situation, when you maybe have never been on a ward before; it gives you this massive insight into the patients, the scenarios and how you have to communicate with them, and what to do exactly." (Hana)

Comments about technical aspects of the equipment used in simulation were exclusively in relation to VR. As mentioned earlier, feelings of disorientation when first using the VR commonly mentioned. They also referred to problems with the headset and its calibration, and (less frequently) problems with the hand controls, though they did not see this as major issues. For instance, Sarah says; "It was only the fact that I couldn't grab right because the size wasn't adjusted, that's all, but I'm sure it will be better for next time." One student refers to programming errors; "I think there are bugs in it too because you know the spillage – that was the only thing I could not do. It would not let me clean up the spillage" (Will).

Three of the five students who completed the VR Assessment scenario pointed to positive technical features of the VR in that session, specifically in relation to its ease of use; "The backdrop is alright, it's clean and smooth, especially the way you communicate with the patient. It makes it so easy and straightforward." (Will)

What the learner brings

Students' highlighted a variety of ways in which their personal characteristics – preferences, experiences, abilities and so on – impacted their views of the simulations. On the whole, different characteristics were referred to in relation to the different forms of simulation. Looking first at the Simulation Centre, four of the students spoke about their preference for visual learning as one reason why they liked this format. Charlotte, for instance, said; "I definitely think visual learning helps way more than textbook learning." Other characteristics mentioned were more idiosyncratic and included a personal interest in biology, previous history with using manikins, self-perceived "caring skills" and limitations from lack of physical strength (made in relation to performing CPR). One student mentioned not liking "being watched" while working on the manikin.

Some students' enthusiasm for the Simulation Centre was linked to their "personal history in health and social care". This mostly involved experience as informal carers. Marla explains;

"I learnt how to do a caring role by caring for my auntie. She was older, I helped her and we spent a lot of time together […] so coming here is really a fun place for me to learn and enjoy what I am learning."

Turning to the VR, five students (including four of the five students who completed the Assessment Scenario) referred to prior experience with and/or enjoyment of video-gaming. For example, Charlotte says; "Yes, I have used it [VR technology] to play games. My stepdad has got one. I have had a bit of time on one." Conversely, two students expressed a dislike of VR technology. Rosa says; "Just something I'm not interested in. I don't think I ever will be […] It just does not bring me pleasure." Marla says; "I'm not a fan, I don't think I will ever get used to it. I'm just not a fan." In three cases students reported that how they were feeling on the day (unrelated to the simulation session) impacted on their engagement with the VR.

One student directly spoke about how his disability (ADHD) shaped his response to the simulations. In both cases, he felt that the active, hands-on learning in the simulation helped him to engage with and enjoy it. Regarding the Simulation Centre he says;

"Because of my ADHD it is harder for me to take in information in a normal way, so being able to be hands-on in the simulation, made me a lot more comfortable and confident about myself and my abilities."

New learning

All the students said something about new learning they had gained through one or both of the simulations, and many talked at some length about what they had learned. This was more the case in relation to the Simulation Centre than VR, though both formats elicited such comments. It was also evident that amongst the comments made in relation to VR, the great majority came after the Orientation session rather than the Assessment session.

There were more comments about learning related to technology, equipment and/or technical skills than to interpersonal or other skills, though overall a wide range of skills is referred to. We provide some examples of the range of responses below;

"Because I learned new things, like how to take a patient's blood pressure and check the heartbeat." (Diane, re Simulation Centre)

"It helped me to learn how to use the professional equipment that you would use on a real individual, and I got a lot more confident with my communication skills." (Dariya, re Simulation Centre)

"I used a stethoscope to listen to the heart. I went into the backroom – I was the one with the headset on, I was the one talking through the manikin." (Rosa, re Simulation Centre)

"If you want to work at a hospital, when you are having blood pressure for example, VR can show you exactly how to do it, so if you can do it on VR you can probably do it in real life." (Fiona, re VR).

"It gives you an insight into a hospital situation, when you maybe have never been on a ward before, it gives you this massive insight into the patients, the scenarios and how you have to communicate with them, and what to do exactly." (Bella, re VR)
Many students said that the Simulation Centre sessions helped them to build on their previous more traditional learning ; this was not evident in relation to VR. For instance, Hana says; "It was actually nice to be able to practice what we have been learning."

Changes suggested

Most students made at least one suggestion for how one or other of the simulations could be improved – about half of them made at least one comment about each format. Many requests were essentially for 'more of the same' – making the experience deeper, having more opportunities to use the equipment, and for two students (in relation to the Simulation Centre) making the experience even more professional. Marla says;

"I would like to have enough time so we can practice and learn more as time seems short. As it was our first time there, I would have liked to be able to see more major scenarios and learn how to deal with them. Looking the part is important too so I would like to have uniforms to add to it all."

Comments about improving the physical environment were exclusively made in relation to Simulation Centre, and referred to making the room less hot, less crowded, and having smaller groups. Conversely, the few comments about 'improvements to technology' (three students) were all in relation to VR; letting students calibrate their own headsets, removing the bug (mentioned earlier) related to cleaning a spillage, and making it easier for the avatar to walk around the (virtual) room.

Assessment issues and concerns

All the comments in this theme related to the VR sessions (one or both of them). Students valued the inbuilt learning aids in the hospital-based scenario – the checklist and questions/prompts. Charlotte says; "I liked how it had all the pointers on the side. It ticks them off when you have passed each task. It's like a check list." Similarly, Will says; "There was a chart that told you what and what not you had done. I found this really helpful, like a checklist/ score sheet to help remember. This was a good function."

The tutorial before the first VR Orientation session was widely seen as helpful, and more generally the need for practice/preparation was emphasised by three students. This is summed up by Diane;

"I thought it was easier doing the practice run beforehand because it showed you how to pick things up. Then I practiced and it became much easier. It was right to do that before because it gave you a chance to practice."

There were only two students who mentioned any kind of anxiety about assessment using VR. Bella commented after the Orientation session that time pressure in a real assessment would "make me panic more", but acknowledged that "it would be a clever

way to learn certain things better, I guess." Hana was worried she "might fail" as she'd found it hard to remember what she had to do.

DISCUSSION

The project aimed to achieve a number of key elements in order to assess the use of immersive technologies in assessment:

The rationale was to level the playing field in terms of FE learning and teachers' access to high-fidelity technology in curricula delivery and assessment with that of HE, test the use of immersive technologies in assessing the Care Certificate standards so students leave education with the demonstrable competencies required by the sector, which should support employers' recruitment and retention and test the use of immersive technologies in formative assessment.

We hoped that the impact for students would be, an increased understanding of course content, engagement and agency by virtue of being immersed in real-life scenario, space for students to be reflective and provide peer to peer feedback, collaboration with employers and sector stakeholders and to replicate real working environments and scenarios that would provide robust scenarios for assessment.

Key Findings

Responses to simulation

Students overall found the simulation experiences engaging and enjoyable. They felt they were realistic, and described new learning that had occurred through their participation in them. They were, though, more consistently positive about the Simulation Centre than the VR, with a small number of students quite hostile to the latter. Regarding the Simulation Centre, students liked being away from college in an environment they viewed as "professional"; they were impressed by the realism of the mannikins and felt well-supported. Negative comments (of which there were few) were predominantly about environmental factors such as the room being too crowded and/or too warm.

Turning to the VR, the majority of students might be described as cautiously positive – they felt it was relatively realistic, could see its value for learning and felt that the orientation session and the embedded support features in the assessed scenario made them feel well-prepared. However, many found the experience initially disorientating and some had issues with the equipment – most frequently with calibration of the headset. Those students who were most enthusiastic about the VR were likely to have had some previous experience with video gaming, and some also mentioned other personal characteristics that predisposed them to enjoy the VR. Those who were most negative about VR did not see its relevance to the people-based nature of health and social care work, and/or were particularly uncomfortable with the technology itself. (It is worth noting that the former issue was even mentioned by one of the enthusiasts.)

It is important to note at this stage that the VR scenarios developed were to prototype standard due to the limitations in funding and time to develop final products, and so the lack of fidelity may have affected students' response to the realism of the VR scenarios.

When we consider these findings, the contrast with traditional classroom learning is in all likelihood of central importance. Both simulations constituted novel forms of learning and a break from college routine that students found stimulating and

enjoyable (with a few exceptions for VR, as we have seen). The more consistent enthusiasm for the Simulation Centre can be understood in terms of the greater feeling of "being professional" it gave, due to its setting in a real hospital as well as the technical sophistication and realism of the mannikins. It is also worth noting that the students were in a sense all on a level playing field at the Simulation Centre; it was new to all of them, and its use did not rely on any related prior experience. In contrast, students varied in how much they had experience and interest in the kind of technology used in the VR scenarios, especially through gaming. Personal preferences regarding the technology – both negative and positive – were much more in evidence for VR than for the Simulation Centre.

There is also a point to consider in terms of facilitation of the simulation centre and VR assessment sessions. The simulation centre is well established, uses actual hospital equipment and consumables, is, as mentioned, off campus and is supported by a skilled Simulation Technician with a number of years' experience. The VR sessions were held in a performance space in the College and facilitated by one of the class tutors who had received training only a matter of hours prior to the students entering the space. This was primarily due to the time of year in the curriculum timetable when the sessions were taking place. And so the lack of a confidently facilitated VR session may have affected the students' responses and relationship to that particular technology.

Assessment issues

It was striking that students did not talk directly about assessment issues in relation to the Simulation Centre, even though the second session involved a formative assessment activity. In contrast, all five students who completed the VR Assessment session made comments about the assessment process itself. This may reflect that they were so engrossed in interacting with the manikins and related technology they didn't focus on what they were doing as being a formative assessment. In contrast, the second VR session was very explicitly aimed at assessing skills and knowledge and included elements such as the 'checklist' that foregrounded the nature of session.

