KnowledgePoint
Where learning lives

AN INSIGHT REPORT

The immersive skills storm

KnowledgePoint supports learning organisations to scale and grow. Through our work with learning organisations around the world, including both Autodesk and Unity, we can see the economic potential of immersive technologies, but this is not widely reflected in the strategies, priorities, and investment plans of governments, businesses, or educators.

We believe the challenges facing the immersive sector are much more nuanced than those facing the digital industry as a whole. That's why we've commissioned this research from Infrabee, which looks at the gathering storm facing the immersive economies across Europe.

SUMMARY

Immersive technologies are developing at breakneck speed; they're transforming key industries from architecture and engineering to interior design and film production.

Forecasts show immersive technologies have the potential to enhance millions of jobs and boost the global economy by $1.5 trillion. But the economic promise of these technologies is under threat as employers face a global shortage of skilled talent who can develop, apply and realise their potential.

This insight report uncovers the gap between immersive technology and immersive skills, identifies the current and future opportunities, and proposes how to get ahead of the skills problem.

Immersive is here...

Immersive technologies are developing at breakneck speed; they are reshaping key industries from architecture and engineering to interior design and film production. Globally, the Augmented Reality (AR) and Virtual Reality (VR) industry alone was valued at $16 billion last year[1].

Immersive technologies are engines for economic growth, creating and enhancing jobs, boosting efficiency, and delivering productivity gains as businesses integrate applications into their operations. AR and VR are already on the path to being mainstream in the manufacturing sector[2]. As adoption across industries grows, it will unlock many more millions of jobs; new careers and jobs are emerging already that didn't exist a year ago.

Immersive is here, and it's already changing the world of work.

Its time to adapt and invest now

Forecasts show immersive technologies have the potential to enhance millions of jobs and boost the global economy by $1.5 trillion[3]. But the economic promise of these technologies is under threat as employers face a global shortage of skilled talent who can develop, apply and realise their potential.

This research is for policymakers, educational institutions, employers, and training organisations. It highlights the urgency for investment and action on immersive skills development across Europe and the Middle East. If immersive skills development isn't prioritised, it will hold back progress with negative consequences for businesses, jobs, and competitiveness.

Stakeholders need to elevate their ambition, shift from the wait-and-see approach to accepting that now is the time to build immersive skills into curriculums, degrees, and upskilling programmes.

> Adopting new technology requires a workforce with the skills and capabilities to make best use of it. There's never a bad time for employers to invest in skills and training. With a projected £62.5bn set to be added to the UK economy by 2030 through increased uptake of immersive technologies, employers, universities and other stakeholders can be confident that their investments will pay dividends.
>
> **Ann Watson, CEO, Enginuity**

1 Virtual Reality Market Share & Trends Report, 2021-2028, Grand View Research

2 For US manufacturing, virtual reality is for real, PwC, 2016

3 Seeing is believing: How virtual reality and augmented reality are transforming business and the economy, PwC

Definitions

Immersive technologies =
tools designed to create immersive experiences that integrate virtual content with the physical environment that feel real to the user. The different types of immersive technologies include:

Augmented Reality

Augmented reality (AR) is a type of interactive, reality-based display environment that takes the capabilities of computer-generated display, sound, text and effects to enhance the user's real-world experience. Augmented reality combines real and computer-based scenes and images to deliver a unified but enhanced view of the world. (techopedia)

Mixed Reality

Mixed reality (MR) is the merging of real and virtual worlds to produce new environments and visualisations, where physical and digital objects co-exist and interact in real-time. Mixed reality does not exclusively take place in either the physical or virtual world but is a hybrid of reality and virtual reality. (Wikipedia)

Virtual Reality

Virtual reality (VR) refers to a computer-generated simulation in which a person can interact within an artificial three-dimensional environment using electronic devices, such as special goggles with a screen or gloves fitted with sensors. In this simulated artificial environment, the user is able to have a realistic-feeling experience. (Investopedia)

Digital Twins

A digital twin is a precise visualisation of a physical objective such as a product or infrastructure component. Typically used to display information about the physical object collected with systems and sensors. (Simplicable)

Immersive design =
the process of designing using immersive technologies and other digital design tools, including:

Real-time 3D

Real-time 3D (RT3D) or real-time rendering is the sub-field of computer graphics focused on producing and analysing images in real-time. The term can refer to anything from rendering an application's graphical user interface (GUI) to real-time image analysis but is most often used in reference to interactive 3D computer graphics. (Wikipedia)

Computer-aided design

Computer-aided design (CAD) is the use of computer-based software to aid in design processes. CAD software is frequently used by different types of engineers and designers. CAD software can be used to create two-dimensional (2-D) drawings or three-dimensional (3-D) models. (WhatIs.com)

Building Information Modelling

Building Information Modelling (BIM) is an intelligent 3D model-based process that gives architecture, engineering, and construction (AEC) professionals the insight and tools to more efficiently plan, design, construct and manage buildings and infrastructure. (Autodesk)

Generative design

Generative design is an iterative design process that involves a program that will generate a certain number of outputs that meet certain constraints, and a designer that will fine tune the feasible region by selecting specific output or changing input values, ranges and distribution. (Wikipedia)

Immersive application
Immersive technologies underpin a range of concepts, workflows, processes, and techniques used by different industries — so it is called by other names. For example, within automotive, immersive technologies are subsumed within the concept of 'virtual engineering' used by the sector. There are many other examples.

3D technology
Virtualisation
Virtual engineering
Immersive
Digital engineering
Digital design
Interactive 3D
Digitalisation
Visualisation

The state of play: What's happening now?

The calm before the storm

Immersive technologies have already made the leap from gaming and entertainment to the broader business environment; 60% of AR & VR spending in 2018 was for commercial uses[4].

It's not just specialist companies this technology matters to; usage will grow exponentially as businesses see its potential.

Jeremy Dalton, head of the PwC VR/AR team in the UK, believes "everything is in place for these technologies to now deliver on their promise." The PwC report "Seeing is Believing"[3] on AR/VR highlights two overarching trends that will drive up business usage in the coming years: the business benefits "are now richer and more attractive"; and "technological advances are creating improved user experience."

As commercial adoption continues to accelerate, will learners, jobseekers, educators and industry miss out because we are too busy playing catch-up on skills-building?

