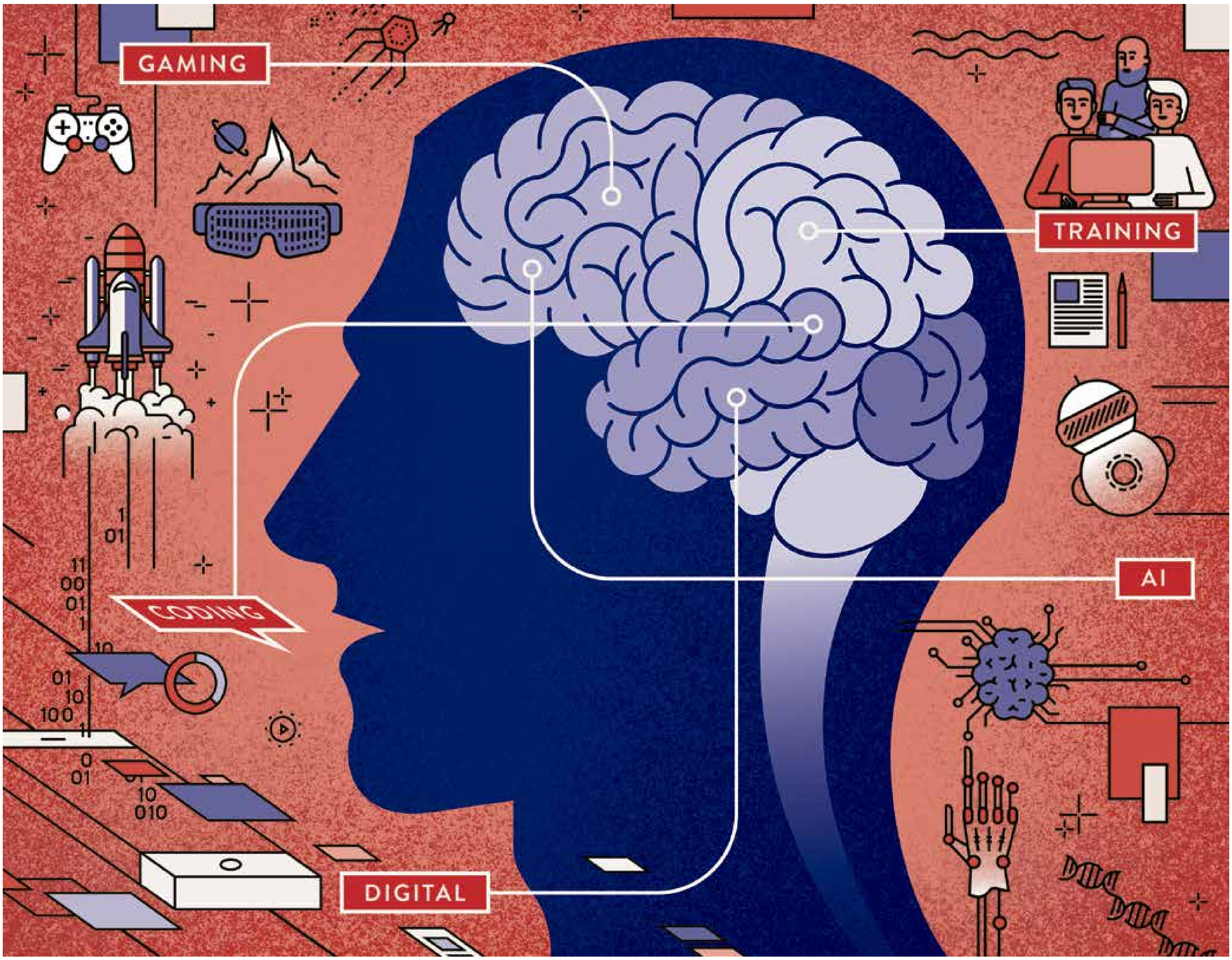
INDEPENDENT PUBLICATION BY

RACONTEUR

raconteur.net | #0406 | 28 / 09 / 2016

FUTURE OF LEARNING



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Tech is transforming teaching and learning

Education technology is a booming market as schools, colleges and universities launch into a new era of teaching and learning

OVERVIEW
JAMIE MARTIN

At the turn of the 21st century, workplaces were being transformed by technology. On financial trading floors, for example, swarms of loud and animated traders in colourful jackets had been replaced by machines quietly processing trades. Intermittently, commentators speculated that education, too, would be revolutionised.

Yet it was not unusual in the 2000s for a teacher to use chalk and a blackboard to teach pupils sat at rows of wooden desks. Even as governments and schools invested heavily in equipment, such as interactive whiteboards, as late as 2008 or 2009 these could be underused and gathering chalk dust.

However, in recent years the education technology or edtech market has exploded. It is now growing at 17 per cent a year and will be worth $250 billion by 2020, according to EdtechX Global and IBIS Capital. Finally, technology seems to be on the brink of transforming education into something very different to the world of just ten years ago.

So what changed? Whereas previously technology usually focused on hardware and methods of doing things the same way – think interactive whiteboards that ended up being used as very expensive flip charts – increasingly software innovations have enabled teachers and students to do more, and to do it faster and cheaper. Also, improved smartphone technology has created a thriving apps market.

But while technology can do the work of several ordinary people, it cannot replace an extraordinary teacher and the best innovations seek to augment traditional excellence rather than replace it.

The United States, especially on the West Coast, has set the pace in edtech innovation. It boasts all four edtech companies with $1-billion valuations: Udacity, Age of Learning, iTutorGroup and Pluralsight. There are around ten edtech-focused accelerators and the first, Imagine K12, was recently absorbed into the world's premier tech accelerator Y Combinator. American edtech firms raised $1.4 billion in funding last year, according to *The Atlantic* magazine, and in both New York and California there are organisations dedicated to acting as a middle man for schools and edtech companies.

> While technology can do the work of several ordinary people, it cannot replace an extraordinary teacher

Hot on the US's heels is the UK, especially London, at the epicentre of a European market that accounts for 25 per cent of global edtech spending, says EdSurge. London hosts Europe's biggest edtech conference, EdTechX-Europe, and a dedicated co-working space and accelerator programme, Emerge Education.

A new generation of tech-savvy and better trained teachers, a government focused on devolving spending and procurement power to schools, technology improvements and a more pragmatic focus on what works have all combined to create a propitious environment.

Edtech UK, a strategic body working to accelerate the growth of the sector, now has a network of more than 1,000 companies. Chief executive Ian Fordham says: "The UK is now home to an incredibly diverse sector with firms not just in London, but all across the country rapidly innovating in digital, apps for schools, augmented reality, communications with parents and professional development – we are entering into an exciting and dynamic time."

So far the biggest market and most notable innovations have come for school-aged children. Exam revision app Gojimo, whose 23-year-old founder dropped out of Stanford University in California to concentrate on scaling it, has 300,000 users answering curriculum-specific questions on smartphones and has raised more than $1 million in funding.

Cambridge-based Wonde help schools keep data secure by allowing them to see all third- party access attempts, and Show My Homework is enabling teachers to set, mark and return homework digitally. UK academies and free schools are learning from US charter school chains such as Rocketship Education and beginning to use games and online tools to make learning more personalised and teacher time more focused.

Emerge Education chief executive Jan Matern argues that the UK's development of "a great network of experts, investors, publishers and partners around the space" means his accelerator and the wider UK edtech market is now able to "attract some of the best entrepreneurs around the world".

The evidence for this can also be seen in significant developments in adult and workplace learning. Proversity offers employees structured and personalised training via a mobile app, and are planning an expansion to North America and Asia. Memrise have raised £4.5 million in venture capital funding for their language learning app and Fluency enables learners to become visible to employers as they complete relevant online courses, some designed by the employers.

Education technology's time appears finally to have come. Last year saw venture capital deals worth more than £6 billion and the first billion-dollar purchase of online course operator Lynda by LinkedIn. Classrooms will look less and less like their Victorian predecessors as pupils learn through apps and games, and teachers teach with online tools and big data.

In a world where education is the smartest investment and the last expense spared by aspirational families, the sharpest minds and deepest pockets are likely to be increasingly drawn to edtech startups.

Schools, parents and investors need to learn fast or risk being left behind.

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Why not get paid to train for a career?

Once the poor relation in education, apprenticeships could be set to make a sustained comeback with greater status and value as more organisations sign up to an attractive alternative to mainstream university courses

APPRENTICESHIPS
PETER CRUSH

Caiaimage/Tom Merton / Getty Images

Nothing says mission accomplished more when it comes to the rising credibility of apprenticeships than when young people are turning down places at Oxford University in favour of on-the-job vocational learning instead.

"This is exactly what one of our new apprentices has just done," says Sara Duxbury, head of people at law firm Fletchers, referring to one of the first learners to begin its just-launched six-year legal apprenticeship in partnership with the University of Law.

Fletchers is one of a growing number of businesses that are re-embracing a once-popular learning route that by the 1990s had almost totally fallen out of favour as university attendance sky-rocketed. By 1990 the number of apprentices in employment had fallen to just 53,000; at their peak in 1966, when 35 per cent of all men did an apprenticeship, there were 234,700, according to an Institute of Directors review of apprentices in 2003.

The revival of apprenticeships is undoubtedly connected to a convergence of factors all in alignment: the crippling cost students now face if they want to go university; employer dissatisfaction with the work-readiness of graduates; and the desire this creates among bosses to be more involved in developing the specific skills they know they'll need.

But it's government too that has been publicising the power of apprenticeships like never before. Since the 2006 *Leitch Review* into the skills the UK would need by 2020, which set targets to boost apprenticeships to 500,000 a year by 2020, numerous pushes have seen Whitehall go all out to achieve its latest target of getting three million apprentices during this Parliament.

The most recent, its *Get In, Go Far* TV campaign, proclaims the message that apprentices are no longer just manual roles. IBM and Lloyds Bank both feature to help promote the fact that apprenticeships are now available in more than 1,500 jobs, from fashion to software development and even special effects.

"Apprenticeships absolutely had a poor reputation among employers and students alike," says Alison Bell, human resources director at MTR Crossrail, the newly created operating company that will deliver train and passenger services on the new Elizabeth Line. "But that's because employers had very little say in what they covered and they attracted the academically poor.

