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Immersive Technology in the UK's Education & Skills Sector



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What is immersive technology?

Extended reality (XR) technologies, including augmented reality (AR), mixed reality (MR) and virtual reality (VR), allows a user to become “immersed” in the digital world. Unlike two-dimensional computing interfaces such as the smartphone, laptop or tablet, immersive technologies offer a sensory experience that allow a user to interact with a digital content in a three-dimensional way; overlaying or completely replacing their immediate surroundings with digital enhancements.

How can immersive technologies support the UK’s education sector?

Immersive technologies offer near-infinite ways to bring learning to life. Students can benefit from XR, with opportunities to share knowledge and practice new skills in a variety of academic and professional settings.

Some of the earliest use cases for the technology focused on educational simulations, and the sector continues to innovate at pace. The prevalence of XR in education has seen an 80% growth rate in the last five years and saw £156m in turnover in 2022¹. Looking to the future, PwC anticipates that VR training will contribute \$294 billion to the global economy by 2030.²

Early indicators suggest that there is a strong appetite for increased use of immersive EdTech in different educational contexts. The market is perhaps more mature for professional skills training, but there is ample opportunity in more formal education settings as well. Indeed, nine out of ten teachers believe that XR would improve classroom teaching.³

This acknowledges the clear educational benefits associated with XR, including:

- **More Engaged Learners**

Immersive technologies offer new ways of learning that are more efficient, effective, and engaging. Students can observe, listen and interact with information in a dynamic digital reality, and therefore enjoy more personalised learning journeys to success. Indeed, Stanford University and Technical University of Denmark found that incorporating XR technology improved memory retention rates by 76%, compared to traditional learning methods.

- **Controlled Learning Environments**

XR technologies allow learners to practice new academic and vocational skills in a virtual setting prior to real-world application. This is particularly helpful when training for risky scenarios that are difficult to safely recreate in normal life. For example, the surgery simulation platform FundamentalVR allows trainee medical professionals to accrue certified training hours without the need to practise on human patients.⁴

- **Remote Teaching Capabilities**

XR can bridge the gap between physical and remote learning. In some instances, this might mean that teachers can instruct learners across significant distances. In others, students can be transported to new locations irrespective of where their feet are planted. For example, language learning company Mondly offers VR applications that allow students to practice their foreign language skills in an immersive setting without the financial or logistical barriers of travelling to another country.

- **New Forms of Assessment**

Immersive tools offer a different approach to evaluating an individual’s capabilities. Whereas oral and written tests typically require a learner to recite theoretical knowledge, XR allows students to practically demonstrate their new skills in hyper-realistic situations. Moreover, some XR devices will offer teachers enhanced ways to measure their students’ performance, with new analytics relating to spatial feedback data, such as eye-gazing movements.

- **Opportunities For All**

In some circumstances, these technologies can help to democratise access to learning experiences. This is particularly important for disadvantaged learners or learners with special needs who may have otherwise faced physical, financial and/or practical barriers to inclusion. For example, a 2020 study found that the use of AR had a positive impact on the acquisition of social, learning, living and physical skills for those with special needs, such as intellectual and/or physical disabilities.⁵ For example, UK based Round Midnight have developed a tool to help young people to build empathy, resolve conflict, make good decisions and learn how to minimise the risk of violence.

- **Long-term Cost Savings**

Whilst there is a need for some upfront investment, immersive technologies often offer long-term cost saving opportunities for training facilities, as they can reduce the need for costly equipment or specialised classrooms, whilst ensuring that standards can be met and maintained. In some instances, it may be able to unlock teaching experiences that would otherwise be out of a school’s reach. For example, a 2020 PwC study found that virtual reality learning was completed four times faster than classroom learning, with overall costs found to be 52% less than classroom teaching for a cohort of 3000.⁶

1 <https://www.immerseuk.org/wp-content/uploads/2022/10/Immersive-Economy-2022-final-13-Oct.pdf>, p.41
2 <https://www.pwc.com/gx/en/industries/technology/publications/economic-impact-of-vr-ar.html>
3 <https://link.springer.com/article/10.1007/s10639-022-11061-0>

4 <https://fundamentalsurgery.com/fundamentalvr-achieves-esteemed-centre-accreditation-from-royal-college-of-surgeons/>
5 <https://www.tandfonline.com/doi/full/10.1080/08856257.2019.1703548?scroll=top&needAccess=true>
6 <https://www.pwc.com/us/en/services/consulting/technology/emerging-technology/assets/pwc-understanding-the-effectiveness-of-soft-skills-training-in-the-enterprise-a-study.pdf>

What does the UK public think?

