Fit for the Future: Growing and sustaining engineering and technology apprenticeships for young people

Engineering UK: call for evidence

Ufi VocTech Trust Response

27 February 2023

Executive Summary

The UK is facing a skills crisis, and the UK's skills *system* is not working how it should. Rather than addressing whatever skills are currently in shortage, jumping from crisis to crisis, the skills *system* should instead be the focus of our efforts. By creating a better skills *system*, we will address the challenges of the here and now, while creating capacity to adapt and deliver the skills we need for the future. Increasing development and deployment of technology in apprenticeships should form a core part of a systems-led approach to addressing the UK skills crisis.

The engineering and technology sector faces an acute skills crisis, like many other parts of the UK. Across all sectors of the economy, at least 24% of current vacancies are proving hard to fill because of skills shortages[1], and only 8% of people who left school at 16 intending to learn in the next three years[2]. In short, we are already seeing the impacts of not addressing the skills crisis.

Apprenticeships provide a vital route into employment, particularly for students who are keen to get into the workforce and start earning. However, as Lords Willet and Knight point out in their call for evidence "engineering-related apprenticeship starts in England are still 9% lower than in 2014/15"[3]. Combined with a 34% decline in student interest in engineering and manufacturing technologies[4] there is a serious threat to the UK's economic capacity.

The good news is that we have the tools to improve apprenticeships, making them more accessible, higher quality and more adaptable. To make this change, the UK needs a comprehensive systems-based approach to skills that is based on a modular, flexible, and tech-enabled approach to learning. The apprenticeship system needs to look at how it can better integrate gamification, modular learning and well-designed digital pedagogies.

Digital technology is transforming how we acquire skills and prepare for the future of work, and by integrating technology across the UK's skills system we will be able to open access to all forms of adult learning and increase opportunity.

Technology, like gamification, digital or online learning, and personalised mobile learning offer tried and tested methods of delivering apprenticeships that are accessible and adaptable to the lives of students across the UK.

Ufi VocTech Trust has experience of developing different projects and ventures that use technology in apprenticeship delivery to give people the skills they need for work. In our response, we lay out some of the key themes developed through the whole range of our work – and provide a series of illustrative case studies that showcase exactly how technology can be effectively developed and deployed.

---

[1] Department for Education, *Employer Skills Survey*, 2019, link

[2] Learning and Work Institute, *Adult Participation in Learning*, 2022, link

[3] Engineering UK, *Fit for the future,* January 2023, link

[4] *Ibid*

Introduction to Ufi VocTech Trust

Ufi VocTech Trust is an independent charity. Our aim is to help improve vocational skills in the UK's workforce by funding digital solutions for vocational learning. We do this by providing funding and expertise to organisations developing and deploying tech for use in adult vocational education.

We are a charity which has provided over £25m to over 280 organisations and invested over £3.2m in ventures developing technology and digital tools for adult learners. In the last year, our funding has impacted over 1,000,000 learners in sectors across the entire breadth of the UK's economy.

We champion the power of technology to improve skills for work and deliver better outcomes for all. We act as a funding partner and advocate for innovators in skills development, looking to help people progress in the workplace. We want to see a fundamental shift in how individuals, employers, and UK society view, embrace and benefit from vocational skills development through digital innovation.

With the UK facing an unprecedented skills crisis, we know that technology has the capacity to improve how adults across the country get the skills they need now and for the future of work.

Inquiry Response

This inquiry seeks to examine the systemic causes of the decline in engineering, manufacturing, and technology apprenticeships over time, to better understand the barriers facing young people in pursuing apprenticeships in engineering, manufacturing, and technology, and to identify solutions and good practice which could help to increase the number and diversity of young people starting and completing engineering, manufacturing, and technology apprenticeships.

At Ufi VocTech Trust we have been demonstrating how transformative the very best technology can be at improving adult vocational skills, at pace and at scale. We know that digital tools and technology present a proven means to optimise delivery of the UK apprenticeship system, including for those who have not thrived in mainstream provision.

