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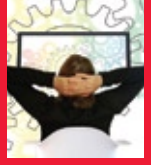

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DQ 38 YEARS

T-SCHOOLS IN NEW NORMAL

How India's top 100 engineering colleges rank up in the **16th DQ-CMR survey 2021**

TOP 10 T-SCHOOLS	
INSTITUTE NAME	RANKING
Indian Institute of Technology, Kanpur	1
International Institute of Information Technology, Hyderabad	2
Netaji Subhas University of Technology	3
Indraprastha Institute of Information Technology, Delhi	4
B.S.Abdur Rahman Crescent Institute of Science and Technology	5
Koneru Lakshmaiah Education Foundation	6
College of Engineering Pune	7
Bannari Amman Institute of Technology	8
Maulana Abul Kalam Azad University of Technology	9
ABV- Indian Institute of Information Technology and Management, Gwalior	10

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T-SCHOOLS IN NEW NORMAL

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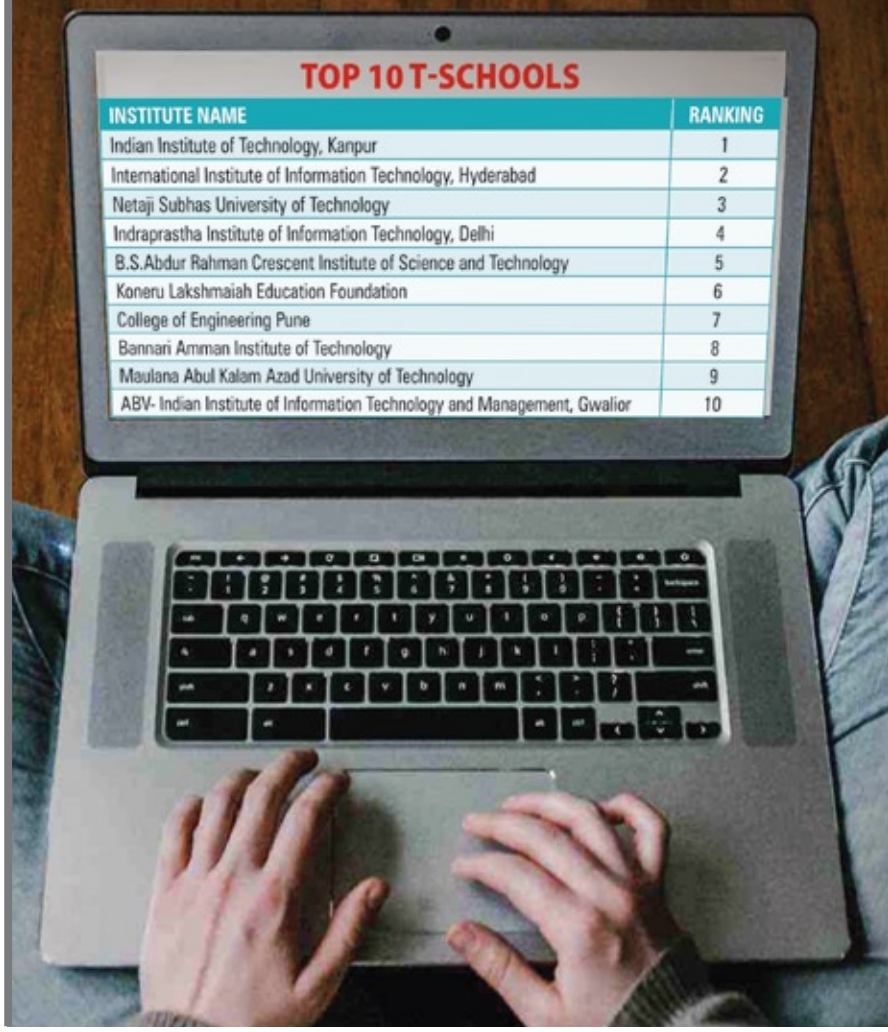

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FORM IV (See Rule)

Statement of ownership and other particulars about the newspaper DATAQUEST to be published in the first issue every year after the last day of February.