> ## Everything is in place for these technologies to now deliver on their promise.
>
> **Jeremy Dalton,**
> **Head of the PwC VR/AR team**

The most in-demand immersive skills

So, what skills are needed to create immersive content and experiences? Here are the main categories:

REAL-TIME GAME ENGINE

Unity
Unreal

3D CONTENT AUTHORING

3D Animation
3D Modelling
3D Graphics
Shading & Texturing
3D Rendering

VR & AR

HoloLens
HTC Vive
Magic Leap
Oculus
Windows Mixed Reality
Vuforia

CAD & BIM

AutoCAD
SolidWorks
Microstation
Fusion 360
Revit BIM
SketchUp

3 Seeing is believing: How virtual reality and augmented reality are transforming business and the economy, PwC

4 https://www.inlinepolicy.com/blog/how-uk-government-is-helping-virtual-and-augmented-reality-flourish

What the data says

TOP USE CASES IN INDUSTRY

Medical
71%

Manufacturing
47%

Military
46%

Industrial
35%

Tourism
28%

Retail
23%

Transportation
20%

XR/AR/VR/MR technology and content investment focus worldwide from 2016 to 2019

Legend: 2016, 2018, 2019

Share of respondents (0% to 90%)

Category	2019	2018	2016
Gaming	54%	59%	78%
Healthcare and medical devices	43%	26%	24%
Education	36%	26%	30%
Military and defence	28%	19%	15%
Manufacturing and automotive	20%	17%	
Movies and television	17%	18%	40%
Live events	15%	19%	34%
Workforce development	15%		
Marketing and advertising	13%	20%	
Retail	11%	18%	7%
Real estate	9%	21%	18%

RISING DEMAND FOR ADVANCED DIGITAL SKILLS

- Immersive skills are recognised as advanced technical skills
- **60%** of employers expect their reliance on advanced digital skills to increase in the next five years[5]
- **58%** of businesses are looking for significantly more advanced digital skills in the next five years[6]

REAL-TIME 3D DEMAND IS UP

The rapid growth in the use of real-time 3D is seeing demand for people with these skills grow.

Overall demand for real-time 3D skills has grown **601%** faster than the overall labour market[7].

Research from labour market data company, Burning Glass[8], into the European and English-speaking markets (not including the USA) found:

- Demand for 3D graphics and real-time 3D skills is outpacing overall job market growth
- The market for these skills is growing more than **10%** faster than the overall job market and over **50%** faster than that of the average information technology skill
- The UK and Germany are the dominant force, showing the highest demand for 3D graphics and real-time 3D skills across roles and industries
- Unreal Engine is predicted to grow **138%** globally, and Unity is expected to grow **70%** globally in the next ten years

Unity is one of the most in-demand IT skills and has one of the highest forecasted growth rates at over 35% over the next two years[9].

SKILLS GAPS HOLDING BACK SUCCESS

Learning from the UK's experience, a leader in immersive technology, we can see big skills gap emerging as a significant barrier to growth. A 2019 survey of immersive businesses found[10]:

- **97%** of respondents indicated that the immersive economy was lacking appropriate skills
- **77%** of companies identified lack of technical skills within their own company and wider talent pool as a barrier to growth
- **48%** of respondents had employed people with roles and job titles that had not existed before, such as 'VR level designer' in games companies
- **52%** identify proficiency with Unity (28%) or Unreal (24%) as a gap in their teams

The hiring difficulties experienced by the sector were captured in the UK Skills for Immersive Experience Creation[11] report, which found fierce competition for graduates "with everyone now chasing the same talent." The already limited talent pool is also being pursued by other disciplines such as engineering, construction, and architecture.

Skills shortages in Unity and Unreal RTGE combined is the highest of all technical skills gaps for immersive content creation[11]

5 Disconnected: Exploring the digital skills gap 2021, Worldskills, Enginuity, L&W Institute
6 Delivering Skills for the New Economy 2019, CBI
7 Visualizing the Future, Burning Glass, 2019
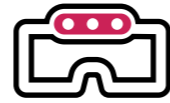8 Visualising the Future Globally 2021, Burning Glass
9 Unity.com
10 The Immersive Economy in the UK 2019
11 Skills for Immersive Experience Creation 2020, The Authors' (Bennett and Murphy)

The rise of real-time 3D

In architecture, engineering and construction

The architecture, engineering, and construction sectors are shifting to using real-time 3D to improve how buildings are designed, built and maintained. Real-time 3D is key to creating digital twins, a virtual replica of a physical asset that, combined with sensor data, can monitor, analyse and predict changes to optimise the performance of the asset.

In film production

Real-time 3D is also majorly disrupting traditional filmmaking and production. It offers a framework and the freedom for content creators to speed up processes, get instant feedback and cut costs. Real-time is bringing new ways of working and is being quickly integrated into the workflows by content developers.

35%

of UK's architects now use at least one form of immersive technology[7]

The Mandalorian: Disney+ productions developed with real-time rendering

Sherman: real-time animated short from the Emmy-winning team behind Baymax Dreams

7   Visualizing the Future, Burning Glass, 2019

The outlook for immersive: **Growth and jobs**

INDUSTRY FORECASTS

$160 billion
Worldwide forecast spending on AR and VR by 2023[12]

$50 billion
European AR and VR forecast to reach by 2026, up from 4.5 billion in 2018[13]

$218 billion
Value of automotive AR and VR market by 2026, up from €390 million in 2018[14]

Retail
AR in retail and marketing is set to be worth more than

$12 billion
globally by 2025[15]

Architecture & Construction
Building Information Modelling is projected to grow from $4.5 billion in 2020 to

$8.8 billion
worldwide by 2025[16]

Healthcare
Immersive healthcare market worth forecast to be worth

$9.5 billion
globally by 2028, up from $1.8 billion in 2021[17]

PROJECT GROWTH IN DEMAND[19]

Skill	10-year projected growth rate in demand
Augmented reality (AR)	207%
Virtual reality (VR)	189%
Oculus	185%
Unreal engine	122%
Unity	72%
HoloLens	28%
Overall labour market	10%

Source: Unreal Engine
See Appendix 1 for more on trends in Real-time 3D skills.

