

Immersive Learning Strategy

FMD digital education innovation project series 2024-2027

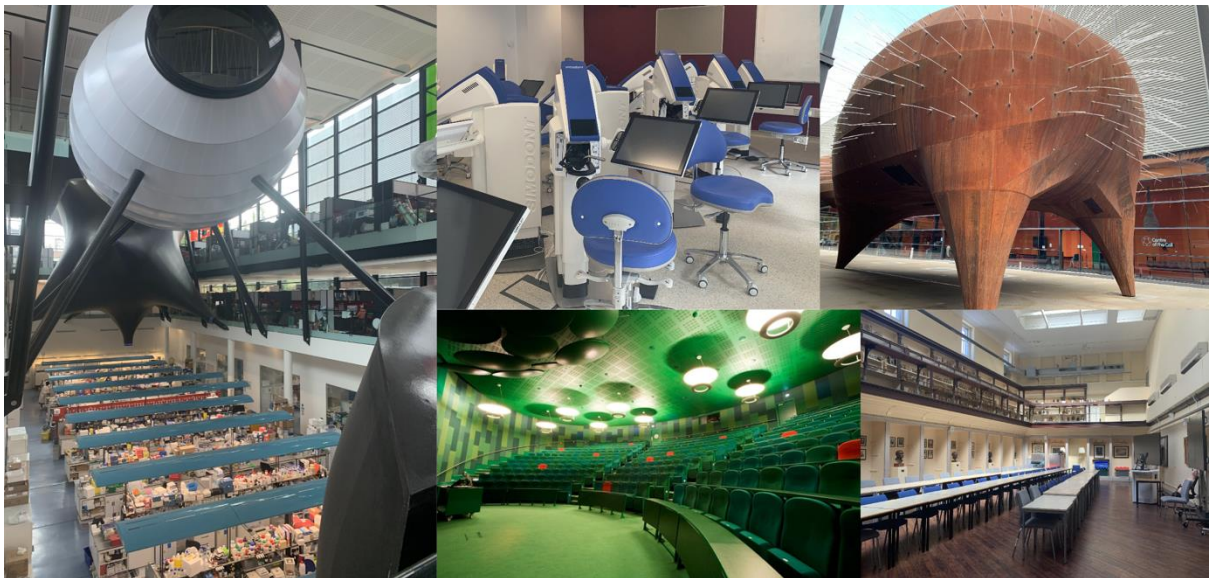


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FMD Immersive Learning Strategy

November 2023

Background

Emerging technologies such as VR have revolutionised the landscape of higher education by providing immersive and simulated learning experiences. With the increased accessibility and affordability of those technologies, the higher education sector is increasing their investment to integrate VR, AR, XR into teaching and learning that replicate real-world scenarios; medical and dental curricula are no exception. The Metaverse, for example, is attracting more attention from the social learning perspective of student experience. Recent educational research reveals that VR and immersive technologies help increase student engagement, confidence, acquisition and retention of knowledge and skills, including problem-solving, spatial reasoning, critical thinking and practical skills (Lin et al., 2023; Radianti et al. 2020).

Further, the NHS Long Term Workforce plan articulates the country's ambitious plan for generating more doctors and health professionals over the next 15 years. In this, the simulated and immersive learning is key to enabling the growth:

We will further expand the **Virtual Hybrid Learning Faculty and Simulation Faculty** programmes. These support educators to design and deliver simulation to underpin growth in education capacity, including with the use of immersive learning technologies and blended learning approaches (NHS England, p.86).

However, even with such national level movement, the strategic and pedagogical approach to creating a sophisticated eco-system of immersive technologies is under theorised and practically implemented across medical schools. Over the last 5 years, the Faculty of Medicine and Dentistry has seen pockets of innovation with AR, VR and immersive learning tech for teaching and learning, though it has been sporadic, also in funding investments.

This strategy therefore outlines the plan for the future of immersive learning technologies for our faculty over the next three years.