Our projects show that high calibre, digitally advanced, technology-rich apprenticeships enhance their appeal. Technology that has the potential to enable learning and assessment that can be embedded throughout engineering and manufacturing apprenticeships.

Contextual learning, digital credentialing and innovative assessment methods will be central to re-skilling the existing workforce and developing the skills of future generations. These approaches should be integral to apprenticeships, as we have seen that they enhance course completions and reduce attrition (drop-out) rates.

Technology has the capacity to create a system of better evaluation which can increase the ways in which an apprentice can prove what they have learned. Technology can make both learning and assessment more relevant to learners and their future employers. This can apply to different stages of the apprentice's journey, including induction, independent working, and evaluation.

Case Study 1: Using technology to support apprenticeship students to become more independent learners through a wider range of more flexible teaching tools that contextualise learning in real work environments.

GTA England: Engineering Employers Mate[5]

GTA England built the Ufi-funded *Engineering Apprentices Mate*, a point and play augmented reality learning app for engineering apprentices that uses virtual equipment to give apprentices control over their own learning. It also supports revision for end-point assessments and allows off-site learning: when away from a workshop or factory floor, the app can be used with photographs of the machinery the apprentice usually uses.

Engineering Employers Mate gives engineering apprentices instant access to independent learning, support and assessment activity in the workshop, 'machine triggered' through AR, and is designed to promote self-reliance and working independence, with content created by engineering instructors to meet learners' needs through to their end-point assessments. Crucially, it also promotes digital pedagogies and best-practice to *instructors*, with tutors encouraged to support the content library, build their *own* digital skills and develop confidence in using vocational tech.

Such projects not only support capability alignment between early-stage and experienced teachers in engineering and manufacturing, but they also support the technology skills that apprentices need

[5] Ufi VocTech Trust Directory - link

to optimise their performance in the businesses in which they are embedded. Independent working is a critical skill for apprentices, and by contextualising learning through the use of technology learners skills can be greatly improved.

Case study 2: Tech-enabled induction process to reduce attrition rates in automotive manufacturing apprenticeships.

Nissan Manufacturing UK - Digital SPACE (Support to Promote Apprenticeship Careers and Engagement)[6]

It can be disconcerting to get to know a new environment or start a new learning programme. At Nissan's UK manufacturing plant, this Ufi-funded project has been focusing on Nissan's apprentices, temporary manufacturing staff and placement students, working to address problems associated with high attrition rates amongst new starters, including learner disorientation and anxieties during the on-boarding phase.

The project developed and tested an app that empowers young adults to settle in and progress into sustainable careers. The product addresses problems known to be associated with current high attrition rates amongst new starters, such as learner disorientation and anxieties during the on-boarding phase. It encourages ownership and success of learning using engaging digital interactive activities. The success of the project has been down to its encouragement of personal ownership and because it helps learners to use engaging digital interactive activities.

The issue of 'tacit knowledge transfer' (learning know-how from existing experts and workers) is critical to key sectors of engineering and manufacturing, a challenge that has been brought into sharp relief since the exit of older workers from the labour market following the Covid pandemic.

Case study 3: Using digital gamification tools to support tacit knowledge transfer from experienced workers in the aerospace sector to new recruits and trainees.

Enginuity - Creating a gamification platform for retaining essential UK engineering skills

Enginuity worked with companies from the aerospace industry to create a knowledge retention game platform to bridge the tacit knowledge gap. A gamified learning platform captures and exchanges best practice, informal and tacit knowledge and expertise from skilled workers – the things you traditionally learn by working alongside time-served engineers – to enable companies to create their own games, appropriate to their workplace so skills can be gained in context.

The primary audience is levels 3 and 4 engineering staff working with those at high risk of leaving the sector. The demonstrator enabled scenario-based 'learning by doing' which supported areas of high skill loss which are critical to sustaining and recovery in the aerospace industry.