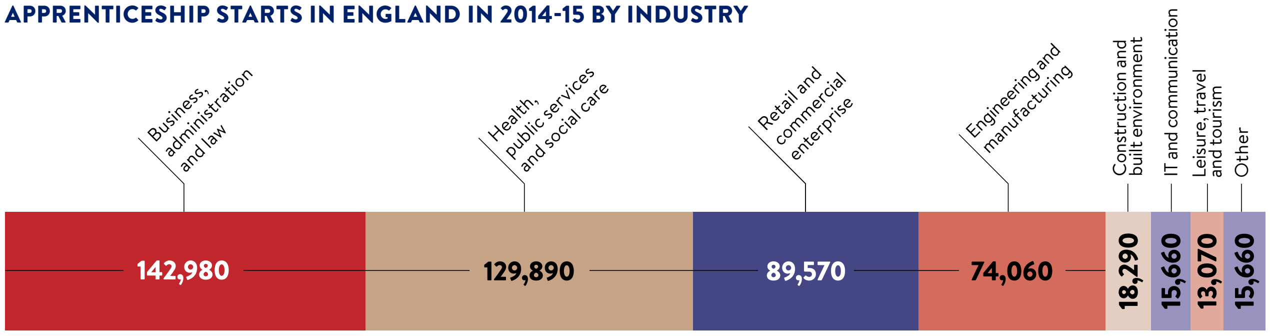
"What has changed is firms like us being able to design our own, including the industry's first train drivers' apprenticeship, which means that better, typically university-standard people follow. Of our 450 staff, around 109 are current or former apprentices – from level 2 (equivalent to GCSEs) through to level 5 (foundation degree level). Old apprenticeships were not fit for the future, now they are because people just want to get into work and start earning earlier."

Such is employer participation that groups of employers, called trailblazers, are now responsible for co-developing all new apprentice standards and they often work with industry bodies to check them. For example, in July the Chartered Management Institute launched two management and leadership apprenticeships, formed in partnership with 30 employers.

500k apprenticeship starts were recorded in England in the 2014-15 financial year, a 13.5 per cent increase on 2013-14

Source: Skills Funding Agency 2016

APPRENTICESHIP STARTS IN ENGLAND IN 2014-15 BY INDUSTRY



Source: Skills Funding Agency 2016

In a further boost to their credibility, apprenticeships were recently given legal protection, meaning an apprenticeship can only be described as such if it creates a career path equal to higher education. But the real game-changer has arguably been the introduction of degree apprenticeships in 2015. It means young people can still achieve the equivalent of a degree, but while working and therefore without the penury that going to university would entail.

"We launched apprenticeships in 2010 and learners gain the same level-4 skills as our graduate trainees," says IBM's head of graduate and apprenticeship programmes Jenny Taylor, who features in the latest ads. Apprentices take three rather than two years to qualify, but she says the near-parity in speed of career development "is a huge attraction for apprentices".

She adds: "Once qualified, we don't pigeonhole people in terms of how they got there – they're all on the same playing field and compete for roles thereafter on that basis. The difference though is that we pay apprentices £18,000 immediately and, once they qualify, market rates apply as they move upwards."

IBM still runs a graduate scheme, but Ms Taylor already feels apprentices are more loyal, a benefit also felt by Mitchells & Butler, operator of Harvester and All Bar One. This year it's looking to train 1,700 apprenticeships at levels 2 to 4, compared with just 50 graduate positions, because 70 per cent of apprentices stay after one year and 90 per cent will have risen to supervisory roles in that same time.

"Our message to apprentices is very much that if they stick with us, the sky is the limit," says Paul Capper, its vocational learning manager. "Slowly but surely, apprenticeships are no longer being seen as a second-rate option."

Government will be glad to hear comments like this because there's

IMPACT OF APPRENTICESHIPS


Ditty_about_summer / Shutterstock

After university tuition fee caps were nearly tripled to £9,000 in 2012, the CBI found there was an immediate 14 per cent fall in applications for arts, humanities and social sciences degrees.

However, this year record numbers of people once more applied to go to university, so experts are split about the long-term impact of the revival of apprenticeships on traditional academia.

"I still think the bulk of the action will be in the graduate market," argues Stephen Isherwood, chief executive of the Association of Graduate Recruiters. "What I think will probably emerge is employers themselves creating more degree-apprenticeship partnerships with universities, so further education will simply develop new avenues."

In April, £10 million of government money was pledged to help universities develop more accredited apprenticeships and firms are certainly showing an interest. This month, Be Wiser Insurance launched its own degree in insurance with the University of Chichester. Be Wiser's Crescens George, director of learning and development, says: "The plan is to have this content converted to an apprenticeship next year."

What's certainly the case is that with degree apprenticeships giving the equivalent of a degree, apprentices are certainly challenging the concept of what it is to be a graduate. "We're recognising this," says Mr Isherwood. "We're in the process of changing our name to the Institute of Student Employers."

one more, but significant, change yet to come. So keen is it to engage firms still not involved with apprenticeships that from April 2017 an apprenticeship levy of 0.5 per cent will be applied to all businesses with a wage bill greater than £3 million. Levy-paying firms can get it back again if they use it to buy accredited apprenticeship training.

Some see this as more stick than carrot and groups such as the CBI have gone so far as branding it a tax. However, a sweetener is that government will give firms a £15,000 a year allowance and a 10 per cent top-up, so that for every £1 of levy paid, firms have £1.10 to spend on training.

What it will certainly do is focus firms' minds. "Here in the NHS, the levy amount we'll pay is equivalent to the cost of training 28,000 apprentices," says Laura Roberts, managing director of NHS Health Education North West, who is involved with the NHS's similarly titled *Get in, Get On, Go Further* apprenticeship scheme. "Currently we're training 19,820 apprentices, so we'll aim to see future apprenticeship numbers hit this 28,000 figure, otherwise we'll be losing money."

Others organisations though argue caution needs to be exercised. "We have around 1,000 apprentices at any one time, but to use all our levy, we'd need to hit 1,500," says Sandra Kelly, head of education at Whitbread. "Chasing numbers though wouldn't be a good thing. We need apprentices to fill a business need; real jobs do need to be there for them at the end of the day."

> "
> HR directors worth their salt will all want to train up their own enthusiastic, high-achieving, intelligent apprentices – the change really is coming

What's clear though is that apprenticeships, once the poor relation in education, now look unlikely to fall by the wayside as in previous years. As more school leavers want them and more good employers realise the benefit that providing them will give them, the future of learning could be apprenticeship-based.

Sharon Walpole, chief executive of Not Going To Uni, believes things have changed and this time there will be no going back. "While there's still a problem of schools not actively promoting apprenticeships, I think we're at the beginning of really important times," she says. "Support for apprenticeships has historically oscillated, but I think it won't be long before employers are no longer interested in what degree someone has done and where they got it. HR directors worth their salt will all want to train up their own enthusiastic, high-achieving, intelligent apprentices – the change really is coming."

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COMMERCIAL FEATURE

APPRENTICESHIP LEVY: BUSINESS TAX OR A CHANCE TO IMPROVE?

New-look apprenticeships present challenges for employers, but help is at hand with software solutions

TRIBAL

Anyone who's ever been involved in learning will know that change is a constant feature, from employers evolving their training programmes to deliver the skills they'll need, to education providers trying to be one step ahead, offering courses that will attract new learners.

Next April, however, sees possibly the biggest change of them all: the introduction of the apprenticeship levy, a 0.5 per cent contribution all firms with an annual payroll greater than £3 million will need to pay into. By requiring firms to divert money into a digital account that can only be claimed back if they buy accredited learning from training providers, its ambition is simple – getting greater numbers of people into apprenticeships than ever before.

This truly is the culmination of a gradual return to favour of apprenticeship learning. As university has become increasingly more expensive and as employers have begun to question the value of higher education in making their employees work-ready, entrants to the workplace really do have a new "learn as you earn" option available to them.

But perhaps the greatest reason to applaud the return of apprenticeships is the fact that in emerging once more, they are transitioning from traditional framework qualifications to become employer-led standards.

For years, employers have felt dispossessed and disenchanted with the learning they were presented with. Learning was created by other bodies and imposed on them. Now this is changing. Employers are setting the standards they want the next generation to learn, so they can make an immediate difference in their organisations. These really are apprenticeships for the 21st century.

As with all change, there are challenges too. Organisations will need to manage their training reporting effectively; they'll need to find efficiencies to make their training support go further. Recent research by CBI/Pearson found that 45 per cent of organisations are concerned about the impact training costs will have on their margins. More than ever businesses will need to know what value apprentices and trainees are adding to their organisation.

In addition, organisations may look to convert their existing training programmes into apprenticeships to benefit from the levy. Some organisations may wish to register as training providers and directly access government funding. This will require businesses literally learning how to become a training provider – everything from managing their learner and funding data, to doing the things they might never have been aware of, such as preparing for external audits.

These are all things we at Tribal have solutions for. Our software can significantly reduce the time and expense involved in manual processes, and we have a team of training, apprenticeship and funding experts who can help with the management and delivery of training programmes. Our history has been all about adapting to change in the sector and we don't see this stopping anytime soon.

What you have to remember though is that change doesn't have to be tough.


James Hill, strategic partnerships manager
Tribal Group

Some organisations have described the levy as another business tax, but we feel it is vital employers realise it's an opportunity they should really grasp. Having accredited, relevant, employer-led standards raises the profile of work-based training, and increases value for the learner and the employer.

The reform we're seeing isn't just about the introduction of a levy, rather it is a fundamental shift in the way training and skills are delivered, assessed and funded. But why not get a head start by fully preparing your business for what these important changes might bring? There's plenty of help you can access along the way and, by opening up to the power of accredited learning, you really can transform your business.

For more information and to download Tribal's free guide to apprenticeship reform, please visit info.tribalgroup.com/apprenticeship-reform


Klaus Vedfelt / Getty Images

Staying ahead of the curve in job market

Future-proofing your career is a tough call, but continuous learning and professional development is a good, if not essential, place to start

TOMORROW'S WORKFORCE

CHARLES ORTON-JONES

Facebook tycoon Mark Zuckerberg elicited a few gasps a while back during a Q&A at Beijing's Tsinghua University by switching to Chinese. The verdict on his lingo was good – decent vocabulary, although his pronunciation was a little iffy. Chinese is notoriously hard to learn. One Chinese language professor calls it: "A five-year exercise in humility."

Yet here was the young tycoon, taking questions from all-comers. As one observer put it: "Mark Zuckerberg became fluent in Mandarin while you surfed Facebook."