Current state

The recent survey of immersive learning tech by ITS (Appendix A) revealed that there are only two Institutes (namely, IHSE and IoD) who have progressed the work with simulated and immersive learning and teaching practice – the two note-worthy champions are: Dr Pedro Elston (Head of the Learning Innovation team, IHSE) and Ben Audsley (eLearning Resource Manager, IoD). The remaining Institutes acknowledged the importance and interest in investing in such technology for digital education, though they have not undertaken any significant work as yet (See Appendix A, NB: no response given by WHRI). Table 1 below outlines the work and equipment put in place within those two Institutes and/or FMD:

Table 1. Immersive Learning Tech, Practices and Cost within FMD

Institutes	Equipment	Purpose/use case	Cost
IHSE	Oculus Quest 2 Headsets and peripherals (16 units)	Virtual patient simulation, anatomy teaching, mindfulness, etc.	£5000 est.
	Anatomy software	Bought for teaching sessions 22/23	£5000
	Patient simulation software	Bought to trial in 22/23, £30 a go model	£300
	360 camera and peripherals for creating recordings	For use with Cenario VR borrowed from dentistry. So far only test cases created but ideal for mock consultations.	£700
	High-end laptops to power simulation (2 units)	Some software requires this; 2 units purchased	£3000
	Hololens (2 units)	To explore the possibilities	£3000
IoD	Pico G2 VR Headsets (10 units)	2 Dental scenarios (An Nervous Adult/Child Visits the Dental Clinic)	£3000
	Meta Quest 2 (1 unit)	2 Dental scenarios (An Nervous Adult/Child Visits the Dental Clinic)	£300
	CenarioVR	VR scenario creation using 360 videos and photos – 5 year licence	£7200
	Insta360 Pro 2 360 Camera	8K 360 photo and videos	£4300
	Insta360 X2 360 camera	5K 360 photo and videos	£400
	Panasonic G5 4K Camera (2 units)	4K 2D videos	£4000
	Monopods, Tripods, Lighting	360 / 2D video production	£1000
	TINALP	Software for MR learning	£23000
Hololens (1 unit)	Used for TINALP	£3000	
Total			£63,200

Proposal

In order to build a coherent eco-system of immersive learning technologies, crucially underpinned by sound digital pedagogy, it is proposed that **the FMD Immersive Learning Lab** be established as a central hub cross the Faculty. Within this emergent, lab environment, the two Institutes (IHSE and IoD) will continue to pioneer, while Digital Education Studio led by Professor Chie Adachi, Dean for Digital Education will provide oversight and alignment with the vision of digital education strategy for the Faculty. The lab will coordinate the three strands of work: namely, pedagogy, technology, and operation.

The roadmap below outlines such approaches and pieces of work to be undertaken over the next three years (2024-2027).