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12 IDC Worldwide Semiannual Augmented and Virtual Reality Spending Guide 2019
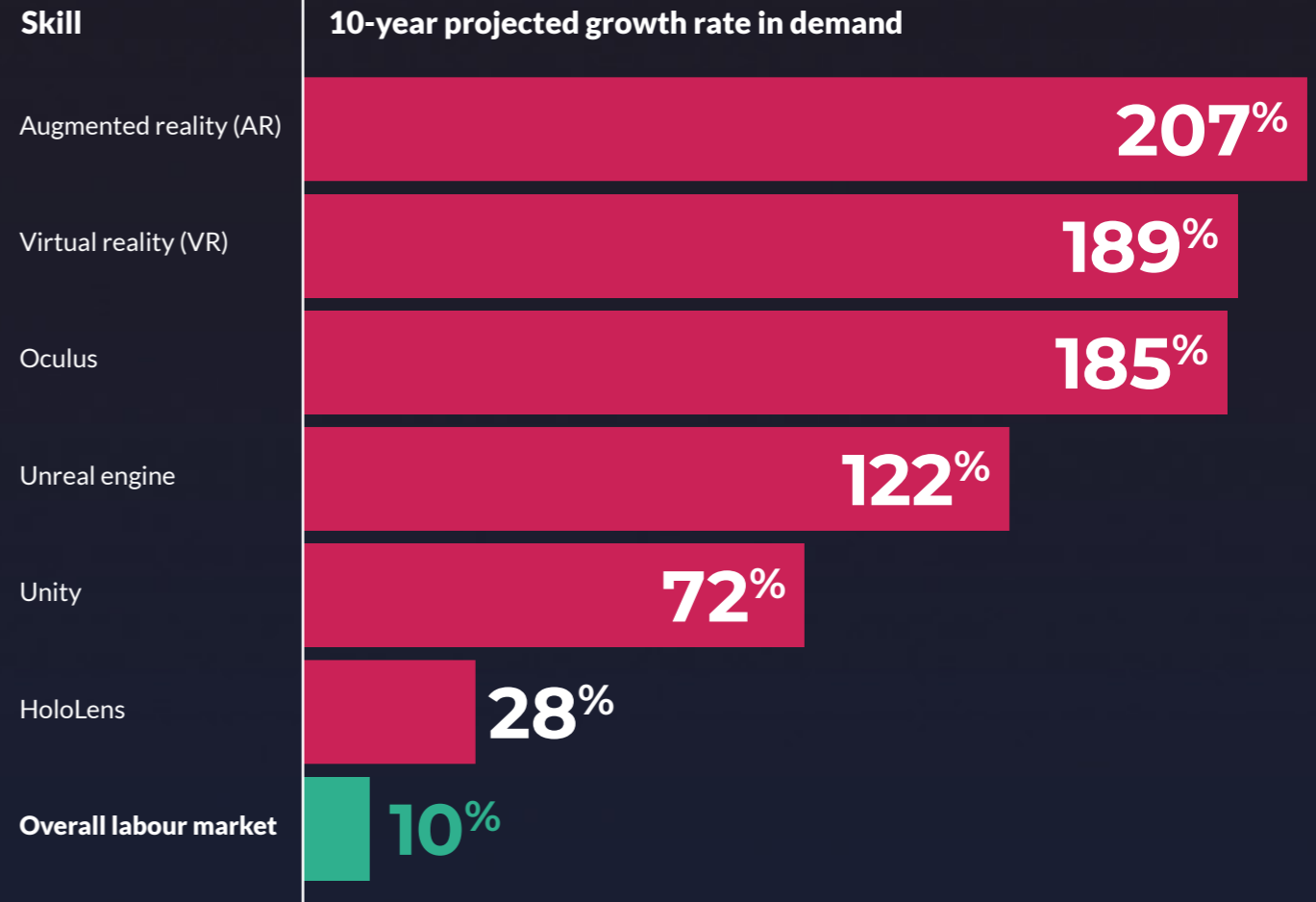
13 Statista.com

14 Global Automotive Augmented Reality (AR) and Virtual Reality (VR) Market 2021, MarketWatch

15 Augmented Reality Applications in Retail and Marketing, 2020 ABI Research

16 Building Information Modeling Market 2020, marketsandmarkets

17 Augmented Reality & Virtual Reality in Healthcare Market Report 2028, Grand View Research

Higher-paid and future-proofed:
the immersive jobs market

Immersive tech will enhance millions of jobs worldwide

Globally, 23 million jobs globally will be enhanced by AR & VR technologies by 2030. These are new job roles that don't yet exist and existing jobs that are enhanced by using the technologies.

In the UK, predictions are for over 400,000 jobs to be "enhanced" by immersive technologies by 2030[18].

Jobs will be higher-skilled, higher-paid and future-proofed

The next decade will bring uncertainty, disruption and see a major transformation of the workplace. According to the Organisation for Economic Co-operation and Development (OECD)[19], 32% of jobs are set to change radically due to automation in the next 15 to 20 years. However, immersive skills are future-proofed; research from the UK[20] shows people with specific digital skills such as computer-aided design (CAD) or Real-time 3D reduce the risk of losing their job to automation by 59%. Immersive skills are vital to offsetting the job displacement created by technological disruption.

The employer ecosystem is varied

Although the traditional boundaries between business models are blurring, the immersive ecosystem broadly falls into three categories:

Content companies

- Agencies and studios
- Video game developers
- B2B and B2C single application businesses
- Companies that are developing immersive content for business and consumer markets

Service companies

- UX and UI design experts for VR/AR applications
- Consultancy on VR/AR activity
- Professional (legal, tax, and grants) advisers on VR/AR activity
- Consumer research using VR/AR technology
- Companies that provide a consultancy or outcome-based service to business clients

Technology companies

- VR/AR headset manufacturers
- Real-time 3D platforms
- AR optics hardware
- VR live streaming platforms
- VR/AR controller solutions
- Companies that create the hardware and software for AR/VR, including platforms, tools, plugins

18 The Immersive Economy in the UK 2018, Innovate UK

19 Future of Work, OECD

20 No Longer Optional: Employer Demand for Digital Skills, June 2019, DCMS/Burning Glass (UK)

Source: Growing VR/AR companies in the UK, PwC

Leading but still learning: **the UK's immersive economy**

The UK's immersive sector is amongst the most well-established; it has the largest market for VR and AR in Europe. It has a unique position, built on the foundations of its world-leading gaming industry, enabling it to punch above its weight.
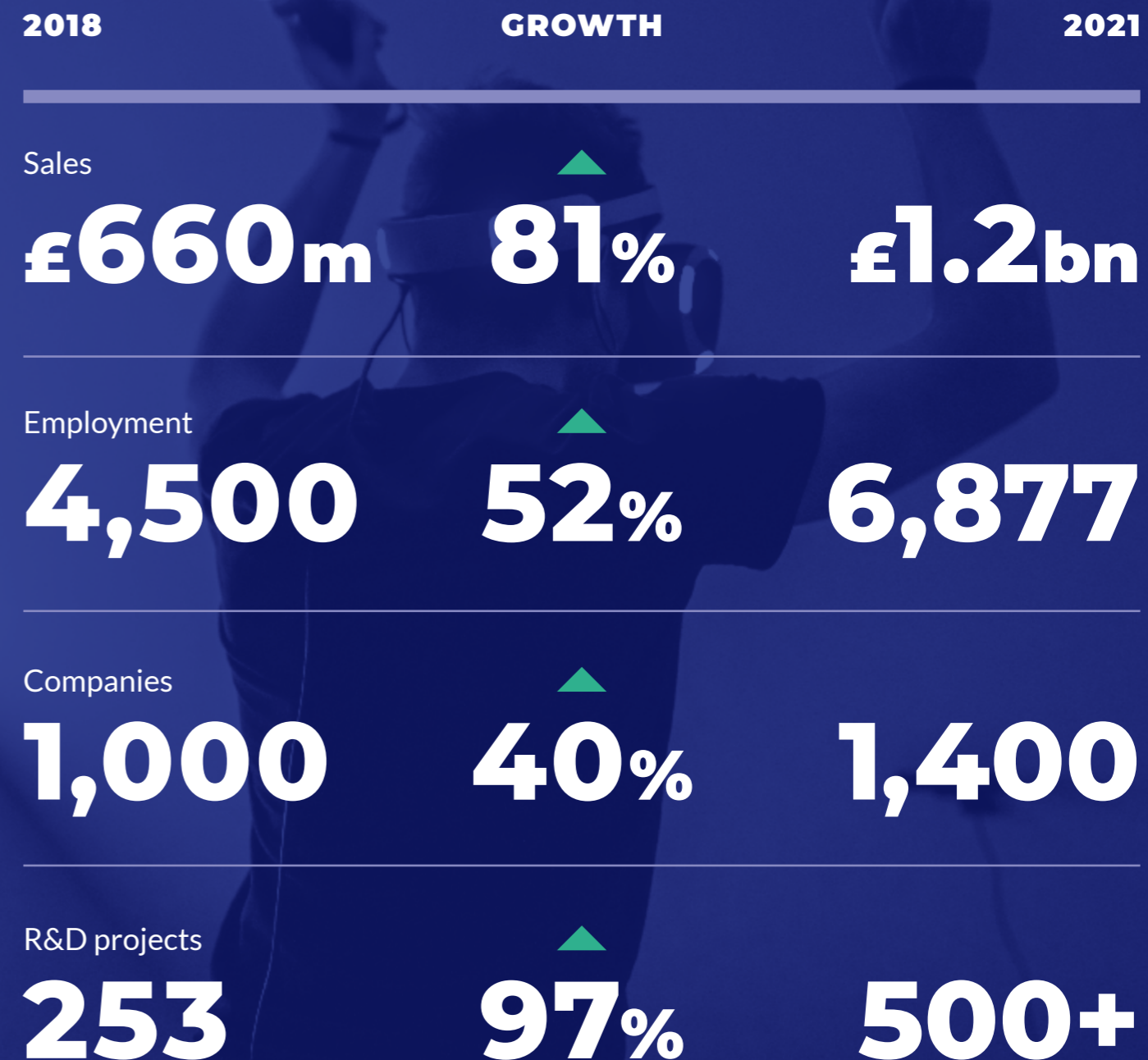
The UK is realising the economic potential of immersive; the sector employs nearly 7,000 people. Initially concentrated in London, most companies are now based outside in the capital, with strong regional hubs within the big cities. Immersive tech start-ups are now scaling up, with targeted support from universities, accelerators, incubators and the government.