1.	Place of Publication	:	New Delhi
2.	Periodicity of Publication	:	Monthly
3.	Printer's Name	:	Pradeep Gupta
	Whether Citizen of India	:	Yes
	Address	:	D-74, Panchsheel Enclave, New Delhi – 110 017
4.	Publisher's Name	:	Pradeep Gupta
	Whether Citizen of India	:	Yes
	Address	:	D-74, Panchsheel Enclave, New Delhi – 110 017
5.	Editor's Name	:	Shubhendu Parth
	Whether Citizen of India	:	Yes
	Address	:	203, Ashirwad Apartments, 74, I P Extension, Narwana Road, Delhi 110092
6.	Names & addresses of individuals who own the newspaper, and partners or shareholders holding more than one percent of the total paid-up capital	:	Cyber Media (India) Limited D-74, Panchsheel Enclave, New Delhi – 110 017

List of shareholders holding more than 1% of the paid up capital of the company as on 15th February 2021: Pradeep Gupta, Presan Consultants Pvt Ltd, Sudha Bala Gupta, Dhaval Gupta, Sanjay Dutt, Mahesh Dinkar Vaze, Mahendra Girdharilal, Hemali Prakash Mehta, Kriti Gupta.

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Subscription (Inland): ₹1200 (12 issues), ₹2400 (24 issues)
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17th — The Times of India: Ranked 17th among Top Engineering Institutes of India

3rd — DATAQUEST: Ranked 3th at All India Level by DATAQUEST-CMR Survey

11th — India Today: Ranked 11th among Top Private Institutes Of India by India Today

14th — Outlook: Ranked 14th among Top Private Institutes Institutes of India

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Shubhendu Parth

Let intelligent organisations **have common sense too**

The year gone by has been disruptive in many ways. The pandemic has not only reiterated the importance of personal and public hygiene, healthcare research and infrastructure, it has also led to an increase in the adoption of digital technologies. According to a recent IDC report, COVID-19 has been driving the demand for intelligence technologies to enable new ways of working. It highlights that the pandemic has exposed the gaps and shortcomings in analytics, artificial intelligence (AI), and machine learning (ML) models of organisations in India making traditional models based on the use of historical data for future decision-making obsolete.

The report indicates that businesses need to focus on a new framework for decision environments that enable real-time data capture, lower processing times, and accelerates business outcomes, to improve resiliency. It also points out that leaning on data to understand the insights into business operations, products and services, experiences, and ecosystems are among the top priorities for organisations in the country.

What the IDC report indicates is certainly the need of the hour and CIOs and CDOs across the sector – including large and small companies – are focusing on; there is a massive surge in demand for automation at all levels. However, here is the catch: while organisations are going full throttle ahead with digitisation and adding artificial intelligence to their system, they are missing on the basic common sense approach.

Over the last six months, my Gmail has been inundated with emails for different Shubhendu's in the world, and these are a variety of companies – Axis Bank, SBI Life, Union Bank, ICICI Bank, Reliance Jio, Khadim's, Rentsher.com, and West Bengal State Electricity Distribution Company Limited, to name a few. While many of them ignored my emails informing them that they had sent the communication to the wrong person, those who replied said that it was the registered email given by the consumer.

A very small, early dotcom-era, common-sense solution could have helped the companies avoid this mix-up. They could have asked the consumer to authenticate the email address. Most companies do the same using OTP for verifying the registered mobile numbers and it came as a surprise when a very senior official from one of the banks pointed out that the existing core banking solution does not have this functionality.

IDC defines the future of intelligence as an organisation's capacity to learn, combined with its ability to synthesize the information it needs in order to learn and to apply the resulting insights at scale. I hope, the organizations also add common sense to their approach and do not ignore the small steps in their rush to big-ticket rollouts.

