Educating the Next Generation Workforce

Preparing Students to Meet Employers’ Needs and Expectations

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EXECUTIVE SUMMARY

As technologies continue to develop at a rapid pace, the job market is constantly changing, as well. Newly minted college graduates increasingly find themselves in one of the many newly created jobs, while alumni need all the help they can get with respect to upskilling or even reskilling. Consequently, it has become crucial for higher education to evolve, as well, to ensure that their students are leaving with the knowledge, skillsets, and experiences necessary to meet the needs and expectations of today’s employers.

To be sure, there are more than a few trends and other influencers driving this transformation. The population is aging, as the workforce becomes increasingly younger, dominated by Millennials and Zoomers (Generation Z). WiFi and mobile connectivity are powering both the rise of social media as a major source of professional information and communication and flexible working arrangements, such as telework and freelance consulting. At the same time, artificial intelligence is displacing workers, as the skills gap is widening. So, to prepare the next generation workforce, postsecondary institutions must not only understand how these variables interact in surprising and complex ways, but also visualize plausible and interesting scenarios for addressing them.

For example, facial recognition technology already enables anyone walking down the street to immediately know all about us, as our personal information pops up through augmented reality. That said, new jobs like Personal Privacy Advisor will be created to protect individuals from such intrusion.¹

Likewise, as companies like Space X and Virgin Galactic grow, jobs like Space Tourism Guide will be created to help people prepare for a “holiday adventure in space.” By the same token, technological advances will undoubtedly cause jobs like HVAC Technician to morph into Smart-Building Technician.¹ Add to that growing list, both the loss and the creation of jobs from the impact of artificial intelligence and automation.

According to the World Economic Forum, it is estimated that around 75 million jobs will be lost or massively disrupted by machines by 2025, while another 133 million new roles may emerge that are more adapted to the new division of labor between humans, machines and algorithms.²

Photo Credit 2: Alex Iby, Unsplash778991
In a Pew Research Survey, Amy Webb, professor of strategic foresight at New York University and founder of the Future Today Institute was asked to think forward to the year 2030 with regards to artificial intelligence:

“As we move farther into this third era of computing, and as every single industry becomes more deeply entrenched with AI systems, we will need new hybrid-skilled knowledge workers who can operate in jobs that have never needed to exist before. We’ll need farmers who know how to work with big data sets; oncologists trained as roboticists; and biologists trained as electrical engineers. We won’t need to prepare our workforce just once, with a few changes to the curriculum. As AI matures, we will need a responsive workforce, capable of adapting to new processes, systems and tools every few years.”

The most successful higher education institutions have done well in preparing students for their future by enabling them to seamlessly flow from graduating onto the business landscape.

Thus, in moving students successfully from coursework to real work, it will be important for academia and industry to join forces in developing new models of self-paced, lifelong and “just right” learning, using the same technologies now being deployed in today’s workplace to provide learning experiences grounded in requisite skills for the next generation workforce.

The purpose of this paper is not to predict the future but to provide a framework for envisioning it. As decisionmakers and educators, it is important to think and plan strategically for the long-term, while considering the demographic and economic, social and cultural trends that will shape the next 15-20 years.

In previous papers, *The Online Classroom of the Future* and *Virtually Transforming Higher Education*, *The Case for Building a Digital Ecosystem* we took an in-depth look at the next generation virtual learning environment, along with the digital ecosystem needed to support it. In this paper, we will explore the jobs of tomorrow, along with the technologies and skills that are already powering them. We will consider what the workplace looks like now and how it will evolve going forward, while also identifying the major game-changers.
TRENDS AND OTHER INFLUENCERS

Now more than ever, we must rely on higher education to prepare students for the workforce, as well as life, at a time when both jobs and the skills needed to perform them are rapidly evolving. But to do that “well,” we must understand what is driving this evolution.

To begin with, the employee talent profile is evolving to accommodate the technology-driven innovation economy. What’s more, college graduates are entering the job market with different expectations, particularly when it comes to the work environments they prefer. And in a world where the only constant is change, they must also become fully invested in continuous upskilling – lifelong learning – if they want to remain employed. At the same time, today’s emerging technologies are revolutionizing the modern workplace.

Consequently, industry and academia are joining forces to define new models of lifelong, self-paced, and “just right” learning, using these same technologies to help educate the next generation workforce. But to ensure that these models really work, we must first understand what is powering both the workforce and the workplace. Here are a few of the most significant trends and influencers.

Cultural and Demographic Shifts

By 2020, Millennials and Generation Z (often referred to as “Zoomers”) will comprise an estimated 70% of the global workforce, at a time when experts say that higher education is falling behind the curve in successfully preparing them for the jobs of the future.

In looking ahead, employers are working with educators to prime the pump for delivering the continuous, just-in-time training these younger generations will demand, in the virtual format these younger generations have come to expect, thanks to the technologies they rely on for just about everything. As digital natives and entrepreneurial learners, they are used to learning on the go, whenever the need arises and wherever they have access to WiFi and a mobile device – a habit they are more than happy to carry over into their career lives.

WiFi and Mobile Connectivity

- An average of 1 million new users per day come online.
- 57% of the world’s population is now connected.
- 2/3rds of the world’s population are mobile users.
- 55% of all active connections come from smartphones.
- Smartphone traffic now exceeds desktop traffic.
Thanks to smartphones, the Internet is becoming ever more pervasive, even in remote parts of the world. According to We Are Social and Hootsuite’s recent report, mobile connectivity continues to grow, with nearly two-thirds of the world’s population using mobile phones - particularly those among the Millennial and Zoomer generations.