If he can find the time to learn a new skill, so can we all. In fact, it's more than optional. Without constant learning, we risk obsolescence. Just look at the jobs market. The best jobs didn't exist ten years ago: self-driving car engineer, blockchain developer, social media creator and anything whatsoever to do with big data or the internet of things – all new.

And the employers? None of Uber, Twitter, Tesla Motors, Dropbox, Spotify and WhatsApp existed 12 years ago.

So how can we do a Zuckerberg and upskill to thrive in the future? First up, make time. Great companies demand their employees take time out for education. Benchmarks vary, but Nupur Mallick, human resources director at Tata Consultancy Services, a company with a glittering reputation for investing in people, offers a good rule.

"Company-wide, we average about ten full days or over 75 hours of learning per employee a year. We encourage unlimited and flexible learning rather than imposing a minimum quota for education," she says.

To maximise learning it is vital to go digital. MP3s, podcasts, Kindle books and online lessons are essential. Digital lessons mean a trip to a coffee shop can become a half-an-hour cramming session. A car becomes a podcast lecture theatre.

Bank of America Merrill Lynch is making the switch to all-digital learning for its employees. Neeha Khurana, the bank's international head of talent, reveals that until recently 100 per cent of learning was done face to face. Now that's down to 25 per cent. The time allocated is flexible. The old method of scheduling fixed hours has been discarded, in favour of a learner-chosen model. Companies looking to create a similar scheme need to research virtual learning environments, in which all lessons and material are put online.

And what subject matter will future-proof your career? Now there's a tough question, but polling data seems to give some clear answers. For example, coding school General Assembly reports the most in demand coding languages are SQL, Java, Python, JavaScript, C#, C++, PHP and Ruby on Rails. In truth, this isn't news to anyone in software. Most professionals know full well what technologies they need to master. What is harder is gaining the freedom to get permission to study blue-sky subjects not related to your job.

IT managed services provider EACS has a nice solution to this issue. At first staff are taught relevant skills for their jobs. Then, as they mature, the curriculum broadens. Managing director Mike Dearlove says: "Everyone at EACS has a professional and personal training plan linked not only to their current role and business needs, but also their future aspirations.

"For example, if a member of the service-desk team aspires to become a consultant, they discuss this with their line manager and as well as developing their technical skills are given an opportunity to work with a product team to understand the role and whether it is what they would like to pursue."

An employer wanting to future-proof its staff would do well to follow this template. Short courses in coding in particular are a great way to diversify the skills and awareness of staff, even if they don't deal with software.

> "Great companies demand their employees take time out for education

Dean Jenkins, managing director of coding school Codez Academy, says: "We run a 12-week course for adults to develop skills in the evenings in order to reduce impact on their work schedule, for example. Either way, any basic coding courses available are capable of providing individuals with core knowledge of CSS, HTML and JavaScript, all of which are used in the creation of websites."

Ensuring a workforce is fit for the future means addressing "soft skills". Mental health could be a key ingredient. Accountancy body ICAEW is working with advice centre CABA to provide tuition in skills such as resilience, balancing family life and dealing with stress.

Alison, an auditor who attended a CABA course on mindfulness, says: "All the courses showed me that I'm able to have time away from my family without worrying about what was going on at home. It's all about doing what you are doing in that moment well, which was good preparation for work. The emotional intelligence course was good for my confidence too. I realised that I'm good at reading situations. It's made me feel positive about myself."

Employers of the future will need to offer training if they want to hold on to stars. Research by online tuition platform Coursera found that nearly 70 per cent of 22 to 25 year olds in the UK put training offered by employers as one of the top three reasons to move jobs.

Anyone wanting to stay relevant in the workforce needs to get engaged in constant learning. Besides, the courses are so mouthwatering. Online provider FutureLearn offers courses in 3D printing, big data, mathematical modelling using data, and online identity to the likes of the European Space Agency or Cancer Research. Or how about Futurism and Business: Dealing with Complexity, a free online course starting on October 31 with FutureLearn. It's four hours a week for four weeks.

Don't say you are busy. Remember Mark Zuckerberg.

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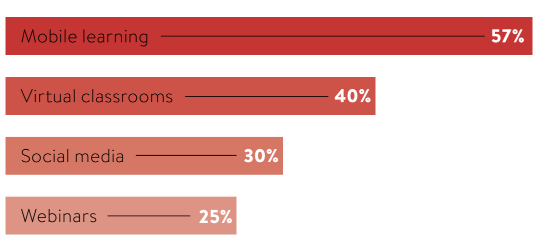
TOP DEVELOPMENTS IN LEARNING TECHNOLOGIES

DEVELOPMENTS L&D PROFESSIONALS BELIEVE WILL HAVE THE GREATEST IMPACT IN THE NEXT FIVE YEARS



Source: CIPD 2015

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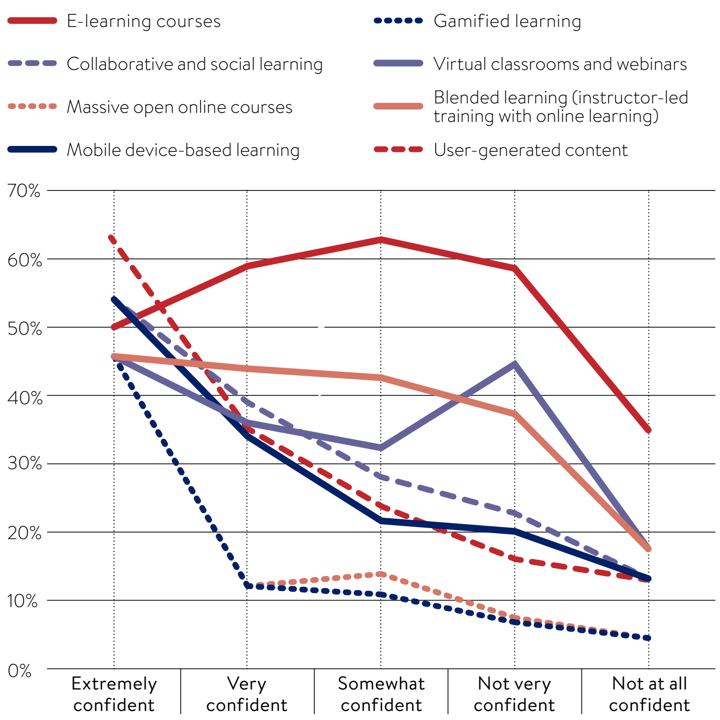

Source: CIPD 2015

ESTABLISH YOUR OWN ACADEMY

If you want to make education a priority in your company, there's nothing like establishing your own in-house school or academy. For example, manufacturer Renishaw created its Applications Academy in 2010, which puts new hires through a 21-month training programme to become an applications engineer. It ensures Renishaw can achieve a high level of knowledge in a specialist area of technology.

Two years ago the Mortgage Advice Bureau realised it needed a place for staff to learn. With 850 advisers offering advice on mortgages totalling £12 billion annually, the AIM-listed company was too big and growing too fast to conduct training on an ad hoc basis.

Head of learning David Bedlow recalls: "Having looked around the market at other recruitment and training models, we found several that had tried and failed." So Mr Bedlow founded an academy from scratch.

The result is a four-month course run by mentors. The first challenge is to train the mentors themselves, so they are coached how best to develop their future pupils. This includes soft skills such as motivation and personality profiling.

The course begins with an induction and leads on to three modules focused on the key areas of mortgage advice: general insurance, mortgages and protection, with a fresh module starting each month.

A key to the academy is recognition that different people prefer to learn in different ways. Mr Bedlow explains: "We tailor content to suit different styles and levels of learner, from traditional stand-up workshops to e-learning packages and video learning."

Naturally, learning does not always have to take place in-house. Industrial conglomerate United Technologies Corporation promotes lifelong learning with its employee scholar programme, which pays for tuition, books and other costs for employees on accredited courses. In the past two decades, the corporation has helped staff gain 38,000 degrees – a return on the $1.2 billion invested over that period.

COMMERCIAL FEATURE

LEARNING NEW SKILLS TO SPARK CREATIVITY

*To succeed in a rapidly changing digital, visual world, students need to be creative problem-solvers and lifelong learners, and to master new forms of communication, says **Tacy Trowbridge**, head of Adobe's Global Education Programmes team*

Adobe

Schools and universities have a problem. A 2016 YouGov survey asked whether it's better for young people to go to university or straight to work. 38 per cent said it's better to find work compared with 28 per cent defending the university route. Even among adults who have a degree, only a third would recommend it.

Employers struggle to find recent graduates prepared with the right skills for success. A poll asking "Are students ready for today's dynamic workplace?" revealed that seven in ten employers say no.

So what's going on? Actually, the data is clear. What students and employers want is greater creativity, current communication skills and technical competence.

In a dynamic world, where today's youth will end up in careers and jobs that haven't been invented yet, we need to foster skills which allow young people to adapt and thrive, no matter their role or the tools they use.

When companies were asked "What skills are most essential for new hires?" the most common responses were technical skills, creativity, and the ability to communicate through digital and visual media.

But the skills students and employers need aren't being taught widely enough.

To improve education, schools need to go beyond teaching traditional skills and make fostering creativity, preparing lifelong learners and developing digital communication a priority, changing both what is taught and how to teach it.

Today, communication is changing – video editing, image creation and digital design are vital literacy skills for all. We need to support educators with school environments that foster learning with the right tools and the right opportunities.

> Video editing, image creation and digital design are vital literacy skills for all

Early in my career as an English and history teacher for 12 to 16 year olds in California, I took a digital storytelling workshop that changed my approach to teaching. I realised it was no longer sufficient to focus primarily on traditional essay formats. My students needed additional skills and tools to communicate in an increasingly digital, visual and noisy world.

Now at Adobe, I've seen many ways students around the world benefit from using today's tools to learn and demonstrate their knowledge.

English students make movies. History students create infographics to share research. Mathematics students print 3D models. Pre-medical students use visual tools to analyse MRI segmentation images. And art students learn graphic design.

Graduates with digital skills possess big advantages over their peers. Imagine business school graduates who tell effective stories through brief videos. Imagine biology graduates who build animations to explain complex research. Imagine students who build apps to solve real-world problems.

We can help. The Adobe Education Exchange, where 320,000 educators come to learn, find inspiration and share ideas, is free to join and use.

Last year, Adobe released a free web-based tool, Adobe Spark, a quick and easy way to create beautiful content that tells powerful stories. Teachers appreciate Spark too – it's simple and intuitive to use and lets them focus on what is most important.

The Adobe Education Exchange contains examples of Spark in classrooms and tutorials to help educators get started.