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T-Schools in new normal: How they rank up

The Dataquest Top T-School Survey 2021 gives a comprehensive view of the top institutes in India and the rapidly changing landscape in the post-pandemic era

We are back with the much-awaited Dataquest Top T-School Survey that highlights the top T-Schools across the country and what makes them special. The survey, which is an industry acclaimed hallmark on technical education and is highly trusted by students, parents and recruiters alike, is out with its 16th edition. Primarily, the survey focuses on T-Schools and their contribution to key skills in the technology industry, and ranks them through a comprehensive evaluation process.

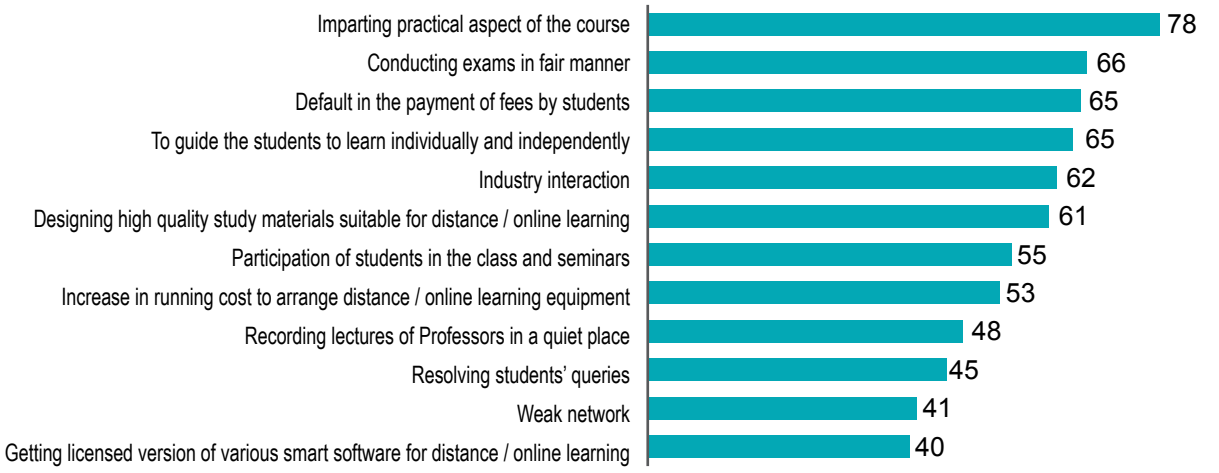
The last year had been quite challenging for the industry owing to the COVID-19 pandemic, driving stakeholders to adapt to the changing work environment. The pandemic and consequent lockdown measures resulted in the 'new normal' of working from home, which is being appreciated by almost every industry, with many planning to adopt this work culture partially or permanently, going forward. As an added advantage, this change will greatly enable industries to access resources globally.

Given the current scenario, it is vital for engineering institutions in India to be future-ready. In this direction, the All India Council for Technical Education (AICTE) has taken some active measures. To start with, it has decided not to permit new engineering colleges from the academic year 2020-21; it will only grant approval for additional seats in existing institutions based on the capacity utilisation of the concerned institute. As per the initiative, AICTE will review the creation of new capacity every two years. This step is expected to encourage institutes to convert their current capacity in traditional disciplines to emerging new technologies such as artificial intelligence, blockchain, robotics, quantum computing, data sciences, cybersecurity and 3D printing and design.