Not surprisingly, this trend has also paved the way for mobile learning, with its continuous, connected access to both formal and informal learning options. Indeed, this approach has become a favorite among today’s entrepreneurial learners, given its capacity to facilitate anytime, anywhere education and training for students and employees alike, whether standing in line for a campus parking pass or waiting for a team meeting to begin.

The Rise of Social Media

With the continued proliferation of smartphones, social media is on the rise. Over 2.7 billion of the world’s population are active users on mobile devices, which is a 30% increase in just a year. In fact, social media is now the primary source of communication and information flow between content creators and consumers.

Likewise, social platforms such as LinkedIn, Facebook and Reddit are being used ever more frequently – in both the classroom and the workplace – to foster intellectually engaging communities of practice that promote a sense of joint enterprise and professional identity. As the world becomes more and more connected, social media is fast reshaping the way business is conducted out in the world of work.

As Clodagh O’Brien of the Digital Marketing Institute recently said, “Not only is social media permeating society and ultimately the workplace today, search engine marketing (SEM) is becoming extremely influential. To put things in perspective, more than 6.5 billion SEM results are carried out each day with Google accounting for 77% of that traffic. Students with SEM experience will be able to increase the visibility of a company’s website on a search engine (e.g., Google) primarily via paid advertising.”

Flexible and Adaptable Learning and Working Arrangements

Greatly heightened mobility and virtual connectivity have not only untethered us from our dependence on physical spaces, it is also driving new education models, economies and social structures. Urbanization is rapidly growing in some parts of the world, while in other areas people are moving away from the city to get back to nature. Yet regardless of geographic location, digital technology provides us with ever more flexible and adaptive learning and working arrangements – from online degree programs and professional development to remote and freelance employment.
options. And online education has become an excellent training ground for building the virtual teamwork skills requisite in today’s increasingly digital workplace.

CEO and Founder of the Digital Workplace Group, Paul Miller, recently stated: “Requesting flexible working has become a legal right in some countries, and even where it isn’t, it’s becoming an essential for modern work and the only way to compete for the best people in an increasingly febrile “war for talent.”7 In fact, more than two-thirds of the worldwide labor force works away from the office at least once every week, according to researchers. Likewise, Switzerland-based office provider International Workplace Group (IWG) found that 70 percent of professionals work remotely at least one day a week, and 53 percent, for at least half of the week.8 And Emergence Capital, a company that has backed technology startups including Zoom, Yammer, and Salesforce, reported that 80 percent of the global workforce is deployed remotely and offsite, creating a deskless labor force of over 2.7 billion people.9

But, regardless of the figures, this trend toward virtual learning and working is a win-win for both the economy and the bottom line. To be sure, online education has become a “go to” revenue growth strategy for institutions of all sizes and types. Moreover, while workers embrace the flexibility of remote workplaces, employers are reaping tremendous savings. Global Workplace Analytics statistics10 indicate just how significant these savings can be:

- Full-time telecommuting can save companies between $20,000 and $37,000/employee/year.
- IBM slashed real estate costs by $50 million through telework.
- Sun Microsystems saved $68 million a year.
- Businesses lose $600 billion a year in workplace distractions. Best Buy, British Telecom, Dow Chemical and many others show that teleworkers are 35-40% more productive when working outside of the office.10
- Aetna, an insurance company with 14,500 of 35,000 employees who don’t have an “in-office” desk, shed 2.7 million square feet of office space, saving $78 million.11.

Coworking or shared workspaces are also popping up across the globe, as an offshoot of the telework movement. According to Deskmag, a German-based magazine that conducts worldwide surveys, the number of people sharing coworking spaces topped 1 million in 2017 and have since then doubled.12 Hosted by companies (chains), such as Copass, Regus, IWG, and Essensys, as well as through dedicated areas in coffee shops, churches and event venues, these coworking spaces are becoming quite popular among both remote employees and freelancers, many of whom find that they build strong community.
One such remote university employee – who shares workspace with other startups and freelancers just a short bicycle ride from his house – reports that both the collaborative energy and the networking opportunity is of tremendous value. At the same time, the connections he makes between higher education and these entrepreneurial ventures is priceless.

Large companies are also beginning to emulate their smaller counterparts when it comes to creating more adaptable organizational structures, with the goal of promoting greater creativity, risk-taking, collaboration and innovation. In addition to agile business practices, the trend to freelance and project-based work is rapidly emerging. What’s more, both industry and academia are experiencing the impact and expanded use of collaborative digital tools, such as videoconferencing and telepresence, as well as cutting edge technologies like blockchain for economic transactions and artificial intelligence for both customized learning and data analysis.

New computing platforms such as smartphones, wearables and drones are ideally suited to the needs of deskless workers, in that they are powerful and programmable just like the computing devices deskbound workers use. But they are also highly portable, which makes them a perfect fit for deskless environments. To accommodate this growing need, companies like StaffConnect are launching next-generation mobile employee engagement platforms.

Robust Networks

One of the biggest drivers of change will be the next generation of mobile Internet connectivity known as 5G. Given its ability to carry data up to 10x faster than 4G networks, 5G is already replacing 4G LTE connection. This improved mobile broadband is making way for autonomous vehicles; remote device control; expansion and management of the Internet of Things (IoT); and new ways of providing bandwidth-intense services such as healthcare.