It's a challenge to keep up with the demands placed on education, but we need to adapt. Let's start by developing creativity and modern communication skills. We can prepare creative, dynamic students with the ability to thrive, no matter what careers they chose.

Join our community of creative educators and explore 10,000-plus free learning resources at edex.adobe.com

Students paying big fees want a better experience

Along with increased fees, students now have consumer rights in higher education, pressuring universities to raise standards and improve the learning experience

HIGHER EDUCATION
HELEN LOCK

Higher education has been going through a busy period of reform and change. We've seen tuition fees increase dramatically, but also a host of incentives to try and improve the experience of university for students have been introduced. There has been a focus on improving teaching quality and employability outcomes, and at the same time students have been reframed as consumers with rights.

This academic year universities are gearing up to introduce reforms in 2017 such as the Teaching Excellence Framework, a new measurement of the quality of academic teaching. In addition, they will need to respond to other policies brought about by new legislation in the form of the Higher Education and Research Bill.

Also, after campaigning strongly to remain in the European Union, the sector has the vote for Brexit to be concerned about. Earlier this month, Universities UK called for clarity from the government on what kind of settlement it will draw up for students coming from the EU. They certainly don't want to see a drop in EU applicants.

What will happen next? It's definitely a time of change and uncertainty for the sector, but observers are cautiously optimistic that the strength of British universities will hold up amid the commotion.

A sign of that strength is how popular going to university remains despite the higher costs. Tuition fees have existed in some form for many years, but it was the Coalition government that made student fees the main source of university funding, trebling them to £9,000 a year from 2012 and cutting back on grants from central government.

Four years on, fees are still controversial. A report by the Sutton Trust in April found UK graduates incur the most university debt in the English-speaking world and there are concerns that the graduate job market simply isn't able to provide enough well-paid jobs.

But despite the gloomy predictions, fees haven't dented the number of school-leavers going to university. Instead, universities have spent the last few years expanding their campuses and enrolling more students, especially since the student numbers cap was lifted in 2014.

A record 424,000 students were awarded places on A-level results day this August, up 3 per cent on last year. Also the Office for Fair Access, which monitors how successful institutions are at attracting students from low-income families, found there was a 7 per cent increase in the number of students from the most disadvantaged backgrounds achieving places. Although the most advantaged young people are still 2.5 times more likely to go.

The plan is that in return for paying their higher fees, students will demand more from their higher education and drive up quality. Students have been given consumer rights and the government plans to create a new Office for Students which will regulate the sector, take action on complaints and publish university performance data.

> After the Brexit vote, universities will be putting in a lot of work to reach out to EU students

Already prospective students are eyeing up the earnings of university alumni to judge whether that university or that course is worth it and this more shrewd approach is set to continue.

"Turning the student into a consumer has been a mixed blessing," says Mike Boxall, an expert in higher education for PA Consulting. "In some ways it has been really successful. In the space of just three years it is clear that universities have been incentivised to look after student needs more carefully, far more so than previously.

"At the same time we are slightly in danger of over-commodifying education, seeing it only in instrumental terms. Students are being encouraged to view university only as a place to improve their earnings later."

Universities are even giving out gifts to attract students with good grades. "You hear of universities offering season tickets for the football along with their unconditional offers rather than talking about the quality of the education they provide. That seems out of balance," says Mr Boxall.

Although school-leavers are still choosing to go to university to do a full-time course, the same is not the case for part-time students, who are usually older and are far more put off by the costs.

There was a dip in the number of full-time mature students, defined as over 21, enrolling when tuition fees increased, but these numbers have now recovered to pre-2012 levels. However, part-time student numbers have fallen dramatically from 428,000 in 2010-11 to below 266,000 in 2015-16, representing a 38 per cent drop.

Nick Hillman, director of the Higher Education Policy Institute (HEPI), says this group are more cautious about debt. "We have seen that school-leavers are not price sensitive, but part-time and mature students are," he says. "If you have a job or you have children, you are less likely to want to take out loans and lose earnings. Plus the 30-year repayment period might look more daunting if you are already middle aged."

In HEPI's report, *It's the finance stupid! The decline in part-time learning and what to do about it*, Mr Hillman writes that the drop in part-time learners is the "single biggest problem facing higher education". The report suggests there is a need for more financial incentives for universities to be more flexible in their provision and for more financial support such as maintenance grants for this group.

This is a problem that needs addressing if university education is to remain accessible. In the 2016 Budget, a review of lifetime learning was promised and the Department for Education has confirmed it will go ahead under Theresa May's government. But it has not started yet.

There is also another group of students to address – international students in the competitive global market for higher education. There are still high numbers of international students choosing the UK, but recently the previous healthy annual growth in numbers has stalled. For example, since the criteria for post-study work visas became stricter, there has been a consistent annual drop in the number of students from India.

Vivienne Stern, director of Universities UK International, is feeling positive though. She says: "Research we have done shows that satisfaction rates are high among international students who chose the UK compared with those who went elsewhere, for example to Australia or the US. We compare favourably on measures such as the quality of the research and teaching available as well as affordability and employment outcomes."

Ms Stern says there is work to do to improve the experience for international students, for example in terms of helping them integrate better into the university and with their employment prospects once they graduate.

"We still need to work hard to attract international students and, particularly after the Brexit vote, universities will be putting in a lot of work to reach out to EU students," she says.

Meanwhile, Universities UK continues to argue that international students should not be included in immigration reduction targets set by the government. This causes a conflict of interest between universities that want to attract foreign students and the Home Office which is trying to reduce the number of migrants.

HEPI's Mr Hillman agrees that universities will want to reassure students, particularly from Europe, that the option is still open to come to learn in the UK, but he is confident that the reputation of British universities will hold.

"We are the only country in Europe that has universities in the top ten of the world rankings," he says. "We'll see what happens, but I don't think we'll necessarily see the huge drop in international students after Brexit that some are predicting. Now there is more incentive for the UK to reach out to students in Europe than before."

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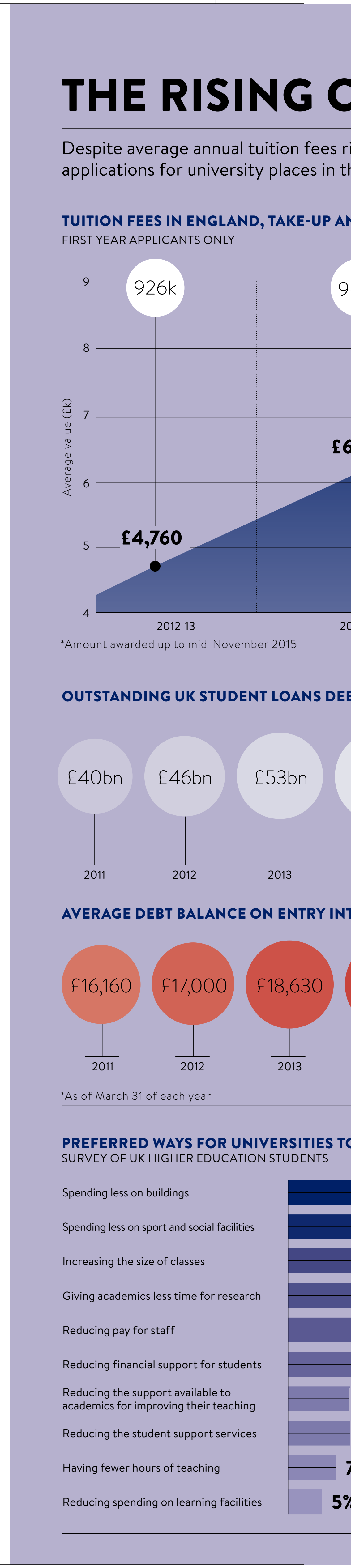
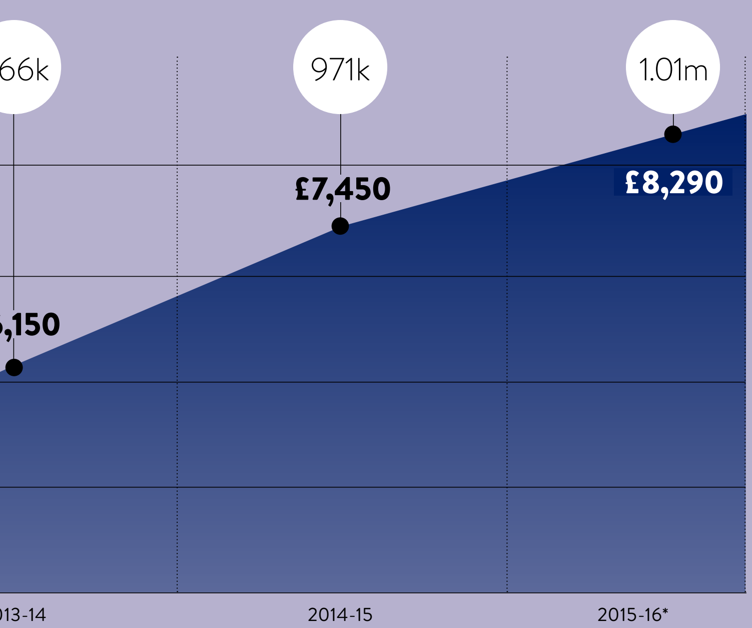


