

# Future learning technologies 13

*We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten.*

BILL GATES, *THE ROAD AHEAD*, 1996

We began this book with a 1999 prediction about the future from John Chambers (see epigraph on page 7). I believe Chambers was right about the likely eventual massive impact of learning technologies. He was just wrong about the timing. As Microsoft co-founder Bill Gates pointed out a few years earlier, it is quite usual to be overenthusiastic about change in the short-term, and fail to see how broad it will be in the longer run.

One reason for this is that our understanding of what is possible is conditioned by our experience. That limits us. It makes us innovate in the shape of the past, which is why both the first cars and the first railway carriages were shaped like horse-drawn coaches.

Occasionally, someone is imaginative enough to alter the future by either creating something truly new or – more usually – combining existing technologies in a new way. These people are seldom the first movers, the original inventors. More usually they are in the next wave, who see a technology's potential. James Watt, for all his originality, did not invent the steam engine, but modified it brilliantly and so precipitated the Industrial Revolution. Apple did not invent the smartphone from scratch. As Mariana Mazzucato points out, it combined existing materials and processes in new ways with the addition of an exceptional user experience (Mazzucato, 2013).

If we were to think about the learning technology of the future by extrapolating from the past, through the present, we would hugely underestimate what the future holds. We would be left with the equivalent of the pitiful, wheezing, pre-Watt steam engines of Thomas Newcomen, or the clunky, handheld digital assistants before

Apple reimagined them. We would be stuck with further refinements of a model that has its roots in the schoolroom assumption, which sees learning technology as a way to parcel up, store and distribute information.

There is, however, little chance of such stasis. On the contrary, there is good reason to believe that the future will be different from today in ways that are almost impossible to predict – for evidence, just look back a few years. In the past decade or so we have seen the creation of: Facebook (2004), YouTube (2005), the iPhone, Twitter (both 2006), tablets (2010), Android (2010) and WhatsApp (2010) – the hardware and software that have transformed information sharing, learning and work. These innovations were built on the foundations of the previous decade, including broadband internet access, reliable Wi-Fi and powerful search algorithms.

Looking back over predictions of the future made around 2000, I have been unable to find anything that predicted social media, powerful, portable devices and in particular today's culture of sharing (and possibly over-sharing) information, experience and opinion. By extension, it would be folly today, in 2017, to attempt to predict the technologies that will change learning in the coming decades. Google co-founder Sergey Brin is wise enough to recognize this. If anyone should know about the future of artificial intelligence (AI), it is Brin, whose company has been at the forefront of developing AI, the technology most likely to completely alter how we live, work and learn. And yet, when asked to comment about the future of AI he replied that it was 'impossible to forecast accurately' (Naughton, 2017).

What we can do, however, is suggest trends, and point to evidence of these trends at work today. How exactly these trends finally make themselves manifest, and the precise technologies that emerge as a result, are less important than the overall direction of travel for learning and technology, which is towards a world abundant in content, with sophisticated curation and where algorithms and artificial intelligence create an invisible infrastructure to our lives in a way almost unimaginable today.

These three trends provoke a question, which we address in the final chapter of this book: Is the learning and development profession ready for a future of technology and learning quite unlike what has come

before? Before we tackle that important challenge, though, we examine how these three trends are making themselves apparent today.

## Evidence of the future today

The three technology trends that I believe will most affect workplace learning in the future are: the increased abundance of free or low-cost content, progressively more sophisticated means of curation, and a growing role for algorithms and artificial intelligence. Evidence of each can be seen in L&D today.

### Abundant content

In Chapter 6 we explored the different types of content available to L&D professionals, and examined how we have moved rapidly from a position where the L&D department was responsible for creating the vast majority of learning content within organizations to where we are now: in a world superabundant in free and near-free information. The amount of content out there is only going to increase, something that the L&D profession can exploit, but often seems reluctant to.

There is some good reason for this reluctance. Not all internet content is – to put it mildly – useful for adults wishing to learn. Some content, however, is not only suitable, but is designed with that aim in mind. This includes Massive Open Online Courses (MOOCs). While these are not the only form of free or nearly free adult learning content available on the web, they are a good example of some current trends, and also of the reaction of L&D.