Strengths and limitations

There have been very few previous projects using simulation technology – and especially VR – with social care students at the Further Education level. Likewise, there is little in the academic literature addressing this specific area. The current work, therefore, offers valuable insights into the topic for future work to build on. The collection and analysis of first-hand responses from students is particularly important.

The main limitation is the drop in participant numbers for the final stage of the work – the assessment session using VR. This was mainly the result of scheduling; by the time all the technical issues with the VR scenarios were addressed the college had reached the latter part of the final term. Students therefore had a number of other demands on their time which for some made it difficult to attend. There may also have been a decline in general levels of motivation at the end of term, compared to the early part of the academic year when the Simulation Centre sessions were run.

Implications for future practice and research

We will focus here on the lessons to be drawn for further developing the use of VR technology in social care education at FE level. It is clear from this project that VR has the potential to be used effectively with this group of students, including in the context of assessment, although a number of challenges need to be met to ensure it is as widely effective as possible.

- Faculty development in SBE is vital and should be factored in as protected learning time for staff that are involved in simulated learning and delivery in order to get it right and avoid training scars. The use of immersive technologies is designed to enhance the student experience, provide realistic learning and assessments, and to facilitate agency in the user in a safe and secure simulated situation. The learning outcome should be the main focus of the simulated experience and where a potential trigger or trauma could present itself, it is the role of faculty to ensure safeguards are in place to mitigate this.

- Potential triggers for students need to be factored into the orientation stage of simulation practice in learning and assessment, such as the name of manikins, nature of the simulation, situation and environment and VR sickness.

- Simulation practice and delivery should be embedded within curriculum content so that it is timetabled and becomes standard for FE students, to avoid the sense of newness and novelty when using immersive technologies and to avoid orientation impacting negatively on the assessment period. FE students should not be at a disadvantage to HE students in access to and the use of immersive technology in learning and assessment. Once simulated practice is embedded within curriculum content, FE students will be exposed to immersive technologies from the beginning of their learning journey.

- To affect a system change in the way assessments are undertaken, stakeholders and employers must continue to be involved in the development and planning of a phase two impact study, which will mean bringing the Institute for Apprenticeships and Technical Education (IFAIT) into the project team along with the Awarding Bodies and the Care Certificate owners. Having their buy-in from the onset will be paramount to ensuring the use of immersive technologies and simulated practice is embedded within curriculum content and assessment.

- The technical element of immersive technologies and simulated practice needs to be thoroughly thought through prior to using simulation for learning and assessment and fully embedded into College processes, systems and management – staff expertise in the use of immersive technologies, practicalities of managing equipment, such as asset stamping of headsets, calibration of headsets to individual students via anonymised user email addresses, setting up of VR stations, screen sharing, diarising adequate time to iron out bugs in programming, physical updating of software, management of headsets and equipment and maintenance. See Appendix 7 for the technical implementation report.

- Time for training and orientation for students and staff, especially because we cannot assume students will all (or even most) be familiar with gaming technology and enthusiastic about it. This is particularly true of H&SC students, who may be more people than technology focused, and low socio-economic class of college catchment area may mean they have less access to the most

modern gaming technology that would have features relevant to the VR. See Appendix 8 for indices of deprivation of L2 Cert Prep and L3 T Level students that participated in the project, that demonstrates 17 out of 20 students live in the top deciles of deprivation in England, with 10 students living in the top two deciles.

- Include more personal interaction with virtual patients in scenarios, so the personal aspects of care are not missed. This feeds into the development of students' behaviours, which is a vital skill for the H&SC sector.

- Think about how to make the whole experience as 'professional' as possible – e.g. students/staff wearing uniforms, rooms for VR sessions made to look like a care setting. This would promote the potential for future research in using a hybrid approach to the use of immersive technology in assessment, where VR is used in conjunction with an immersive room environment with 'set' and 'props' replicating the resources available within a simulation centre. Setting the correct scene from the onset is crucial to creating a realistic scenario. See Appendix 9 for Simulation Centre first visit protocol and process.

- Include scalability in a phase two impact study of the project to assess the use of immersive technologies across another curriculum area. This would add validity to the final recommendations and implications for future research.

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APPENDIX 1 - SCENARIO PLANNING

QUAL / UNIT / STANDARD	LEARNING OUTCOME(S) INTENT	ASSESSMENT CRITERIA
S1.26 – Duty of care:	Implement a duty of care and candour when working with individuals and their families/carers, speaking clearly and confidently using appropriate tone and register that reflects audience and purpose.	• Communication • Person centered care • Observing confidentiality • Clarity around definitions scenario related to the care of an individual and communicating with the individual and their families/carers.
K1.6, S1.29 – Techniques for infection control:	**K1.6** How to use a range of techniques for infection prevention and control. **S1.29** Use a range of techniques for infection prevention and control (for example waste management, spillage, handwashing, use of PPE) and have a thorough understanding of the context of the work.	Students to individually make notes on a range of techniques for infection prevention and control within the following areas: • Personal Hygiene • Handwashing • PPE • Spillage • Waste management • Appropriate cleaning • Incidents and emergencies • Responding

S1.30, K1.80 – Person centered care:	**S1.30** Provide person-centred care and support to individuals, carers and relevant others. • Individuals, carers and others • Listening • Decision making • Gaining consent **K1.80** How to support individuals' care needs, ensuring privacy and dignity is maintained whilst recognising the importance of personal health and wellbeing.	Students will be given a scenario of an individual requiring care. They will be given information on practical tasks to undertake with the individual. They will be required to provide an effective clinical environment, provide person centred care and assist with individuals overall comfort and wellbeing. Groups to be given one of the following assisting with care related tasks: • Simple dressings (for example plasters, sterile pad). • Catheter care. • Personal care/personal hygiene (including washing, dressing, bathing, toileting). • Fluids and nutrition (including feeding, drinking). • Supporting with mobility (including getting in or out of bed, bathing sitting in a chair, standing, walking).
S1.32 – Moving and Handling:	**S1.32** Move and handle individuals safely when assisting them with their care needs, using appropriate moving and handling aids. • Check equipment	Students to be provided with a handout with manual handling tasks to undertake with the 'patient' using various manual handling aids (wheelchairs, walking aids/frames, transfer belt).
K1.13 – Report / record needs:	**K1.13** How and why to report changes and	Students to research indicators of deteriorations in physical and mental health and make two lists physical/mental health.

	deterioration when supporting individuals.	Groups to research and discuss how and why to report changes and deteriorations and make notes.
		Peer professional discussion They will discuss the indicators of deteriorations in mental and physical health and how they would respond to this. Students to record peer discussion, listen back and complete the reflection handout. They should reflect on what they discussed, thinking about what they did well, what else they could have included and what further skills they may need to develop on placement. **(Becca Note: The Simulation Centre Debrief will suit this element well but how will this be achieved in the VR scenario?)**
S1.37 – Use of PPE:	**S1.37** Use appropriate techniques and PPE to ensure effective infection prevention and control in the healthcare environment.	Students to undertake a practical activity role play in which a carousel of activities will be set up. Students will have to demonstrate the techniques for infection prevention and control, covering the areas of: • Personal hygiene. • Handwashing. • Personal protection equipment (applying and removing). • Spillages. • Waste management. • Correct order of applying PPE • Correct order of removing PPE
S1.38 – Contribute, record in care plans:	**S1.38** Contribute, record and follow information in care plans.	Students to be given a handout with instructions on for some care tasks to be completed in relation to the information on the care plan form.

		Daily observations / living – Sleep, urine levels, physiological measurements
PO3 – K3.1, S3.16, K3.4 – Physiological measurements:	**K3.1** What physiological measurements commonly measured by the healthcare support worker are and what the normal range is for each measurement in adults. **K3.4** How these measurements are taken. **S3.16** Use physiological measurement equipment.	scenario of an individual who has been admitted to hospital. The scenario will require that they undertake physiological measurement using equipment including: • Blood pressure recording device. • Stethoscope. • Thermometer. • Watch with second hand. • Pulse oximeter. • Weighing scales/tape measure. • Dip stick. • Peak flow chart. • Peak flow monitor. Students to record the measurements on the physiological measurements templates provided including: • Blood pressure chart. • Body temperature chart. • Peak flow chart. • Weight/height chart. • Urine output chart. • National Early Warning Scores (NEWS) 2 chart. Students to calculate National Early Warning Scores (NEWS) 2 and report on the (NEWS) 2 chart. Some of the measurements will fall outside of the normal range. Student to report findings to individual acting as the student's manager. • Blood pressure – blood pressure recording device – check blood pressure • Body temperature – Thermometer – checking temperature • Heart rate – Use a watch with a second hand – check measurement

		• Respiration rate – pulse oximeter – oxygen in blood • Stethoscope – Check heart/ lungs
Unit 02 Communication skills for working in the health sector		
3 – Understand how to promote effective communication:	3.1 Using verbal and nonverbal communication-	Demonstrate ways to use verbal and nonverbal communication.
4 - Understand how to maintain accurate and complete records	4.1 Recording work activities – 4.2 Accurate record keeping –	Demonstrate how to report and record work activities. Demonstrate the importance of accurate record keeping.
Unit 04 Health, safety and security in the health sector		
1 - Know how to assist in maintaining a healthy, safe and secure working environment consistent with legislation and organisational	1.1 Potential risks to health and safety	Demonstrate potential risks to health, safety and security in healthcare settings in relation to: • the environment • individuals • information and its use

policies and procedures.		
3 - Know how to reduce the spread of infection in healthcare settings.	3.1 – Own health and hygiene in healthcare	Demonstrate the ways an infection can get into the body
	3.2 – Ways infection can get into body	Demonstrate the ways an infection can get into the body.
	3.3 – Effective hand washing	Demonstrate the most effective method for hand washing.
	3.4 – PPE and it's use	Demonstrate how the use of personal protective equipment (PPE) can reduce the spread of infection.
	3.5 – When employees should stay away from workplace	Demonstrate circumstances when employees are advised to stay away from the workplace. – Perhaps when they are in the lobby they undertake a personal check list prior to entering the hospital room? - **All of this unit relates to Standard 15 of the Care Certificate.**

APPENDIX 2 – SCENARIOS ALL BRIEFINGS

Calderdale College - Scenario 1

(All Briefing created by Ann Sunderland on 21 - Nov - 2022)

Description

This scenario is designed for T level students and will form part of a series of three scenarios of increasing complexity.

