

Immersive reality (XR) is still in its relative infancy but, boosted by the pandemic and global staffing crisis, it's already starting to disrupt education and training in the health and social care sectors. Candesic's **Dr Michelle Tempest** and **Dr Andrew Tan** explore how the technology is developing and what this might mean for providers and investors as they look for innovative solutions to recruitment and retention



# Tomorrow in the making immersive education in healthcare



**T**here is no silver bullet for the global staffing crisis in health and social care, where demand has long outstripped the supply of clinicians and other professionals. However, improving training in a way that makes it more fun and more accessible while allowing a diverse global cohort to learn at a time and pace to suit them are all key. This is where immersive reality

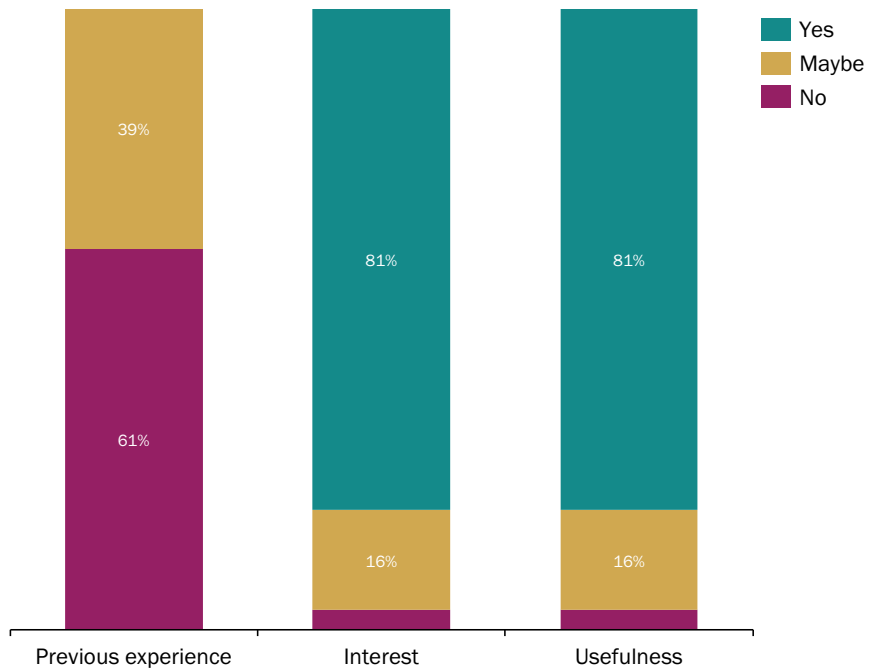
(XR) comes in. XR in the form of Augmented Reality (AR), Mixed Reality (MR), Virtual Reality (VR), haptics, interfaces, platforms and software – remains a nascent and fragmented market but it could disrupt and revolutionise the way training is delivered. And it's a market that is growing fast. Projected to be worth over £58bn globally by 2024, it is likely that investors will view it as one to watch,

particularly given how it could benefit their portfolio companies.

Health and social care training is lifelong. Its remit is broad and includes everything from patient education through to skills required in nursing and medical school, mandatory learning and the sub-specialist knowledge required for post-graduate qualifications. There has always been a delicate balance between

**FIGURE ONE - USER REVIEW SUMMARY**  
**ATTITUDES OF MEDICAL STUDENTS TOWARDS XR ARE GENERALLY POSITIVE**

SURVEY OF UK MEDICAL STUDENTS' ATTITUDES TOWARDS IMMERSIVE TECHNOLOGY, %, N=33



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using patients to hone practical skills and clinical risk. The ‘see one, do one, teach one’ conveyor belt training method of conducting a procedure after observation is being replaced and disrupted. Pilots have been using flight simulators for years from novice through to continued professional development and the care sector is following by using immersive training technologies, with evidence-based benefits.

‘Immersive technology brings experiential learning within reach for everyone – a vital tool to support not only clinicians but also our best shot at empowering people to manage their own health more effectively,’ says founder and CEO of Cognitant, a patient education platform. The application of XR can offer patients pre-visualisation to help prepare for scans and surgery, alongside the ability to re-create unique perspectives of illnesses. XR education is also starting to offer humanistic skills, including interaction and communication. This is a major driver of uptake for universities offering nurse and doctor training. Health economics flag XR as a more cost-effective way to train large swathes of students in the ‘soft skills’ of the care sector.

