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## **Lifelong learning- How to survive in the age of automation**

A couple of weeks back, the Economist featured a well-researched and thought provoking cover story on lifelong learning, a topic that is surely of interest to all of us. We will look at some key points covered in the report.

### **Introduction**

Information technology is rapidly transforming the way we work. More specifically, automation is eating into a range of jobs, which in the past needed human skills. The need for lifelong learning, i.e. constant upskilling and reskilling throughout our working life has never been more compelling. The current model of formal college education at the start of our life and backed up by a little bit of training once in a while in the organizations where we work, is becoming increasingly inadequate. How the problem is to be tackled is still not fully clear. However, some useful ideas are emerging. We will look at them in this write up.

### **Understanding the ground realities**

The education landscape needs a complete remake if we want to address the problem of lifelong learning effectively. Consider college education to start with. For long, college education has been considered as the stepping stone to better jobs, higher incomes and a more prosperous future. Between 1982 and 2001, the average wages earned by American workers with a bachelor's degree rose by 31%, whereas those of high-school graduates did not budge. (according to the New York Federal Reserve) But in the following 12 years, the wages of college graduates fell more, compared to their less educated peers. At the same time, tuition costs at universities have been rising. Thus there is growing cynicism about the relevance and benefits of formal college education.

Corporate training should logically play a big role in reskilling and upskilling people. But the news here is not too good. In the US and in the UK, the average amount of training received by workers seems to be falling. This may reflect the hard reality

that when the times are tough, as indeed they are today, training is one of the first expense items that gets attention.

Is vocational education the answer? Vocational training certainly has a role to play in providing market relevant skills to people and is good at making people who do not go to college more employable. But giving specialized training to someone early in life to do one thing all their lives is not the answer to lifelong learning. Vocational education, does not do much to help people adapt to changes in the world of work. Indeed, research done at the Hoover Institution suggests that people with vocational education are more likely than those with a general education to withdraw from the labor force as they age. The pattern is particularly noticeable in countries that depend heavily on apprenticeships, such as Germany. Some OECD education experts feel that Germany has not quite adapted to the knowledge economy.

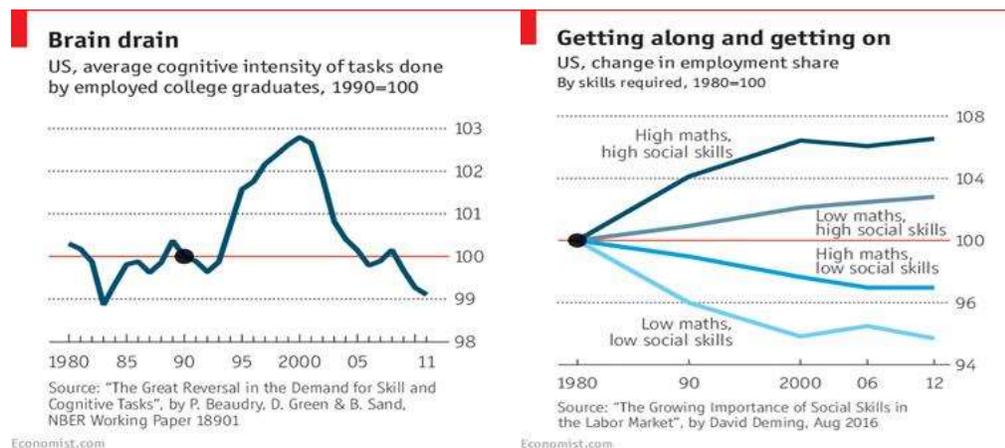
### **The impact of automation on jobs**

Automation is having a big impact on the job market. Between 1996 and 2015, the share of the American workforce employed in routine office jobs declined from 25.5% to 21% eliminating 7 million jobs. Between the onset of the global financial crisis in 2007 and 2015, job openings for unskilled routine work suffered a 55% decline relative to other jobs.