But like other fast-growing industries, the sector has become a victim of its success and is now facing fundamental skills shortages. A 2019 survey of immersive companies found that 45% of respondents said difficulties in recruiting talented individuals with the right skills was a blocker to success, and 44% of respondents worried about the lack of graduates with relevant skills able to keep up with demand[21].

Richard Wilson, CEO of UK games industry board TIGA, thinks the outlook for the UK is positive and underscores the need to increase the supply of highly skilled graduates for the wider immersive economy to recruit from.

Even with the UK's thriving immersive sector, skills shortages present a risk to and are holding back growth, demonstrating the importance of continuously investing in the talent pipeline with new entrants and by upskilling existing employees.

[21] The Immersive Economy in the UK 2019

UK – Jobs boom in immersive

	2018	GROWTH	2021
Sales	£660m	▲ 81%	£1.2bn
Employment	4,500	▲ 52%	6,877
Companies	1,000	▲ 40%	1,400
R&D projects	253	▲ 97%	500+

Source: The Immersive Economy in the UK 2018, 2019

Countries to watch

We've identified tier 1 markets with leading immersive economies. The next wave of growth is likely to be in the second tier and emerging markets, where skill-building needs to start now.

Europe is generally well-positioned to capitalise on immersive technologies because of its R&D investment, education institutions, and leadership in manufacturing.

Entrepreneurial education institutions can seize on immersive opportunities to differentiate and position themselves as centres of excellence.

1ST TIER MARKETS

UK	**Netherlands**
France	**Germany**

2ND TIER MARKETS

Sweden	**Finland**
Spain	**Denmark**
Switzerland	**Belgium**
Portugal	

EMERGING MARKETS

Czech Republic	**Greece**
Estonia	**Poland**
Italy	

Careers of the future

Immersive technologies will create new jobs and careers across every part of society. Futurists at leading companies such as BAE Systems and Unreal are predicting the types of roles that are likely to exist in the future.

VR Architect

Creator of digital twins for AI modelling, responsible for using VR and AR to understand the lifespan of the component parts within a physical asset so it can be managed effectively and safely.

Areas of study:

Graphic Design and Information Technology (IT)

Architectural Visualisation Specialist

Responsible for interpreting, visualising and communicating the architect designer's vision, translating CAD data into 3D models.

Areas of study:

Architecture, Engineering or Construction Graphic Design and Information Technology (IT)

The enlightened ones:
Industries leading the immersive charge

Immersive technology is not only for the creative industries or high-tech Silicon Valley start-ups — it's adopted by household names like **Ikea**, **Volvo**, and **Toyota**. Here are a few examples of use cases from companies and brands leading in this space:

Automotive

Auto companies have been using modelling and simulation technologies for decades and are now amongst the leading practitioners of real-time 3D, VR and AR. The automotive sector accounts for the largest investments in augmented reality (AR) and virtual reality (VR) technologies[22]. At US carmaker **GM**, every "program, vehicle, and platform utilizes VR."[23] These technologies are delivering tangible benefits like shortening development processes. For example, at **SEAT**, VR reduces prototype production time by 30%[24]; VR also makes cars safer, parts are tested in different conditions and optimised before they hit the factory floor. The current use cases span the entire product cycle using CAD to design, testing safety through simulations, AR-assisted assembly for works, and AR apps, and virtual showrooms for customers to view, customise and buy new cars.

Volvo is using real-time 3D and MR to produce better and safer vehicles. They were the first to create a mixed reality approach to evaluating prototypes, designs, and active safety technologies. Their mixed reality 'ultimate driving simulator' comprises a moving driving seat, a VR headset, a steering wheel, and a full-body Teslasuit that provides haptic feedback. Volvo uses Unity's real-time 3D platform to create a realistic virtual environment for the simulator, enabling engineers to test different scenarios without testing in the real world, which saves time and cost.

Aerospace

The aerospace and defence industries have played a key role in advancing AR and VR technologies globally. **BAE Systems** is at the forefront of experimental technology in this area; they are creating the highest performing AR glasses globally. BAE Systems' Director of Innovation, John Kelly, says "We've been incubating AR technology since 2016, and now we're driving it into all parts of the business."

Both VR and AR are used extensively across the business, from training staff on the factory floor to showcase products. The company also uses real-time game engines to allow engineers and designers to deliver VR across many platforms. Building their digital skills capability is crucial for BAE Systems. They and other major UK defence players have identified digital skills deficits as a significant threat to their businesses. The defence industry-led Digital Skill Framework is working to address this upskilling and reskilling of an ageing workforce, critical to the UK's competitive leadership globally.

Engineering

Arup, a global multi-disciplinary design and engineering practice, uses real-time 3D to create immersive solutions to communicate and engage clients. On their High Speed 2 project, they used VR to model everything from the "in-carriage experience to the landscape design of the route." Their Virtual and Visualization team leads the industry in simulations.

We interviewed Henry Harris from the team; he explained that the real-time 3D platform, Unity, was a fundamental tool for them. "We're using Unity bolted onto existing packages and workflows; we use it like game developers would, as opposed to how construction companies might." The team has Unity skills in-house. However, competing for new talent, particularly graduates, could be an issue in the future, as graduates with real-time skills are often attracted to the gaming industry. Arup continues to upskill existing employees, who are highly experienced in more traditional forms of visualisation and can bring those skills to augment the strengths of packages like Unity.

