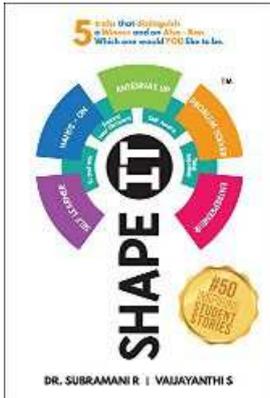


## Self Learner



*Excerpts from the Chapter 1 of the book*

**ShapeIT: A Perfect Gift for Budding Engineers to Become Industry Ready**  
By Subramani R. & Vaijayanthi S  
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Sep 2016 – The campus placement events had just started across India. Unlike Europe and US, where there are two intakes in a year for the admission process (Summer/Winter or Spring/Fall), in India, there is only one intake season. The academic calendar begins typically in the month of June, and the graduation happens in the month of May.

The campus placement events are something that all recruiters, students, parents and campuses eagerly look forward to. Each year, these events create a lot of buzz, and the local newspapers are filled with articles about placement records of corporates, campuses, highest pay package offered and so on.

The campus placement events generally start with a pre-placement talk. In this pre-placement talk, the recruiter talks about their organization and the career opportunities that they offer. The pre-placement talk is then followed by the selection process – which includes a whole gamut of tests – analytical and quantitative aptitude tests, oral and/or written communication, group discussion, hands-on application challenges, hackathons and many more.

In one such campus event, after our pre-placement talk, we opened the session for questions. In these sessions, the typical questions would be centered around compensation, work-location, nature of work, company's vision and the like. We had well-prepared and rehearsed answers for these. But one of the questions caught us off-guard. The question was, **“How much of what you learnt in college are you still using today at work?”**

Well, that set us thinking. We had done our Bachelors in engineering about twenty years ago and could not recall exactly how much of our college education we applied at work.

It was a difficult thing to quantify, but the larger question in front of us was: **What skills are being taught today that will have little or no value in the future?** There is a risk of usefulness of a college education wearing out even before the educational loan repayments end.

We managed to give an answer to the student, but it was not convincing to us. As we left the event, the question raised by the student was still bothering us and triggered us to explore further, and the result is what you see, the **SHAPE IT** book.

### Half-life of Knowledge

In 1962, Fritz Machlup, an economist, coined the expression **‘half-life of knowledge’** to describe the amount of time that has to elapse before half of the knowledge in a particular area is superseded or shown to be untrue. The various articles in IEEE (Institute of Electrical and Electronics Engineers) journals over the last few decades show a steady dropping of the ‘half-life of knowledge’. The half-life of an engineering degree in the late 1920’s was about 35 years; for a degree from 1960, it was thought to be about a decade.

According to an **International Labor Organization report**, the **“half-life” of an engineer’s technical skills** was estimated to vary from 7.5 years for mechanical engineers and 5 years for electrical engineers, to 2.5 years for software engineers.

Russ LeFevre, President, IEEE-USA (2008) adds, *“When the half-life of an engineer is five years, it’s quite clear that the days when an engineer could spend his or her career shepherding a specific computer program are long gone. You must be able to move from one discipline to another discipline, and you must be able to do it quickly.”*

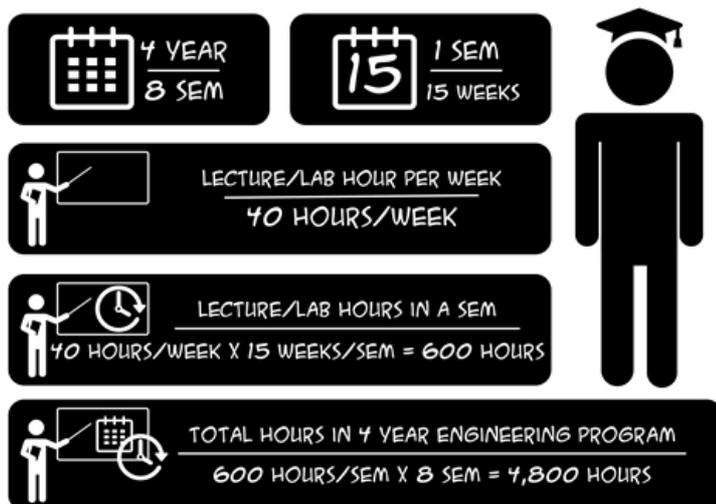
The depth of the question, which the student asked us in the pre-placement talk was sinking in, and we thought the ‘half-life of knowledge’ partly answered the question.