MOOCs exploded into public consciousness in 2012, as the result of what appeared to be a magical ability to attract money. In April, Coursera picked up US \$16 million in funding; in May, MIT and Harvard jointly put US \$60 million behind edX; in October, Udacity announced US \$15 million in funding; in December, 12 major British universities combined to form FutureLearn.

The sudden, overnight successes of MOOCs in 2012 was, in reality, not sudden at all. Nor did everyone agree that they were particularly successful.

MOOCs had been with us since at least 2008, when Canadians George Siemens and Stephen Downes ran an online class in learning theory for the University of Manitoba, which more than 2,000 people showed up for. The term MOOC was coined to describe this new style of teaching by colleagues Dave Cormier and Bryan Alexander (Learn Canvas, 2013).

However, not all MOOCs are the same. Downes and Siemens' MOOCs involve people working together along the lines of their Connectivist approach to learning (Siemens, 2004), and are known as cMOOCs. Most of the well-funded courses run by universities and private institutions use an instructional model instead, and are known as xMOOCs.

As well as being far from an overnight success, they were not successful by some measures, because the schoolroom assumption is that the class enters on time, attends for the entire hour and leaves on the school bell. That is a completion rate of 100 per cent, even though attendance says nothing about learning. During their contentious early days, completion rates for MOOCs were frequently cited as being in the single percentage digits (Parr, 2013).

This has not stopped MOOCs gathering seemingly unstoppable momentum. If MOOCs were born in 2008 and hit the press in 2012, then 2015 was the year their use exploded. More people registered for MOOCs in 2015 than in the previous three years combined, with the number of people who had signed up for at least one course exceeding 35 million, up from 16–18 million the previous year. Importantly, this was the first year that the market grew faster than Coursera, the largest supplier, which increased its user base by 7 million to 17 million students in total (Shah, 2015). Provision has leapt, too. FutureLearn's original cohort of 12 universities has swollen to 64 worldwide, along with a further 47 partners.

And the MOOC model is evolving. Some providers are already moving away from the schoolroom model, and involving participants in a great deal of interaction. (FutureLearn stresses its courses work through storytelling, discussion, community support and social learning (FutureLearn, 2017).) Not all MOOCs are offered by universities now – some large corporations offer their own to both employees and non-employees in the 'extended enterprise' of supply chain and/or

distribution and sales. Increasingly there is a range of approaches to costs, too. For some MOOCs a certificate of completion is an additional extra, available for a fee. For others an obligatory paid-for certificate has become a way of both reducing numbers and raising revenue. And amid all this change, the number of MOOCs on offer continues to increase: from near to zero in January 2012 to 4,000 in January 2016 (Shah, 2015).

Yet in the face of this growth and diversity of free or near-free material, the reaction of L&D has been largely a lack of interest. Every year, I run a worldwide poll of L&D professionals, asking what they think will be 'hot' in the following year. Respondents choose up to three options from a list. In 2014, MOOCs ranked fourth of 12 options. Each subsequent year this ranking has fallen, and by the 2017 Global L&D Sentiment Survey, 885 people from 60 countries placed MOOCs unequivocally last of 16 choices (Taylor, 2017). Largely, it seems, L&D is ignoring MOOCs, and this is a dangerous precedent. If L&D still sees the professional role as focused on the production of learning content, it will lose an opportunity to make the most of the growing amount of free material out there. It will also lose influence in the workplace, because people in the workplace will turn to MOOCs, or YouTube, or to other low-cost providers anyhow without approaching the L&D department at all. At that point, L&D will have become marginalized, confined to what I have elsewhere called the 'Training Ghetto', where interesting learning initiatives that will impact the business are carried out somewhere else in the enterprise, with the L&D department confined to a narrow role of induction, compliance and remedial training (Taylor, 2013).

### ***Personalization, playlists and pathways***

While I have focused on MOOCs, they are just one example of a trend towards an ever-increasing amount of good quality content being widely available at low cost or no cost. This abundance has led in turn to another trend: enabling better control and use of that content.

A 'playlist' was originally a collection of songs put together for an occasion like a party. Literally it was the list of the order in which to play the vinyl records. The idea has been extended and playlists of

everything are everywhere. On YouTube you can find playlists of 1980s glam rock, of poetry for classrooms, of DIY videos and more. It was only a matter of time before the playlist reached workplace learning.