COST OF UNIVERSITY

ising by almost three quarters since 2012-13,
he UK have continued to rise

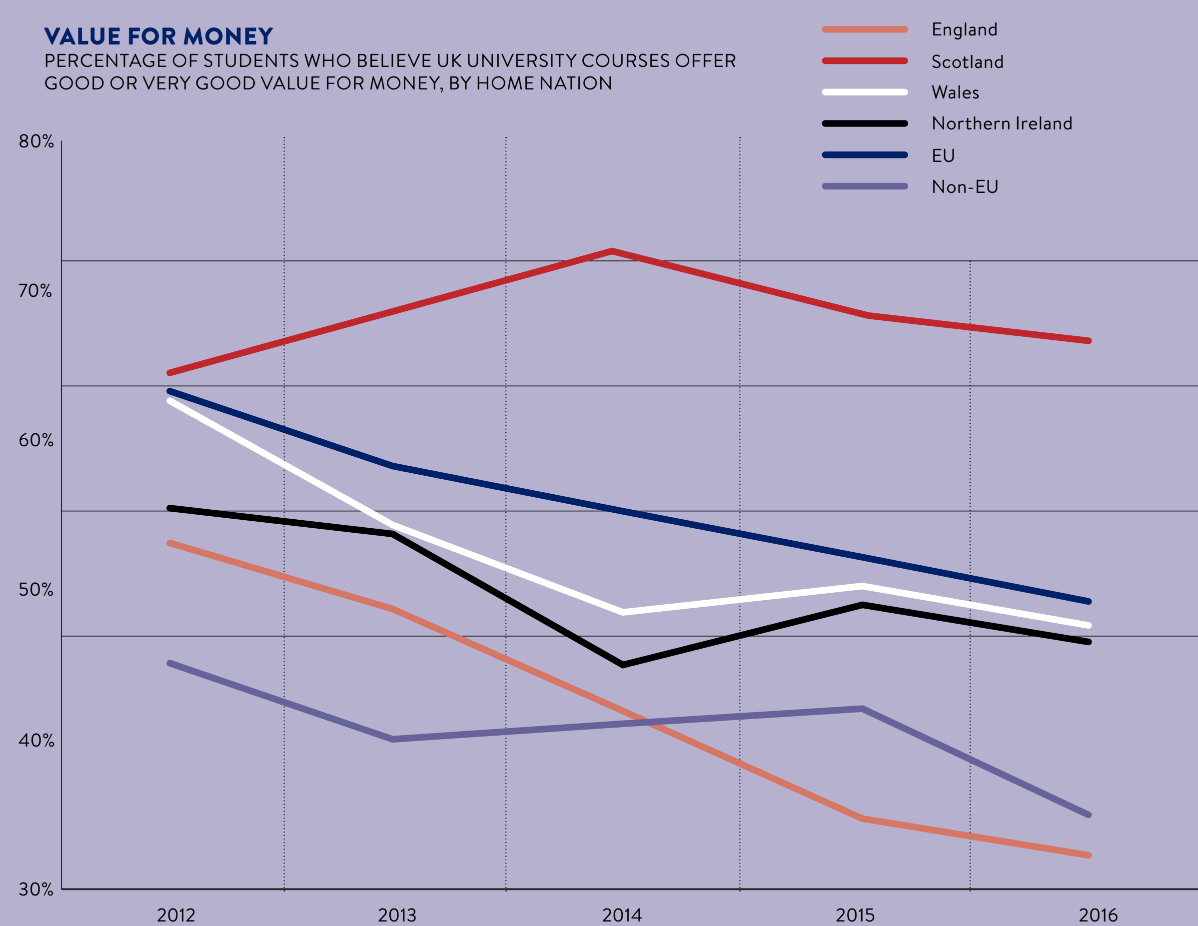
ND VALUE



Source: Department for Education/Student Loans Company 2016

VALUE FOR MONEY

PERCENTAGE OF STUDENTS WHO BELIEVE UK UNIVERSITY COURSES OFFER GOOD OR VERY GOOD VALUE FOR MONEY, BY HOME NATION



Source: UCAS Analytics and Research 2016

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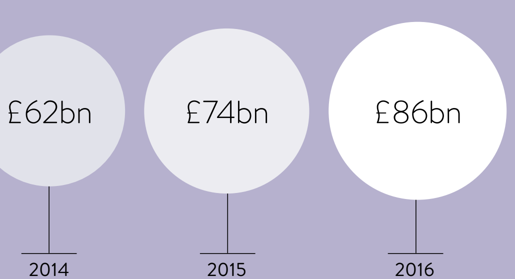
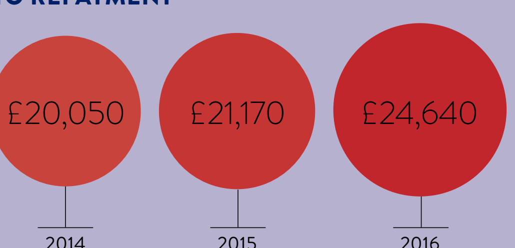
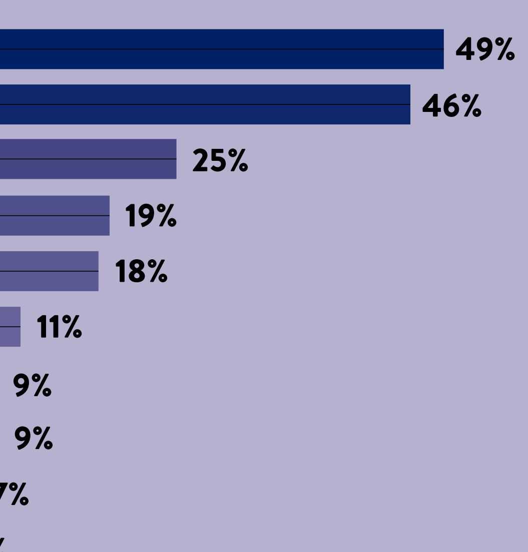


TO REPAYMENT



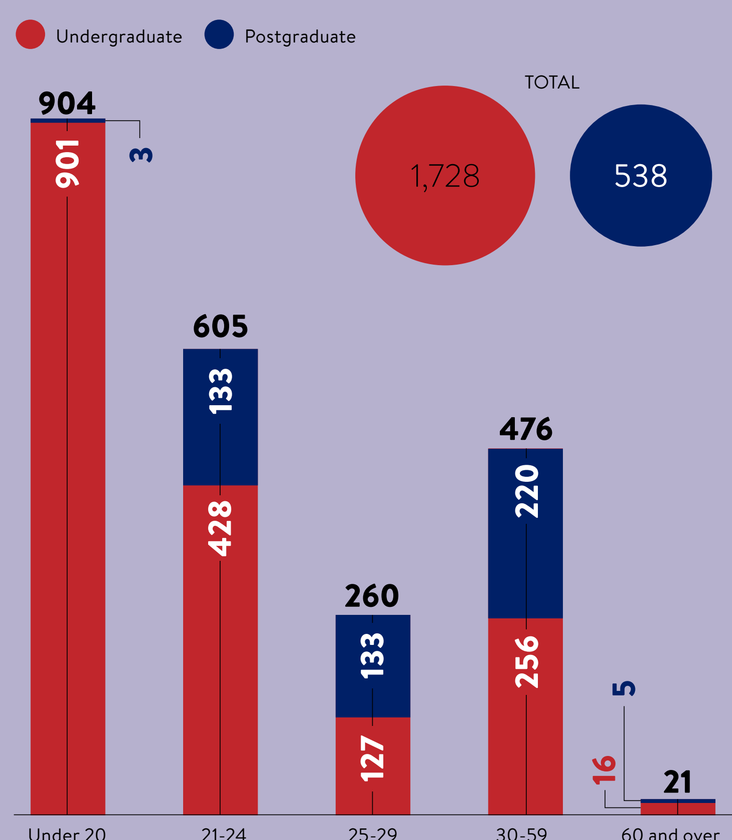
Source: Student Loans Company 2016

O SAVE MONEY

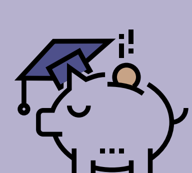


Source: Higher Education Policy Institute 2016

STUDENTS IN 2014-15 BY AGE AND LEVEL (THOUSANDS)



Source: Higher Education Statistics Agency 2015



£9k
maximum amount that universities in England are permitted to charge for undergraduate courses

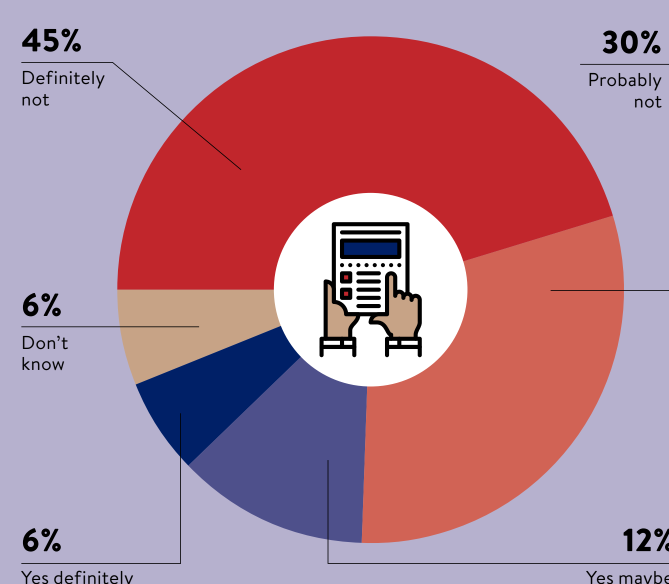
96.7%
of universities in England and Wales are charging the maximum amount for undergraduate tuition fees in the 2016-17 academic year

£21k
minimum annual income required for student loan repayment post graduation

Source: Complete University Guide 2016

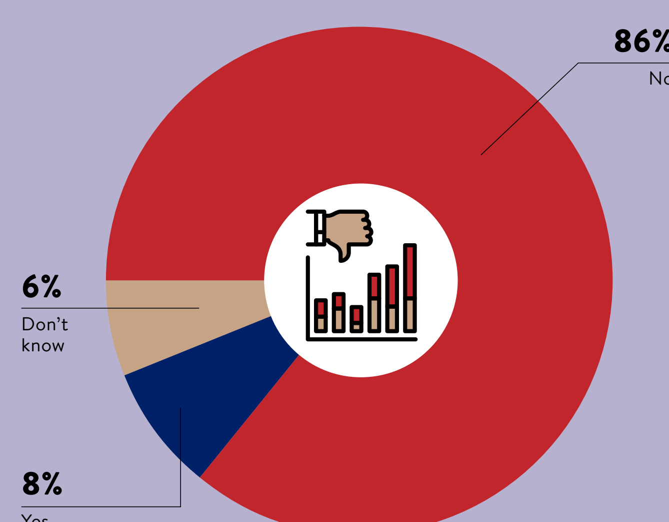
HAVE YOU BEEN GIVEN ENOUGH INFORMATION ON HOW TUITION FEES ARE SPENT

SURVEY OF UK UNDERGRADUATE STUDENTS



ARE TUITION FEE RISES FOR EXCELLENT TEACHING A GOOD IDEA?

SURVEY OF UK UNDERGRADUATE STUDENTS



Source: Student Loans Company 2016

COMMERCIAL FEATURE

DIGITAL LESSONS TO LEARN

UK universities are using technology to reduce costs and improve the student experience

VitalSource™

Three of the craziest words in education are "out on loan". A student goes to the library for an assignment only to find the recommended book is gone, not to return for three weeks. It's hard to imagine a more annoying, counter-productive and, frankly, avoidable scenario.