- With 5G, the Internet of Things (IoT) will not only be able to handle exponentially more connections than 4G, it will also make it possible for IoT to go beyond smart homes to fully smart cities.
Next-Generation Automobiles: Making self-driving cars a reality will require 5G, but flying cars may also be in our future.\textsuperscript{14}

Telecommunications giant Verizon is deploying the power of 5G to better serve their patients, by using holography at a distance.\textsuperscript{15}

Not only can robust technologies be applied across great distances and to remote areas, but this level of broadband can connect the world by delivering faster, more reliable connection with download speeds averaging 1Gbps or more. Experts see this capability to be a huge game changer, as it will allow all technologies that depend on it to advance at a much faster speed, while delivering more robust levels of performance for applications, software programs and the IoT. According to analyst firm Gartner, 20.4 billion connected things are going to be in use worldwide by 2020.\textsuperscript{16}

\section*{NEXT GENERATION TECHNOLOGIES}

Although most Millennials and Zoomers are quite comfortable in the virtual world, they often lack the digital skills with which to effectively use the many emerging technologies that are rapidly changing the way we work. So, in educating and upskilling the next generation workforce, universities will need to focus more on digital literacy, by deploying those very technologies in the classroom.

\section*{Augmented and Virtual Reality}

In examining the modern workplace, numerous industries are viewed as taking advantage of augmented and virtual reality (AVR) technologies, including manufacturing, retail, real estate and space exploration; tourism, construction, finance, and healthcare. And while virtual and mixed reality are certainly growing in popularity, many believe that augmented reality will quickly become a technology favorite for such industries as gaming, healthcare, entertainment, and retail.
Here are just a few attention-grabbing statistics:

- In the last five years, the number of VR users has grown from less than 1 million to 150+ million.\textsuperscript{17}
- The VR market made a staggering $54 billion (47 billion Euro) in 2018 from VR devices alone.\textsuperscript{17}
- Revenue from AR mobile apps amounted to $725.4 million (633 million Euro) worldwide.\textsuperscript{17}
- The VR market is expected to reach $186 billion collectively from sales of devices and services by 2020.\textsuperscript{17}
- The global AR market is expected to reach approximately $133.78 billion in 2021.\textsuperscript{18}
- China’s market spending on augmented reality and virtual reality (VR/AR) is forecast to exceed $65.21 billion in 2023, according to a report published by the International Data Corporation (IDC).\textsuperscript{19}

Flight simulation was one of the earliest uses of VR and is still a safe method for training pilots and astronauts. So, why not take this concept and apply it to other areas? That is exactly what a collaborative global partnership of companies and universities joined forces to do with The Virtual Reality Flight Simulator for Surgery.

Most surgeons learn on dead, plastic or live bodies – none of which are ideal for learning. Consequently, three companies, two teaching hospitals, and two universities – FundamentalVR, Figment Productions, 3D Systems, Kings College London, Mayo Clinic, University College Hospital London, Imperial College London, and UCLA – set to find a better solution.

According to this group, The World Health Organization estimates that five billion people worldwide do not have access to surgeries of any kind. Their mission is to democratize surgical training and put it within arms-length of surgeons worldwide, to create a low-cost, highly effective simulation platform. The partnership created a revolutionary SaaS platform, combining virtual reality and haptic (the sense of touch) software simulations, which for the first time, provides surgeons with a cyber space for safely practicing procedures, while receiving feedback on their performance. The Surgical Haptic Intelligence Engine (SHIE) was a finalist in the Auggie Breakthrough Awards in 2018.\textsuperscript{20}

Collaborative partnerships such as this one, between corporations – such as Daimler Mercedes, Audi, Deutsche Bahn and IBM – and institutions of higher education – like Harvard, Technical University of Munich and Imperial College London – are producing any number of innovative industry-focused AVR applications. Indeed, these emerging technologies are being deployed for an ever-expanding range of educational and commercial purposes.
Training and Professional Development

Technology-enhanced, immersive learning – through serious games, simulations and virtual worlds – provides an engaging option for practicing real-world skills in a safe environment, while receiving valuable and continuous feedback. Just as a growing number of universities are using technologies like gamification and virtual reality to create immersive learning experiences, so are businesses beginning to leverage them for training.

In fact, AVR is becoming an essential tool for professional development across multiple functions in many industries, given that it enables companies to minimize the time and resources spent on training, while also maintaining and improving quality. On top of that, trainees master and retain new knowledge and skills at much higher rates, while having the benefit of constructive and immediate feedback on their performance. That said, virtual environments and simulated experiences can enable companies to bring employees up to speed quickly and accurately in new facilities or with new procedures. Here are a few good examples.

Walmart, the biggest retailer in the world, issued 17,000 Oculus Go headsets to train its more than one million U.S. employees in skills ranging from compliance to customer service. With a successful pilot program well behind them, over 45 training programs have been implemented. One, for example, focuses on learning to use the new Pickup Tower automated vending units in virtual environments. After implementing VR in 200 of Walmart’s training “academies,” (off-site training locations), Oculus Go VR machines have now been deployed in over 5,000 stores.\(^\text{21}\)

Toyota launched augmented reality for their Europe-based materials handling division, using EON Reality.\(^\text{22}\)

The United Nations Industrial Development Organization (UNIDO) revitalized its forest training centers in the Southern African Development Community.\(^\text{23}\)

Healthcare

Zion Market Research predicts the VR/AR market in healthcare will reach $5.1 billion by 2025,\(^\text{24}\) while Reports and Data project it reaching $6.91 billion, by 2026.\(^\text{25}\) Of course, considering AVR’s many uses, it is far from surprising that the healthcare market has been quick to adopt and apply
this technology for any number of purposes. Indeed, hospitals, emergency rooms, and medical schools are exploiting its tremendous value for, among other things, patient care, fitness management, education and training, pharmacy control, and surgery.