### Medical student survey

To understand the perception of XR within UK medical schools, Candesic undertook a survey. The results revealed (see Figure One) that 39% of students had used XR – although this was limited to surgical training. Most students (78%) responded favourably to using XR, but concerns were raised around:

- Variation in quality of graphics
- Price of headsets
- Lack of standardisation in skill training
- Lack of team working

Although XR can reduce training costs and improve overall surgical performance by as much as 230% versus traditional training methods, there is still a long way to go before adoption becomes ubiquitous. Dr Will Watson, consultant cardiologist and medical education fellow with the University of Cambridge, said: ‘Studies have shown that training medical students with simulation techniques prior to clinical practice can help improve self-confidence and skills performance, may ease the transition to the clinical setting and thereby improve patient safety.’

### Practice makes perfect

When Candesic scanned XR companies, most required headsets and specialised computers, but this has not hindered development across the full spectrum of health and care settings. Steve Dann, co-founder and executive chairman of Medical Realities, says: ‘The old methods

of training need a new shot in the arm and we need to embrace XR. Initially, people will be wary and prefer the status quo.

However, that time has passed; with the pandemic, there needs to be adoption of the new tools. We are slowly embracing XR simulation, with key focal areas involving talking to or treating a 3D simulated patient.’

From the companies we scanned, most have focused their XR offering on medical and nursing students (see Figure Two). Educators gain the ability to track students’ engagement and performance and students receive immediate feedback. Other companies are starting to spread their offering across post-graduate disciplines and new geographies. For example, Oxford Medical Simulation caters for mental health and paediatric simulations and Proximie has penetrated 35 countries.

Istiaque Ahmad, Business Development Officer at SyncVR highlights that XR education companies are gaining traction within healthcare and Joe Varrasso, Mixed Reality Strategic Partnerships for Microsoft Europe explained: ‘Microsoft’s mission is to democratise access to immersive technology for training in healthcare.’

THE ‘SEE ONE, DO ONE, TEACH ONE’ CONVEYOR BELT TRAINING METHOD OF CONDUCTING A PROCEDURE AFTER OBSERVATION IS BEING REPLACED AND DISRUPTED

**FIGURE TWO – SERVICES AND FUNCTIONALITY  
MAJORITY OF XR COMPANIES FOCUS ON MEDICAL STUDENTS AND SURGEONS**

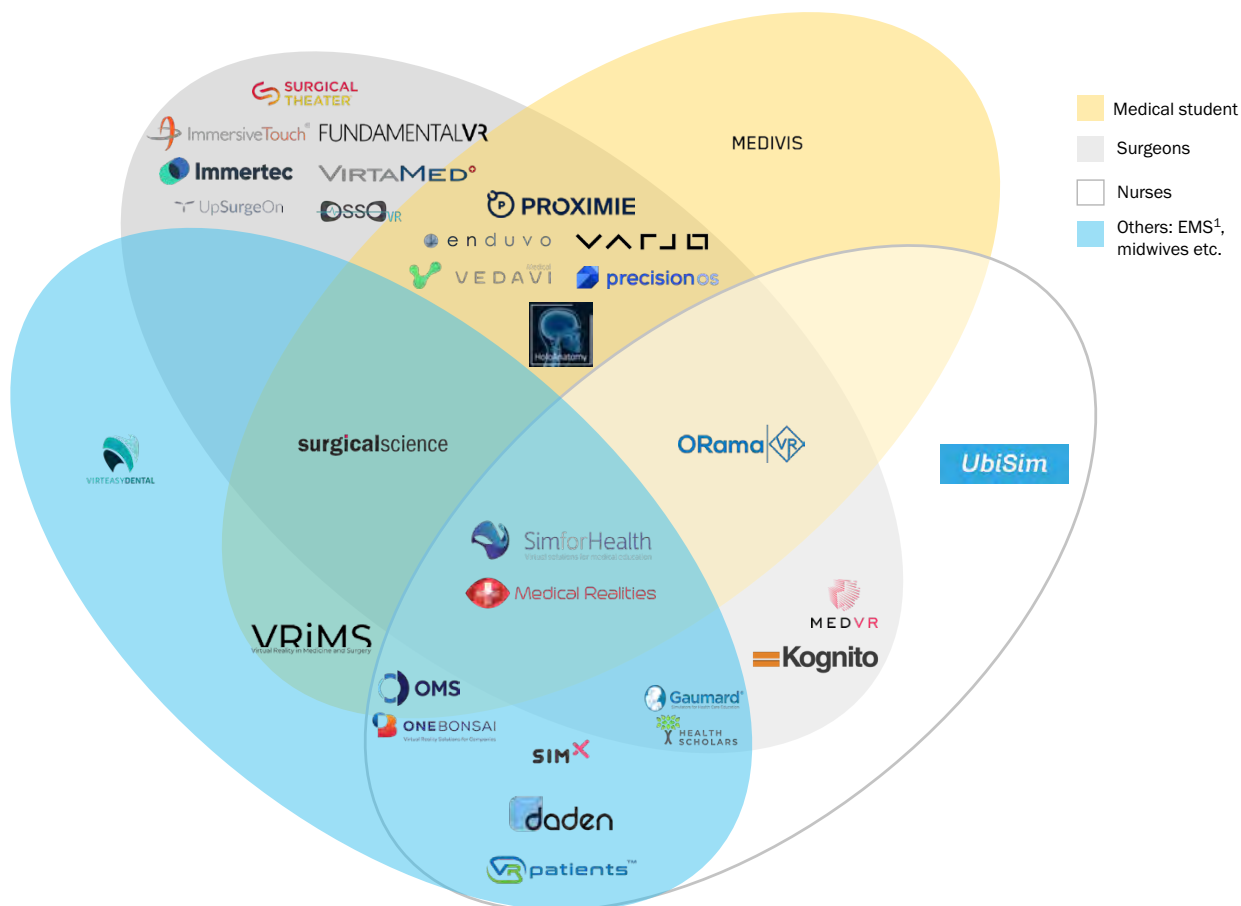
Countries	Founded by doctors	Medical students	Trauma/emergency medicine	Non-surgical specialties	Surgical guidance and training	Emergency responders	Nurses/nursing students	Totals (proportion /30)
US, Canada (15)	47%	40%	13%	40%	60%	20%	46%	<b>50%</b>
EU (10)	40%	60%	30%	40%	80%	0%	40%	<b>33%</b>
UK (5)	60%	60%	40%	40%	80%	20%	40%	<b>17%</b>
Totals (proportion/30)	<b>47%</b>	<b>50%</b>	<b>23%</b>	<b>40%</b>	<b>70%</b>	<b>13%</b>	<b>43%</b>	