With the introduction of student fees continuing to put pressures on budgets, more than 50 per cent of students find it difficult to fund their course, let alone the course material. On average, only 19 per cent of university students are issued their own textbooks. This leaves more than 80 per cent scrambling to locate library editions.

The answer to solving the dilemma seems simple: offer all course material digitally. Students should be able to access every text and source material whenever they want on any device.

While a seemingly straightforward solution, in reality the transition to digital from paper is proving a hard slog.

Firstly, there is the issue of cost. Textbooks are expensive and getting costlier. In fact, according to the University of Essex, textbook costs have risen 1,041 per cent – almost four times the rate of inflation – since 1977. Today's typical student must budget between £450 and £1,070 for books and equipment a year. Switching to digital has the promise to address this cost issue.

Then there's the physical convenience. Anyone who's watched a medical student attempt to lug six volumes of microbiology and anatomy to lectures will have no doubt of that. Again, this is an issue the switch to digital could address.

So, why is the transition not yet complete? "Obstacles that get quoted don't stand up to scrutiny," says William Chesser, vice president of business development and international markets at the world's largest eTextbook platform, VitalSource. "Some students say they prefer paper copies and lecturers occasionally lack the vision to understand how teaching can be transformed."

These prejudices rarely survive when electronic resources are introduced. Research by VitalSource shows when students are provided with an eTextbook by their university, 90 per cent have a positive experience. At the start of a 2014 London School of Business and Management trial, there was scepticism of the move to eBooks, with only 8 per cent of students strongly agreeing they were useful. By the end of 2015, after using eTextbooks, 80 per cent of students agreed they were useful. Only one half of 1 per cent disagreed.

The University of Manchester is in its third year of digital pilot projects. In year one, more than 4,600 texts were made available online for download, and for Apple and Android mobiles. This year they are making 11,800 copies available.

The feedback is emphatic. "The library should make an electronic copy of course material available for all students," says one student. A study by the university showed having access made students more likely to do their reading, which should have positive effects for their grades.

eTextbooks are easy to highlight and annotate. During the University of Manchester pilot, the textbook *Criminal Law* got an average of 35 highlights per student. Phil Gee, associate professor at the University of Plymouth, where they run one of the largest UK eTextbook programmes, concluded eTextbook functionality has the "potential to transform teaching".

Another benefit of digital books is the use of data. Electronic materials can be tracked by university faculties and publishers to discover how they are being used. Lecturers can see who has clicked on source material, how many pages have been read and which students are falling behind. Publishers can identify which titles are most popular and which segments of books attract most attention.

The learning curve is accelerated through electronic books. Students can listen to podcasts on a jog or brush up on course material while on a train, for example. Lecturers can add notes and share them with students. This adds value, whether challenging concepts or pointing students to additional material, and crucially students can return to material when needed.

> The best thing about eTextbooks is that I can search within the text, highlight and bookmark

eTextbooks can offer a full complement of accessibility features for learners with disabilities. In fact, VitalSource Bookshelf recently received perfect rankings from the DAISY Consortium, Book Industry Study Group and the International Digital Publishing Forum for its Android and iOS apps for their accessibility options for blind learners.

Corporate training sessions can also benefit hugely from this capacity. Ed Monk, managing director of the Learning and Performance Institute, has spent years researching peak learning methods.

"The Ebbinghaus Curve of Forgetting shows a day after tuition, you remember a bit. A week later, less. After a month, it may all have gone. If you ask corporate trainers how much gets retained in the long run, they'll just laugh," says Mr Monk.

His recommendation? "When you put all the material online, it means people can return and refresh their knowledge. Add in gamification and you can really start to help people remember the material long term."

Switching to electronic books and resources is easy. Specialists such as VitalSource offer intuitive and rich interfaces for hosting all types of material. Textbooks, podcasts, videos and all source materials can be hosted to every student in a personalised library.

"We work with more than 1,000 publishers, so it's almost certain we have the books you need," says Mr Chesser. "If we don't, we will work with the publisher to obtain the material. They are always very happy to work with us."

It's a mature sector. VitalSource operates in 241 countries and territories in 37 languages, offering more than one million titles to twelve million users. All materials are available on all major devices. Existing modules, such as Blackboard, Moodle and Canvas, are compatible.

Student demand will fuel the transition to fully downloadable materials. A survey by the National Union of Students reveals eight out of ten students expect universities to be offering books digitally. With mobile phones and laptops, students already possess and use the electronic devices needed for digital.

Add up all the factors – availability, cost, data analytics and elevated learning performance – and it makes an irresistible argument for digital learning.

To find out more please visit VitalSource.com

Analysing data to help staff learn on the job

Technology to help businesses transform their training for a wide range of staff remains patchy, but its wider adoption is inevitable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LEARNING ANALYTICS
LEO KING

It is among the most promising technologies, yet remains rarely used in business. Learning analytics, a pioneering system used in a number of universities to transform tuition, is stuck at the periphery of managers' strategic vision, pushed out by the dominant efficiency and customer targeting strategies.

Businesses are missing out. Experts say learning analytics technology would enable them to make development programmes consistently deliver. Staff would learn more quickly and efficiently, and achieve better outcomes, because their engagement and learning could be measured, understood and responded to.

Organisations' closed viewpoint is to some degree understandable, given that they cannot see others using the technology. But in their fear and distraction, companies are overlooking just how effective learning analytics is. It pulls together data on what online training modules employees are looking at, how well they are doing, where they are stuck, how long they spend studying and what the outcomes are, enabling effective course changes.

"Previously, learning and development groups paid for professional training and just hoped it worked," says Lisa Barrett, managing director at digital learning firm Avado. "Now they can see if people are watching videos to the end, if they are guessing on assessments, if it's all too easy and what's working."

With so much learning in business being unstructured, it is difficult to view and assess. "The first potential of analytics is to make learning visible, so it can be made more effective," explains Graham Attwell, director of educational research organisation Pontydysgu.

The resulting analysis highlights the training that is delivering the best outputs for individuals' capabilities. Will Chadwick, UK vice president at Tata Interactive Systems, explains that it enables "the delivery of personalised bite-sized learning, to narrow individual capability gaps". Organisations can also set much fairer performance targets based on real abilities.

> Arrival of learning analytics programmes remains an inevitability as organisations develop a data-driven culture

"I strongly believe this will change the approach to learning and the focus will shift to how the top performers can be stretched rather than dragging up the performance of the bottom quintile," he adds.

Such radical change in learning and development means organisations will be better prepared for the future environment. Prithvi Shergill, chief human resources officer at HCL Technologies, says: "We will need to shift from an orientation of prescription to an orientation of prediction, so we can ensure people and teams are future-ready." Analytics are crucial to preparing for this new world.

Several large organisations have grasped the potential and are ahead of the curve in their adoption. The International Olympic Committee has been among those working with Avado to offer learning to athletes that fits around their training. HSBC, meanwhile, has been providing more engaging and responsive digital learning to its 1,000 marketing employees, resulting in improved measurement and performance, and more effective learning groups.

Fast food retailer KFC is rolling out its own analytics to understand employee training across 825 UK restaurants. Newspaper the *Financial Times* uses the technology to quicken career development and digital-skills knowledge, while marketing agency iProspect is improving training in the interests of staff satisfaction and retention.

The industries most likely to adopt the technology are those closest to consumers, given their existing appreciation for analytics in customer targeting. "We see a lot of interest in fast-moving consumer sectors such as retail, telecoms, high street banking and insurance," says Ms Barrett at Avado.

BENEFITS OF LEARNING ANALYTICS
SURVEY OF HIGHER EDUCATION STUDENTS

86% Helps me to be more effective and efficient

67% Makes me feel better prepared for class

46% Increases my confidence

45% Reduces stress

Source: McGraw-Hill Education 2016

It is important not to overstate take-up, which is held back in most companies by several factors. Alan Duncan, a research director at analyst house Gartner, warns that many firms still "don't understand what they actually need", and time spent working out these aims simply has to precede their purchasing of tools.

There is also some nervousness among learning and development departments of the sudden accountability they and their employees face. "There's a degree of sensitivity, but there's also a sense that HR, learning and development need to get smarter to changing demands," says Mr Duncan.

Whatever tack businesses take, the arrival of learning analytics programmes remains an inevitability as organisations develop a data-driven culture. Such programmes will be enabled and powered by chief data officers, those new corporate chiefs responsible for the collation of, and results from, massive amounts of information.

But employees might resist the change. They are certainly torn between a negative and a positive concept: the danger of their development being closely examined, yet the potential for training that is responsive to their exact needs. In a recent, small public-sector experiment in the EU, staff reportedly asked for more analytics in the interest of better learning, while it was their managers who were nervous and feared the analysis would force them to invest in better training.

There is a final, understandable concern that is holding back the adoption of learning analytics – data privacy. No one wants to be identified for slow development at work. The situation can be maturely handled, however. "To some degree, having transparency here is a good thing. It can be used to provide constructive feedback," says Mr Duncan. "Of course, companies could use it for ill, to target employees, but that would be a culture and data-handling problem rather than an issue with the information itself."

In making learning analytics work, businesses face cultural and technical challenges. Many are also distracted by other pressing objectives. There is, however, no denying that companies are overlooking the enormous potential to have a truly functional, effective workforce. To continue doing so would be a grave mistake.

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‘Games’ are not always what

A useful way of engaging staff and measuring results in a workplace learning programme, gamification may be

GAMIFICATION

CATH EVERETT

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A few years ago, it seemed like gamification was about to take over the world. The hype was everywhere and dramatic predictions for growth abounded.

Respected high-tech market research firm Gartner, for example, forecast that more than 70 per cent of Global 2000 organisations would have introduced at least one gamified application by 2015 due to the benefits they offer in terms of user motivation and engagement.

But as little as 18 months later, things had started to cool off. In fact, Gartner predicted at this point that by 2014 a huge 80 per cent of such applications would fail to meet business expectations as a result of poor design.

So just what is the truth of it today? According to Dr Karl Kapp, professor of instructional technology at Bloomsburg University of Pennsylvania and author of *The Gamification of Learning and Instruction*, the sector is now “out of the infant stage and towards the end of the toddler stage” in terms of market adoption.

Most big companies have implemented projects in pockets, primarily in areas such as sales and marketing, and learning and development (L&D). In the latter instance, they generally purchase learning management systems from vendors, such as Growth Engineering or Axonify, and add their own content.