*U.S. News* cites a market and research report that shows more than 250 U.S. hospitals are using virtual reality to facilitate various health-related procedures and help patients visualize and understand their treatment plans. Some examples include helping individuals deal with substance use disorders; reducing pain during physical rehabilitation; and easing anxiety for patients going into surgery by explaining complex procedures.

The healthcare industry is also seeing positive outcomes for cancer patients, when this technology is deployed to immerse them in personal stories of those who have fought and won their battle with the disease. Equally impressive, patients suffering with stroke-related cognitive impairments can also undertake everyday tasks in VR, enabling them to increase speed and proficiency over time. The end result is increased cognitive function, with real data available to their doctor throughout for progress tracking.

Again, early adopters of this emerging technology are finding success through industry/academic partnerships. In a recent report, Cognizant shares how one such relationship has helped transform neonatal training: “We worked with the University of Newcastle (UON) in Australia to create a VR-based delivery room for midwifery students to learn key anatomy and birthing techniques. The solution simulates a virtual emergency neonatal resuscitation event.”

At the same time, some universities are striking out on their own, and in doing so, providing their students with valuable workplace skills, while also serving patients. A report from VR First describes several such projects:

- The University of Hamburg has a digital VR games joint project called “EXGAVINE: Motion Play in Virtual Reality as a Therapy for Neurological Diseases.”
- University College Cork is piloting a study, which indicates that Virtual Reality (VR) could be successful in raising awareness among men about the risk of testicular cancer.
Oklahoma State University’s Mixed Reality Lab, is creating an AR-based mobile app that functions as a mapping device for individuals with physical disabilities or mild memory loss.29

Transportation and Display Applications

AVR has also made its way quickly into the transportation industry, facilitating such breakthroughs as the present-day example of emerging holographic navigation systems for cars.

An advanced augmented reality interface provides clear directions and a wealth of helpful information designed to take travelers to their destinations as quickly and safely as possible. What’s more, drivers don’t need to wear special eyewear or headgear, given that AR visuals are projected directly to the front windshield of the car, as seen in the above illustration of DigiLens waveguide technology combined with innovations from Germany-based technology company, Continental.30

Nvidia’s DriveAR platform, powered by machine learning, uses a dashboard-mounted display overlaying graphics on camera footage from around the car, pointing out everything from hazards to historic landmarks along the way. Car manufacturers, Audi, Mercedes-Benz, Tesla, Toyota, and Volvo are now all on board to use this technology. Likewise, Alibaba-backed start-up, WayRay, projects AR data directly onto the car windshield, giving navigation prompts, right-of-way information, lane identification and hazard detection (Marr 2019).31

Photo Credit 9: DigiLens and Continental
While companies such as Nvidia, DigiLens, Continental are transforming windshield experiences for the auto industry through AR, pioneers such as Spatial are leading the way with AR tools for the boardroom and office.

**Business/Finance**

Employees can now work collaboratively from anywhere in the world on virtual whiteboards and pin boards, as well as design documents overlaid on real-world objects. In fact, by joining via videoconferencing, team members can appear as if they are physically in the room through the wonders of augmented reality. Once the group is together, documents, sticky notes, images, and more can be displayed for collaborative activities.32

A short video clip vividly demonstrates how Spatial uses the space around you to create a shareable augmented workplace, which brings remote users together to seamlessly collaborate, search, brainstorm, and share content – whether wearing a headset like HoloLens 2 or Magic Leap One for a 3D experience, or simply using your computer for a 2D experience.33

By the same token, the finance industry is also great example of how early adopters are using AVR for visualization whether trying to beat the competition or better serve customers. For example, Fidelity Labs – part of a multinational financial services corporation – is heavily invested in
identifying emerging opportunities that align with Fidelity’s core business. With eight global locations, the labs employ researchers and strategists who look three to five years out for technologies and changes that can impact their customers.

With the help of such innovative technologies as virtual reality, artificial intelligence and wearables, they are exploring new ways to improve people’s financial lives, creating incubators that focus on rapid experimentation with a customer-centric approach to problem solving. Take for example a VR agent named Cora, who answers questions about stocks and companies through a “Hosted” VR Experience built on Amazon Sumerian. 

Likewise, other banks and credit unions are pioneering VR apps to showcase their digital banking solutions in artificial 3D environments. One such project hatched by Commonwealth Bank – one of the largest in Australia – resulted in the Virtual Reality Workplace Experience (which, in fact, makes a great learning activity). By downloading the bank’s app anyone can lead a project team to build a customer-focused app, while powering through a series of challenges.