Learning Objectives

Learning outcomes:

- To identify and appropriately manage issues relating to infection prevention and control

- To be able to record clinical observations on a NEWS2 chart, calculate an accurate score and escalate appropriately

- To be have an awareness of issues relating to the patient's presenting problem and clinical history

Classification

Curriculum Mapping	Level 3 T level
Schools / Departments	Nursing
Parent Specialty	Nursing
Learner Type	Pre-Licensure
Target Learner Group	T level students in further education
Patient Group	Adult
Organ System	Respiratory
Human Factors	Situational awareness, Anticipation and planning, Communication
ASPiH	Assess't - learner performance, Assess't - learning outcomes

INACSL	02 - Measurable objectives for Scenario define clear outcomes, 07 - Begin simulation-based experiences with a pre-briefing, 10 - Provide preparation materials to support participant's success, 06 - Maintain a patient-centered and facilitative approach, 04 - A Scenario/case provides a context for the simulation experience, 11 - Pilot test new simulations before full implemetation, 01 - Needs assessment demonstrates clear need for Scenario, 03 - Scenario structure maps to (i) purpose (ii) theory and (iii) modality, 08 - Follow Simulation-based experiences with a debriefing and/or feedback session
Nursing Good Practice - Knowledge & Skills Framework	Communication, Health: Safety & Security
Nursing Good Practice - Values & Behaviour	Communication, Competency, Care (quality/safety)
SimZones	Zone 1

Required Resources for Scenario Setup (State-specific Resources to be added later)

Item	Description	Linked Document			
Location	The scenario will be developed in VR. Setting: A one-bedded room in a hospital setting Contents: • Hospital bed with controls to change height and head	Hospital sink1.jpg, Water jug and glass.jpg, Allergy wrist band.jpg, Blue tissues.jpg, Paracetamol - take off branding.jpg, Sputum pot full.jpg, Allergy wrist band 2.jpg,	General/ multiple	Blank NEWS2 chart	NEWS2 chart.jpg

| | of bed (these do not need to function).

• Dynamap

• Over-bed table

• Bedside cabinet

• Box of tissues on bedside cabinet

• Gloves and apron dispenser wall-mounted

• Chair

• Water jug and glass on top of cabinet

• Chart at the end of the bed

• Wall strip to include oxygen, suction and emergency buzzer

• Curtains around bed

• Patient dressed in hospital gown, sat up in bed

• Sink

• Open bottle of paracetamol on bedside cabinet

• Sputum pot with lid off and sputum on floor to the left hand side of the patients bed as you look at it. Colour of sputum to | Gloves and Apron.jpg, NEWS2 chart.png, Hospital curtains - disposable.jpg, Sputum pot.jpg, clinicalwaste-640x640-c-center.jpg, Hospital bed chart - use NEWS2.jpg, Sink.jpg, Dynamap close up.jpg, Dynamap stand.jpg, Hospital bed and table.jpg, Glove and apron dispenser.jpg, METAL_28_DUO_12141WEB__57523.jpg, | | |

	roughly match 3rd row on colour chart. • Patient should be wearing a red wrist band indicating an allergy • Blue tissues in dispenser • Clinical waste bin • General waste bin			
General/multiple	SBAR handover model	SBAR.jpg		
General/multiple	Guidelines on measuring manual blood pressures	CHECKLIST-HCAS-MEASURING-BLOOD-PRESSURE-P1-P3.pdf, HCAS-MEASURING-BLOOD-PRESSURE-PART-1-EQUIPMENT-P1-P3.pdf, HCAS-MEASURING-BLOOD-PRESSURE-PART-2-PROCEDURE-P1-P4.pdf, HCAS-MEASURING-BLOOD-PRESSURE-PART-3-THE-PATIENT-P1-P2.pdf		

Equipment	Details of what gloves and aprons would look like.	[Apron back.jpg](), [Gloves.jpg](), [Gloves and apron.jpg]()
Set-up Patient information	Medical records	[Medical Records.docx]()
General/multiple	Student pre-brief	[Pre-brief.docx]()
Equipment	Cleaning the VR headsets - Guidelines and further information can be found at: [https://oxfordmedicalsimulation.com/resources/how-to-clean-vr-headsets/]()	
Set-up Patient information	Voice Lines	[I was born on 12th Jan and i am 62 years old.4.mp3](), [Thank you.mp3](), [Yes thats fine.mp3](), [I accidentally knocked the pot.mp3](), [I was born on 12th Jan and i am 62 years old.1.mp3](), [Hello.mp3](), [I've had them done before so i know what to expect.mp3](), [My name is Joe]()

		,	

Required Resources

Actor/Other Roles in Scenario	Notes for Actor/Role- Script / Mindset / Agendas driving Behaviour
Patient	The patient is sat up in bed wearing a hospital gown. She appears a little flushed.

Instruction to Learner

<u>Learner Pre-Brief</u>

You are working on a medical ward within a busy hospital and have been asked to look after Joe today. You have been asked to:

- Consider and manage any issues that you identify in relation to infection prevention and control

- Take Joe's clinical observations and document them on the NEWS2 chart, calculating the score

- Answer some questions related to the scenario when you have completed the above

Remember to interact with the patient during the scenario, as you would in a real clinical setting.

When you have completed the above, head to the door to exit the scenario.

Patient Profile : Joe Binns, Male, 62 year(s), 69 kg(s), 166 cm(s)
Presenting History (Candidate / Learner Storyboard)
Joe was admitted to hospital earlier today after collapsing at work. He has had a cough for 4 days and feels generally unwell. He has been seen in accident and emergency and is thought to have a lower respiratory tract infection
Previous Medical History

- Tonsillectomy aged 5

- Hypertension (high blood pressure)

- Type 2 diabetes

Lifestyle

- Non-smoker (has never smoked)

- Drinks alcohol occasionally if meeting up with friends

- Tries to stick to a healthy diet

- Likes to go hiking at weekends

Social history

Joe lives alone following the death of his wife five years ago. They do not have any children. He is semi-retired and works part-time as a lawyer.

Current Medication

Lisinopril 10mg once daily

Metformin 500mg once daily

Known Allergies

Penicillin and grass pollens

Initial state

Presentation and Behaviour

Patient is sat up in bed wearing a hospital gown and looks slightly flushed.

Vital Signs - Breathing

Respiratory rate (br/min) : 22	SpO2 (%) : 98
Airway : Patent	

Vital Signs - Circulation

Rhythm : Sinus (Maestro/LLEAP/REALITi)			
HR (bpm) : 94	SBP : 100 mmHg	DBP : 60 mmHg	
Cap Refill (seconds) : 4		Skin : Looks slightly flushed and feels warm	

Vital Signs - Disability/Exposure

TBody : 38.1 °C	AVPU : A	GCS : 15

Pupils : Reacting to light and accommodation bilaterally	

State-Specific Resources

Item	Description	Linked Document
Multiple/Other Docs/Resources	Order of play spreadsheet. This contains an overview of the flow of the scenario as well as the suggested audio for both the patient and student. It also contains the questions (with answers) for the end of the scenario.	Order of play.xlsx

Desired Actions/Outcomes

Participants Should	- Introduce themselves to the patient S1.26 - Visually assesses surroundings for hazards - Identify bottle of paracetamol on bedside cabinet with top off and secures top - Patient states that they were asked to provide a sputum sample but that they have dropped in on the floor. When they look, the top has come off the sample bottle. They will need to deal with it by: - Donning apron and gloves - Ventilate area (will be using chlorine based products) - Soak up excess liquid with paper towels - Clear away container and spillage with paper towels - Dispose of in infectious waste

- Wash area with a disposable cloth using pH neutral detergent and warm water and then chlorine-based disinfectant.

- Dry area with paper towels

- Dispose of cloth and paper towels in infectious waste

- Remove and dispose of gloves

- Clean hands

- Remove apron

- Clean hands

- Washes hands before taking observations

- Gains informed consent to carry out clinical observations S1.26, S1.30 - Consider how this will be done ? click on appropriate body part to be given the findings e.g. click on chest for resp rate, wrist for pulse etc.

- Accurately document the observations on the NEWS2 chart, including an overall score K1.13, S1.38, K3.1

- Responds to questions relating to the scenario, using a multiple choice approach - refer to order of play spreadsheet

Questions presented at the end of the scenario.

Is there anything you notice in the patient's history that may make them more prone to infection? (Type 2 diabetes) S1.30

What is the maximum normal blood pressure for a healthy adult? (140/80) PO3

Why might Joe's blood pressure be elevated now? (Stress of being in hospital, medication not working or poor compliance) S1.30

Joe is wearing a red wrist band. What does this signify? (An allergy to something e.g. medication) S1.30

	Options and correct answers are in the order of play spreadsheet. For more information, refer to the order of play spreadsheet found in section 4 resources.
Facilitators Should	• Ensure the headset (if using), is in working order, is set up correctly and is fully charged • Ensure computer/headset it connected to the internet • Ensures the student understands the concept of the scenario and why it is being presented • Provides a debrief and additional feedback to the automated feedback, as soon after the scenario as possible

Debriefing Points

The debriefing should follow a recognised debriefing model such as the Diamond model (see teaching notes and references for more information). The debrief should focus on what happened within the scenario, analysis of thoughts/actions and how learning points can be transferred into to practice.

Teaching Notes and Resources

Please note that the rationale for having either a male or female patient is to allow flexibility within the simulation suite when the scenario is being replicated. In the VR scenario, the character will be male.