Many optimists have argued that as automation removes jobs, new kinds of jobs will emerge. But this view may be too simplistic. According to a paper published in 2013 by Canadian economists, Paul Beaudry, David Green and Benjamin Sand, the demand for interesting and intellectually stimulating work is tapering off. In the two decades prior to 2000, demand for jobs involving such work shot up as the computerization wave gathered momentum. But now that the technology is largely in place, this demand has waned. In the US, since 2000, the share of employment accounted for, by such jobs has been falling. Thus, college-educated workers are taking on jobs that are cognitively less demanding, displacing less educated workers. Those with better education are still more likely to find work, but these

jobs may not be very satisfying. And those who never made it to college may be squeezed out of the workforce altogether.

While on the subject of automation, we must note that when computers were first introduced, the focus was on enabling and supporting people and making them more productive. As routine jobs were automated, people could focus on doing the cognitively more demanding parts of their jobs, such as analysis and decision making. But now the scenario is somewhat different. Artificial intelligence is enabling the substitution of human beings by machines in a variety of jobs. Big data algorithms are now rapidly entering domains reliant upon pattern recognition and can readily substitute for human beings in a wide range of non-routine cognitive tasks. Algorithms are not only more scalable compared to human beings but they are also less vulnerable to errors and biases. Surely, it may not be that easy to convert all the people who lose their jobs into AI or robotics experts.



## Changing skill sets

In this technology driven world, the type of skills in demand is also changing. We saw in an earlier blog that the world is moving away from logical programming to data analysis. People who can play with numbers, analyze them and derive meaning out of them will have better careers. Over the past five years, demand for data analysts has grown by 372%. Within that segment, the red hot area is data-visualization, where demand has shot up by 2,574%. At the same time, social skills

are also becoming important. Indeed, since 1980 growth in employment and pay has been fastest in professions that put a high premium on social skills. Social skills are becoming important even in non-customer facing jobs. Social skills are needed to maintain good relationship with colleagues. People who can divide up tasks quickly and effectively between them form more productive teams. As work increasingly gets done by contractors and freelancers, the capacity for co-operation will become even more important.

### **The response of employers and education providers**

The Economist report illustrates with a number of examples how the education providers and employers are responding.

United Technologies (UTC) is a conglomerate whose businesses include aircraft engine maker Pratt & Whitney and lift manufacturer Otis. UTC has been emphasizing lifelong learning, long before it became a fad. Since 1996, UTC has been allowing employees to take part-time degrees and have tuition fees of up to \$12,000 a year reimbursed, with no strings attached.

Microsoft, one of the pioneers of the IT revolution, is trying to encourage the “growth mindset” in its employees. One of the key performance appraisal criteria is how much an employee has learned from others and what efforts she has made to apply that knowledge. Microsoft has also set up an internal portal that integrates Lynda, the training portal of LinkedIn, which Microsoft bought.

AT&T, with around 300,000 employees, faces rapidly changing skills requirements in an era of big data and cloud computing. Constant employee churn means the company has to fill 50,000 jobs a year. The firm has launched an ambitious plan to reskill its own people. Employees have a career profile, which contains a record of their skills and training. They also have access to a “career intelligence” database, which shows them the jobs on offer within the company, what skills they require and how much demand there is for them. The firm has developed short courses called nanodegrees with Udacity, the MOOC (Massive Open Online Courses)

provider, and is also working with universities on developing courses. Employees work in their own time to build their skills. AT&T offers generous help with tuition fees (totaling \$30m in 2015) for those who take courses while giving negative appraisal ratings for those who show no interest.

Technology has revolutionized education, in the past 20 years or so. Like in various other industries, platforms are disrupting education too. This is most plainly evident in the rise of Massive Open Online Courses or MOOCs. The MOOCs are spreading their reach to cover underserved segments, are now adapting themselves in various ways to address the problems of lifelong learning, most significantly in the way they are trying to align their courses with the needs of employers.