Moreover, a VR First project focuses on business applications that use virtual reality as a multi-dimensional data visualization tool by repurposing AVR technologies developed for games. Caltech and NASA Jet Propulsion Laboratory (JPL) are also creating a company called Virtualitics to enable intuitive and collaborative data exploration, visualization and analysis.
And at the intersection of Big Data, Machine Intelligence, and Virtual and Augmented Reality, an innovative platform is under development for effective, collaborative discovery of patterns in complex, high-dimensionality data. With the goal of extracting actionable knowledge that may be hidden, analysts can create a 3D immersive visualization.\(^{38}\)

**Marketing**

From a home improvement store that immerses viewers in a “Do-it-Yourself” experience to a virtual seat at London’s Fashion Week, marketing to customers takes on many shapes and forms, all of which are highly effective. Here are three examples from the marketing, sales and service software company Hubspot.\(^{39}\)

**ADIDAS** ran a VR campaign featuring two athletes on a mountain-climbing journey, designed to advertise their TERREX line of outdoor apparel and accessories. The experience gives viewers a 360-degree view of this journey, as if rock climbing alongside.

European makers of the **BOURSIN** brand of Gournay cheese created a live experiential marketing campaign, the Sensorium. This multi-sensory VR experience takes users through a virtual refrigerator, to raise awareness about its products' flavor profiles, food pairings, and recipe ideas.\(^{40}\)

**DP WORLD** helps businesses transport goods around the world. When opening a new terminal, they need to market what they have to offer – which they do, by conducting a VR 360-degree tour of the company’s terminal. This unique
approach enables prospective customers to experience how efficient, safe, and crucial these facilities are.

**Entertainment**

In the past couple of years, virtual reality entertainment rooms and stands have popped up in shopping centers and other public meeting places. Likewise, massive VR theme parks have been opened such as the one in Dubai, which was opened with the help of Chinese investors.

Museums are also using AVR to transform the visitor experience. Such is the case with the Historium Brugge in Belgium which transports customers into the medieval era to relive the Golden Age of Bruges as if you were there in person.

**Manufacturing**

From a design perspective, manufacturing companies can test products virtually before physical prototypes are created, which means better ergonomic designs and improved usability. Airbus and Boeing use AR in manufacturing facilities. To assist with wire harnessing on a Boeing aircraft, for example, operators have the virtual instructions immediately in sight, instead of referring to harnessing schemes displayed in a massive PDF document on a computer screen. Boeing reported that the AR system has cut production times by one-fourth and cut error rates by half.41

**Construction**

To save companies from costly mistakes, augmented reality empowers architects and engineers to see a detailed virtual example of a new building. Other areas and industries benefitting from AVR include safety, emergency preparedness, biotechnology, pharmaceuticals, aviation, oil and gas, military, sales, and more.
Gamification

Like augmented, virtual, and mixed realities, gamification has moved beyond entertainment to become a staple technology in both academia and industry. And no wonder, given the many easy-to-deploy solutions, including badges, levels and leaderboards, that have proven successful for engaging students and employees alike.

Rated #1 among “Gamification Gurus Power 100” by RISE and awarded the “Gamification Guru of the Year” by the World Gamification Congress three times since 2014, Yu-kai Chou is an often-published author on gamification and behavioral design. Having spent more than 20 years in the field, he has advised such corporate giants as Google, Accenture and Tesla around the power of gamification and game-based learning across every aspect of the business enterprise, from sales and products, to lifestyle and consumer behavior. The table below captures some of the statistical data Chou has gathered along the way:

<table>
<thead>
<tr>
<th>The SAP Community Network re-gamified its already-mature system increasing usage by 400% and community feedback by 96%.</th>
<th>SAP Streamwork added gamification in brainstorming groups and grew generated ideas by 58%.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spotify and Living Social replaced annual reviews with a mobile gamified solution and saw over 90% of employees participate voluntarily.</td>
<td>CalLLogix reduced attrition by 50% and absenteeism by 80% to save $380,000 annually.</td>
</tr>
<tr>
<td>Google designed a Travel Expense System resulting in close to 100% of employee compliance for travel expenses.</td>
<td>Deloitte gamified training programs which took 50% less time to complete and massively improved long-term engagement.</td>
</tr>
<tr>
<td>Idea Street, the Department of Work and Pensions in the UK, used game mechanics to get 120,000 people to contribute 4000 ideas, with 63 of them implemented in the marketing department.</td>
<td>Consumer behavior gamification Joiz, a Swiss television network, increased sharing by 100% and social referral traffic by 54% with social infrastructure and gamification technologies.</td>
</tr>
<tr>
<td>Drexel University created Diet DASH which was shown to reduce sugar intake and over half the players lost 3% body weight over a 2-month period.</td>
<td>With Investorville, a property-investing game from the Commonwealth Bank of Australia created 600 new loans.</td>
</tr>
</tbody>
</table>

Photo Credit 16: David Sager, Unsplash
Moosejaw clothing company saw 76% of sales revenue come from gamified activities, including 240k social media impressions, resulting in a 560% ROI from initial marketing expenditures.

Volkswagen got 33 million webpage hits and 119,000 ideas through its gamified People’s Car Project that lets people design their “perfect car.”

Extraco Bank raised customer acquisition by 700% through its gamified system.

Samsung Nation experienced a 500% increase in customer product reviews, and 66% increase in site’s visits when using gamification.

Microsoft improved its translations for Windows OS through the Language Quality game with over 900 employees completing 26,000 tasks with 170 additional errors reported.

Nike used gamified feedback to drive over 5,000,000 users to beat their personal fitness goals every day of the year.

Astra Zeneca gamified medicine training to see 97% of their large network of agents participate with a 99% completion rate.