But uptake is also growing elsewhere as some mid-range firms start purchasing more traditional applications that include gamified elements built in or can be hooked up to gamified platforms such as Badgeville.

In the L&D space, gamified e-learning systems such as Kineo’s are the most popular option, says Pete Jenkins, founder of strategic consultancy Gamificationplus. But organisations are also using gamification techniques for everything from staff inductions to helping encourage cultural change.

In fact, L&D researcher Ambient Insight expects the gamified learning market, which it breaks down into four key categories, to nearly double in value from \$8.7 billion in 2013 to \$15 billion in 2018. These categories are game playing to achieve learning objectives; simulations to teach skills in an immersive environment; points, badges and leader boards as a means of motivation; and gamification, which it classifies as the use of rewards to motivate behaviour in a non-game context.

> “Organisations are using gamification techniques for everything from staff inductions to helping encourage cultural change

Mr Jenkins points out, however, that the use of the term “gamification” is progressively broadening to cover all of these classifications. “There are often misunderstandings as to what it actually is and so people will ask for a game,” he adds. “But what gamification is really about is using game mechanics and game-design techniques in a non-game situation.”

As for the failure rate of the first generation of initiatives, while perhaps not quite as high as predicted by Gartner, it still amounted to between 50 and 60 per cent, says Dr Kapp. A key issue here was that too many organisations simply added points, badges and leader boards to their existing content, and found people quickly became bored with them.

But the second generation of projects now under development or recently launched tend to be more sophisticated. “It’s about adding ideas such as stories, feedback loops, player experience and exploration,” says Dr Kapp. “It’s not enough to just add points for logging in – you have to give people an incentive, a mission and purpose.”

Indeed research appears to indicate that to be truly effective, gamified learning needs to provide users with a mixture of intrinsic (internal) and extrinsic (external) motivation, he says.

“Points, badges and leader boards were all about external motivation,” Dr Kapp explains. “But you have to offer a combination of both external and internal motivation, which is about helping someone to do something better and have them recognised for their accomplishment. This is what makes gamification most effective.”

Brambles / Shutterstock

LEFT
Supply chain game *Ship It*, designed by LEO, requires players to make pick-ups and deliveries, while managing timescales, customers, stock and truck capacity

MOTIVATION FOR GAMIFICATION

86%
of learners said a points system would boost their engagement

82%
were in favour of multiple difficulty levels and explorable content

62%
would be motivated to learn if leaderboards were involved and they could compete with colleagues

Source: Talent LMS

One firm that has attempted to go down this route is supply chain logistics company, Brambles, which operates in more than 60 countries. It introduced a game element into its Supply Chain Academy digital learning hub about a year ago to increase internal awareness of what the organisation does.

The academy is based on six classic online learning modules on different elements of the supply chain. But it also includes a standalone game called *Ship It*, based on technology from Learning Technologies Group’s Leo business and real-life scenarios, and input provided by an internal steering committee.

Players must master four levels in which they plan optimal routes to make pick-ups and deliveries from a range of suppliers, distributors and retailers, while taking things like timescales, customer priorities, stock replenishment and truck capacity into consideration.

Learning as they go, players can self-correct if they get something wrong and cause customer satisfaction to drop, profits to fall or carbon emissions to jump. But they are also awarded points for positive behaviours, which in turn are recorded on a leader board.

Although *Ship It* is referred to internally as a “simulation” so as

they seem

entering a new wave

CASE STUDY: HOUSE OF FRASER

James Kennedy NI / Shutterstock

One of House of Fraser's plans for its gamified House of Learning environment is to link rewards such as badges with employee benefits to encourage positive behaviour among its staff.

House of Learning is an e-learning portal from Growth Engineering that includes a mix of training tools, such as a live chat function, to enable discussion with subject matter experts.

It also offers specific role-based learning paths for people from the time they first join the organisation to provide structured career development. As workers move up the different levels, they gain experience points and badges as rewards for completing different training elements and sharing their knowledge with others.

But the next step will be to take the reward system up a notch. Cheryl Daubney, House of Fraser's digital design learning lead, explains: "In future, we'll be exploring how to link things like points and badges to our House of Benefits system so that people will get House of Fraser vouchers if they post self-generated content, for example. It's about recognising and encouraging certain behaviours, and it would add a whole new dimension."

The UK-wide department store chain first rolled out the scheme to retail managers and staff at headquarters at the end of 2015, but plans to make it available to the rest of its 6,000 or so store workers by early-2017.

not to "frighten people off" by associating it with a computer game, Lynne Rutherford, group vice president of L&D at Brambles, says: "It basically explains in a fun, very practical, active way what our business model is and what we do. So its uses are spreading through the organisation and we now use it for onboarding new starters too."

Another approach that is starting to be discussed quite widely, meanwhile, is linking rewards with employee benefits. Dr Kapp explains: "To show progress and mastery, some organisations award badges. But the idea is that after awarding people so many badges, you could put them on a new salary schedule or give them a promotion. It's not widespread, but there's a lot of talk about it and definitely some pilots."

Gareth Jones, chief technology officer at business management consultancy the Chemistry Group believes, however, that a third wave of even more sophisticated gamification initiatives is on the L&D horizon. The firm is currently working with SAP to create a logistics and resource management game not dissimilar to *Ship It* that will be posted to the careers element of the business application giant's website in October at the same time as it launches a big recruitment campaign.

But the big difference between the two games is that SAP's offering will act as a tool to collect data about individual players as part of a much bigger project. Mr Jones says: "It gives us an insight into their values and motivations, so whether they're risk-averse or assertive, for instance, and how likely they are to behave in a certain way."

The aim is to combine this information with data gleaned from social-media sites to create a profile of each candidate using machine-learning technology. Should they be successful in their application, this profile can subsequently be added to over the years based on activities ranging from e-learning to performance reviews.

The aim, says Mr Jones, is to "inform their learning and development journey in the business" by helping "us understand people's learning styles, how to manage them, where to point them and the like". Over time, enough data should have been gathered to make wider predictions about how each individual is likely to perform and what their ideal role would be as well as to fine-tune recruitment processes.

"No one is pulling all this information together at the moment, but the aim is to join up people's data journey. To ensure it's rich enough, we need lots of data points and game mechanics, if done properly, is a useful way to gather that data," Mr Jones concludes.

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COMMERCIAL FEATURE

IS EDUCATION TECHNOLOGY'S LAST FRONTIER?

The technology industry is known for shying away from education's longer sales cycles, but startups are capitalising on the huge untapped potential

emerge education | pi-top | BOOLINO read · discover · grow

Technology has the potential to decrease educational inequality, increase graduates' job fitness and save schools money.

Only 3 per cent of global education spending is digital, however this component is growing twice as fast as the rest of the sector, according to IBIS Capital.

Thousands of startups are entering the edtech arena. Europe's most active edtech seed investor, Emerge Education, tracks more than 23,000 such startups worldwide, with the number of newcomers increasing by 300 per cent last year.

In just over two years, Emerge Education has invested in more than 40 edtech startups. Backed by Oxford University Press, the world's largest university press, Qtone, a leading Chinese education company, and angel investors, it provides startups with up to £100,000 of investment, and supports product testing and sales.

"We have spent the last two years convening the most influential education institutions, entrepreneurs and investors," says Jan Matern, co-founder and chief executive at Emerge Education. "Startups from over 60 countries apply to join Emerge Education in order to access this community."

23k edtech startups tracked

3x more new edtech startups founded last year than the year before

40 investments

£100k investment for accelerated companies

Source: emerge education

Boolino

Pi-Top

Emerge Education portfolio company Pi-Top is tackling the large technical skills gap in the workforce of tomorrow. Its devices are the pi-top, a laptop that you make yourself, and the plug-and-play pi-topCEED desktop, both based on the Raspberry Pi system. The combination of Pi-Top's hardware and software make it possible for any teacher, regardless of their computer literacy, to deliver engaging lessons across science, technology, engineering and maths.

Pi-Top expanded in two years from operating out of a living room, to becoming a 25-person company selling computers in 70 countries.

"We work with schools and the education system to enhance what teachers already do," says Jesse Lozano, co-founder and chief executive at Pi-Top. "Rather than expecting the education system to adapt to us, we work with well-known content providers and educators to create a new cost-effective platform that enhances current content."

Meanwhile, Barcelona-based Emerge Education startup Boolino is addressing the issue of low child engagement in reading. This is a global problem, with some 5.2 million adults in the UK functionally illiterate, according to the Literacy Trust.

Boolino focuses on developing young reading habits and skills. On its website, a large group of expert bloggers, booksellers, librarians and teachers help more than 250,000 families and children find new books to read.

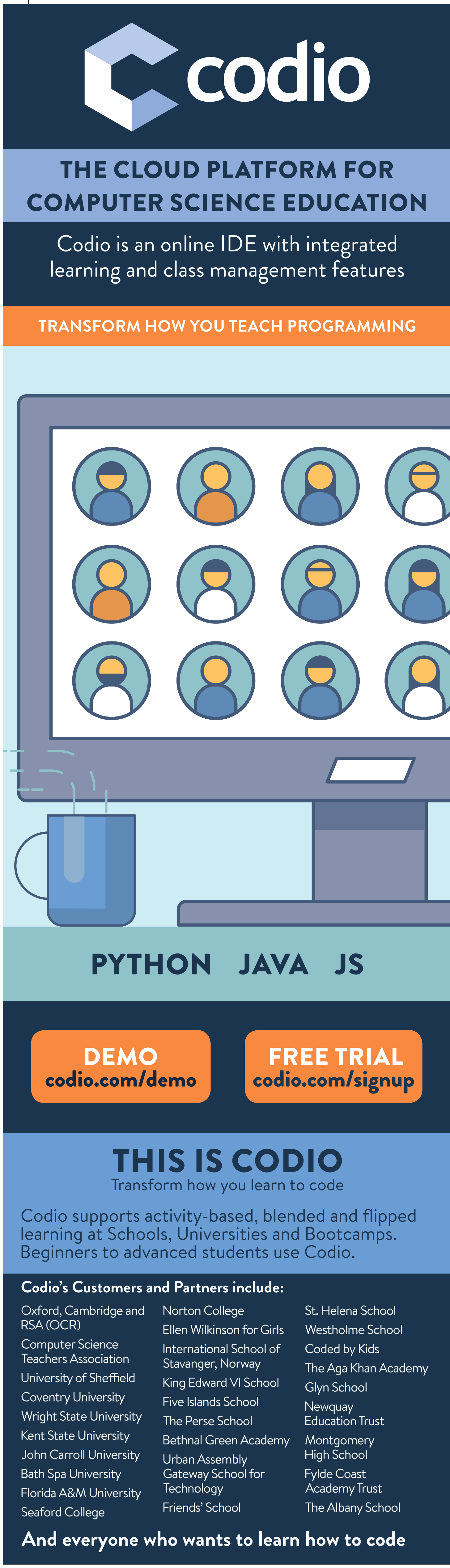
Sven Huber, a former Bertelsmann executive who founded Boolino in 2011, explains: "Our mission is to improve children's learning capabilities around the world, helping them to become enthusiastic readers. We offer great growth across the sector and work actively with all parts of the value chain."