When asked, around a third of UK adults were positive about the potential that immersive technologies might offer the education sector. When asked about a long-list of possible XR use cases, four of the top five most popular were related to learning.



34%

of UK adults said they were excited about the possibility of using immersive technologies to help students learn about new topics in the classroom.



31%

of UK adults said they were excited about the possibility of using immersive technologies to train a surgeon to safely conduct brain surgery.



31%

of UK adults also said they were excited about the possibility of using immersive technologies to help train a pilot to safely land a plane.



The current policy landscape:

Policy efforts have already been made to support the use of immersive technologies across the UK:

In **2019**, the Department of Education published its Realising the Potential of Technology in Education report, committing to improving teacher training for EdTech and supporting schools to buy new technologies such as XR for use in the classroom.¹

In **2020**, the Information Commissioner's Office released the Children's Code, which came fully into force in 2021. It requires all digital services, including EdTech, to be designed "in the best interests" of children and that privacy must be the highest priority for digital services designed for children.²

In **2022**, the Department of Education published its Future Opportunities for Education Technology in England report, which highlighted successful case studies of XR being used in education internationally and the benefits of the technology. It called for the creation of "digital resource-centres" from which schools could borrow equipment (such as VR headsets).³

1 https://assets.publishing.service.gov.uk/media/5ca360bee5274a77d479facc/DfE-Education_Technology_Strategy.pdf
2 <https://docs.google.com/document/d/10zM2msGNQVgpB8xrSHkEULrWblQwy6s-qfuwgA0RNkE/edit>
3 https://assets.publishing.service.gov.uk/media/629f2065e90e070395bb3e4c/Future_opportunities_for_education_technology_in_En

What are the barriers to adoption and innovation?

Despite the opportunities offered by immersive technology, significant barriers continue to prevent widespread adoption. This is true in formal education settings, such as schools and colleges, but also across skills strategies for public services more broadly. Conversations with industry stakeholders emphasised the following:

- **Access to Hardware**

Adoption is significantly limited by access to the right equipment. Whilst XR experts emphasise that many XR programmes can actually be delivered without headsets or similar XR devices, this is not commonly understood by educators or skills leads. Equally, concerns about budgetary pressures and other logistical constraints such as hygiene or storage space all inhibit adoption at scale.

- **Legacy Infrastructure**

Many educators and training coordinators are grappling with legacy infrastructure and insufficient network access. This results in significant friction where immersive devices cannot readily integrate with existing, out-of-date systems - meaning that their full potential cannot be realised. This in turn leads to frustration as schools, colleges and other training facilities cannot make the most of new solutions.

- **Lack of Confidence and Understanding**

Most immersive technologies require informed individuals to source, maintain and implement XR tools in a systematic way. However, educators are often under significant time pressures, with little capacity to familiarise themselves with XR's capabilities. This is then coupled with some scepticism regarding the efficacy of XR - devices are often perceived as gimmicks rather than valuable learning tools. As a result, devices are sometimes underutilised and, without thoughtful deployment, risk delivering a poor return on investment.

- **Compatibility With a Broader Curriculum**

Strong educational outcomes rely on structured pedagogical approaches. However, educators are often unclear as to how XR services and tools can be effectively and consistently integrated within their curriculum. Indeed, the market tends to offer discrete learning solutions, rather than full integration across complete curriculum programmes. Teachers are therefore required to undergo an expensive and time-consuming process of determining the right software to support their learning objectives.

- **Accessibility Limitations**

XR devices are inherently audiovisual products that often require some form of user motion to operate and navigate, meaning that those with visual, hearing, and mobility disabilities may have difficulty using these devices or fully realising their benefits. There have been significant advancements made in haptics, spatial audio, and other technologies that can enhance the accessibility of XR devices; but many users still face challenges in experiencing the benefits of immersive training and education. The potential limitations for people with disabilities can be particularly felt in group-learning environments, where parity across learners is important for overall development.



"We did a pilot [...] in schools, and they couldn't for the life of them get hold of the equipment...I had to use internal funds to buy the [hardware] and even then it didn't connect to anything in their environment. We de-risked it to the tune of £250,000 to get the hardware for them, it was the infrastructure that was the problem."