Devhub, a place for Web developers, added gaming feedback and watched in awe as the percentage of users who finished their sites shot up from 10% to 80%.

Likewise, companies like Verint have used gamification to drive a dramatic uptick of 300% in their sales processes. A global leader in Actionable Intelligence® solutions with a focus on customer engagement, security intelligence, and fraud, risk, and compliance, Verint reports that it is a highly effective digital tool for encouraging sales professionals to perform requisite administrative tasks and processes that resulted in greater sales volume and a much-improved bottom line. And in a similar fashion, Dr. Jianming Dong, Chief User Experience Architect at Huawei, found Octalysis to be a turnkey for gamification in any product and service design, as a potent and pragmatic human behavioral framework for encouraging people to do their best work.

**Voice and Facial Recognition**

Voice and facial recognition is yet another emerging technology that will become commonplace in the modern workplace. While still controversial, facial recognition has safely made its debut in business meetings, including those held through video conferencing. Some systems not only keep attendance records but can also adjust the camera to capture the best view for far side participants. What’s more, this technology can enable secure office access for employees, by scanning faces against company records.

Industry leaders like Face++ and Kairos, are leading the market for facial recognition software, which at an annual growth rate of

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**Figure 1:** Yu-kai Chou: Gamification stats and figures

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Photo Credit 17: Dylan Nolte Unsplash
NGRgFt3Zhy4
20% is expected to be worth $9 billion by 2022, according to Market Research Future⁴⁵ – and for good reason. After conducting an environmental scan of facial recognition applications in the field, Emerji found the majority of use-cases fall into three major categories:

- **Security**: Companies are training deep learning algorithms to recognize fraud detection, reduce the need for traditional passwords, and improve the ability to distinguish between a human face and a photograph.
- **Healthcare**: Machine learning is being combined with computer vision to more accurately track patient medication consumption and support pain management procedures.
- **Marketing**: Although fraught with ethical considerations, marketing is a burgeoning domain of facial recognition innovation and one we can expect to see more of as this technology becomes ubiquitous.⁴⁶

Likewise, most people are familiar with voice recognition, as a digital tool that can convert human speech into the written word. Consequently, it is often used in texting or through services like Siri and Alexa. While these applications are focused on giving the end user some ease and control over their devices, they are increasingly popular in the workplace for business meetings and conferences. What’s more, natural language processing (NLP) tools allow learners in all settings to search lecture-captured content through key words and phrases. Indeed, as the technology improves, it will enable users to catalogue large streams of communication, while tracking individual speakers. So, imagine being able to revisit a meeting in which important decisions were made and extensive “next steps” were determined.

**Artificial Intelligence and Automation**

As learning technologies expert George Siemens once put it, “The way we learn should be our most personalized experience because no two people process information the same way.” That said, artificial intelligence is fast becoming the key to fulfilling that dictum. In fact, ever more sophisticated Artificial Intelligence (AI) technologies like analytics, machine learning and chatbots are being rapidly deployed in the service of personalized and responsive learning, enabling us to focus on mastering the right skills, in the right way, for the right job.

We can all benefit from AI’s ability to connect the dots between formal education and job training, by continuously assessing and addressing skills gaps, while creating customized learning content to close them. This technology has also given rise to innovations like *Experience API*, a learning
technology specification that makes it possible to collect and track critical data from any learning experience, in any environment, on any device.

At the same time, AI is transforming the workplace itself at an alarming speed, as the technology behind automation, particularly for low-skilled jobs. Just walk into Walmart and see how many cashiers have been replaced with automated checkout terminals, using AI-powered cameras to prevent theft and shrinkage. While experts project more than 75 million jobs will be lost or massively disrupted over the next five years, there is also good news in that around 133 million new jobs will be created during the same time.²

The Future of Jobs 2018 report, published by the World Economic Forum, states, “New technologies can drive business growth, job creation and demand for specialist skills but they can also displace entire roles when certain tasks become obsolete or automated. Skills gaps—both among workers and among the leadership of organizations—can speed up the trends towards automation in some cases but can also pose barriers to the adoption of new technologies and therefore impede business growth.”²

Likewise, Dror Poleg, strategy adviser at flexible workplace provider Breather, which serves companies such as Spotify, Away and Tesla, put it succinctly when he said:

"The rise of A.I. and automation software means humans are moving away from repetitive tasks and are increasingly focused on tasks only humans can do: think creatively and interact with other humans. For workspaces, this means people spend less time sitting at their desks and more time in a diversity of settings. The most innovative companies are no longer thinking about workspace as a single location, but rather a network of spaces that employees can access based on what they are trying to achieve--brainstorm a new product, train a new sales team, impress a client, or work quietly on their own. Uber and Spotify have revolutionized access to music and mobility, by giving everyone a private driver or a personalized playlist for a specific occasion. Employees will increasingly expect the same level of choice and diversity from their workspace."⁴⁸
In an interview with Forbes Magazine, Jeetu Patel, Chief Product Officer of Box, also said that AI and automation will have an impact on some half a billion white collar jobs, a subject he is well-versed in given that his company, which assists 92,000 businesses with automating processes and managing workflows, has been building intelligence into its product for years. As he stated:

“Digital transformation is more urgent than ever as enterprises face emerging competitors, pressure to innovate and release products faster, and the need to provide real-time access to information. Companies need to re-imagine how they work, how they interact with customers, and how they operate with stakeholders inside and outside their organization. To become truly digital, businesses have to re-think the very fabric of their make-up and begin to fundamentally think and work in new ways.”