IT'S GOOD TO BE ON YOUR MOBILE WHILE STUDYING

The recent pandemic has changed the model of education

Challenges faced after COVID-19 outbreak
(all figure in %)



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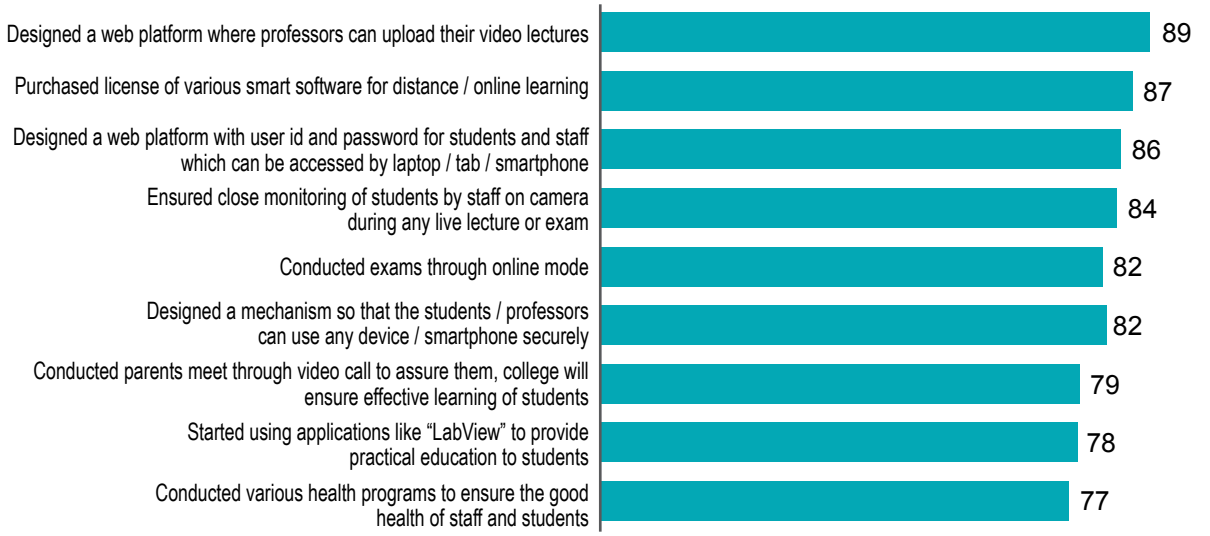
system to a great extent. There was a time when mobile phone usage was banned during classes but today classes have come to mobile phones. This transition, however, has been very expensive when it comes to the practical aspect of a course.

While institutions faced a number of challenges, they remained firm with their commitment to provide the best education to students. The major challenge witnessed after the COVID-19 outbreak has been imparting the practical aspect of a course such as working with equipment in a laboratory. To address this issue, four in five engineering colleges have started using applications such as LabView.

As self-learning can be challenging for students, teachers have made tremendous efforts in providing smart and easy-to-understand study material. Institutes have also designed a web platform where professors can upload their video lectures to help students learn at their own pace. As per the survey, four in five engineering institutes conducted regular parent-teacher meetings through video calls to provide assurance on the progress of students. Furthermore, three in four institutes conducted various health programmes to ensure the good health of students.

The post-COVID-19 era encourages 'out-of-the-box' thinking, emphasises on creativity and innovation skills, and pushes for a learning environment where divergent ideas are encouraged. Today's engineering education is

Facilities provided to smoothen online classes to students



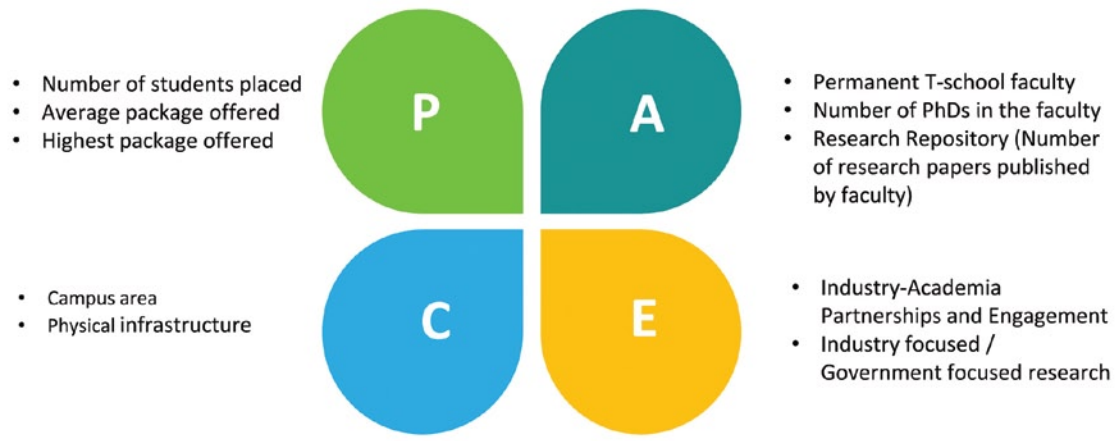
poised for a major shift to better prepare students for the world of tomorrow.