The obvious way to use a playlist is to assemble short pieces of content together to make a course, or something like one. It is already possible to do this with providers like Lynda. Online learning company Lynda was bought by LinkedIn for US \$1.5 billion in April 2015 (Kosoff, 2015), and provides a library of some 4,000 courses and a far larger number of video tutorials. (A year later, LinkedIn was in turn bought by Microsoft for US \$26 billion (BBC, 2016).)

This is an impressive range of materials, but there is a problem with having too much choice. Not only can it be difficult to find what you want, it can actually be demotivating. Iyengar and Lepper's famous 2000 study of choosing – whether for jam, essay subjects or chocolates – showed that participants found selection easier, and were happier with their selections, when the choice was limited. In the essay study, a smaller range of options also led to them writing better essays (Iyengar and Lepper, 2000).

Playlists are the obvious response to the wide range of materials found in any collection of learning materials. Rather than simply giving people the keys to the library, give them the keys along with a reading list tailored to their needs. Lynda's playlist function enables combinations of materials which fit a particular need. These could be to support a particular role or a particular course, or a way of supporting a person in a particular location.

One large Irish company had its team of 35 trainers compile playlists both for personal development and to help employees work towards professional certifications. Looking at the usage data, they were able to modify the playlists based on what worked best for each job role, each team, and even according to what seemed to be most successful on each day of the week. Here, the trainers were not fulfilling their normal role of creating and delivering courses. They were instead using their valuable expertise to curate existing materials created by someone else.

It is not only internal L&D departments that are taking this curation role. Founded in 2012, US-based Degreed is one of a number of companies making it their business. Degreed acts as a super curator,

pulling in courses from the likes of Lynda and elsewhere, as well as selected articles, papers and book extracts to make learning playlists from almost anything on the web, and track progression across them.

Picking a way across that range of materials can be a daunting task, which is where the playlists come in. Degreed has sets of playlists for individuals by role, by aim and by job title. It can also track reading as well as formal online and face-to-face courses, and firmly pitches itself against traditional learning systems.

Personalized playlists like this are a natural extension of the idea of curated content sets that we saw in Chapter 6, but taken to a new level of sophistication. That sophistication, however, is resource intensive to achieve. To work well at scale, it is not something that can be done practicably by hand.

## **Algorithms and artificial intelligence**

How does Amazon know which book to suggest you read next? How does Netflix have an uncanny sense of your viewing tastes? How can Google suggest what you are going to type in that search box before you even finish? They all use algorithms, based on our usage patterns and those of millions of other users. The amount of personalization in the services we use every day is extraordinary, and yet we barely remark on it.

Given the proven success of algorithms in our daily life, many software providers are extending the same principle to learning in the workforce. London-based Filtered was founded in 2009, has a staff of about 30 and a US patent pending on its algorithm for identifying the course content that people don't know, yet really need. This start-up uses the same principles as Amazon and Google to suggest what will work best for individual users of the system.

Filtered has built the various techniques behind its successful approach from scratch, and has been relentless about testing and measuring the effectiveness of this approach. They point out that not only do adaptive courses take less time to complete (by an estimated 20–50 per cent), they are also more effective. In a controlled study across 3,000 users, those adopting the adaptive approach learned 26 per cent more than those using a one-size-fits-all course (Filtered, 2016).

The prospect of learning more, in less time, is something of a holy grail for anyone buying a learning technology, and is a distance away from the traditional approach of simply parcelling up and distributing information and calling it training. Once exposed to the effectiveness of an algorithm-driven approach, individual learners and their employers are unlikely to want to return to one-size-fits-all training.

Rather as Google rapidly overtook other search engines such as Alta Vista in the early 2000s to establish a dominant position, we can expect a battle of the algorithms in learning technology. And this will not just be about the careful, personalized delivery of learning content for individuals. A deep application of artificial intelligence will do much more than this.

Imagine a machine that could learn about your patterns of behaviour from following your diary, your online activity and scanning your mail. Imagine if you also shared with it your personal and professional goals. Such a machine would certainly be able to provide content tailored for your preferred times and ways of learning. If you had said you needed to know more about business finance to develop yourself at work, then it could find a way to assess what you already knew, and only provide material to build on that. It would deliver that material at a time and in a way that suited you. Perhaps on your morning commute you would prefer a podcast and at the weekends some reading.