	>80%	61-80%	41-60%	20-40%	<20%
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**FIGURE THREE – INDIVIDUAL COMPANY COVERAGE  
CONSOLIDATION OPPORTUNITIES: COMPANIES WHO OFFER XR TRAINING TO HEALTHCARE STAFF**



NOTE 1 EMS = EMERGENCY MEDICAL SERVICES

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## Post-graduate surgical training

Post-graduate surgical XR training is an especially buoyant field. Converting 2D images into a 3D model allows surgeons to plan surgery in more depth and get a more exact depiction of what will unfold before incision. Surgical Theater's 'SyncARTM Hub' provides XR that integrates with current operating theatre workflows. The surgeon can then focus on the patient without taking concentration off the surgical site. This improves visual awareness during surgery, can minimise human error and reduce the need to train on patients or cadavers.

Technological advancements in haptics provide an enhanced user experience by delivering kinesthetic feedback through handheld devices. FundamentalVR provides this in its software modeling system which prides itself on enabling surgeons to acquire true muscle memory in simulations. The realism and ability to manipulate the models in 3D are beneficial to knowledge and improve the comprehension of anatomical structures.

Within the NHS, doctors at Somerset Foundation Trust have collaborated with Virti to deliver immersive VR learning content. As a supplement to traditional lecture-based presentations, it does not substitute but rather enhances training. XR's repeatability and scalability enables students to retain skills for a longer period. Maudsley Learning, the training arm of South London and Maudsley Mental Health Trust is also exploring XR to train frontline staff.

Chief operating officer James Pathan explains the theory behind XR, saying: 'It allows us to run experiential learning at scale, which then starts to bring the cost down per head and gives more staff the opportunity to have really high-quality training and not just be given a one-hour lecture or e-learning exercise... We've started to see 30% to 40% retention of information with experiential learning, compared with more static exercises such as people reading off slides.'

### What the future holds

In the wake of the Covid-19 pandemic

and an increased focus on patient safety, training with XR is developing ever more realistic and repeatable offerings but initially it can be costly to embed.

The wide variety and complexity of medical simulations required means that the software development and hardware deployed only reach a positive return on investment metrics with scale. Also, the spotlight is rapidly moving away from technical skills to using XR in the development of social and emotional skills.

Our research points to a market which is poised to mushroom, but it will require investment from operators, investors and educators to truly flourish. End users seem to like it and in the words of a neurosurgeon at John Hopkins Hospital, 'It's like using GPS for the first time. It's not that it teaches you how to drive - it doesn't drive the car for you - but you find that your ability to execute the task is much better than ever'.

With the potential of a sticky client base and training aimed at solving staff shortages, the XR market looks like a sweet spot for future investment with plenty of consolidation opportunities in the market.

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