KEY OUTCOMES

Many prestigious IITs, NITs, IIITs and private and government institutes participated in the T-School 2021 Survey. The survey had at least one T-School participating from each of the major states of India. Private T-Schools proactively participated in the exercise with over 85% representation. T-Schools based in the southern region took the lead in participating in the survey with over 56% of the respondent institutes coming from this region. Institutes from the western parts took the lead over those in the northern parts compared to last year.

A structured questionnaire with over 30 questions was used to capture the Placement, Academics, Campus Infrastructure and Engagement (PACE) Framework. These questions enabled the DQ-CMR team to build a comprehensive picture on the basis of the inputs from T-Schools. Adequate time was provided to the T-Schools to share their filled-in nominations, either online or via physical modes. The submissions were scrutinised by the CMR Edutech Practice for completeness and veracity of the information shared, and were examined through a random check process, with >30% of the submissions being cross-checked, as per the market research code of ethics. CMR analysts reached out to key stakeholders for further deliberations, enabling for a holistic snapshot of the T-School.

Key attributes of DQ's PACE framework



Placement	Academic Environment	Engagement and Outreach	Campus Infrastructure
30%	30%	25%	15%

> THERE WAS A TIME WHEN MOBILE PHONE USAGE WAS BANNED DURING CLASSES BUT TODAY CLASSES HAVE COME TO MOBILE PHONES

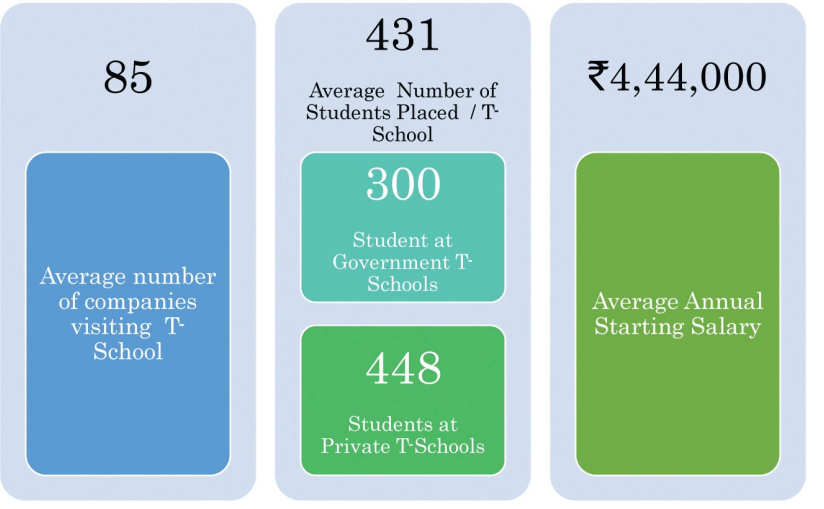
The quantitative inputs received and verified from various T-Schools were then analysed wherein the absolute data was normalised to relative data in order to compare the parameters across the participating institutions.

For each of the above mentioned parameter segments, a final score was achieved which was then factored with the pre-defined weights to arrive at the overall score of each participating T-School. The institutes were then ranked as per the scores across all parameters. The rankings were also arrived by category and region.