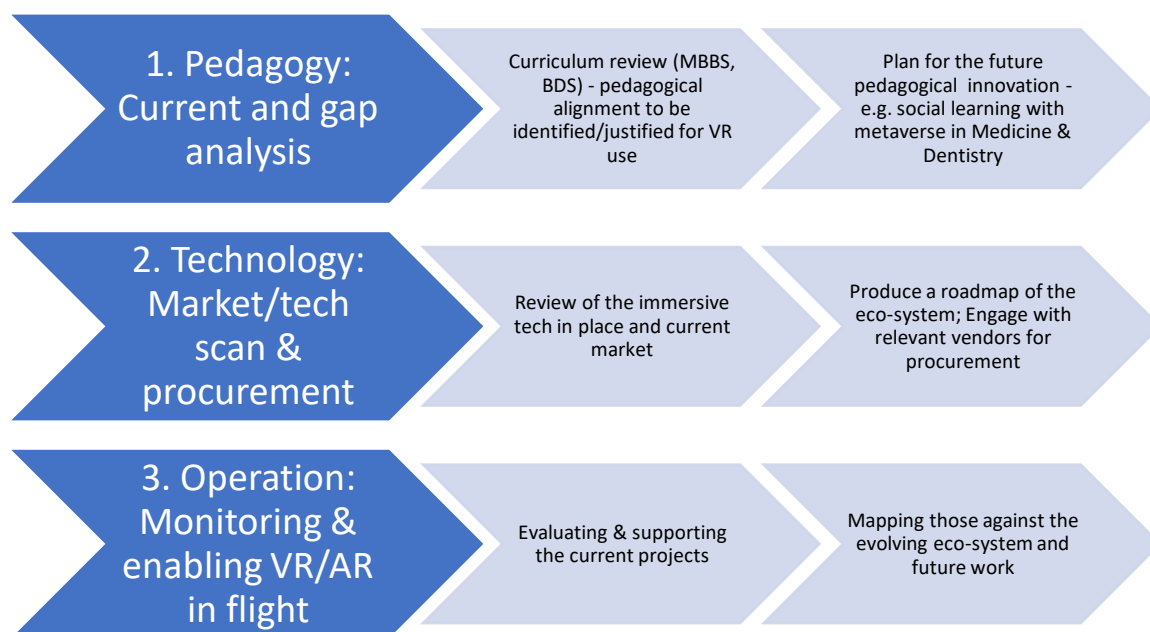


Figure 1. Roadmap of the work to be undertaken by the Immersive Learning Lab

Anticipated Outputs

Below table outlines the anticipated outputs from the project undertaken by the Immersive Learning Lab.

	Output Type	Brief Description
1	Review paper of the current curriculum and pedagogy with simulated and immersive learning	In light of the MBBS and BDS curriculum review, an analysis paper is produced, with a focus on the scope of simulated and immersive learning.
2	Review of the simulated and immersive learning tech in FMD and in the market	Based on the audit, a brief paper and/or ecosystem-roadmap is produced, outlining the repertoire of VR/AR/immersive learning tech – including what’s already within FMD and in the market.
3	Implementation of VR/immersive learning tech in MBBS and BDS	To implement the use of tech in both degrees/curriculum in MBBS and BDS.
4	Analysis of student satisfaction and outcome indicators	An analysis of student satisfaction and outcome indicators for the selected modules is conducted using a range of metrics (including student evaluation data) to inform the student experience pre, during, and post completion of the (re)designed modules and courses with simulated/immersive learning.
5	Funding request/business case for the comprehensive eco-system of immersive tech suite	Building on the gap analysis, a bid/funding request to be made for the Faculty to procure more equipment for simulated/immersive learning.

The project team

Team Member	Role	Responsibilities
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FMD Executive Board VP Health (Professor Sir Mark Caufield) Deputy VP Health (Professor Jo Martin) Dear for Digital Education (Professor Chie Adachi) Dean for Education (Professor Anthony Warrens)	Executive Sponsor	<ul style="list-style-type: none"> - Overall accountability for the strategy - Keeps abreast of major activities via faculty boards - Ultimate decision maker for the strategy - Provides high level support and guidance to the Project Lead - Manages strategic and external risks - Interacts with the University Executive (SET) about the strategy where relevant
Head of Innovation and Learning (IHSE) (Dr Pedro Elston) eLearning Resource Manager (IoD) (Ben Audsley)	Project Lead	<ul style="list-style-type: none"> - Provides regular reports on project status, issues and risks directly to the Executive sponsor - Ensures appropriate faculty-wide consultation/engagement - Provides direction in planning, managing and delivery - Ensures all aspects are completed within the broad budget and timeline parameters defined by the Executive Sponsor - Champions the project in the faculty and wider university - Directs/ supports the PM to operationalise the outlined outcomes - Ensures all elements of the strategy are reflected in the plan
DES Senior Learning Designer, Jorge Friere	Learning Design Lead	<ul style="list-style-type: none"> - Provides high level learning design support to the project lead - Advises the project team and other stakeholders on pedagogy - Evaluates new tools and directions in online learning for use in FMD programmes, modules and courses. - Supports transition of successful innovations into usual teaching practice
Digital Education Studio	Operation support	<ul style="list-style-type: none"> - Provides operational support to enact on the strategy within the faculty - Ensures the enactment of the strategy goes to agreed upon processes and timelines - Communicates and champions the strategy and work of the Immersive Learning Lab across FMD

University & External stakeholders

Aside from the core project team outlined above, the below stakeholders are imagined for the project.