Udacity has launched a series of nanodegrees in tech-focused courses that range from the basic to the cutting-edge, in partnership with employers. A course on Android has been developed with Google. A nanodegree in self-driving cars uses instructors from Mercedes-Benz and Nvidia. Udacity also offers a premium version of its nanodegree for an extra \$100 a month, with a money-back guarantee if graduates do not find a job within six months. The involvement of Google in the Android nanodegree has helped persuade Flipkart, the Indian ecommerce leader to hire Udacity graduates.

Coursera is trying to improve employability through certification. Although its materials are available without charge, there is a fee for assessment and accreditation at the end of the course (\$300-400 for a four-course sequence that Coursera calls a “specialization”). Coursera is also increasingly working with companies. Firms can now integrate Coursera into their own learning portals, provide the appropriate menu of courses and track employees’ participation.

General Assembly with campuses in 20 cities across the world and around 35,000 alumni is an example of how to develop courses that significantly boost the chances of finding the right job. General Assembly’s curriculum is based on inputs from employers about the skills they are critically short of. Full-time participants

pay about \$10,000-12,500 to learn about the digital economy in a program lasting 10-12 weeks. General Assembly holds “meet and hire” events where firms can see the coding work done by its students. Of its 2014-15 graduating class, 75% used the firm’s career-advisory services, and 99% of those were hired within 6 months.

Generation is a philanthropically funded programme run by the McKinsey Social Initiative, the consulting firm’s not-for-profit arm. Generation trains people for middle-skilled roles in industries like retailing and health care. The innovative programme is designed around key events (how an IT helpdesk handles a call from an irate customer, for example) that distinguish high performers from the rest. Based on these inputs, a full-time training programme is created, which lasts between four and 12 weeks and covers both technical knowledge and behavioral skills. The programme has gone live in the US, Spain, India, Kenya and Mexico. By the end of 2016, it had 10,000 graduates, with an employment rate of 90%. McKinsey provides the training free to the participants but hopes the employers will fund the programme, or embed it in their own training programmes, when they are convinced about the value.

What is the future of traditional universities? Clearly, they are being given a run for their money by tech companies. In response, many universities have begun to offer online courses. Georgia Tech has started to offer a low cost online version of its MS (Computer Science) program. The program targets older people who do not want to leave their jobs. This one program, it seems, has the potential to increase the number of Computer Science graduates produced in the US each year by 7-8%.

But universities also need to look at the way they run their operations and draw lessons from the tech platforms. It would be no exaggeration to say that traditional academic institutions lack the agility needed to constantly revamp their content and keep pace with the changes outside. Pluralsight has a network of 1,000 experts to produce and refresh its library of videos on IT and creative skills. These experts get royalties based on how often their content is viewed. The best performer earned \$2mn last year. Such rewards provide keep the authors on their toes when

it comes to updating their content. University faculty, who get bogged down in their intellectual pursuits and consulting activities will have to change fast.

The big advantage which universities have is credibility. Many of them have been around for a long time and their names are well known. Even today, most of us prefer to do a course with a well-known academic institution. Coursera relies on universities and business schools for most of its content. Their names lend a lot of credibility to the certificates.

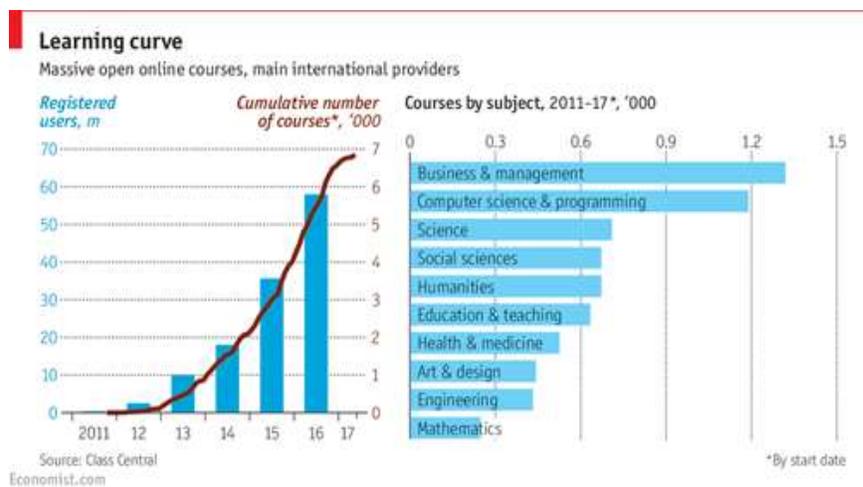
Universities are also offering modular courses that can be taken on their own and also carried forward as part of a full Master's Course. University of Wisconsin offers slivers of online content. In the new world that is emerging, it may be possible to fit educational qualifications together like a Lego Block! Some universities are toying with the idea of digital badges. Such badges are given to skills that are acquired in practical ways (such as through action learning projects) but without going through an exam. To validate such badges, a standardized assessment is needed. Agencies which can offer credentials are also emerging.