Retail

AR, in particular, is transforming the shopping experience for consumers; Deloitte talks of a quiet revolution[25] happening in retail. Immersive technologies are changing how customers shop. Major brands and retailers are increasingly using AR as part of their marketing strategies to build deeper engagement with consumers through interactive experiences that increase sales. Harvard Business Review says, "Once a nice-to-have feature, AR has quickly become an essential technology for retailers."[26]

IKEA used Unity to develop their AR app Place — which allows users to test their products in real-time. Users can upload an image of their space and preview how furniture looks in their home. **Toyota** deployed Unity and Microsoft tech to provide customers with a Mixed Reality experience. Customers can virtually park their car in their garage or in front of their house to see it in real life — they can also move and make changes to the 3D image for a highly personalised perspective.

22 https://www.vrfocus.com/2020/01/5-applications-of-ar-vr-in-automotive-and-adoption-challenges/

23 https://www.asme.org/topics-resources/content/manufacturing-cars-with-virtual-reality

24 https://www.seat.com/company/news/cars/virtual-reality-car-manufacturing.html

25 Augmented shopping; The quiet revolution Deloitte Insights

26 How AR Is Redefining Retail in the Pandemic, Helen Papagiannis, October 2020

A SPOTLIGHT ON MANUFACTURING:
AUTODESK

AUTODESK.

Manufacturing is way ahead of other industries in adopting emerging technologies such as AR, VR, AI, and robotics. We spoke to Mike Westlake, Global Design & Manufacturing Education Strategy Manager at Autodesk, about how the skills landscape is changing and how educators can adapt.

Mike Westlake
Autodesk, Global
Design & Manufacturing
Education Strategy
Manager

How are emerging technologies changing manufacturing roles?

Automation will drive the biggest shift in manufacturing in future years. One of the areas I've been researching is the future skills needed for a mechanical engineer in five years' time. If you consider the changes to the profession to date, it evolved from only learning about mechanical engineering to now, where you also need to have an appreciation for electronics, computer science and coding. Even though the job title hasn't changed, the skill set has massively so.

What skills are needed for the future? And how can education adapt?

Co-creating — artificial intelligence or machine learning will take over more functions. We need to teach students to get better at co-creating with computers. We need to set student expectations; you're going to have to work with machines, and they will be better than you at certain things. And you will be better than them at certain things.

Design for manufacturing — we need to get better at designing with an appreciation for how things are made. We need to get students to make more in their formal education.

Systems engineering — this is around multi-disciplinary skill sets coming together to deliver a product or outcome. It's moving away from thinking in silos. As a mechanical engineer, I will need to understand the bigger system and how what I produce fits into this. The way to tackle this is through multi-disciplinary degrees, where you learn a bit of everything.

Remote working — everything we do now do is going to be on a cloud. We need to teach students how to manage data and work collaboratively on the cloud.

What role do your products play in this changing landscape?

We're building products for the future. We are automating processes through our software, which is driving the skills changes. I'm reasonably confident in what those skill changes are because we know what parts we're automating. So, for instance, finite element analysis (FEA), students are taught all the sums behind how the computer works this out. But we've automated that in our products so students don't need to learn how to do that. It's the application of that knowledge that is important.

The perils of inaction

Businesses are already harnessing the power of immersive technology to drive productivity and competitiveness. Even though the job titles haven't changed, the skills needed will continue to evolve over the next five to ten years.

We cannot afford to stand still. Even leading immersive economies like the UK are experiencing skills shortages despite being further along on their journey. Accenture estimates $11.5 trillion could be lost in cumulative GDP growth over the next decade if we fail to speed up skills development for intelligent technologies[27].

Countries that do not have a skilled workforce or the educational and upskilling programmes to demonstrate a future talent pipeline will struggle to attract investment to grow their immersive sectors and secure the productivity gains needed to ensure their industries remain competitive.

Educational institutions, who are also increasingly competing on a global scale for students and standing, put themselves at a considerable disadvantage by not leveraging the potential of immersive technologies. By embedding immersive into the curriculum, education institutions create graduates highly sought after by industry and lead us into the immersive era

All stakeholders need to respond to meet this ever-growing demand and get ahead of the skills problem. Moving quickly on this is more essential than ever.

27 It's Learning. Just Not As We Know It, Accenture

How can we get ahead of the skills problem?

01
Create a common language

02
Tertiary education needs to get in step with industry

03
Strengthen the new talent pipeline

04
Governments need to get competitive

05
Employers need to invest in immersive skills

06
Coordinate a fragmented ecosystem

"

The Royal Academy of Engineering's priority is to get people to choose engineering, new technologies such as AR/VR can be an interesting way of stimulating interest and inspiring young people into the profession.

**Dr Rhys Morgan,
Director of Education at Royal Academy of Engineering**

"

01

Create a common language

The Problem

Immersive technologies cover a broad spectrum of tools and processes. There is currently limited understanding in this nascent landscape and no common language across industries on the skills, standards, and job roles.

The Solution

Business groups and industry bodies need to work with employers and educators to create a common language for the skills required that transcends industry-specific workflows or processes. This would reduce confusion, increase understanding of these skills, promote their value, and encourage further research into this area of skills development.

> Universities can be slow on the uptake of cutting-edge technologies that are coming through from industries. At the moment, they are less prevalent than we want them to be.
>
> **Dr Rhys Morgan,**
> **Director of Education at Royal**
> **Academy of Engineering**

02

Tertiary education needs to get in step with industry

The Problem

There is a fundamental disconnect between the rapid developments of immersive technologies across industries and the ability of educators to respond through the curriculum. These are some of the challenges the education sector faces:

1. Lack of awareness that immersive technologies are becoming embedded in a wide range of job roles that have nothing to do with gaming.

2. Limited understanding of the criticality of the sector to future employability and economic growth, and competitiveness.

3. No widespread use of immersive technologies in the delivery of learning. Research from the UK found that only 9% of Higher Education surveyed were using AR/VR in more than five departments/faculties in 2019[28].

4. Some traditional institutions lack the agility to act quickly to keep up with such a fast-paced sector.

5. Skills gaps in institutions in technical expertise.

6. Meeting the cost for software, licensing, equipment, or infrastructure is a barrier.

7. Low down the priority list for management, lack of buy-in from senior leadership who are sceptical of the benefits or value.

The Solution

Immersive skills need to be integrated across key curriculums and not just boxed into dedicated specialist courses such as gaming. These skills should be taught as a foundational skill across various degree programmes from architecture and construction to interior design and film production. We think educators should be at the forefront of using more immersive technologies in their learning delivery to build their expertise and capacity and raise awareness of the many applications.

Further, a more dynamic approach to industry engagement is needed. Educators need to pursue partnerships or academic alliances with software and platform companies to stay abreast of developments. Most big companies have partner programmes that provide subsidised and affordable access to their platforms, products, resources and certification exams. These alliances and endorsements also serve to differentiate and position institutions globally.

03

Strengthen the new talent pipeline

The Problem

The current global digital skills crisis is going to worsen over the next decade. The gap between what companies need to grow and the skills available is widening, and most countries are not set up with the skills infrastructure to react.

Why is this happening?