But suppose it went further, and aligned your learning programme with your areas of unconscious incompetence – where you need to know, but don't know that you need to know. And perhaps it could also add in material as a result of what it knows about developments in your company, and in your area of professional work. This machine would aim to help you prepare for a future you could not anticipate by factoring in trends you were unable to see. In the long term, that would provide you with a compelling advantage over others in the same field.

Suppose it did not stop at providing access to content personalized for your needs, but also included performance support, and suggested you connect with particular experts who could help you develop through *ad hoc* conversation. This artificial intelligence machine would not be a Learning Management System that we

turned to reluctantly when we needed to do our annual compliance training, it would be an invisible, seamless, part of our working lives, the antithesis of what poor Sally was struggling with in Starbucks.

In a world where artificial intelligence can beat expert humans not just at chess but also at poker (Naughton, 2017), detect a lie in an e-mail (Billington, 2016) and against the odds predict the outcome of the US presidential election (Engel, 2016), it is not merely credible that such a machine could be built, I would say it is inevitable. It is unlikely to be a single 'machine', but rather a series of services, offered by different providers. It will arrive piecemeal, rather than all at once, but arrive it will, and sooner than we think, for one compelling reason: it is good business. As human capital and intangible assets increasingly become the main differentiators for organizations, and as the capability of artificial intelligence rises and its costs fall, it is simply a matter of time before we see AI transforming how we learn. The question is not when it will happen, but rather who has the money and expertise to make it happen?

## **The future is different, large and well-funded**

Traditionally, the learning technologies market has been highly fragmented and not particularly large. It has a few big players and plenty of smaller ones. Nobody knows how many LMS providers there are, but estimates put the number at over 500. There are tens of thousands of bespoke content providers worldwide. Some niche companies among these may be able to provide parts of the artificial intelligence learning solution of the future, but evidence suggests that the future of learning technologies may belong in the hands of the world's software giants.

In December 2015, Facebook founder Mark Zuckerberg announced that he and his wife planned to give away 99 per cent of their Facebook shares – currently valued at about US \$45 billion – to a variety of causes, including software 'that understands how you learn best and where you need to focus' (Herold, 2016). He has already

begun donations to trusts focused on schools, even though his 2010 donation of US \$100 million to help schools in Newark is widely regarded as a failure (Russakoff, 2015). Whatever else happens, this level of funding and support will at the very least impact where other people decide to invest.

The key learning technology that Zuckerberg's company has backed is Oculus Rift, the virtual reality (VR) technology that Facebook bought in 2014 for US \$2 billion (an eye-watering sum considering that the small company wasn't actually generating any sales at that stage). His explanation for the purchase underlines his commitment to learning and his long-term vision that enabled him to see beyond Oculus Rift's then focus on gaming. On Facebook, he wrote: 'Imagine... enjoying a court side seat at a game, studying in a classroom of students and teachers all over the world or consulting with a doctor face-to-face – just by putting on goggles in your home' (Zuckerberg, 2014). US \$2 billion for a technology that is significantly focused on education and learning. That's a game changer.

However, it is also interesting to see how limited Zuckerberg's explanation was of the possible uses of VR technology for learning: 'Studying in a classroom of students and teachers'. This is, literally, the schoolroom assumption. Scottish learning technologist and blogger Donald Clark sees things differently. Writing after the acquisition, he pointed out 10 ways in which VR was already being used for learning, including putting yourself in someone else's shoes for diversity training, construction training and understanding physics better by trying a space-walk (Clark, 2014).

VR is just an example of one area of the substantial investment a software giant is willing to make to affect learning at work. What really matters is the influence of significant companies in this field, something that didn't happen at the beginning of the e-learning revolution. Facebook has Oculus Rift. Microsoft/LinkedIn has Lynda. Google has Google classroom (an administrative tool for teachers). More importantly, all of these companies also have an impressive understanding of the power of algorithms and artificial intelligence, a long history of using them and the resources to make them work.