Guidelines for dealing with spillage of body fluids: https://www.england.nhs.uk/wp-content/uploads/2022/09/national-infection-prevention-and-control-manual-appendix-9.pdf

NEWS2: https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news-2

SBAR communication tool: https://www.england.nhs.uk/wp-content/uploads/2021/03/qsir-sbar-communication-tool.pdf

Diamond Debriefing Model: https://pubmed.ncbi.nlm.nih.gov/26009951/#:~:text=The%20diamond%20debriefing%20method%20is,aspects%20of%20a%20simulated%20scenario

Lessons Learned

Post-Simulation Debrief/Lessons Learned	Date	Decision	Description of Decision	Linked Document
Will not be including SBAR handover	27/02/2023	Abandon	Initially the scenario was to request an SBAR handover at the end of the scenario. This element has now been removed as SBAR handovers are not included in the curriculum. A recommendation to included in future training, will be taken forward.	
Enhance realism	23/03/2023	Adopt	Pilot the use of haptics with regards to the pulse to that it can be felt/heard.	
In testing, delegates struggled with the hand sets.	23/03/2023	Adopt	Enhance user interface design and add a "help" layer which can be toggled on or off.	
Enhance realism	23/03/2023	Adopt	Separate the dynamap on/off button so that it can be switched on/off.	

Need a means of timing the pulse and respiratory rate	23/03/2023	Adopt	Add a clock to the scenario on the pillar above the patient.	
Enhance realism	23/03/2023	Adopt	Change the bins so that the general waste bin opens as well as the clinical waste bin, allowing learners to dispose of material in wrong bin.	
Unclear currently how scenario ends	23/03/2023	Adopt	Add an "end scenario" button on the door so it is clear how to exit the scenario.	
Enhance clarity with regards to fuctions	23/03/2023	Adopt	Highlight the selected item or cursor so it is clear what has been selected. Show the password. Include a wifi warning to ensure that wifi is connected. Add an existing user warning.	
Enhance clarity of actions	23/03/2023	Adopt	Add user interface buttons to the bins to highlight when gloves and aprons have been disposed of.	
Enhance realism	23/03/2023	Adopt	Add audio to include monitor beeps/clicks, bin opening and	

			closing, tap turning on/off, ambient background noise etc.	
Enhance realism	23/03/2023	Adopt	Add animation that shows apron going over head when donned.	
Aid user interface	23/03/2023	Adopt	Change user interface so that pulse ox, thermometer and sphyg cuff are suspended above the dynamap basket for easy access and that they snap back into place in the basket if they are dropped or incorrectly placed.	
Aid user experience	23/03/2023	Adopt	Increase the size of the hitbox around items to they are more easily interacted with.	
Enhance realism	23/03/2023	Adopt	Touch the sink to open the taps, touch again to close.	
Aid user experience	23/03/2023	Adopt	Add a ghost version of the sphyg cuff that shows when it has been picked up and applied to the arm.	

Enhance user experience	23/03/2023	Adopt	Remove the 90 degree rotation on the right controller and remove the switch to movement on the left thumbstick.	
Aligning scenario development with national and international standards	23/03/2023	Investigate further	Explore purchasing iRIS licence	
Enhance realism	23/03/2023	Investigate further	Add coloured bin liners to general and clinical waste bins. This is not likely to be done prior to testing and will likely be postponed to phase 2.	
Enhance realism	23/03/2023	Investigate further	Consider adding different ways of doffing PPE so the student has to chose correct option. Will most likely happen in phase 2.	
Aid user experience	23/03/2023	Adopt	Show learner pre-brief at start of scenario so the learner is clear on what they should achieve.	

Appendix – Copyright Ownership

The first entry is the source item, with subsequent derivatives showing below with their associated authors and organisations.

Created By	Date	Organisation	Item Link
AnnSunderland	21/11/2022	ASPiH	Ann's TinySim scenario template
AnnSunderland	21/11/2022	ASPiH	Calderdale College - Scenario 1

Calderdale College - Scenario 2

(All Briefing created by AnnS on 02 - Mar - 2023)

Description

This scenario is designed for T level students and will form part of a series of three scenarios of increasing complexity.

Learning Objectives

Learning outcomes:

- To identify and appropriately manage issues relating to infection prevention and control

- To be able to record clinical observations on a NEWS2 chart, calculate an accurate score and escalate appropriately

- To be have an awareness of issues relating to the patient's presenting problem and clinical history

Classification

Curriculum Mapping	Level 3 T level
Schools / Departments	Nursing
Parent Specialty	Nursing
Learner Type	Pre-Licensure
Target Learner Group	T level students in further education
Patient Group	Adult
Organ System	Mental & Behavioural Disorders
Human Factors	Communication, Anticipation and planning, Situational awareness
ASPiH	Assess't - learning outcomes, Assess't - learner performance
INACSL	08 - Follow Simulation-based experiences with a debriefing and/or feedback session, 10 - Provide preparation materials to support participant's success, 01 - Needs assessment demonstrates clear need for Scenario, 07 - Begin simulation-based experiences with a pre-briefing, 04 - A Scenario/case provides a context for the simulation experience, 11 - Pilot test new simulations before full implementation, 06 - Maintain a patient-centered and facilitative approach, 03 - Scenario structure maps to (i) purpose (ii) theory and (iii) modality, 02 - Measurable objectives for Scenario define clear outcomes
Nursing Good Practice - Knowledge & Skills Framework	Health: Safety & Security, Communication

Nursing Good Practice - Values & Behaviour	Care (quality/safety), Communication, Competency
SimZones	Zone 1
Others	

Required Resources for Scenario Setup (State-specific Resources to be added later)

Item	Description	Linked Document			
Location	The scenario will be developed in VR. Setting: A one-bedded room in a hospital setting Contents: • Hospital bed with controls to change height and head of bed (these do not need to function). • Dynamap • Over-bed table • Bedside cabinet • Box of tissues on bedside cabinet • Gloves and apron dispenser wall-mounted • Chair • Water jug and glass on top of cabinet	Sink.jpg, Dynamap close up.jpg, Hospital sink1.jpg, clinicalwaste-640x640-c-center.jpg, Bandage on wrist.jpg, Gloves and Apron.jpg, Hospital bed chart - use NEWS2.jpg, Hospital bed and table.jpg, Hospital patient chair.jpg, Hospital curtains - disposable.jpg, Vacutainer needle and sheath.jpeg, Tissues - take off	General/ multiple	Blank NEWS2 chart	NEWS2 chart.jpg

	- Chart at the end of the bed - Wall strip to include oxygen, suction and emergency buzzer - Curtains around bed - Patient dressed in hospital gown, sat up in bed - Sink - Patient should be wearing a white wrist band - Blue tissues in dispenser - Clinical waste bin - General waste bin - Sharps bin on locker at side of bed - Cardboard kidney dish on over-bed table containing unsheathed vacutainer needle (as per photo), a couple of mediswabs (one torn open and one intact), 2 or 3 cotton wool balls (1 with a small about of blood on)	branding.jpg, Overbed table.jpg, Kidney dish.jpg, Bedside cabinet.jpg, METAL_28_DUO_12141WEB__57523.jpg, White hospital bracelet.jpg, Water jug and glass.jpg, Mediswab open.jpg,			
Equipment	Details of what gloves and aprons would look like.	Gloves and apron.jpg, Apron			

		back.jpg, Gloves.jpg	
Set-up Patient inform ation	Medical records	Medical_Records Scenario 2.docx	
Gener al/multi ple	Student pre-brief	Pre-brief scenario 2.docx	

Required Resources

Actor/Other Roles in Scenario	Notes for Actor/Role- Script / Mindset / Agendas driving Behaviour
Patient	The patient is sat up in bed wearing a hospital gown. She avoids eye contact and appears agitated i.e. keeps picking at her fingers and fidgeting. She has a cling bandage around her left wrist (see photo in above section).

Instruction to Learner

Pre-brief provided at the beginning of the scenario:

You are working on a medical ward within a busy hospital and have been asked to look after Sophia today. You have been asked to:

- Take Sophia's clinical observations and document them on the NEWS2 chart, calculating the score

- Consider and manage any issues that you identify in relation to infection prevention and control

- Answer some questions related to the scenario when you have completed the above

Patient Profile : Sophia Shaw , Female, 20 year(s), 70 kg(s), 162 cm(s)

Presenting History (Candidate / Learner Storyboard)

Sophia was admitted to the ward via accident and emergency yesterday evening, after self-harming. She had attempted to cut her left wrist with a kitchen knife following a

breakup with her boyfriend. Her wrist has been sutured and dressed. The mental health ward is full so she was admitted to the medical ward. She has not self-harmed before and has no history of mental illness.

Previous Medical History

Past medical history

- Hay fever

- Eczema

Family history

- Parents alive and well

- Maternal grandmother committed suicide at the age of 28 by sitting in her car with the windows open and the engine running in an enclosed garage

Lifestyle

- Non-smoker (has never smoked)

- Likes to go out with her friends Friday and Saturday nights. Will drink about 8 gin and tonics each night.

- Tries to stick to a healthy diet

- Does not do any regular exercise

Social history

Sophia lives with her parents. She has been in a relationship with her boyfriend, Zak, for 8 months and they were planning to move in together but he broke off their relationship yesterday as he has met someone else.

Sophia works full time as an assistant in a shoe shop. She has worked there for the last 2 years since leaving school. She hates going to work as she is being bullied by her boss.

Current Medication

Microgynon (oral contraceptive pill)

Fexofenadine (for hay fever)

Hydrocortisone cream (for eczema)

Known Allergies

Grass and tree pollen Elastoplast

Initial state

(None)

Presentation and Behaviour

The patient is sat up in bed wearing a hospital gown. She avoids eye contact and appears agitated i.e. keeps picking at her fingers and fidgeting. She has a cling bandage around her left wrist.