Most developed countries are carrying a digital skills debt in the existing workforce, which will intensify as new technologies such as AI, automation, AR and VR proliferate, and young adults leave education without the necessary digital skills employers need. The UK is among the top five most digitally advanced nations in Europe, yet is seeing the number of young people taking IT subjects at GCSE has fallen by 40% since 2015, the number taking A Levels, further education courses, and apprenticeships are also all declining[5].

Digital skills shortages (from a basic level of digital competence through to high-tech specialists) hold back growth, productivity, and investment, are costing global economies billions and will hinder COVID-19 recovery. Shortages will have a knock-on impact on the pipeline for immersive talent.

The Solution

We need to strengthen the new talent pipeline and prepare young people with the skills required for an increasingly digitised and automated world. Young people need to be introduced to immersive skills earlier in their education journey — and think opportunities to experience technologies such as BIM and real-time 3D should be included within learning at secondary school. For example, some school-based educators use the popular video game Fortnite to help students understand history, maths, or science.

Going further, immersive should be a core digital competency for students in secondary education. It needs to be integrated within the Science Technology, Engineering, and Mathematics (STEM) agenda. It can also help to inspire and inform young people of careers in the immersive sector.
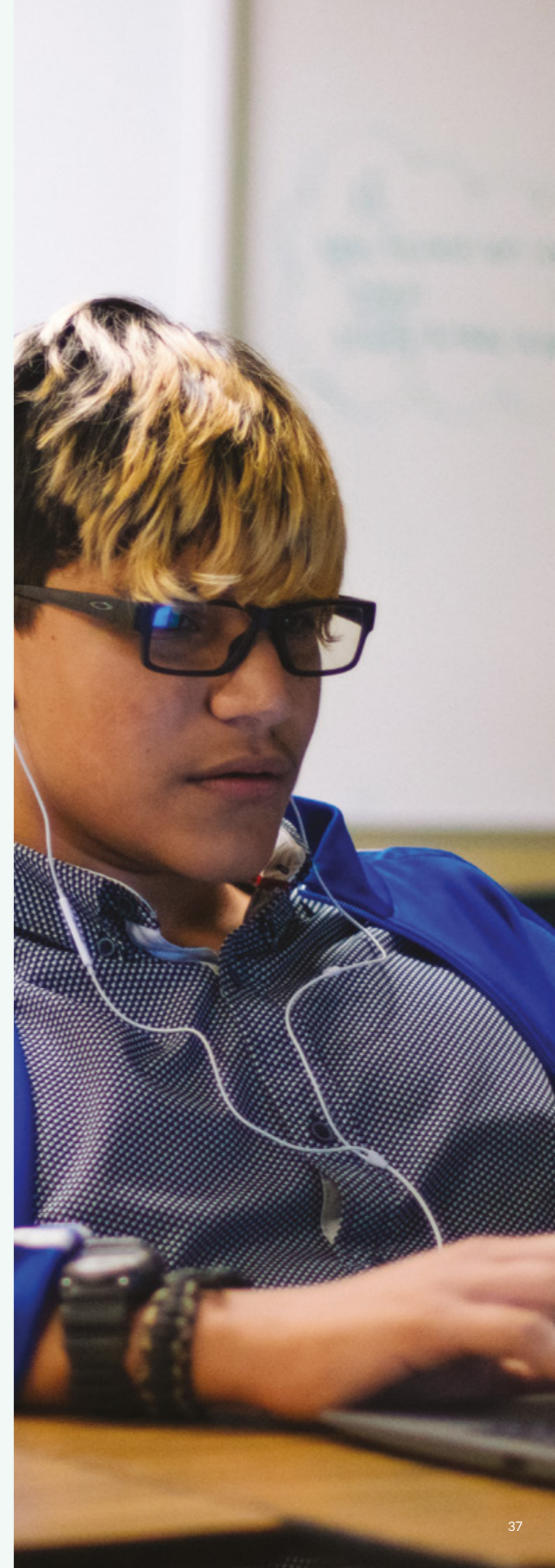
04

Governments need to get competitive

The Problem

In some countries, governments aren't moving quickly enough to realise the potential of immersive technologies. The availability of skilled talent attracts inward investment, high-quality jobs and unlocks productivity gains for businesses. Entrepreneurial nations will overtake lagging countries as they play catch-up on skills and forgo the potential to build their global competitiveness.

The Solution

To close the skills gaps, the government first needs to recognise immersive as key to unlock future growth, now more critical than ever in COVID-19 recovery. Immersive must move up the skills policy agenda, and governments need to work collaboratively with educators to ensure they can rise to the challenge. We think government-funded employability, apprenticeship, and skills programmes aimed at young people and disadvantaged groups should focus heavily on upskilling and reskilling people in immersive skills to add to the talent pool. In Macedonia, the government-funded Virtual Reality programmes will help train and certify jobseekers in the Unity platform, enabling them to take up roles in the new immersive sector.

Government must also create an environment that attracts investors and start-ups in immersive, through tax incentives, R&D funding, and accelerator programmes. More EU countries need to tap into the EU's €80 billion Horizon 2020 R&D programme for innovation to boost their immersive sectors.

5 Disconnected: Exploring the digital skills gap 2021, Worldskills, Enginuity, L&W Institute

05

06

Employers need to invest in immersive skills

The Problem

Research shows that 1 in 3 UK businesses don't offer employees the opportunity to learn new skills or invest time in development. Almost one in ten (9%) workers last invested time in learning new skills for the workplace five years ago[29]. Employers which don't invest in upskilling their workforce in immersive skills will fail to build their productivity and competitiveness.

The Solution

Employers adopting immersive technologies need to anticipate their future skills requirements, support retraining, and provide access to training now rather than later. As the CBI[30] report urges, **"businesses need to ramp up activity on upskilling to address digital skills deficits — they need to prioritise upskilling staff on current and future technologies."** This includes supporting employees to pursue professional certificate programmes, which are becoming increasingly accessible and affordable and provide a better alternative to sending employees onto a degree course. Professional courses are industry-specific learning and are vital to closing the skills gap. There's a range of specialist training providers in immersive skills, such as Mastered and Semos (see later section), who provide training, mentoring, and job search support to companies and individuals in real-time 3D, VR, and AR.

Coordinate a fragmented ecosystem

The Problem

A look at the UK immersive ecosystem shows it is fragmented and dominated by lots of small studios and specialists from a wide range of backgrounds.

The Solution

The UK is bringing their industry immersive together through a coordinating body Digital Catapult and Immerse UK. More coordinating bodies are needed across Europe to promote cross-industry approaches, enable faster adoption, and respond to the big skills challenges.

29 MPA Group, https://mpa.co.uk/a-third-of-uk-businesses-offer-no-employee-training-or-development-time/MPA Group

30 Delivering Skills for the New Economy 2019, CBI

The role of professional training in closing the skills gap

Professional training will be necessary to upskill the existing workforce to help close the skills gaps. Certification can allow employees to quickly acquire specialist technical skills to improve productivity in the fast-changing technology landscape. In high compliance sectors such as aerospace or precision manufacturing, certification ensures a proven minimum baseline of skills has been met. Today's certification programmes are an affordable alternative to degree programmes, offer more flexibility, and are industry targeted.

Certification takes on greater importance in new and emerging sectors like immersive, where roles, workflows, and technologies evolve rapidly. Professionals with certified immersive skills will have countless employment opportunities in the coming years.