The UK labour market will suffer if workers exit without passing on vital knowledge to new apprentices. Technology can support older workers with family responsibilities by making their

[6] Ufi VocTech Trust Directory - link

knowledge more accessible to new students while also helping to make it easier for them to stay in a working role.

Industries often only want to train small numbers of apprentices as training is expensive and requires significant upfront investment in equipment, laboratories, and workshops. Financial rules faced by public providers can disincentivise them from offering the provision that employers, who are trying to deploy new technologies, need.

Current qualifications need to match industry innovation, and learners and trainers need to acquire technical knowledge of new and emerging changes in engineering and manufacturing: this means apprenticeship standards need to adapt and keep pace with the industries they are serving, because the rate of change across engineering and manufacturing is rapid.

Case Study 4: Using technology to better support training and assessment in cutting edge green-industries that will require whole swathes of the engineering workforce to gain new skills.

Edinburgh Napier University: TimberTED[7]

The TimberTED project, at Edinburgh Napier University Development Trust, demonstrates the power of technology to improve assessment in offsite timber construction, an industry with an acute shortage of people with accredited skills. Current qualifications don't match industry innovation, as many learners and experienced professionals are unaware of the new technical knowledge and skills needed for the manufacturing-line approach to building. TimberTED has provided construction students and professionals with online flexible training modules to upskill and gain a recognised, accredited qualification with a bespoke digital assessment tool.

The pace of technological change means we need to ensure that apprenticeship standards can adapt and keep pace with changing demands. That is particularly acute in science, technology, engineering and manufacturing-related subjects, where a more rapid model for updating apprenticeships, standards may be helpful. We need a system that moves as quickly as the industry that it is serving, because the rate of change in these industries is rapid.

In the interim, technology-led, apprenticeship-supporting projects that can be rapidly updated, remain invaluable.

A systemic challenge remains the need to align apprenticeship applicants to suitable employers, addressing over- and under-subscribing in the same regions. One of our case studies, cited here, successfully matches apprentices to suitable businesses.

Case Study 5:

[7] Ufi VocTech Trust Directory - link

Multiverse (previously WhiteHat): careerhacker.ai

This project aimed to provide a solution to the problem of high dropout rates in UK apprenticeship training. 500,000 people start each year, but only 70% complete their apprenticeship. With apprenticeship numbers increasing rapidly, WhiteHat wanted to reduce the dropout rate by using machine learning to better match apprentices to employers at the outset.

The careerhacker.ai platform intelligently matches a very diverse range of apprentices with high-quality opportunities, enabling apprentices to create a digital profile of their skills and experience. It has trained over 5000 apprentices in partnership with more than 200 top world employers since 2016 breaking the record for the UK's largest EdTech venture investment round in 2021.

Conclusion

As our response has shown, the UK apprenticeship system has both a wide range of tools available to improve provision and the capacity to develop and deploy innovative solutions that can improve apprentices' learning. By adopting a tech-enabled approach to apprenticeships Government, providers and policy makers can increase accessibility, improve quality support greater flexibility.

To make this change, the UK needs a comprehensive systems-based approach to skills that that stretches beyond the immediate apprenticeship system and looks to better integrate the technology, digital tools and pedagogies that Ufi VocTech Trust has demonstrated can improve outcomes.

Digital technology is transforming how we acquire skills and prepare for the future of work, and by integrating technology across the UK's skills system we will be able to open access to all forms of adult learning and increase opportunity.

We suggest that sector leaders and Government increase the degree of digital delivery in all apprenticeships, with recognition and reward for the adoption of technologies that improve learner outcomes. We believe that teacher and assessor training CPD should, concurrently, be designed to equip the education workforce with the understanding and skills to use technology that will be able to support these apprentices.

The UK's apprenticeship's system must be supported so that it can develop a comprehensive strategy that integrates the potential for technology to improve outcomes for learners, future employers, and the economy as a whole.