*“The half-life of an engineer, software or hardware, is only a few years.”*

Craig Barrett,  
President, Co-Founder, Intel Corporation (1996)

Many of the basic skills and much of the knowledge that people acquire while they are at school, college or university are becoming 'out of date' at an alarming rate. This means one has to be a 'life-long learner' to succeed in the industry. We started calculating the amount of time one should spend on acquiring new knowledge.

### UNDER GRADUATE ENGINEERING PROGRAM



Well, this is for the IT profession, and for other engineering disciplines, time to be spent on acquiring new knowledge may be lower; nevertheless, **an engineer MUST spend 1-2 hours learning every day to stay current.**

Now, we had two more questions:

1. How long should one keep learning?
2. How does this learning happen?

### The end of the three-stage life

We continued our search on how long one should continue this learning. There is good news and bad news.

The good news first. In the last two centuries, the life expectancy has increased at the rate of more than two years every decade. And if this trend continues, a child born today has more than a 50% chance of living to 105 years. On an average, most of these extra years of life will be healthy ones. It is as if the arc of life has been extended.

And the bad news. One has to keep learning that much longer.

With longevity extending, the way we work is getting transformed, a new work-life model is replacing the traditional career path of the past. Those 55 to 65-year-old employees, currently part of the industry, followed a typical three-stage path: get educated, work and retire. Lynda Gratton, professor at London School of Business, believes this pattern is about to be smashed to pieces.

*"The life structure that emerged in the 20th century – a three-stage life of education, work and then retirement – is unlikely to survive the life elongation.*

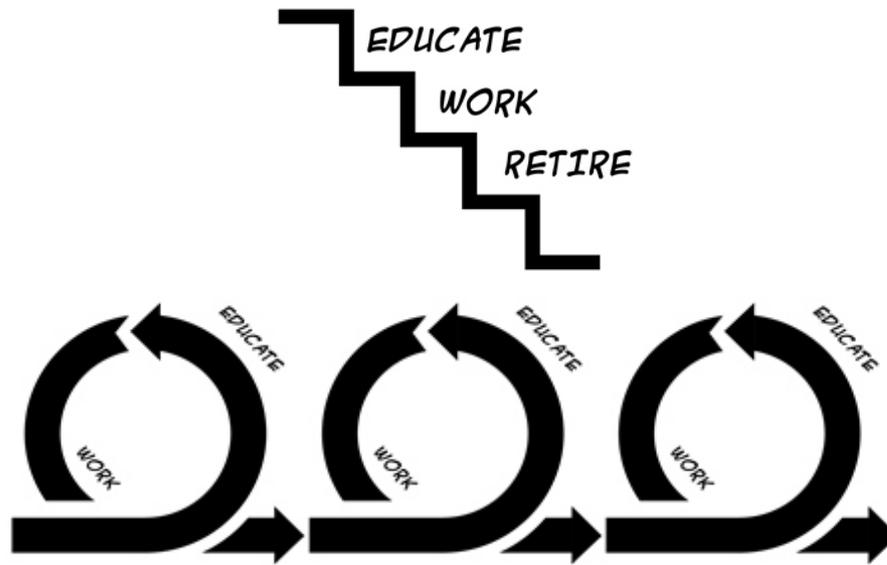
*How can you maintain and build productive assets when most education takes place in your 20s? How can what you have learned remain relevant over the next 60 years against a backdrop of technological upheaval and industrial transformation?"*

**Lynda Gratton and Andrew Scott,**

*The 100 Year Life : Living and Working in an Age of Longevity*

The three-stage life of educate, work and retire can be likened to the traditional, sequential approach to the 'water-fall' model in the software development parlance.

The half-life of knowledge necessitates taking an 'agile' approach to life, and drawing a parallel with Scrum (an iterative and incremental agile software development framework). One has to plan for multiple 'sprint' cycles of *educate* → *work* → *educate* → *work* → *educate* → *work* and the iteration continues till one can sprint (pun intended) in life.



Well, it's getting tougher now. Based on half-life of knowledge and expected longevity of life, one needs to plan for spending 1-2 hours/day for at least forty years, and this is after the formal education.

Sounds tough and grueling, huh?

But wait, let's see if there is some good news, and we still haven't answered the second question about how this learning happens. Is it going to be formal classrooms and grades?