Vital Signs - Breathing

Respiratory rate (br/min) : 18	SpO2 (%) : 98
Airway : Patent	

Vital Signs - Circulation

Rhythm : Sinus (Maestro/LLEAP/REALITi)			
HR (bpm) : 88	SBP : 110 mmHg	DBP : 70 mmHg	CVP :
Notes :			
Cap Refill (seconds) : 2	Skin : Looks slightly flushed and feels warm		

Vital Signs - Disability/Exposure

TBody : 36.8 °C	AVPU : A	GCS : 15
Pupils : Reacting to light and accommodation bilaterally		

State-Specific Resources

Item	Description	Linked Document
Multiple/Other Docs/Resources	Order of play spreadsheet. This contains an overview of the flow of the scenario as well as the suggested audio for both the patient and student. It also contains the questions (with answers) for the end of the scenario.	Order of play scenario 2.xlsx

Desired Actions/Outcomes

Participants Should	• Introduce themselves to the patient S1.26 • Visually assesses surroundings for hazards • Identify sharps/infection control risk and dispose of items appropriately • Washes hands before taking observations • Gains informed consent to carry out clinical observations S1.26, S1.30 - Consider how this will be done ? click on appropriate body part to be given the findings e.g. click on chest for resp rate, wrist for pulse etc. • Accurately document the observations on the NEWS2 chart, including an overall score K1.13, S1.38, K3.1 • Responds to questions relating to the scenario, using a multiple choice approach - refer to order of play spreadsheet <u>Questions presented at the end of the scenario.</u> Sophia has been seen by the psychiatric registrar and has been diagnosed with depression. What information from her history might support this diagnosis? Which of the following can be symptoms of depression? The risk of suicide significantly increases in patients who have self-harmed. True or false. If you noticed that Sophia's bandage was blood stained, what would you do? Options and correct answers are in the order of play spreadsheet. For more information, refer to the order of play spreadsheet found in section 4 resources.
Facilitators Should	• Ensure the headset (if using), is in working order, is set up correctly and is fully charged

	• Ensures the student understands the concept of the scenario and why it is being presented • Provides a debrief and additional feedback to the automated feedback, as soon after the scenario as possible

Debriefing Points

The debriefing should follow a recognised debriefing model such as the Diamond model (see teaching notes and references for more information). The debrief should focus on what happened within the scenario, analysis of thoughts/actions and how learning points can be transferred into to practice.

Teaching Notes and Resources

Please note that the rationale for having either a male or female patient is to allow flexibility within the simulation suite when the scenario is being replicated. In the VR scenario, the character will be male.

Guidelines for dealing with spillage of body fluids: https://www.england.nhs.uk/wp-content/uploads/2022/09/national-infection-prevention-and-control-manual-appendix-9.pdf

NEWS2: https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news-2

NICE guidelines on self-harm: https://cks.nice.org.uk/topics/self-harm/

Diamond Debriefing Model: https://pubmed.ncbi.nlm.nih.gov/26009951/#:~:text=The%20diamond%20debriefing%20method%20is,aspects%20of%20a%20simulated%20scenario

Lessons Learned

Post-Simulation Debrief/Lessons Learned	Date	Decision	Description of Decision	Linked Document
Will not be including SBAR handover	27/02/2023	Abandon	Initially the scenario was to request an SBAR handover at the end of the scenario. This element has now	

			been removed as SBAR handovers are not included in the curriculum. A recommendation to included in future training, will be taken forward.	

Appendix – Copyright Ownership

The first entry is the source item, with subsequent derivatives showing below with their associated authors and organisations.

Created By	Date	Organisation	Item Link
AnnSunderland	21/11/2022	ASPiH	Ann's TinySim scenario template
AnnSunderland	02/03/2023	Calderdale College	Calderdale College - Scenario 2
AnnSunderland	21/11/2022	ASPiH	Calderdale College - Scenario 1

Calderdale College - Scenario 3

(All Briefing created by AnnS on 09 - Mar - 2023)

Description

This scenario is designed for T level students and will form part of a series of three scenarios of increasing complexity.

Learning Objectives

Learning outcomes:

- To identify and appropriately manage issues relating to infection prevention and control

- To be able to record clinical observations on a NEWS2 chart, calculate an accurate score and escalate appropriately

- To recognise a deterioration in the patient's condition and escalate accordingly

- To be have an awareness of issues relating to the patient's presenting problem and clinical history

Classification

Curriculum Mapping	Level 3 T level
Schools / Departments	Nursing
Parent Specialty	Nursing
Learner Type	Pre-Licensure

Target Learner Group	T level students in further education
Patient Group	Adult
Organ System	Gastrointestinal System
Human Factors	Communication, Anticipation and planning, Situational awareness
ASPiH	Assess't - learner performance, Assess't - learning outcomes
INACSL	01 - Needs assessment demonstrates clear need for Scenario, 03 - Scenario structure maps to (i) purpose (ii) theory and (iii) modality, 11 - Pilot test new simulations before full implementation, 06 - Maintain a patient-centered and facilitative approach, 08 - Follow Simulation-based experiences with a debriefing and/or feedback session, 04 - A Scenario/case provides a context for the simulation experience, 07 - Begin simulation-based experiences with a pre-briefing, 02 - Measurable objectives for Scenario define clear outcomes, 10 - Provide preparation materials to support participant's success
Nursing Good Practice - Knowledge & Skills Framework	Health: Safety & Security, Communication
Nursing Good Practice - Values & Behaviour	Competency, Care (quality/safety), Communication
SimZones	Zone 1
Others	

Required Resources for Scenario Setup (State-specific Resources to be added later)

Item	Description	Linked Document

| Locati on | The scenario will be developed in VR.

<u>Setting:</u>

A one-bedded room in a hospital setting

<u>Contents:</u>

- Hospital bed with controls to change height and head of bed (these do not need to function).
- Dynamap
- Over-bed table
- Bedside cabinet
- Box of tissues on bedside cabinet
- Gloves and apron dispenser wall-mounted
- Chair
- Water jug and glass on top of cabinet
- Chart at the end of the bed
- Wall strip to include oxygen, suction and emergency buzzer
- Curtains around bed
- Patient dressed in hospital gown, sat up in bed
- Sink | Tissues - take off branding.jpg, Hospital curtains - disposable.jpg, Gloves and Apron.jpg, Hospital bed control.jpg, Dynamap close up.jpg, White hospital bracelet.jpg, Hospital bed chart - use NEWS2.jpg, Hospital sink1.jpg, Dynamap thermal scanner.jpg, Wall phone.jpg, Olive skin tone.png, Overbed table.jpg, Blood stain - only need one.jpg, Sink.jpg, clinicalwaste-640x640-c-center.jpg, Dynamap stand.jpg, METAL_28_DUO_12141WEB__57523.jpg, Bedside cabinet.jpg, Infected wound.jpg, | Gen eral/ multi ple | Blan k NE WS2 chart | NEW S2 chart. jpg |

	• Patient should be wearing a white wrist band	
	• Blue tissues in dispenser	
	• Clinical waste bin	
	• General waste bin	
	• Small blood stain on bedcovers over lowers right leg	
	• Phone on wall	
	• Photo of infected wound	
Equipment	Details of what gloves and aprons would look like.	Gloves.jpg, Apron back.jpg, Gloves and apron.jpg
Set-up Patient information	Medical records	Medical Records Scenario 3.docx
General/multiple	Student pre-brief	Pre-brief scenario 3.docx

Required Resources

Actor/Other Roles in Scenario	Notes for Actor/Role- Script / Mindset / Agendas driving Behaviour

Patient	The patient is sat up in bed wearing a hospital gown. Character to be female, olive skin tone (see photo for example) with dark brown long hair.

Instruction to Learner

Pre-brief provided at the beginning of the scenario:

You are working on a ward within a busy hospital and have been asked to look after Lisa today. You have been asked to:

- Review Lisa's medical records and last set of clinical observations

- Consider and manage any issues that you identify in relation to infection prevention and control

- Take Lisa's clinical observations and document them on the NEWS2 chart, calculating the score and escalating accordingly

- Phone the senior nurse with an update on Lisa's condition once you have completed your assessment

- Answer some questions related to the scenario when you have completed the above

Patient Profile : Lisa Riley , Female, 42 year(s), 62 kg(s), 165 cm(s)

Presenting History (Candidate / Learner Storyboard)

Lisa was admitted via accident and emergency yesterday morning following a fall in her garden at home. She sustained a laceration to her right lower leg which was cleaned and sutured in theatre. She is hoping to be discharged home later today.

Previous Medical History

Past medical/surgical history

- Tonsillectomy aged 5

- Normally fit and well

Family history

- Father died following a myocardial infarction (heart attack) at the age of 42

- Mother is alive and well

- Lisa does not have any siblings

Lifestyle

- Ex-smoker. Stopped about 10 years ago. Used to smoke 10/day.

- Drinks alcohol occasionally, usually only on special occasions.

- Tries to stick to a healthy diet

- Goes horse riding 3-4 times per week

Social history

Lisa lives with her long-time partner, Danny. They do not have any children. Lisa works as a local tour guide and Danny is an interior designer.

Clinical observations

Lisa's observations were last taken four hours ago. No NEWS2 chart was available at the time so they have been recorded here in the medical records.

- Blood pressure: 120/80

- Pulse: 70

- Respiratory rate: 16

- Temperature 37C

- SpO2: 98%

Current Medication

- Lisa does not take any regular prescribed medication

- She does take paracetamol occasionally for a headache

- Lisa has been prescribed flucloxacillin capsules (antibiotics) but is waiting for them to come up from the pharmacy so hasn't taken any yet.

Known Allergies

No known allergies.

Initial state

(None)

Presentation and Behaviour

The patient is sat up in bed wearing a hospital gown. She appears a little flushed and is anxious to be discharged home following her fall.