KEY FINDINGS

- **Placement:** An average of 431 students per T-School secured job placements in the year 2020 while an average of 85 industry partners visited T-Schools for recruitment. At private T-Schools, an average of 448 students got placed, whereas at government T-Schools, 300 students secured placement. The average salary package in 2020 was Rs 4.44 lakh per annum. The maximum salary offered stood at Rs 20.68 lakh per annum.

Campus placements in perspective



Source: DQ-CMR T-School 2021 Survey

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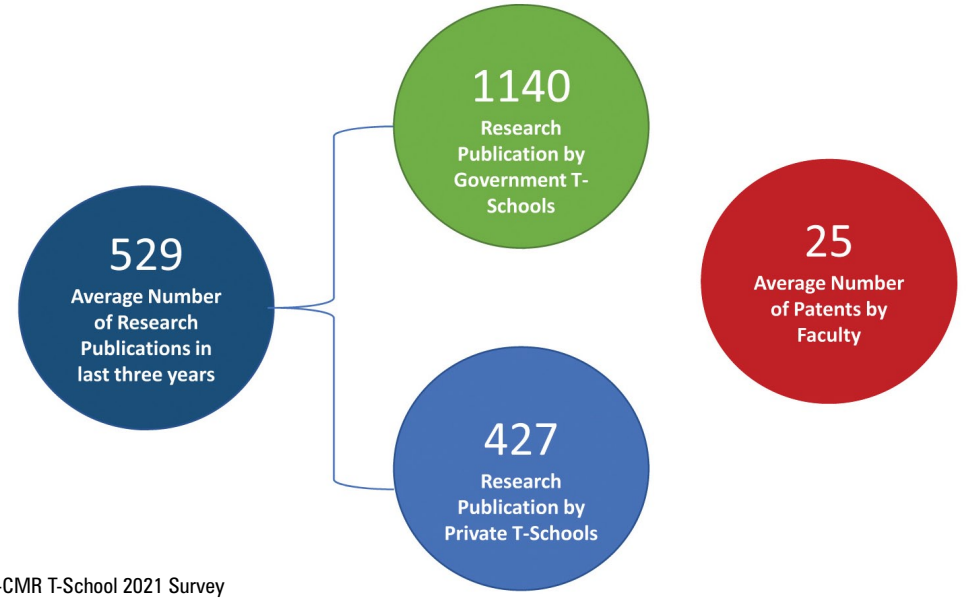
> AN AVERAGE OF 431 STUDENTS PER T-SCHOOL SECURED JOB PLACEMENTS IN THE YEAR 2020 WHILE AN AVERAGE OF 85 INDUSTRY PARTNERS VISITED T-SCHOOLS FOR RECRUITMENT

- **Research papers and patents:** In the last three years, the average number of research publications carried out per institute has been 529. In the case of government institutes, this figure is much higher (1140). The average number of patents registered by government and private T-Schools has been 25. The research papers published by T-Schools, including academic research papers in reviewed research journals, articles

Growth in intellectual property (IP)