*"Life-long learning of engineering is possible only by disciplined life-long study and thought."*

Thomas Jones,  
Former President, University of South Carolina

The life-long learning, if it takes place, will have little or no resemblance to the formal college education that you have gone through. Based on our experience, adult learning models adopted in the industry suggests that the life-long learning will be:

- Less formal and more experiential
- Less classroom-centric and more pervasive

### 70:20:10 Model

70:20:10 is a learning and development framework, which sets out a rationale for how employees learn. The framework is attributed to Morgan McCall, Michael Lombardo and Robert Eichinger at the Center for Creative Leadership in North Carolina. This is based on the results of research they conducted with senior business executives about the factors they felt made them successful. In their publication, *The Career Architect Development Planner*, they presented the 70:20:10 model, which sets out the ways in which people learn.

They found that over the course of their careers, the most successful executives had gained their most valuable learning in the following ways:

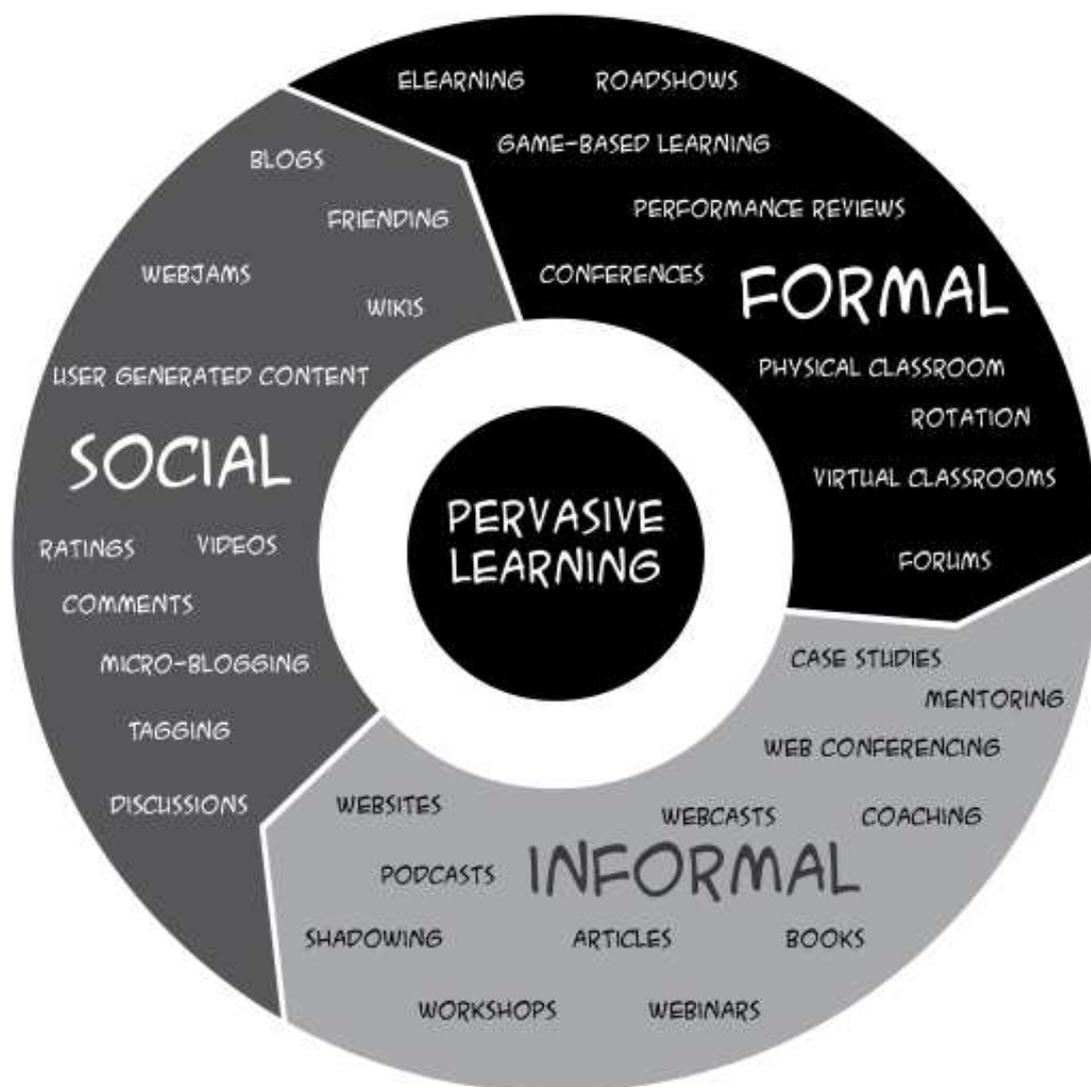
- 70% from challenging assignments and on-the-job experiences
- 20% from other people (mainly their manager), networks and the feedback received
- 10% from formal training, such as courses and workshops