Vital Signs - Breathing

Respiratory rate (br/min) : 20	SpO2 (%) : 95
Airway : Patent	

Vital Signs - Circulation

Rhythm : Sinus (Maestro/LLEAP/REALITi)			
HR (bpm) : 92	SBP : 108 mmHg	DBP : 66 mmHg	CVP :
Notes :			
Cap Refill (seconds) : 4	Skin : Looks slightly flushed and feels warm		

Vital Signs - Disability/Exposure

TBody : 38.1 °C	AVPU : A	GCS : 15
Pupils : Reacting to light and accommodation bilaterally		

State-Specific Resources

Item	Description	Linked Document
Multiple/Other Docs/Resources	Order of play spreadsheet. This contains an overview of the flow of the scenario as well as the suggested audio for both the patient and student. It also contains the questions (with answers) for the end of the scenario.	Order of play scenario 3.xlsx

Desired Actions/Outcomes

Participants Should	• Introduce themselves to the patient S1.26
	• Visually assesses surroundings for hazards
	• Identify blood stained bedding - ask Lisa how she is feeling and look at her leg wound
	• Washes hands before taking observations

	• Gains informed consent to carry out clinical observations S1.26, S1.30 • Accurately document the observations on the NEWS2 chart, including an overall score K1.13, S1.38, K3.1 • Informs patient of findings and that she will ask a senior nurse to review her • Phones the senior nurse with an update on Lisa's condition and ask her to come and review Lisa • Responds to questions relating to the scenario, using a multiple choice approach - refer to order of play spreadsheet <u>Questions presented at the end of the scenario.</u> What do you think is the most likely reason for the change in Lisa's observations and NEWS 2 score? What information in Lisa's medical records support the diagnosis of a wound infection? A decrease in urine output can be a symptom of sepsis - true or false Options and correct answers are in the order of play spreadsheet. For more information, refer to the order of play spreadsheet found in section 4 resources.
Facilitators Should	• Ensure the headset (if using), is in working order, is set up correctly and is fully charged • Ensures the student understands the concept of the scenario and why it is being presented • Provides a debrief and additional feedback to the automated feedback, as soon after the scenario as possible

Debriefing Points

The debriefing should follow a recognised debriefing model such as the Diamond model (see teaching notes and references for more information). The debrief should

focus on what happened within the scenario, analysis of thoughts/actions and how learning points can be transferred into to practice.

Teaching Notes and Resources

Please note that the rationale for having either a male or female patient is to allow flexibility within the simulation suite when the scenario is being replicated. In the VR scenario, the character will be male.

NEWS2: https://www.rcplondon.ac.uk/projects/outputs/national-early-warning-score-news-2

NICE Guidelines - Sepsis: Recognition, diagnosis and early management https://www.nice.org.uk/guidance/ng51

NICE Guidelines - Lacerations https://cks.nice.org.uk/topics/lacerations/

Diamond Debriefing Model: https://pubmed.ncbi.nlm.nih.gov/26009951/#:~:text=The%20diamond%20debriefing %20method%20is,aspects%20of%20a%20simulated%20scenario

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AnnSunderland	02/03/2023	Calderdale College	Calderdale_College - Scenario 2
AnnSunderland	21/11/2022	ASPiH	Calderdale_College - Scenario 1

APPENDIX 3 - HAND CONTROLS CRIB SHEET

Have on table at VR Stations for reference.

Interact with UI: Right Trigger Button.

Use keyboard in login screen: Push keys with virtual fingers, much like an actual keyboard.

To select the input field (e.g. password input field) click on the input field.

Movement: Left thumbstick.

Change movement between teleport and walking: Click left thumbstick.

Rotate player: Right thumbstick.

Interaction with objects: Right or Left Grip button.

Remove apron and gloves: A and B button on right controller.

To end the scenario, EXIT through the door.

APPENDIX 4 - PROJECT PLAN

Project Activity	Start Date	End Date
Project Name - Calderdale College	**01/02/22**	**08/11/23**
Workpackage 1 - Define	**19/05/22**	**16/06/22**
Task	**19/05/22**	**16/06/22**
Review Due Diligence & Associated Sign Offs	**19/05/22**	**19/05/22**
Customer Compliance Due Diligence	**19/05/22**	**19/05/22**
Procurement Due Diligence	**19/05/22**	**19/05/22**
Legal and Commercial Due Diligence	**19/05/22**	**19/05/22**
Develop NCFE Project Plan	**19/05/22**	**16/06/22**
Workpackage 2 - Feasibility	**16/06/22**	**26/09/22**
Task	**16/06/22**	**26/09/22**
Development of NCFE RAID Logs		
Pre-contract meeting to discuss key requirements	**16/06/22**	**16/06/22**
Agreement of re-scope (if required)	**16/06/22**	**16/06/22**
Agreement of Interim Report Dates	**16/06/22**	**16/06/22**
Agreement of Payment Dates	**16/06/22**	**16/06/22**
Agreement of Monthly Meetings	**16/06/22**	**16/06/22**
Agreement of Monthly Project Documentation (PP and RAID Logs in advance of monthly meeting)	**16/06/22**	**16/06/22**
Agreement of Quarterly Project Documentation (Interim Report, Blog Post and Finance Update)	**16/06/22**	**16/06/22**
Review & Refine for Contracting	**16/06/22**	**26/09/22**
Iteration 1 (Partner to NCFE)	**16/06/22**	**26/09/22**
Raise Purchase Order		
Workpackage 3 - Partner Define	**01/05/22**	**31/10/22**
Task	**01/05/22**	**31/10/22**
Finalisation of Project Plan	**01/05/22**	**29/07/22**
HSC Curriculum Area Lead Planning	**01/05/22**	**29/07/22**
Identification of course segments	**20/06/22**	**24/06/22**
(Employer/Stakeholder Sessions) Invitations to requirements gathering session Production of employer/stakeholder briefs	**04/07/22**	**22/07/22**
Employer Workshops	**04/07/22**	**22/07/22**
Development of a matrix to cover KSBs	**04/07/22**	**22/07/22**
Pilot Launch Event Planning	**05/07/22**	**05/07/22**
Requirements Gathering and document completed for AR Product & Simulation	**25/07/22**	**29/07/22**
1x Digital/Networking Plan Delivery Plan	**01/08/22**	**26/08/22**
Sim Centre Visits	**01/08/22**	**31/10/22**
Workpackage 4 - Partner Delivery Stage	**01/02/22**	**31/07/23**
Task	**01/02/22**	**31/07/23**
Story Boarding & Scripting for 1x VR product & Simulation Centre Scenario based on Infection Control	**19/09/22**	
Ethics - Participants agreements for all learners	**01/10/22**	**27/02/23**

Building 3 D models and working with unity.	**03/10/22**	**03/03/23**
Working with the 3D environments and checking how the characters can interact with environments.	**10/10/22**	**03/03/23**
Simulation mode on web sites from smaller groups/ Research and up skilling	**10/10/22**	
Initial development / getting used to Unity and headsets	**17/10/22**	**21/10/22**
Staff Training The use of Virtual Reality and How to interpret its assessment data	**19/10/22**	
Procurement and Contracting	**01/10/22**	**27/02/23**
Purchase of 15x Oculus Meta Quest 2 Headsets	**01/11/22**	**27/02/23**
Project Launch Event	**06/12/22**	**06/12/22**
SEG online Teachmeet on Wednesday 29 March 1pm-4pm	**29/03/23**	
(Baseline Assessment for Transition Group) Simulation centre	**11/11/22**	**03/03/23**
Development of VR Product Bug Fixes	**25/11/22**	
VR Testing with Employers, SMEs and NCFE	**04/04/23**	**04/04/23**
Employer and Stakeholder Focus Group Visit SIM Centre	01/12/22	**27/02/23**
(Baseline Assessment for T-Level Group) Simulation centre	**11/11/22**	**03/03/23**
Focus Groups with employers & stakeholders to evaluate the use of immersive tech in assessments	09/01/23	**20/03/23**
Tech Specialist Flat Fee - Half Payment	**01/11/22**	**31/01/23**
Research Flat Fee - Half Payment	**19/10/22**	**31/01/23**
Evaluation	**01/03/23**	**02/06/23**
Continued Use & Evaluation of Immersive Tech in Assessments	**11/11/22**	**30/06/23**
Consultant ImmseriveTech - 10 Days @ £350 per day	**01/11/22**	**31/01/23**
Sim Centre Visits	**01/11/22**	**31/01/23**
VR Final Product / Final Release	**01/02/23**	**30/06/23**
(Mid-Point Assessments) Simulation centre and Augmented Reality	**15/02/23**	**30/06/23**
(End-Point Assessments) Simulation centre and Augmented Reality	**01/04/23**	**30/06/23**
Tech Specialist Flat Fee - Half Payment	**01/02/22**	**28/04/23**
Continued Use & Evaluation of Immersive Tech in Assessments	**01/02/23**	**30/06/23**
Focus Groups with employers & stakeholders to evaluate the use of immersive tech in assessments	**19/06/23**	**30/06/23**
Continued Use & Evaluation of Immersive Tech in Assessments	**01/05/23**	**31/07/23**

Sim Centre Visits for Employers and Stake Holders	**01/05/23**	**31/07/23**
Workpackage 5 - Evaluate	**28/04/22**	**30/11/23**
Task		
Final Evaluation	**01/06/23**	**08/11/23**
Draft Research Report	**01/06/23**	**18/10/23**
Dissemination Event Invitations	**04/09/23**	**04/09/23**
Dissemination Event	**19/10/23**	**19/10/23**
Event at ASPiH	**07/11/23**	**08/11/23**
Publication of Research Report	**31/07/23**	**30/11/23**

APPENDIX 5 - Clinical Simulation Centre Evaluation Questionnaire:

Full Name:	
Date:	
Number of visits to Simulation Centre:	
Level of study:	

Background:

Have you ever been in a clinical environment like this before?

What do you think of the simulation centre?

Did you feel like you were in a real-life simulated ward environment?