Benefits of Certification

Research from Pearson Vue shows that training combined with certification has the potential to make a greater impact.

90% of learners surveyed said it was more effective at preventing or reducing gaps in their learning.

Learner views on Certification & Training:

For younger students, certification is an excellent way to track progression. Research from Certiport in the US showed certification helped increased student performance, workplace readiness, and greater self-confidence.

89%
Makes me more valuable to my employer

67%
Greater confidence in abilities

88%
Provides greater motivation for me to keep my skills up to date

55%
Knowledge has been transferrable to real work situations

84%
Helps me retain acquired knowledge over a longer period

44%
Higher quality work output, more effective solutions

84%
Helps me better see how different concepts are connected within a larger subject domain

44%
Increased personal productivity and task efficiency

41%
Increased job satisfaction

Certification also adds a salary uplift for jobseekers — according to Global Knowledge Training[31], IT professionals with certifications have an average salary of $111,334, which is 7% more than non-certified professionals.

31 Global Knowledge, IT Certification https://www.globalknowledge.com/us-en/resources/resource-library/articles/certification-value-continues-to-grow-for-it-professionals/

Seizing the opportunities

How educators and trainers are leaning into immersive

CASE STUDY:
**EQUIPPING MECHANICAL
ENGINEERS WITH UNITY SKILLS**

Hochschule Anhalt/Anhalt University of Applied Sciences, Germany

Professor Dr Johannes Tümler has incorporated the Unity platform in the Computer Science for Engineers course he teaches at the University. Prof. Tümler used to work at Volkswagen, where he used Unity extensively for prototyping while working for the car manufacturer. He immediately saw the benefits of future mechanical engineers developing their Unity skills; he says, **"Before cars were all about mechanical engineering, now it's all about software, things have changed radically. It's important for my students to get a good grounding in Unity, they don't need to be experts, but they need to be able to communicate and understand it, as it will be increasingly prevalent in the jobs they do."** Prof Tümler has opened up the opportunity to learn Unity to students in other departments across the University.

Hochschule Anhalt
Anhalt University of Applied Sciences

CASE STUDY:
**INCORPORATING REAL-TIME
3D INTO VIRTUAL ENGINEERING**

Hochschule Mannheim/ Mannheim University of Applied Sciences, Germany

The virtual engineering course run by Professor Julian Reichwald at the University uses Unity to develop a 3D Cave working with an industry partner. Prof. Reichwald plans to use real-time 3D in his learning delivery, so students can see industrial components brought to life in 3D and learn more about how real-time 3D works.

Unity was chosen because it provides much freedom to develop, offered a good fit for engineering, and in the future will be instrumental in their plans for developing digital twin models.

CASE STUDY:
MEETING THE NEEDS OF
THE CREATIVE COMMUNITY

Perri Lewis, CEO of UK-based Mastered

🌐 mastered.com

Tell us about Mastered…

Our Mastered programme for 3D worlds is unique; we run bootcamps for creators to help them launch and develop their careers. They're designed to provide the technical skills, soft skills, mindset and community support individuals need to become job-ready. It's not a course — it's a team of people there to provide support learners until the first day of their new job.

In the last seven years we've trained almost 5000 creators from over 95 different countries — always focused on the creative industries. It's where our backgrounds are, it's where our hearts are and we know that a blend of creative and technical skills are the ones that are the most future-proof.

Why did you decide on real-time 3D skills training?

Since 2015 we've been supporting creators in their careers. Even before the pandemic, we saw jobs disappearing that were not coming back and so we spent a lot of time understanding the future of the creative industries and the future of work and what that means for creators.

It became very apparent from our research and discussions with employers that one of the biggest skills gaps is in real-time games engines. As software such as Unity and Unreal moved well beyond games into everything from film to architecture, training to manufacturing, the lack of skilled talent in the UK has become even more evident. The demand for this has soared, and so we saw an opportunity to support creators into careers in these new, exciting and thriving industries.

What are employers telling you about the skills they need?

I've spent the last 12 months talking to industry founders, recruiters, and hiring managers. It's evident that there is a lack of skilled talent. Programmers are, as ever, in demand. As are technical artists — brilliant people who are just as comfortable being artists as they are engineers and scientists.

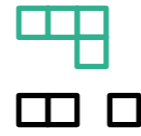### Are you seeing new roles that didn't exist a year ago?

We're seeing roles that didn't even exist six or three months ago. Take virtual production for example. The workflows, the technology, it's evolving every month and so the skills and talent companies need is adapting too.

MASTERED

CASE STUDY:
FILLING A GAP IN THE MARKET

Miroslav Klampfer, Head of Unity & Autodesk Department Semos Education in Macedonia

🌐 semosedu.com.mk

Tell us about Semos

Semos Education is a dedicated provider of information technology courses and is a well-known brand in Macedonia and over 15 countries globally. We offer customised training for companies and host structured courses for aspiring individuals as an authorised partner for numerous companies, including Microsoft, Cisco, Adobe, Autodesk, and Unity. We are helping train the future workforce of IT professionals, including data analysts, data scientists, AWS solutions architects, and Unity developers — the highest-ranking jobs in the industry. Our Autodesk Training Center provides a comprehensive range of training for future civil engineers, architects, and mechanical engineers.

What is the real-time 3D skills demand in Macedonia?

We have a small but growing number of immersive specialist companies in Macedonia. Many of them work internationally exporting services. Following the trends in the gaming industry and its incredible pace of growth and considering that more than 60% of all AR/VR content is made with Unity led us to incorporate these programmes into our catalogue of training and includes 2D, 3D, and Mobile game development and Virtual Reality as key areas of focus.

We also support a government-funded VR skills programme to tackle unemployment. As part of this, students attend four official workshops and receive support with further Unity education and gaining certification.

What are your future plans?

We are hoping to expand our Unity VR Academy into new markets. Based on our research, we see huge potential in Serbia for VR skills.

SEMOS education

UNITY: OUR ALLIANCE WITH EDUCATORS

Melissa Oldrin
Unity, Head of Education Programs

Please tell us about your role?

I develop and oversee Unity education programs, which run across the globe for both secondary education and higher education, focusing on schools and educators. Our programs are in place to support educational institutions as they teach, learn and innovate with RT3D, using Unity.

What is the aim of Unity's global education programme?

Our education programs support educational institutions, educators and students, as they teach, learn and innovate with RT3D, using Unity technology. Ultimately, our goal is to support schools as they prepare students with the skills that will enable them to secure jobs in industries using RT3D.

How critical are real-time 3D skills for future career and opportunities?

The world is changing, and consumers demand a more personalized, higher fidelity, immersive and connected experience. Unity tech helps creators develop for today's modern consumers.

- Careers using Rt3D tech are growing faster than the average career field.
- Demand for AR/VR developers grew 1400% from 2018 to 2019.
- Demand for game developers grew nearly 150%.

- We see RT3D used across industries — industrial, marketing, manufacturing, digital commerce, healthcare, teaching & learning, entertainment, film & animation, architecture, and construction, automotive.

How is Unity being used in the secondary curriculum?