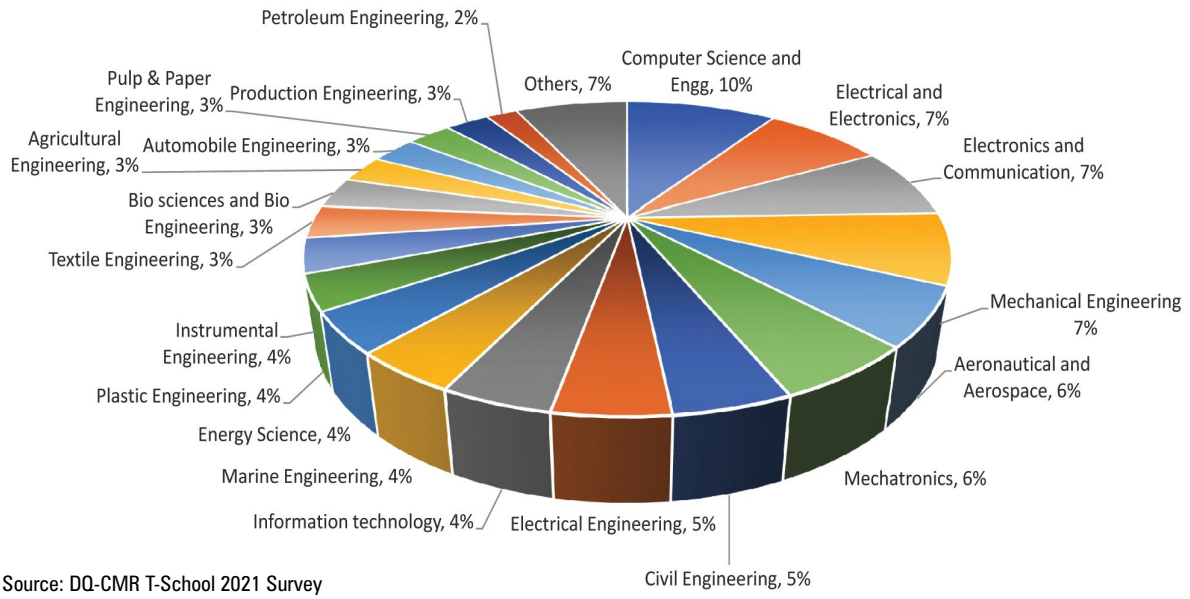
Source: DQ-CMR T-School 2021 Survey

> IN LAST TWO YEARS, AN AVERAGE OF 1,113 STUDENTS TOOK UP INTERNSHIPS ACROSS 117 COMPANIES, AND AN AVERAGE OF 108 INDUSTRY EXPERTS PER INSTITUTE VISITED T-SCHOOLS

and books, point to the overall research productivity of the T-Schools.

- **Courses offered:** The DQ-CMR T-School Survey 2021 findings illustrate that T-Schools are offering an eclectic selection of streams for students, ranging from Computer Science to Electronics and Communications, from Mechatronics to Textile Engineering. The top three streams offered at