At its heart, 70:20:10 highlights that people get most of the skills and knowledge they need to do their job from on-the-job learning experiences, rather than from classroom or course-based learning.

### 3:33 Model

Dan Pontefract, in his book *Flat Army*, talks about how learning happens in an organization. It is all about a collaborative culture, which will engage, empower and encourage all employees.



*“70% of all learning projects are planned by the learner himself.”*

Prof. Allen Tough,  
*The Adults Learning Projects (1971)*

Pontefract’s 3:33 model of pervasive learning presents a perspective on the reality of how we learn and how leadership is formed. It suggests that:

- 33% of learning happens by formal means (e.g. in a physical or virtual classroom, at conferences and roadshows and via e-learning)
- 33% is informal (e.g. via mentoring, coaching, webinars, reading books and case studies, listening to podcasts and role shadowing)
- 33% is social (e.g. via user-generated content, wikis, blogs, videos, discussions, comments, ratings and instant messaging tools)

The concept of 70:20:10 and 3:33 learning was refreshing, and we thought we had answers for the questions raised in the pre-placement talk.

HOW MUCH OF WHAT YOU LEARNT IN COLLEGE ARE YOU STILL USING TODAY AT WORK?	
WHY IS OUR LEARNING AND KNOWLEDGE BECOMING REDUNDANT?	RAPID TECHNOLOGY ADVANCEMENT IS LEADING TO CONTINUOUS REDUCTION IN THE HALF- LIFE OF OUR KNOWLEDGE
HOW LONG SHOULD ONE KEEP LEARNING?	LIFE-LONG. BE PREPARED TO BE A LIFE-LONG LEARNER.
HOW DOES THIS LEARNING HAPPEN?	LESS THROUGH FORMAL MEANS AND MORE OF IT THROUGH INFORMAL AND SOCIAL MEANS

*“Learning is Pervasive, which is the switch from a ‘training is an event’ fixed mindset, to ‘learning is a collaborative, continuous, connected and community-based’ mindset.”*

Pontefract, D.

*Flat Army: Creating a Connected and Engaged Organization (2013)*

### Learning in the Corporate World

Gone are the days when individuals were trained when they joined the organization, and the training would last them their whole careers. The technology and processes are changing, and job roles are becoming sophisticated, and there are full-fledged learning and development departments within the organizations that are tasked with the responsibility to keep workforce knowledgeable, skilled and up-to-date. But the world is changing so fast that even learning and development departments are not able to keep pace and ensure that every employee is trained for current and future jobs.

According to the Deloitte’s *Global Human Capital Trends 2016* report, employees at all levels expect dynamic, self-directed, continuous learning opportunities. The report is based on more than 7,000 responses from over 130 countries. As per the survey, eight in ten executives mention learning as important, while four in ten regard learning as a very important issue.

Advances in technology, shifts in demographics, and the constant competitive necessity to upgrade workforce skills are the major disruptive drivers in corporate learning. These forces are pushing companies to develop new ways to **put employees in charge of the learning** and foster a culture of self-directed learning throughout the organization. The mobile devices make anytime anywhere learning possible. From content-centric ‘push’ approach, the learning is moving towards a learner-centric ‘pull’ approach.

Companies are adopting new technologies and new learning models, for e.g., 43 per cent of companies surveyed feel comfortable incorporating massive open online courses (MOOCs) into their learning platforms compared to 30 percent the previous year.

Corporates stress the importance of employees to learn continuously and keep abreast of the latest in their field of work – and this is through Self Learning, complemented with a social approach of collaborative learning with peers, teams and professional networks.

### ‘I am a lifelong learner’, Satya Nadella says

It is refreshing to hear Satya Nadella, CEO, Microsoft Corporation speak about his passion for and commitment to continuous learning.