And after completing an extensive research study into the correlations between automation and productivity, The McKinsey Global Institute estimates that about half of all the activities people are paid to do in the global workforce could potentially be automated by adapting currently demonstrated technologies – a move that amounts to almost $15 trillion in wages.

In addition to automating jobs, AI is redefining the way we live, work and learn, thanks to companies like the China-based SenseTime. As the most profitable AI company in the world, with a current valuation of $4.5 billion, it maintains a portfolio of some 700 clients and partners, including the Massachusetts Institute of Technology (MIT), Qualcomm, Honda, Alibaba, and Weibo.

In its mission to power the future, SenseTime has developed a variety of AI and machine vision technologies, including face, image, object and text recognition; medical image and video analysis; remote sensing; and autonomous driving systems – which have been deployed across numerous industries, from healthcare to finance; online entertainment to education; retail to security; and smart cities to smartphones. The company has also created a deep learning platform; while establishing itself as the largest algorithm provider in China, as well as the fifth largest AI platform. SenseTime is also part of a consortium of tech titans working with the Chinese government on Made in China 2025, an initiative to make the country economically autonomous.
NEW AND FUTURE JOBS

Looking into the future can be overwhelming, particularly given the speed at which things are changing. Yet, as we ascend further into the digital age, we should probably stop and reflect on the bottom line. What kinds of jobs are we preparing students for and how will that affect the direction higher education is taking?

Consider some of the newest jobs on the labor landscape. Just as predicted in 2013 by the Association for Unmanned Vehicle Systems International, the drone industry is well on its way in creating 100,000 jobs by 2025. Likewise, the World Economic Forum predicted an increasing demand by 2022 for data analysts and scientists; software and applications developers; and e-commerce and social media specialists.²

While current job opportunities exist for data architects, systems analysts, digital marketing strategists, mobile software developers, and blockchain developers, future options will include personal privacy advisors; smart-building designers and technicians; cyborg designers and robotics service technicians; remote healthcare engineers; weather control and genetic engineers; extinct species revivalists; and mind transfer specialists.⁵²

Imagine custom body part manufacturers who will oversee growing organs or producing them with 3D printing using the patient’s own cells, or workers who oversee the process of implanting special computer chips into the brain for virtual telepathy, memory enhancement and disease management; mood regulation and paralysis treatment. Pharmaceutical artisans will create targeted treatments from an individual’s stem cells, while organizational disrupters will help larger companies become more adaptable, like smaller organizations. And hyper-intelligent transportation engineers will be needed to design and build smart roads, vacuum-tube tunnels, maglev trains or advanced systems not yet dreamed of.⁵²

Exemplary Job Postings

In its recent whitepaper, 21 Jobs of the Future, Cognizant projects low- to mid-tech and mid- to high-tech positions, as exemplified in the following job postings it anticipates seeing down the road.⁵³
**Master of Edge Computing**
As the master of edge computing, you will help us overhaul the full-scale infrastructure to ensure the new technology seamlessly interacts with legacy systems, minimizes latency and delivers the required business benefits.

**Cyber City Analysts**
Our organization is seeking a team of cyber city analysts to ensure the safety, security and functionality of our municipality. Cyber city analysts ensure the steady flow of “healthy” data around our cities – including bio data, citizen data and asset data – by ensuring all technical and transmission equipment functions without being compromised. The person in this role will carry out the necessary repairs when automated data flows are flagged by the city resilience team as broken, faulty or hacked.

As a member of our growing team of cyber city analysts, you will ensure the functionality and security of the digital systems and processes that make our modern city work. You will serve as the critical frontline to ensure interoperable data flow keeps our city safe, secure and operational.

**Chief Trust Officer**
An alloyed role is emerging in our organization that requires the combined financial and regulatory acumen needed to deal in traditional and cryptocurrencies, with the PR expertise to maintain a positive public image that upholds our organization’s financial and public integrity.

**Quantum Machine Learning Analysts**
We are seeking bright and ambitious quantum machine learning (QML) analysts to join our software research team. Individuals in this role research and develop next-generation solutions by integrating the disciplines of quantum information processing with machine learning. As a QML analyst, you will be at the intersection of quantum information processing and machine learning to create technology functionalities that never existed before.

**Personal Data Broker**
The successful personal data broker will monitor and trade in all forms of personal data that a client creates from his/her micro data feeds, streaming preferences to platform data. The personal data broker is one of a number of new data roles created within the newly mandated banking sector to administer the personal data assets of citizens and consumers. This followed the market’s “big bang,” which led to the establishment of 10 interoperable data exchanges across Asia, Africa, Europe and the Americas. As a personal data broker, you will ensure consumers (clients) receive revenue from their data.
**Personal Memory Curator**

As a personal memory curator, you will consult with patients and stakeholders to generate specifications for virtual reality experiences that bring a particular time, place or event to life. The ideal candidate will have a high degree of emotional intelligence to uncover lost memories and experiences, together with a solid grounding in virtual reality simulation techniques.

Tailoring and managing the “advance memory statement” is a central requirement of the role. You will generate and manage the advance memory statement, and work with a team of researchers to blend content from personal data feeds and image banks to beta-test experiences agreeable to the client. You will then create a specification for the virtual reality team to architect and create the sets, mood, historical time, etc.