Queen Mary University of London stakeholders

- FMD Students
- QMA Virtual Experiential Learning Community of Practice – led by Elise Omfalous (QMAcademy)
- QMAcademy
- VP-Health Office
- Taught Programme Board
- FMD Education Strategy Group
- FMD Dean for Education Advisory Group (DEAG)
- Education Strategy Group (ESG) – VP-Education
- Technology Enhanced Learning Team (TELT) within ITS

- IT Services
- Institute TLCs,
- Marketing Directorate
- Admissions
- Library

External stakeholders

- NHS England and Trusts
- Accreditation bodies
- Potential tertiary education partners – e.g. other medical schools
- Prospective students

Related projects – dependencies

The following projects have close connections with the Immersive Learning Lab and the core project team will be working closely with these project teams to ensure continued alignment.

1. “Empowering Skill-Based Education through Virtual Reality” project funded by the Principal and President grant (£20K) – led by Professor Chie Adachi, Dr Lesley Howell, Dr Pedro Elston – creating, piloting, and evaluating virtual simulations designed to build practical and skills-based competencies in Chemistry and Medicine. Due to complete in 2025.
2. “Mindfulness study” project within IHSE – led by Dr Pedro Elston and Gian Paulo Canale (IHSE Innovation and Learning Team) – utilising virtual reality to allow students to self-assess and improve wellbeing. Ongoing.
3. “Anatomy studies” project funded by the Westfield grant (£10K) – led by Dr Pedro Elston, Gian Paulo Canale, Paula Vickerton and Geetika Ail – assessing the effectiveness of virtual reality in anatomy teaching. The project is at wrapping up with 2 papers accepted.
4. “TINALP” project – led by Ben Audsley (IoD), in collaboration with the ITS TELT team, Queen Mary have purchased a one year licence to pilot the use of 3D holographic teaching. TINALP allows staff to upload 3D layered images, and embed them within an online lesson. 2D images, video, audio etc. can also be uploaded. Students can connect to an online classroom using their phones and computers, and view 3D holographic lessons. The tutor controls the lesson using a MR device such as the Microsoft HoloLens, and students can interact with the 3D holographic material by wearing MR (or certain VR) devices such as the Meta Quest 3. In dentistry, the vision for this software is to integrate it into the BDS/BSc Oral Health taught curriculums, with focus on its use for anatomical and haptic teaching.
5. “CENARIO VR” project – led by Ben Audsley (IoD) - using CenarioVR to create our own scenarios in VR using 360 images and videos. 2 scenarios were created by using actors – A Nervous Adult Patient visits the Dental Clinic and A Nervous Child Patient visits the Dental Clinic. These have been used by BDS Year 2 and 3 during 2022-23; the plan is to integrate these into the BDS curriculum going forward. Other scenarios developed include: a visit to the Sedation Clinic (with NHS), a visit to the X-Ray clinic (with NHS) and an introduction to the dental clinic. Further plans to use VR to develop professional and student communication skills training.

References

Lin, H. C., Hwang, G. J., Chou, K. R. and Tsai, C. K., 2023. Fostering complex professional skills with interactive simulation technology: A virtual reality-based flipped learning approach. *British Journal of Educational Technology*, 2023 (54), 622-641.

NHS England. 2023. NHS long term workforce plan.

Rianti, J., Majchrzak, T. A., Fromm, J. and Wohlgenannt, I., 2020. A systematic review of immersive virtual reality applications for higher education: Design elements, lessons learned, and research agenda. *Computers & Education*, 2020 (147), 103778.

Use of VR and AR in FMD

24 October 2023

1

Summary

- Survey shared with Education Managers and Learning Technologists across FMD by IT Services.
- The aim of the survey was to:
 - Capture current use of AR and VR technology across the Faculty
 - Capture business need and future aspirations across Faculty for AR and VR technology
- Information collected from 6 Institutes. No feedback provided by Malta or William Harvey Research Institute.

VR– current use

- **Institute of Dentistry** and **Institute of Health Sciences Education** are the only business areas which reported using Virtual Reality to support teaching and learning currently.