*“I think the thing that I realized is, what excites me is that I’m learning something. I can learn something about some area. I can learn something from people. I can learn something from doing things differently. And I admire that in other people, too. I fundamentally believe that if you are not learning new things ... you stop doing great and useful things. So family, curiosity and hunger for knowledge all define me.”*

Satya Nadella started his career as a member of the technology staff at Sun Microsystems. In 1992, he joined Microsoft. He was on his way to get a master’s degree in business when the Microsoft job offer came. The company was building an operating system that ultimately would be known as Windows NT and needed team members who understood UNIX and 32-bit operating systems. Nadella wanted to complete his master’s degree and take the Microsoft job. He did both.

"I used to fly to Chicago Friday nights, attend classes Saturdays and come back to Redmond to work during the week." It took him two-and-a-half years, but he finished his master's degree.

*"What defines me ... I'm a lifelong learner. I buy more books than I read or finish."*

**Satya Nadella, CEO Microsoft**

#### **THINK 40: Self-Initiated Learning Program at IBM**

To foster the link between IBMer engagement and client experience, IBM launched a broad range of tactical activities, and one of the flagship learning program has been THINK40, a self-initiated learning program of at least 40 hours of professional development that every IBMer undergoes each year. According to *2013 Corporate Responsibility Report* of IBM, IBMers completed more than 25 million learning hours in 2013, and this number only keeps growing every year.

IBM's Think Academy is a new method of sharing and learning that the entire company does together. This online, easy-to-digest approach to learning allows employees to gain insight in areas critical to the business where new knowledge is being rapidly created. This allows employees to become experts in and advocates of rapidly changing areas such as cloud, Big Data and analytics, mobile and social computing. Courses called Think Friday sessions begin on the first Friday of each month, but employees can choose when and how they access content. IBM CEO Ginni Rometty begins each Think Friday session by framing a given topic, its importance and key concepts to explore. She also regularly interviews clients to gain insight into how a topic affects their business and what they are learning about it. Think Academy curates and houses each new topic in an interactive learning environment.

We looked at IBM and Microsoft, as the software engineering field experiences a half-life knowledge of two and a half years.

It is becoming increasingly evident that employees are working in a volatile, uncertain, complex and ambiguous environment (VUCA). Organizations are trying to create a learning culture that

- Focuses on self-directed learning, i.e., encouraging employees to develop themselves
- Blending the learning environment with the work environment

All the above discussion leads us to conclude that '**Self-Learning**' is a trait every budding engineer must cultivate and nurture to survive and succeed in their career.

Now, as students and budding engineers, the question you may have in your mind:

What is Self-Learning?

What are the opportunities available for you to do self-learning?

*"Learning never exhausts the mind"* – Leonardo Da Vinci

All of you may recall Ekalavya, probably, the earliest Self-Learner recorded in the history of mankind.

#### **Ekalavya – the story of an early self-learner from India**

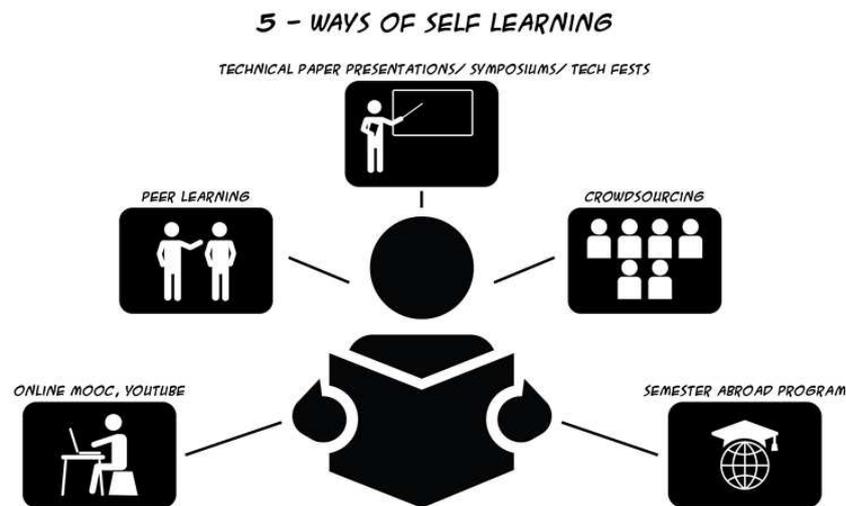
Ekalavya was a young prince of the Nishadha, a confederation of jungle tribes in ancient India. Ekalavya aspired to study archery from Guru Dronacharya. Guru Dronacharya, Guru to the royal family, imparted various skills to the Kauravas and Pandavas. Ekalavya approached Dronacharya, who was very impressed by his sincerity. Upon enquiring about his lineage, Drona rejected him on the grounds of tribal parentage.