In your opinion, is there any component from the coursework, which could include to make the experience even better in the future?

Using the Equipment

Tell me what you enjoyed from the whole Simulation experience?

What equipment did you get to use during your visit?

Have you ever used any the apparatus previously? Did you feel comfortable using the equipment? Was the equipment easy to use?

What are your personal thoughts on using the simulation manikins?

How does being in the Simulation center help to make you feel like a real-life situation?

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Do you think this is an effective way to learn how to do tasks in your future job role correctly and why?

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In your opinion what was the **least** enjoyable part of the experience?

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Learning experience.

Has using the simulation centre supported your professional learning?

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How will using the Simulation centre make learning on the course more effective?

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Do you think the experience in the Simulation centre increased your understanding on the Health and Social care course?

How has the extensive simulated learning scenarios helped you to understand the work needed in practice better?

Did you gain an understanding on how using the equipment relates back to the course work you are studying?

Prospects

Will this experience be memorable to you in the future and why?

Are you looking forward to having more visits during your course?

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What are the benefits of having these planned visits, while you study at the same time?

What have you gained from being part of the simulation centre experience?

Is there anything that you would change during the experience to make it better?

Would you recommend the experience to others? And why?

Has using the equipment benefit your own development in Health and social care?

YES	MAYBE	NO

Personal Reflection

❖ How would you rate the simulation centre experience? (Please circle)

1   2   3   4   5   6   7   8   9   10

❖ Do you think that continued development in the simulation suites will help with your personal learning on the course?

YES	MAYBE	NO

❖ Could using this experience and equipment help you to advance your future career?

YES	MAYBE	NO

❖ From the list below (please circle) the best part of the Simulation experience today?

Content quality	Workshop delivery	Knowledge gained

❖ Has this experience helped you to understand the work required when in a future role?

YES	MAYBE	NO

Please state any new individual skills that you gained from your Simulation experience today.

Thank you for your time and effort completing the questionnaire.

APPENDIX 6 – FULL CALDERDALE TEMPLATE FOR REPORT

Figure 1. Final coding template

1. Emotional responses to simulation environment

- 1.1 Positive and energized
    - o 1.1.1 Feeling happy
    - o 1.1.2 Novel, fun experience
    - o 1.1.3 Enthusiastic re future simulation use
    - o 1.1.4 Excited by innovative tech

- 1.2 Scary
    - o 1.2.1 Realism as scary
    - o 1.2.2 Being observed leads to nervousness
    - o 1.2.3 Anxious about doing it right
    - o 1.2.4 Initial anxiety
    - o 1.2.5 Novelty is scary

- 1.3 Disengaged
    - o 1.3.1 Dislike of simulation
    - o 1.3.2 Disinterest in task
    - o 1.3.3 Disinterest in using technology
    - o 1.3.4 Not everyone's preferred way to learn
    - o 1.3.5 Found it hard

2. Developing confidence.

- 2.1 Confidence now
    - o 2.1.1 Confidence in own ability with technology
    - o 2.1.2 Confidence in communication skills
    - o 2.1.3 Confidence from experience
    - o 2.1.4 Prior practice helps you progress
    - o 2.1.5 Confidence from the realism of the simulation

- 2.2 Confidence for the future
    - o 2.2.1 Confidence for future roles
    - o 2.2.2 Confidence in career

       o 2.2.3 Confidence in succeeding on the course

3. Safety of environment

- 3.1 Ability to ask questions

- 3.2 Simulation allows safe practice

- 3.3 Feeling supported / guided

- 3.4 Risk/Lack of safety in environment

4. Impact of realism on the session

- 4.1 Realistic simulation

       o 4.1.1 Simulation as convincing

       o 4.1.2 Simulation as unconvincing

       o 4.1.3 Simulation: 'gamified' or real?

- 4.2 Wish to be as realistic as possible

- 4.3 Playing the role as a professional

- 4.4 Value of being in a real/ professional setting

- 4.5 Limits of realism

5. Simulation vs traditional learning

- 5.1 Feeling professional in simulation

- 5.2 Preference for 'real' hands-on learning

- 5.3 College setting cf simulation

- 5.4 Simulation enhances learning/development

- 5.5 Not knowing what to expect

- 5.6 Challenges with equipment

       o 5.7.1 Disorientation

       o 5.7.2 Initial difficulties with technology

       o 5.7.3 Technology use improves with practice

       o 5.7.4 VR hand control issues

       o 5.7.5 VR headset issues (fit and/or calibration)

- 5.7 Positives about equipment

- 5.8 Simulation Centre cf VR

6. What the learner brings

- 6.1 Personal characteristics as a learner

- 6.2 Interest in / experience of gaming

- 6.3 Dislike of / disinterest in VR

- 6.4 Value of visual learning

- 6.5 Disability impact on learning

- 6.6 Personal history in health and social care

- 6.7 Mood on the day

7. New Learning from VR/ SIM

- 7.1 Learning relating to technology

  - o 7.1.1 Learning about technology and/or equipment

  - o 7.1.2 Using / trying specialist equipment

  - o 7.1.3 Finding out about new health care procedures.

  - o 7.1.4 Using up to date equipment

  - o 7.1.5 Learning about technology and health care in general

  - o 7.1.6 Immersive tech builds on traditional learning

- 7.2 Learning about communication and/or cooperation skills

  - o 7.2.1 Communication skills

  - o 7.2.2 Better interaction with patients

  - o 7.2.3 Learning to work with others

- 7.3 Learning other skills

8. Changes suggested to VR SESSIONS

- 8.1 Nothing to improve

- 8.2 More of the same -

  - o 8.2.1 Increase in intensity of experience

  - o 8.2.2 More opportunities to use equipment

  - o 8.2.3 More 'professional' experience

- 8.3 Physical environment

  - o 8.3.1 Make room less warm

  - o 8.3.2 Less crowded room

  - o 8.3.3 Smaller groups

- 8.4 Improvements to technology

9. Assessment concerns and issues

- 9.1 Time pressure

- 9.2 Need for practice/preparation before assessment

- 9.3 Anxiety with regards to assessment

- 9.4 Value of inbuilt learning aids

    o 9.4.1 Value of assessment checklist

    o 9.4.2 Value of inbuilt prompts and questions

- 9.5 Value of tutorial before assessment

APPENDIX 7 – TECHNICAL IMPLEMENTATION REPORT

Overview

The college received funding from NCFE to carry out a feasibility study regarding how the assessment of learners on a T Level Health and Social Care course could be conducted within a virtual reality-based environment.

This also provided an opportunity for a project for our learners in the 2nd year of their T Level Digital Production, Design and Development (DDPD) course to create the environment and learn how to create code within the Unity development environment. Ultimately, a proof-of-concept application was developed by the learners and, due to pre-existing coursework requirements, this application was then developed further by Taran3D, a.

Development of the Application

Initially, we started development on the Microsoft Hololens system, but it was suggested by a member of The Centre for Immersive Technologies at the University of Leeds that we may have a better experience switching our development to the Meta Quest 2 headsets. They also recommended that we focus on using UXF - Unity Experiment Framework they had developed to allow the learners to hit the ground running.

Hardware

The Computing department at Calderdale College purchased two Meta Quest 2 headsets from Amazon. Two Amazon Fire tablets were also purchased at the same time.

Each headset was a basic 128GB model and at the time of purchase, these were priced at £399 each.

After receipt, each headset was tagged and etched with an asset number as part of standard asset management procedures. At a fundamental level, the headsets can be thought of as an android-based devices with an advanced built-in video display. As such the normal Android protections are in place with respect to installing software packages from unknown sources. This is similar to how an Android mobile device will operate with the Google Play Store. You can install software packages that are cryptographically signed but, as a general rule, packages that have not been signed

will not be allowed to be installed. This is to prevent any potentially malicious software from being installed.

However, it is possible to change this behaviour and place the device into what is known as '*Developer Mode'.* This mode will warn you that you are installing software from an unknown source and ask you if you are happy with that. It will then allow the software package to be installed. On Android devices, this mode can be activated via a trivial process. However, the Quest 2 headsets require a bit more work to enable this mode.

Activating Developer Mode

To activate Developer mode on the headset it must be already registered to an existing Meta account. This is something that would normally be carried out when the device is started up for the first time. You will also need to install a companion application on a mobile device.

Once completed the Quest 2 headset can be then used as normal and is linked to the relevant account.

As we only had two headsets, we were able to use an Amazon Fire Tablet to hold the companion app for each headset.

To enable developer mode some further work is required:

- A developer must be registered with an *'Organization'.* This could be either achieved by being invited to an existing organisation or by creating one.

- The account then has to be verified by either setting up an SMS based two-factor authentication or by adding a valid payment method.

Whichever method is chosen will need to be kept alive as you are prompted to authenticate yourself at times. It is recommended that the SMS be used as it appears that it is fine for multiple devices to authenticate from one device.

Once complete the Developer mode can be enabled by using the companion app to turn it on.

It was found that this was manageable for a small number of headsets but started to become unmanageable when a larger number of headsets needed to be updated. This was mainly due to having to sign in and out of multiple Meta accounts. We found that

keeping a record of what device was connected to which account, along with credentials, helped in keeping this under control.

Software Development and Deployment

The proof-of-concept application the DPDD students produced was created using the Unity framework. The tutorials provided with the Unity application provided a starting point for the students to begin with. They then progressed to using the Unity Experiment Framework as an extension to Unity to create their own applications.

Deployment of the software to the headsets within the classroom was initially carried out using an application called SideQuestVR. This allowed the management of a headset and the application uploading to the headset. It also provides a mirroring function that allows the viewing of what the user can see in the headset.

Managing the End User Experience

This phase provided a challenge on how the end users could use the devices with the minimum of guidance from the supporting staff.

The main issue was how to enable the viewing of what the user can see through the headset. Before it was possible to use the SideQuestVR application, but this would be problematic due to the applications requirements and College IT security policies.