If the idea of my invisible 'learning machine' sounds incredible, consider how utterly incredible and distant a self-driving car would

have seemed in 2005. And yet now, in 2017, we have self-driving cars and lorries on trial on the road, close to mainstream production. And the main company behind that innovation – Google – is not in the automotive or transport businesses. But neither is it in the software business. Its mission statement makes that clear: ‘Google’s mission is to organize the world’s information and make it universally accessible and useful’ (Google, 2017). Put like that, it seems that Google is squarely in the learning business. It and other software giants are set to impact the future of learning technologies substantially, by direct investment and through acquisition. While their influence will be substantial and beneficial to enterprises and employees, it is also likely to be fundamentally disruptive to the L&D industry and profession.

## A note of caution

It is impossible to consider any new technology without a combination of wonder and excitement at what it may make possible. However, it is also crucial to sound a note of caution.

We’ve been here before. In 1999 John Chambers suggested a grand vision for technology-supported learning. That vision failed to be realized. Instead we found click-next courses and frustration.

In his excellent *Geek Heresy*, Kentaro Toyama describes his journey from technophile to techno-realist, detailing a long series of recent instances in which technologies have failed to achieve their predicted impact, until the reader is compelled to ask why on earth we continue to make the same mistake of expecting technology to solve anything. He then points out our long history of such failings in the field of education, citing emeritus Stanford professor Larry Cuban’s chronicle of failures past. These begin with Edison’s belief (expressed in 1913) that ‘The motion picture is destined to revolutionize our educational system’. In 1932, Benjamin Darrow claimed that radio would be ‘a vibrant and challenging textbook of the air’ and in the 1960s President Kennedy authorized US \$32 million for classroom television programmes (Toyama, 2015).

It seems all we can learn from this is that humanity is destined never to learn from its own mistakes, however frequently repeated.

Although he describes himself as a 'recovering technoholic', Toyama does not claim that technology is evil or pointless. On the contrary, he gives many cases in which it has a positive effect. His point is that this is not an automatic result of implementing technology. Whether the impact is positive or negative depends on what was there beforehand. As he puts it: technology's primary effect is to amplify human forces. 'What people get out of technology depends on what they can do and want to do even without technology.'

This chapter began with a quote from Bill Gates. It will end with one, too, made 20 years before Toyama's book and which underscores his point. Gates, the co-founder of Microsoft, has lived through an amazing period of technical change and been responsible for a good part of it. In the course of his illustrious career he has accumulated a substantial fortune that he is now using to alleviate some of the worst conditions facing humanity – such as malaria – via the Bill and Melinda Gates Foundation.

In short, this man knows technology and knows that the world is far from perfect, but does not believe the former to be a panacea for the latter. Technology, he appreciates, is a selective power, to be used wisely, in the right circumstances.

In *The Road Ahead* – published years before John Chambers made his celebrated COMDEX speech – Gates wrote: 'The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency' (Gates *et al*, 1996).

Any learning and development professional who thinks things have changed dramatically since COMDEX 1999 is right. They should know, however, that this is only the beginning of a long, turbulent period of dramatic, technology-fuelled change with no end in sight. The plans of software giants such as Google and Facebook are evidence of that.

We must consider this unfolding technology landscape with Gates and Toyama in mind. We have to ask ourselves: How good are our current approaches to learning? Do we run the risk of making inadequate practice worse by applying technology? And that leads to deeper questioning: What shape will the future L&D profession take, and is everyone capable of adapting to it?

## Key takeaways

- 1 One current trend that will have an impact in the future of learning technologies is the increasing amount of good quality content available at low or no cost.
- 2 Massive, Open, Online Courses (MOOCs) are one example of the increased amount of such content that will challenge the need of L&D to produce its own.
- 3 Amid this super abundance of free material, it will be time-consuming to find the most useful content. This issue will be reduced by the increased use of playlists and other methods of curation, sometimes associated with learning platforms.
- 4 Increasingly, playlists will be created not by people but by algorithms. It is likely that they will be created not *en masse*, but personalized for individuals.
- 5 The greatest single future trend in learning technology is likely to be the use of artificial intelligence across a range of different technologies and services.
- 6 Artificial intelligence in this field will be hugely influenced by global software giants such as Facebook, Google and Microsoft/LinkedIn.

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