**Augmented Journey Builder**

As a pioneer in the “experience economy,” we’re seeking tens of thousands of talented AR Journey Builders who can help design, write, create, calibrate, gamify, build and – most importantly – personalize the next generation of mind-blowing stories and in-the-moment vignettes for our clients’ trips in augmented reality. Much as composers, bricklayers, and playwrights, were in demand a century ago, AR Journey builders are their 21st Century successors, transposed to the medium of AR – equal parts “experience composers,” “Data overlayers” and CX/UXwrights.”

**Genetic Diversity Officer**

Our organization is seeking a full-time experienced genetic diversity officer. The individual will work closely with our country and business unit heads, as well as our in-house and third-party genetic pathologists, to ensure genetic inclusion within the organization. The successful candidate will either be experienced in genetic equality or have experience handling and implementing other equality programs within organizations and be willing to undergo training on genetic enhancement methodology and implications. As our genetic diversity officer, your primary role will be to facilitate the profitability and productivity of the organization while fostering an environment of genetic inclusion.53

The World Economic Form has published two reports on the future of work, the most recent of which comprised a significant volume of research focused around how emerging technologies and automation will disrupt jobs and improve the quality of productivity. The following tables (Table 5 and 6 respectively) summarize some of its findings.54
The Skills Gap

The most obvious fact about the future is that technology will dominate both our personal and professional lives. The McKinsey Global Institute summarizes and then estimates that by 2030, AI will have displaced up to one fifth of the global workforce and at the same time, emerging...
technologies will create new jobs. Consequently, higher education must also plan ahead with respect to teaching the complex skills needed for preparing the next generation workforce to flourish.\textsuperscript{50}

According to the World Economic Forum, by 2022, no less than 54% of all employees will require significant re- and upskilling, with some 35% expected to need additional training of up to six months; 9%, six to 12 months; and 10%, more than a year.\textsuperscript{2} The organization also reports that while multiple strategies are in place for addressing skills gaps, companies point to three, in particular, for managing the skills gap that continues to widen as new technologies are adopted:

- Hiring wholly new permanent staffs that possess pertinent skills
- Automating the relevant work tasks altogether
- Retraining existing employees.\textsuperscript{2}

So, what are companies looking for in future employees?

Fidelity Labs, mentioned earlier, advertises that they are seeking explorers, visionaries, and makers, while other employers are looking for experts who are also resourceful, adaptable and able to generate quick and effective solutions. And Clodagh O’Brien of the Digital Marketing Institute writes that, when surveyed, 58%, 55% and 52% of professionals in the U.S., the UK and Ireland respectively see strategy and planning as a leading skills gap in their organizations.\textsuperscript{55}

Moreover, in meeting workforce needs, educators and employers are coming up with innovative solutions. For example, Fidelity has started teaching design thinking workshops in secondary schools in an effort to develop its future workforce. Likewise, elementary and high schools in Canada and other parts of the world are piloting “Genius Hour” projects, where students are encouraged to work on topics that interest them from one hour every week up to as much as 20% of their school day.

This program emulates the way tech companies, such as Google, encourage employees to work on areas of interest outside of their usual workload, but within their working hours. Students receive support around developing new approaches and ideas on their own, which gives them ownership and responsibility for their learning. The program culminates with students showcasing their projects to their peers and the wider school community. Programs like this also help develop other important attributes, such as entrepreneurial skills, self-directed learning and creative problem-solving.\textsuperscript{55}
In collecting and analyzing market intelligence, Erasmus+ programs of the European Union, such as Skill UP\textsuperscript{56} and Elene 4 Work,\textsuperscript{57} have developed a framework of skills, grouped into four categories:

- **social skills**
  - teamwork, flexibility, openness for constructive feedback and humility.
  - students are too self-confident and convinced they know everything

- **personal skills**
  - empathy, honesty, commitment and motivation, openness for new things to learn, curiosity, patience, perseverance, capacity to learn from one’s failure

- **“self-skills”**
  - self-evaluation
  - self-regulation of the learning process and, as a consequence, capacity to make a conscious career choice

- **learning skills**
  - synthesis, skills of numeracy, ability to absorb in and deeply familiarize the topic, presentation skills

In a similar vein, this illustration summarizes findings from two recent articles.

**FINAL THOUGHTS**

In a world where the only constant is change, 21\textsuperscript{st} century workers must become fully invested in their own continuous learning process - *if they want to remain employed, that is.*

So, in supporting this reality, we will need to move beyond traditional, degree-driven education to embrace new models of self-paced, lifelong and “just right” learning, using the latest technologies to help bridge the skills gap. That will undoubtedly require a collaborative research and development effort between academia and industry, with universities taking the lead to create, pilot and evaluate digital learning tools and experiential curricula that can be effectively used in both settings.
While a college degree will still hold value for the foreseeable future, employers are already beginning to hire on the basis of demonstrated skills, rather than credit hours. Consequently, these new models must also incorporate alternative credentialing systems, like stackable badges, professional certificates and competency-based learning, which empower entrepreneurial learners to customize an educational roadmap that aligns with industry standards for a chosen career path. Moreover, e-portfolios for tracking these credentials from coursework to real work will become must-haves for career advancement.

With competition fierce among higher education institutions and the pressing needs of the next generation workplace, student experiences and employable competencies are critical success factors in attracting and retaining students. High-quality programs must give students the skills that employers are seeking.

REFERENCES


ACKNOWLEDGMENTS

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