It was noted that SidequestVR used Scrcpy to handle the mirroring of the headset's screens. Scrcpy is an open-source software project that enables a user to mirror an Android device's screen as it runs.

This was installed on a Raspberry Pi 3B+ small board computer to act as a go between with the aim of developing a simple plug-and-play device. What was found was that what was being displayed slowly became out of sync with what was being viewed in the headset. It was suspected that the rate of data being sent from the headset may have been causing the Pi's USB interface to struggle to keep up.

Also, at this stage, the Scrcpy would also need to be started from a command line terminal. This would not be a suitable solution for those who do not possess the skills or knowledge.

As a temporary solution, three old laptops were acquired from the college's Technical Support Unit. These laptops were configured to run the Ubuntu operating system along with a version of Scrcpy that could be used with a graphical interface. With this, the

end user would only have to plug in the headset to the USB connector on the laptop and then click a start button for the service to start.

This was easier to use for the end users and some assessments were able to be carried out with learners from the Health T Level.

Future Opportunities

From a technical point of view, there is potential for research and development into making a 'one-stop shop' connection device to allow an unskilled user to connect a headset up and to display what is being set up. Due to time and equipment constraints, further exploration could be carried out to see if more recent versions of the Raspberry Pi are able to support the streaming without the display becoming out of sync. Ultimately a simple box with a button to start/stop/record streaming would be ideal.

There is also potential to explore the possibility of using real-world sensors / equipment to present data inside of the virtual environment and also for data from within the environment to interact with real-world equipment.

Further Reading:

T Levels: https://www.tlevels.gov.uk/

The Unity Experiment Framework: https://github.com/immersivecognition/unity-experiment-framework

Taran3D: https://taran3d.com/

Initial Setup of a Meta Quest: https://www.meta.com/en-gb/help/quest/articles/getting-started/getting-started-with-quest-2/set-up-meta-quest-2/

Current Official Guide on Developer Mode enablement: https://developer.oculus.com/documentation/native/android/mobile-device-setup/

SideQuestVR: https://sidequestvr.com/

Overview of setting up Scrcpy on the Pi (Personal Blog): https://heeed.net/sharing-a-meta-quest-screen/

Git Repository for Scrcpy: https://github.com/Genymobile/scrcpy

APPENDIX 8 – INDICES OF DEPRIVATION

Demographic of Learners in Health and Social Care at Calderdale College

T Level Technical in Health L3

IMD	Ward	Learners
1	Park	1
2	Park	1
2	Queensbury	1
2	Warley	1
4	Town	1
		5

T LEVEL Transition Programme Health Sector

IMD	Ward	Learners
1	Illingworth and Mixenden	1
1	Little Horton	1
1	Park	3
1	Royds	1
2	Ovenden	1
2	Queensbury	1
2	Skircoat	1
2	Warley	1
3	Warley	1
4	Wyke	1
6	Warley	1
8	Skircoat	1
8	Morley North	1
		15

There was a total of 20 students that enrolled onto the T Level and L2 Transition Group, with 1 withdrawal.

Out of 20 students:

5 lived in the 1st decile, which is in the top 10% of the most deprived wards in England.

7 were in the 2nd decile, which is 10% to 20% of the most deprived wards.

1 was in the 3rd decile, in Warley Ward, which overall is in the 2nd decile of most deprived.

2 were in the 4th most deprived decile. 1 of these wards is outside of Calderdale.

3 were in the 6 and 8th decile of least deprived. 1 of these wards is outside of Calderdale.

So, overall, 17 students lived in the top deciles of deprivation in England.

English Indices of Deprivation (IoD): Calderdale

2019 map colour key

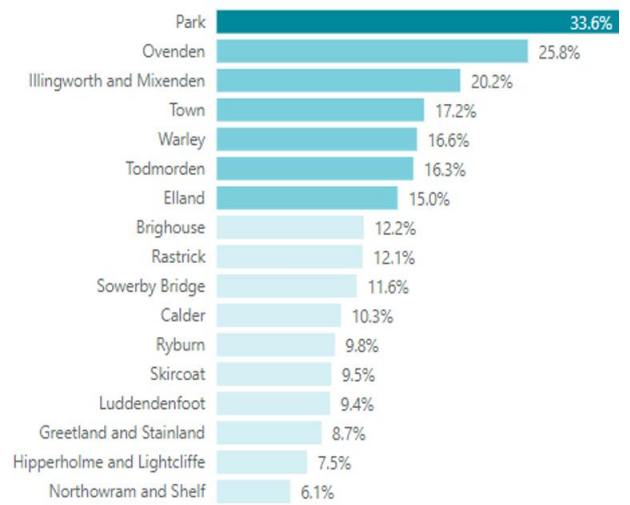| Decile	Deprivation level	No of LSOAs
1	10% most deprived	20
2	>10% to 20% most deprived	19
3	>20% to 30% most deprived	13
4	>30% to 40% most deprived	15
5	>40% to 50% most deprived	10
6	>40% to 50% least deprived	18
7	>30% to 40% least deprived	18
8	>20% to 30% least deprived	7
9	>10% to 20% least deprived	4
10	10% least deprived	4
Total		**128**

2019 map
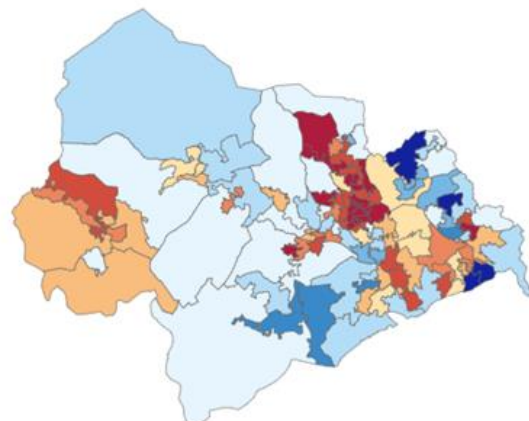
Percentage of people in poverty by ward: map
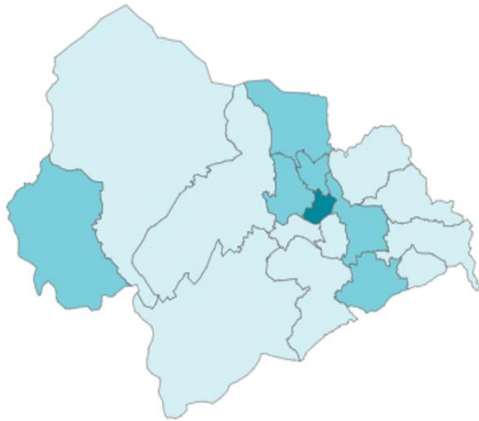
Data source: Department for Levelling Up, Housing and Communities (DLUHC), English Index of Income Deprivation 2019 Percentage of People who are income deprived; c/o LG Inform Plus www.lginform.local.gov.uk, accessed 16/10/2019. Next update expected 2023 or 2024

Percentage of people in poverty by ward: chart

Ward	Percentage
Park	33.6%
Ovenden	25.8%
Illingworth and Mixenden	20.2%
Town	17.2%
Warley	16.6%
Todmorden	16.3%
Elland	15.0%
Brighouse	12.2%
Rastrick	12.1%
Sowerby Bridge	11.6%
Calder	10.3%
Ryburn	9.8%
Skircoat	9.5%
Luddendenfoot	9.4%
Greetland and Stainland	8.7%
Hipperholme and Lightcliffe	7.5%
Northowram and Shelf	6.1%

Relative overall deprivation in Calderdale has increased in recent years when compared with other authorities in England.

In the Index of Multiple Deprivation (IMD) 2019 Calderdale was ranked 66th out of 317 local authority districts compared with a rank of 89 out of 326 districts in IMD 2015 (a lower rank denotes a higher deprivation).

Calderdale is the **66th** most deprived Local Authority District in England and....

There are **20** neighbourhoods in the **10%** most multiple deprived areas in England,

19 neighbourhoods in the **11-20%** most multiple deprived and ...

13 ...neighbourhoods in the **21-30%** most multiple deprived areas in England

APPENDIX 9 – SIMULATION CENTRE FIRST VISIT PROTOCOL AND PROCESS

Introduction session and orienteering.

Learning Outcome of the Intro Session? Aim of the session?

- Simply to introduce the simulation centre and its facilities/resources to the students
- To familiarise the students with getting to and from the centre
- To familiarise the students with appropriate behaviour/attire

Lay it out like a first day induction:

- Notification letter to guardians – to include taking off site, gathering learner feedback to be used to inform future visits and project research, case study photographs, what to wear on the day and bring on the day, etc.
- Information letter to students of time, location, where meeting, what to bring, what to wear, what not to wear, ID, behaviour, etc
- Rebecca to pop in to say hi to the team and make my introductions – to familiarise the team with her prior to session.

On the day:

- Meeting at specific location – hospital entrance foyer
- Identify a calm down/safe space for on the day in case needed
    - Protocol if someone taken to breakout room – ie, RW to remain with students. What if two need a separate space?
- Familiarise the students with expectations:
    - Presentational skills – what to wear, what not to wear
    - Logistical skills – understanding meeting time/start time, getting there
    - Organisational skills, having contact details of named person in case of issues, bringing relevant documentation, understanding of what to do if triggered (college process), how to act when there
    - Appropriate behaviour for setting
    - protocols whilst at the sim centre – from the Sim Centre Technician
- Familiarise students with Equipment use and functionality / tech space / kit / debrief sessions
- Intro to key staff members who work there – their roles/functions/potential career pathway

ACTION	WHO
Notification Letter to Guardians, where needed	Stace / Debs
Information Letter to Students	Stace / Debs
On Day Breakout Room Protocol – to speak to Maj	Becca
Call guardians to talk through sim visit, where needed	Stace / Debs
Feedback Form to capture student thoughts, feelings, reactions (paper based, to be completed at the centre)	Debs