Secondary schools and educators are teaching Unity to achieve many of their STEAM goals (Science, Tech, Engineering, Art, and Maths). They often start by teaching Unity for game development because it's fun to learn tech skills and computer programming. Students make games and learn transferable tech and coding skills that prepare them for careers in technical fields. Many secondary schools now teach XR — AR, VR, MR -- using Unity. Secondary students make simulations, games, tutorials and bring their stories to life in XR mediums. It's lovely to see young technologists empowered to be the creators — not just the consumers.

We have seen students who go on to use Unity to create XR therapies for medical conditions, designs for future vehicles, space and aeronautics simulations, virtual museums, films, and animations… and the list goes on and on.

We support schools and educators with free and low-cost programs. A few are:

1. Free Unity Licenses. We have a new Educators Plan and a Student Plan that are free for current educators and students. These licenses are Unity Pro for free. Our education grant license is used in computer labs and can be batch installed across school computers. It's free for most educational institutions.

2. Free teaching and learning resources. Our Unity Learn platform offers hundreds of free tutorials, courses, and projects that educators can use to bring Unity into their courses and programs. Many of these resources include lesson plans, standards alignment, and align to our career certifications. I recommend Create with Code as a foundation in Unity and computer coding, our new Create with VR course, and our junior programmer pathway. We are constantly adding to Unity Learn as Unity's products change and evolve.

3. Certifications that students and educators can earn to show employers they meet the standard for creating with Unity. Many schools teach certifications as a great way to anchor or capstone their courses.

How are degree programmes incorporating Unity/real-time 3D?

Educators are weaving Unity into existing degree programs like architecture, engineering and construction programs, art and design, and new media. And they are creating all-new programs where they teach RT3D, AR, VR for various subject areas.

The Unity Academic Alliance program is currently available for higher education institutions. This program is a year-long membership for higher education. It comes with batches of certifications, courseware and practices tests, and curricular frameworks for teaching RT3D subject areas across the curriculum. Additionally, members are given up to a 70% discount on Unity products like MARS and Reflect and a member-only portal, communications, and webinars.

The curricular frameworks that come with the UAA membership offer guidance on how schools and course planners can teach Unity for subject areas like VR, AR, AEC, game development, and more.

How important is gaining certification for learners and jobseekers?

Certifications are a great way to demonstrate that you meet the standard for Unity development. We know hiring managers say that those with certifications win out when faced with candidates who don't. For many in hiring positions, it's hard to assess someone's tech skills. Certifications are one way to show you have the skills. Our certifications are industry agnostic — meaning they are great for individuals who want to pursue careers across industries — game development but also XR development, AEC, art, design, edtech, media and entertainment, etc., etc.

We offer a few tiers of certifications for a variety of learners — our User-level certificates are for entry-level Unity developers and are used in high school and early college programs. Our associate level is aimed at higher education students and faculty, and our professional level certifications are great for students who are one or two years into their studies.

Conclusion

Time to immerse yourself in immersive tech

This insight report reveals the game-changing significance of immersive technologies for future skills development. We are facing a perfect storm. On the one hand, there's rising demand for skills crisis as immersive technologies adoption accelerates across industries. On the other hand, inertia, complacency, and a lack of agility in our education and skills infrastructure mean we cannot react in time. We need to build skills now, not tomorrow.

Leaders in education, industry and government have an opportunity to close the forecasted skills gap. By working together, we can seize the growth opportunity that immersive technologies present across many industries, from game development, architecture, and construction to manufacturing, interior design, and film production.

Policymakers

Drive future growth by creating and funding employability, apprenticeships, and skills programmes focused on immersive skills.

Academic leaders

Create the future talent pipeline by integrating immersive technologies across a broad range of degree programs and curricula and partner with industry to embed and apply the skills.

Employers

Innovate and enhance your competitiveness by supporting employees to upskill through immersive skills training and certification programs. Adopt a common language for the skills required, increasing access to talent from industries and sectors outside your own.

Appendix 1:
Immersive skills emerging trends

DEMAND AND TRENDS MONITOR

Emerging

Civil Planning

Jobs looking for solid modelling software almost doubled in the UK and Australia.

Associated roles in planning in France requesting 3D graphics and real-time 3D skills was c.4,000 in 2019.

Trend alert: Increasing use of 3D skills by transportation planners.

Trend alert: UK Chartered architectural technologists and town planning technicians requiring 3D graphics.

Fashion

The UK now over 14% of UK fashion designer postings calling for 3D graphics skills.

In Spain, the Netherlands, Germany, and France, almost a third of postings for product designers request 3D skills.

Trend alert: Fashion designers moving to 3D modelling.

Growing

Civil engineers

12% of civil engineering job postings in Germany requesting 3D graphics skills.

UK civil engineering job postings in 2019 jumped to 22.6%—a 41.8% growth in demand in six years.

Trend alert: Civils moving to become a major industry within the 3D graphics world.

Graphic design

Occupations such as industrial designers, graphic designers, and multimedia designers are growing in their demand for real-time 3D skills.

Leading

Gaming

Specific expertise in real-time software requirements now represents 25.4% of the video game developer market.

Architecture/Construction

UK jobs have more than doubled in demand for 3D skills, with 7,755 UK postings requesting these proficiencies in 2019.

Draftsperson is the most common occupation to request 3D graphics skills in the EU, call for 3D graphics skills in over 50% of jobs.

Draftsperson is the top 3D occupation in Germany, France, Italy, Austria, the Netherlands, Belgium, Ireland, Czech Republic, Sweden, Slovakia, Luxembourg, and Malta.

Trend Alert: Draftspeople seeing a shift toward real-time 3D modelling software, as job postings call for virtual and XR skills, especially in Germany and Poland.

Engineering

A significant percentage of all job postings for engineers request solid modelling and 3D modelling technologies such as AutoCAD or Solidworks.

In Spain and Germany, solid modelling CAD software is requested in a third of all graphics job postings.

Trend alert: In France and Germany, some engineers are beginning to incorporate real-time software into their 3D modelling.

Trend alert: Move toward real-time 3D modelling in an occupation that previously reliant on CAD.

Trend alert: Real-time 3D rendering skills, such as virtual and augmented reality, are being requested for engineering jobs in these European nations.

Source: Visualizing the Future Globally 2021, Burning Glass

About KnowledgePoint

KnowledgePoint adds value to learning organisations by delivering a range of complementary and proven learning support services. From print services and digital learning solutions to administrative services and global training network management, we make life easier for our learning industry partners.

Our customers are training and learning organisations and teams; they design, create and deliver learning programmes. We work in partnership with them, providing practical solutions which support these efforts. In doing so, we make a real difference to them and their learners. We help them achieve positive learning experiences and outcomes, boost customer and learner satisfaction, and realise cost and resource efficiencies.

We manage the global training networks for Unity and Autodesk; as such, we're the gatekeeper to official training programs for two of the most exciting software companies in the world. Through these programs, people and businesses develop the 3D, VR, and AR skills they need now — and they'll need in the future.

About Infrabee

Infrabee is a competitive insights consultancy; we research markets, industries and companies to support organisations with strategy and growth.

Start your immersion today

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