Among the company's offerings is Boolino Book Box, a tool that combines reading, games and crafting activities. Drawing from new funding, Boolino recently acquired Fiction Express, an interactive literacy resource used in 500 UK schools. It allows primary school pupils to take part in the story-writing process, changing the plot while the author is writing it.

The rise in educational technology startups is impressive and they are tackling major issues. Mr Matern says Emerge Education has "bet its existence" on the sector, and its portfolio companies already sell to nearly a half of secondary schools and a fifth of primaries in the UK.

The new wave of edtech businesses is here and it's time to be involved.

To find out more about the companies in this article visit www.emerge.education, www.pi-top.com and www.boolino.co.uk



Prepare for a giant leap

As schools seek to raise standards, help could come from an the power of artificial intelligence

ARTIFICIAL INTELLIGENCE
ALEX WOOD

Yuri_Arcurs / Getty Images

Glancing around school classrooms in 2016, it's easy to miss just how far technology has transformed learning over the last decade. The desks, whiteboards and rows of chairs are the same, but so much else has changed that can't be seen.

A third of Britain's schools are asking students to bring their own tablets and laptops into the classroom now, coding has been on the national curriculum for three years, and more and more education is happening outside school through apps and digital services.

But these changes are just the start. Artificial intelligence (AI) is the next giant leap in learning and, according to those working in the field of education and technology, we haven't seen anything yet.

"Some technologies in the field of education have had the potential, but not the ability, to deliver or transform," says Ian Fordham, chief executive of Edtech UK, the strategic body for education technology in Britain.

"The recent developments in AI and machine-learning are a major exception with the potential to revolutionise how young people learn, teachers and tutors teach, and how society drives forward learning in the future."

If you don't think AI is poised to change your world, maybe you haven't spotted the signs. It's not just Apple's Siri getting better at telling jokes or ordering you a taxi, AI is recommending what you should buy on Amazon, listen to on Spotify and even writing the news articles you read (but not this one).

Last year a group of the most respected tech entrepreneurs, including Tesla's Elon Musk and PayPal's Peter Thiel, pledged $1 billion to the creation of OpenAI, a non-profit "friendly" AI to benefit all humanity.

This year Google's DeepMind took on and beat the best human Go player in the world, and Facebook launched a virtual assistant, powered by AI, called M.

The sheer wave of investment and energy being poured into AI is undeniable and on par with mankind's greatest endeavours – and now it's coming into the classroom. First, forget any notion of robotic teachers. In fact, human teachers will be vitally important in rolling out and developing AI in education.

"AI will not replace tutors, it will support them and it will guide them to be better teachers," says Tom Hooper, founder of Third Space Learning.

Third Space began in 2012 by providing one-to-one maths tutoring over the internet by connecting children with teachers around the world. Since starting, nearly 350 UK schools have enrolled 6,000 struggling students on to Third Space.

> “The sheer wave of investment and energy being poured into AI is undeniable and on par with mankind's greatest endeavours – and now it's coming into the classroom

And the real magic is what Mr Hooper and his team are doing next. "We record every session that we deliver, thousands of hours of teaching and learning every week – a huge quantity of data on human interactions," he says.

"About 12 months ago we started a research project with University College London looking at what patterns there are around positive teaching outcomes and how we can optimise teaching interactions to promote best practice."

By boiling down teaching to this level, Third Space's ultimate goal is to build a platform that can give real-time feedback to its online tutors and empower them to become even better educators.

Say a child misunderstands a core mathematical concept or a teacher accidentally skips something, the AI could alert the teacher to this problem before it becomes a bigger issue later in the child's education.

"If we can aim to shape the performance of the teacher – the teacher being the significant input into a child's learning – then you're creating something truly powerful," says Mr Hooper.

He imagines a world where every teacher, both in and outside the classroom, is guided by an AI that has itself been trained by the learnings from millions of lessons.

But why do we need AI in the classroom at all? Aren't teachers doing a good job? For one, class sizes are growing. According to the Organisation for Economic Co-operation and Development, the UK now has an average classroom size of 26 pupils, compared with an international average of 21.

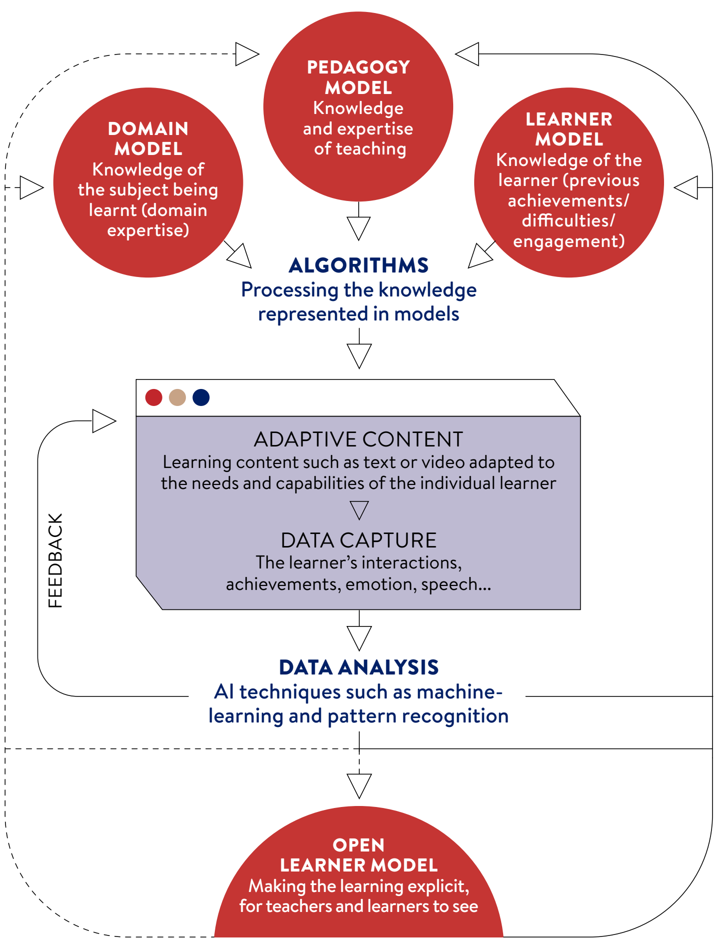
At the same time recent Department for Education statistics show that in England half a million prima-

forward in education

unlikely source – a virtual teaching assistant packed with

ARTIFICIAL INTELLIGENCE EDUCATION SYSTEM

A SIMPLIFIED PICTURE OF A TYPICAL MODEL-BASED ADAPTIVE TUTOR



Machine-learning algorithms can process information on the learner, teacher and subject to select the most appropriate content according to the student's individual capabilities and needs. Continuous analysis of the student's interactions informs the delivery of feedback to help them progress through the content they are learning. It is also used to help teachers understand the individual's approach to learning and allows them to shape future learning experiences appropriately.

Source: Pearson 2016

ry school students are being taught in classes of 31 pupils or more.

"The implications for teachers are stark: how do they deliver a teaching experience that meets each child's individual needs?" asks Junaid Mubeen, head of product at digital maths tutor Whizz Education. "Our research shows that a four-year learning gap now exists in classrooms the world over."

That's why digital services such as Whizz Education's virtual maths tutor and Gojimo's free exam revision app are booming in popularity; they're giving students more personalised education outside the classroom.

Whizz Education claim that just an hour a week spent with their AI-powered tutor over the course of an academic year can accelerate a student's learning by 18 months ahead of their peers.

Similarly, an independent university study in 2012 found that 34 hours using the free Duolingo language app to learn Spanish was the equivalent of an entire first term studying the language at college.

> Teachers are already struggling as class sizes race above 30 students per teacher

But, if they're already so powerful, why are these AI-powered learning systems only being used by a tiny fraction of students?

"AI suffers from image problem in education," says Whizz Education's Mr Mubeen. "With the rise of intelligent tutoring systems, educators have been forced to confront their own existential crisis: can a machine teach and what does this mean for teachers?"

Resistance, therefore, has been rife, but misplaced. "Within 15 to 20 years, artificially intelligent tutors will be as common as car insurance, and these tutors will engage with a child's emotions through speech interaction, support problem-solving and develop much more targeted learning paths for each student," he says.

And while the pioneering work of Whizz Education, Third Space Learning, Gojimo, Duolingo and others is pushing AI into mainstream education, it's admittedly still a work in progress.

"Despite nearly three decades of work, AIEd [AI in education] is in many ways still a cottage industry, and the benefits and enormous potential of the field remain mostly unrealised," according to education giant Pearson in its 2015 report *Intelligence Unleashed: An argument for AI in education*. "Sadly, many of the best ideas in AIEd currently make it no further than the lab or perhaps a lecture hall."

With a growing, diverse population, not just in the UK, but also in countries such as India and Japan, AI in education isn't just an option, it's quickly becoming a necessity.

Today's teachers are already struggling as class sizes race above 30 students per teacher and this is a challenge that only looks like getting worse.

AI, like the education technologies that came before it, probably won't change the desks, whiteboards and rows of chairs synonymous with learning, but it has the potential to change just about everything else.

Teachers, empowered by smart assistants helping them to be even more effective educators, students, given tailored support, and AI-powered learning opportunities both inside and outside the classroom, will excel.

The issue that continues to hold back AI in education remains that of the human capital which will be needed once AI takes hold.

Stanford University, which sits on the doorstep of Silicon Valley and has been the birthplace for dozens of AI startups, recently began its *One Hundred Year Study on Artificial Intelligence*. Its panel of leading AI academics were unequivocal on the importance of teachers: "Over the next 15 years in a typical North American city, the use of intelligent tutors and other AI technologies to assist teachers in the classroom and in the home is likely to expand significantly."

Teachers, students and parents, prepare for the revolution.

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