Deeply hurt by Drona's rejection, Ekalavya did not give up on his resolute will to master archery. He once stayed hidden in the forest while Guru Drona was teaching the Kaurava and Pandava brothers. After they left to the ashram, Ekalavya collected the mud on which his Guru walked as a symbolic gesture of his want to follow his knowledge and footsteps. He later went into the forest and made a statue of Drona. He began a disciplined program of self-learning over many years. Eventually, Ekalavya became an archer of exceptional prowess, greater than Drona's best pupil, Arjuna. He accepted the statue as his guru and practiced in front of it every single day.

After many months, Drona, along with the Pandavas and the Kauravas, camped in the very forest where Ekalavya resided. At night, their sleep was disturbed by the incessant barking of one of their own hunter dogs. As it was a new moon night and pitch dark, none of the royal pupils ventured out to drive the dog away. All of a sudden, the barking stopped. The royal pupils came out and saw the dog was unable to bark due to an amazing construction of arrows in and all around his mouth. This construction was harmless to the dog, but prevented the dog from barking.

Drona was amazed, but also distressed: he had promised Arjuna that he would make him the greatest archer in the world. Drona and his students investigated, and came upon Ekalavya. Upon seeing Drona, Ekalavya came and bowed to him. Drona asked Ekalavya where he had learnt archery. Ekalavya replied "Under you, Guruji", and showed Drona his statue while explaining what he had done.

Well, that's how self-learning happened thousands of years ago. As we set out on our conversation with the millennials on how they do their learning, we saw a pattern emerging. The students, today, have at least five distinct opportunities to pursue self-learning:



1. **Online Learning** – Leverage MOOCs, YouTube videos and tons of material available on the net to pursue topics of your interest. **Malvika Joshi** and **Tanmay Bakshi** stand out as great examples of self-learning, and they made it to the headlines.
2. **Peer Learning** – Forming special interest learning groups is another way by which students motivate and learn from each other. The stories of **Ishita Joshi**, who acquired new skills through peer learning and secured a job-role of her choice, or **Mohammad Anwar** and his team who realized their dream of designing aircraft, are fascinating stories of what one can achieve in a peer group.
3. **Technical Paper Presentation** – Technical Paper Presentation refers to presenting your research work in an invited conference/workshop/symposium. In addition to helping the students gain an in-depth knowledge, this also helps them to improve their communication skills, share their knowledge and encourage them to read existing body of knowledge and make incremental original contributions. Almost all major engineering colleges host technical symposiums, and it was refreshing for us in our field work to listen to **Anjali Mishra**, **Aphurvika Mani** and **Debayan Mandal** on how they derived their inspiration to seek knowledge and went about publishing papers in international conferences.
4. **Crowdsourcing** refers to the practice of obtaining information or input into a task or project by enlisting the services of a large number of people, either paid or unpaid, typically via the Internet. There are many portals that offer opportunities for students to bid and work in real-life industry projects. The learning one gets from crowdsourcing projects are immense, and it was exciting to see how **Joseph Chacko** started with freelancing and gained experience in mobile-app development, that landed him with a job at the Apple Garage at IBM.
5. **Cross-cultural Learning Opportunities** – Travel is a great teacher, and there are campuses that offer opportunities to students to pursue a semester or their project-work or internship in a university outside the country. **Malavika Suresh**'s story makes an interesting read of how spending a semester abroad helped her to hone her technical skills and how the cross-cultural exposure made her a more holistic individual.

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Less than a decade after directing workers to communicate in English at work, billionaire CEO of Japanese IT giant Rakuten, Hiroshi Mikitani, has now asked his 17,000 employees to learn basic coding. "If you're working for Toyota, you know how the automobile works...So if you work for an IT company, you need to know what's in the computer," Mikitani said.

The International Olympic Committee has unveiled robots designed to help workers and attendees, specifically wheelchair users, at the 2020 Tokyo Olympics. Made by Toyota, the 'Human Support Robot' and 'Delivery Support Robot' will perform tasks like carrying food, and guiding attendees to seats. Further, Panasonic-made 'Power Assist Suits' will help workers lift heavy objects with less strain.