Institute	Institute of Dentistry	Institute of Health Sciences Education
Software and hardware used	Canario VR - elearning brothers, Meta Quest2 and Pico	Meta Quest 2 - Medical scenarios (Oxford Medical Simulation) - Physician Associates programme sporadically
Being used this academic year	Y	Y
Courses used for	Multiple courses	MBBS and Physician Associates
In person or online	Both	In person
Group sizes	Small (less than 40)	Small (less than 40)
Used to recreate the environment or to immerse into aspects of the curriculum i.e. imagery	Both	Both

VR– business and education goals

- Two business areas reported that current VR technology does not support their education goals and the number of students they teach:
 - **Barts Cancer Institute:** They haven't discussed its use yet and are looking to make improvements to how current basic technology is used.
 - **Wolfson Institute of Population Health:** no further information provided.
- Five business areas reported that current VR technology may support their education goals and the number of students they teach:
 - **Blizard Institute:** unsure as to direction – would need to check with Blizard Education Committee.
 - **Wolfson Institute of Population Health:** no further information provided.
 - **Institute of Dentistry:** mentioned need to integrate VR into teaching more.
 - **Institute of Health Sciences Education:** Raised that scaling up is challenging due to a large number of students. Solutions for the MBBS revolve around software that can be used without a headset because of the numbers currently.

(Please note, Wolfson Institute of Population Health: completed the form twice and provided a no and a maybe to this answer.)

VR –headsets

To the knowledge of IT Services FMD own the following VR headsets:

- Malta have 1 x device which they plan to use weekly during teaching time.
- IHSE London have 16 x devices (Quest2).
- IHSE London are looking to purchase 40 x more (QuestPros).
- IHSE London intend to use these very regularly (most likely in Lynton House in Ilford) and they are regularly used in the Turnbull Centre for anatomy teaching. They plan to loan 1 of these to HSS soon and some of the 40 with SPCS.

VR – future aspirations

- Institute of Dentistry and Institute of Health Sciences Education were the only business areas which reported having future visions for the use of VR.
- **The Institute of Dentistry** have aspirations to use VR across multiple scenarios for dental students including interviews.
- **The Institute of Health Sciences Education** have a high likelihood that they will use on healthcare courses to bridge the gap between simulation and practice, and to also the ability to visualise 3D models for teaching in both anatomy and physiology.

AR – current use

- Only the Institute of Dentistry reported using AR to support teaching and learning currently.

Institute	Institute of Dentistry
Software and hardware used	Immersify Dental
Being used this academic year	Yes
Courses used for	BDS, BSc Oral Health, GDC
In person or online	Both
Group sizes	All students have access to this app on their phones
Used to recreate the environment or to immerse into aspects of the curriculum i.e. imagery	Supplementing traditional delivery with interactive elements

AR – business and education goals

- Two business areas reported that current AR technology does not support their education goals and the number of students they teach:
 - **Wolfson Institute of Population Health:** no further information provided.
 - **Barts Cancer Institute:** They haven't discussed its use yet and are looking to make improvements to how current basic technology is used.
- Five business areas reported that current AR technology may support their education goals and the number of students they teach:
 - **Blizard Institute:** no further information provided.
 - **Wolfson Institute of Population Health:** no further information provided.
 - **Institute of Dentistry:** supports education goals by supplementing traditional delivery with interactive elements – personalisation and gamification.
 - **Institute of Health Sciences Education:** Stated that it can work and be used, but the evidence is not there yet to say how effective it is, and it requires a shift in how academics work.

(Please note, Wolfson Institute of Population Health: completed the form twice and provided a no and a maybe to this answer.)

AR – future aspirations

- Institute of Dentistry and Institute of Health Sciences Education were the only business areas which reported having future visions for the use of AR.
- **The Institute of Dentistry** have aspirations to use AR to teach dental anatomy i.e. TINALP.
- **The Institute of Health Sciences Education** have said they may look to experiment in the future and see it could be useful for certain scenarios including use on wars.

Additional comments

- The Institute of Health Sciences Education also stated that it is likely developments in AI will influence VR/AR but also in its own right will impact medical education. Very unclear at this stage how it would be used, but communication skills is emerging as a use.