Meanwhile, technology is enabling the testing of skills in innovative and more effective ways. Ways of testing the intellectual curiosity and learnability of employees are also emerging. Knack, a startup, offers a series of apps that are, essentially gamified psychological tests. In one case, participants play the part of waiters and are asked to take the orders of customers. As more and more customers arrive, the job of managing the workflow gets tougher. Every decision and every minute change in approach is captured as a data point. Machine-learning algorithms analyze the players' aptitudes against a reference population of 25,000 people. An ability to read the facial expressions of customers wins points for empathy. A decision always to serve customers in the order in which they arrive in the game, might serve as an indicator of integrity. Intellectual curiosity is another of the traits that Knack tests for. A start up called Code Fights offers gamified challenges to learners. Once learning has crossed a certain threshold level, the startup recommends a candidate to prospective employers. Code Fights earns fees amounting to 15% of a successful candidate's starting salary.

The ability of learning platforms to try various experiments and analyze data is also providing useful ideas on how to improve learnability. For example, when MOOC participants were required to write down their plans for undertaking a course, they were 29% more likely to complete the course than a control group who did not have to do so.

## The role of Governments: Lessons from Singapore

Governments have played and will continue to play an important role in education. What is the role of governments in promoting lifelong learning? Singapore offers the best example with its Skills Future initiative. Employers in different industries in the city-state are asked to visualize the changes, that they expect to see over the next three to five years, and to identify the skills they will need. Their answers are used to create “industry transformation maps” designed to guide individuals on what kind of skills they need to have. Since January 2016, every citizen of Singapore above the age of 25 has been given a S\$500 (\$345) credit that can be freely used to pay for any training courses provided by 500 approved providers, including universities and MOOCs. Generous subsidies, of up to 90% for Singaporeans aged 40 and over, are available on top of this credit. The programme currently has a budget of S\$600m a year, which is due to rise to S\$1 billion within three years. Skills Future’s CEO has mentioned that the ROI matters less than changing the mindset around continuous reskilling.



## **Concluding notes**

A new ecosystem for aligning education with the needs of the job market is certainly evolving. Employers are putting greater emphasis on adaptability, curiosity and learning as desirable attributes for employees. Technology is making it possible to test many of these attributes. Employers are also working with universities and alternative education providers to improve the availability of talent. Shorter courses, lower costs and online delivery are making it easier for people to combine work and training. At the same time, new technologies, including virtual and augmented reality are making learning more effective and engaging. Technology is also enabling more personalized education and making it easier to connect people of differing levels of knowledge and allowing peer-to-peer teaching and mentoring.

But in the immediate future, this nascent ecosystem is more likely to benefit those who are already well educated and have some basic IT skills. Thus on Coursera, 80% of the learners have college degrees. These are the people who have the money, time, motivation and basic skills to retrain and pick up advanced technological skills like AI, analytics and robotics. If the problem of inclusion is to be tackled, much more has to be done to make learning available to those at the bottom of the pyramid.

As leaders and parents, we have the onerous responsibility of guiding young minds who will have to reinvent themselves far more frequently during their careers than we have had to. We have to encourage a culture of lifelong learning in the true sense of the word rather than just paying lip service. And for that, we need to become lifelong learners ourselves.