Roundtable Participant, Glasgow

"From the schools' perspective, if they can only use [a headset] for one lesson every third term, they can't invest in that. [...] There's a lot of complexity, people don't understand what else they can run on a piece of hardware...They want the vendor to provide them with a whole suite of [software] and therefore the price tends to be massive." "

Roundtable Participant, Manchester

"AR and VR as we have them at the moment, and of course mixed reality, are heavily visual mediums and will continue to be predominantly visual for a long time, there's no getting away from the fact that that excludes some people, those with visual impairments."

Roundtable Participant, Glasgow



Recommendations

In order for public sector organisations and XR businesses to ensure that the benefits offered are fully realised across the UK's education sector, we would recommend the following actions.

- **Improve digital infrastructure**

Any meaningful roll-out of XR will depend on strong technological foundations in schools, colleges and other public sector learning environments. This will inevitably require targeted funding and associated IT support. Whilst there are a lot of competing priorities in the education sector, laying the groundwork for digital integration is an absolute priority, closely followed by access to high-quality EdTech solutions.

- **Upskill teachers and training providers**

Educators need support in identifying and utilising the right tools for their learners. Central and local governments should therefore work with XR providers to release official up-to-date guidance on the educational benefits associated with XR, along with advice for practical implementation in different education and training settings.

- **Prioritise partnerships between technology providers and established bodies**

Formal networking opportunities between technology providers and groups such as subject associations, awarding organisations or professional bodies may help to facilitate new partnerships or accreditation processes. This may, in turn, give educators confidence in the efficacy of XR tools, services and curricula.

London: BodySwap

London-based VR developer BodySwap offers users immersive experiences designed to help develop a range of soft skills.

Using a series of virtual reality training scenarios, BodySwap's software mimics a highly sophisticated form of role-play, allowing users to develop communication, collaboration, and leadership skills. Users engage in conversation with virtual characters, allowing them to simulate and rehearse a range of scenarios.

For example, in partnership with the University of Liverpool, BodySwap developed a series of scenarios preparing students for job interviews. Students were able to attend practice interviews, repeat sections, review responses and work at their own pace, allowing them to manage and avoid the anxiety typically associated with these processes.

With programs aimed at professionals and students, self reported data from BodySwap found that 87% of learners report improvement in their self-awareness and knowledge of how to improve their skills and 85% report improvement in their confidence to apply the simulated soft skills in real situations.



Newcastle: Flaim Systems

Flaim Systems' multi-sensory immersive learning tool allows firefighters to safely train for emergency situations, without the cost and sustainability implications of physical rehearsals. They also have a tool to facilitate workplace fire-safety training.

Flaim Systems combine virtual reality environments with real physical tools and headsets to deliver accurate and effective training experiences. Users can strengthen their skills through a broad range of scenarios and tools, without the need to create a potential hazard. Moreover, users are given the opportunity to receive live feedback and to review actions taken during exercises.

For example, Flaim Systems is working with Newcastle International Airport Training Academy to assist in the delivery of Aviation Firefighter training.

Where practical training requires real extinguishers, gas cylinders, live flame, and specialist locations - all of which have strict safety requirements - Flaim Systems only require a classroom with a TV, and can be easily used by many trainees in quick succession. The immersive scenarios are significantly less time and resource dependent, and remove any risks of accidental harm.



Glasgow: Museums in the Metaverse

In 2023, the University of Glasgow launched the "Museums in the Metaverse" project in partnership with Edify, The Hunterian, National Museums Scotland and Historic Environment Scotland.

The project allows in person and online visitors the ability to explore cultural artefacts using immersive technology. By digitising objects in various collections, users of the Museums in the Metaverse online immersive spaces will be able to explore collections and artefacts, many previously only held in storage, from anywhere in the world. At the University of Glasgow's Advanced Research Centre, teams are creating virtual duplicates of a large range of artefacts that users will soon be able to get up and close to.

This pioneering immersive experience will enable a new type of interaction with cultural heritage, allowing new, previously excluded audiences to interact with the biggest and best collections. With much of the cultural heritage sector limited by the physical space required to display collections, Museums in the Metaverse will allow museums the ability to connect users with their history in brand new ways, overcoming the logistical and cost barriers.

About This Research:

Public First has worked with Meta and techUK to convene the immersive tech sector across the country. This factsheet reflects Public First's independent research findings from workshops in Bristol, Glasgow and Manchester, along with new public opinion polling and expert interviews. A full list of acknowledgements can be viewed [here](#).



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