Programs offered at T-Schools



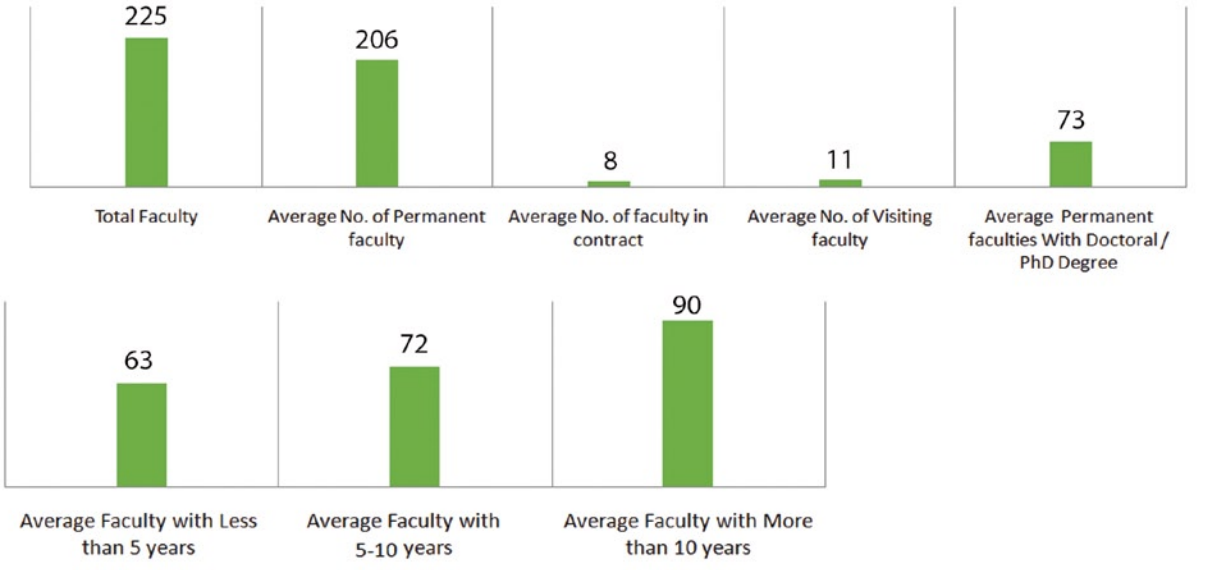
Source: DQ-CMR T-School 2021 Survey

> THIS YEAR, GOVERNMENT INSTITUTIONS HAVE SET A PARADIGM BY SECURING THE TOP FOUR PLACES IN A ROW. OF THE TOP 10 T-SCHOOLS IN THE COUNTRY, SEVEN ARE GOVERNMENT OWNED

T-Schools are Computer Science, Electronics and Communications, and Mechanical Engineering.

- **Faculty at T-Schools:** According to the survey, 33% of the faculty at T-Schools have doctoral degree. The DQ-CMR T-School Survey results further illustrate that 91% of the faculty at T-Schools are permanent, 5% are visiting, and 4% are on contracts. In terms of the experience level,

Faculty in perspective



Source: DQ-CMR T-School 2021 Survey

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B.Sc Hotel Mngt & Admin.

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MBA Hospitality & Tourism

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CSE

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CHEMISTRY

MATHS

COMMERCE

MANAGEMENT

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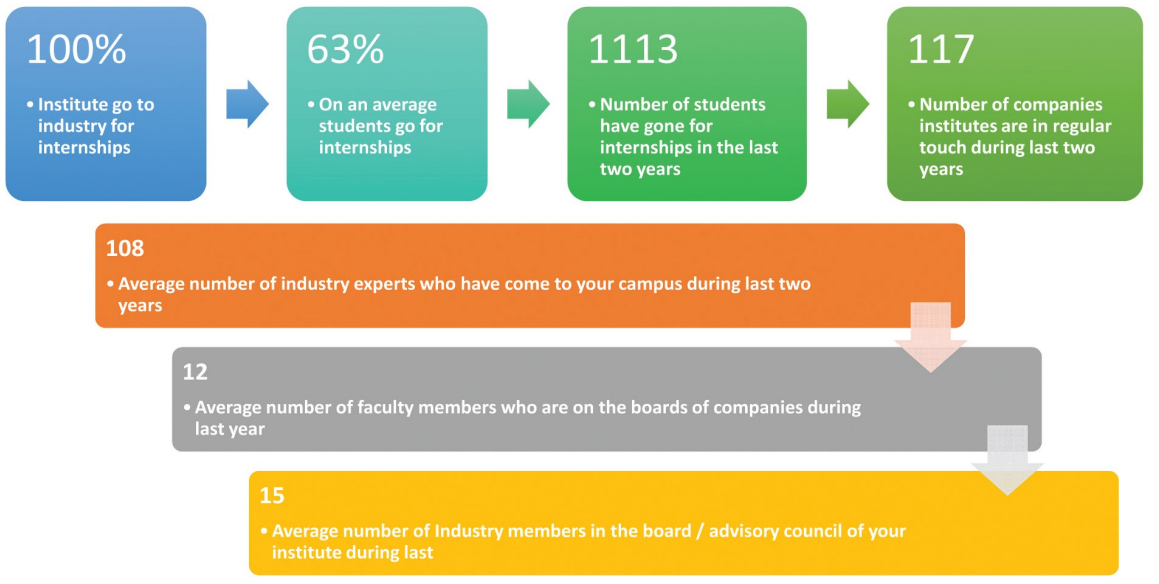
40% of the permanent faculty have more than 10 years of experience, 32% of them have 5-10 years of experience and 28% of them have less than five years of experience.

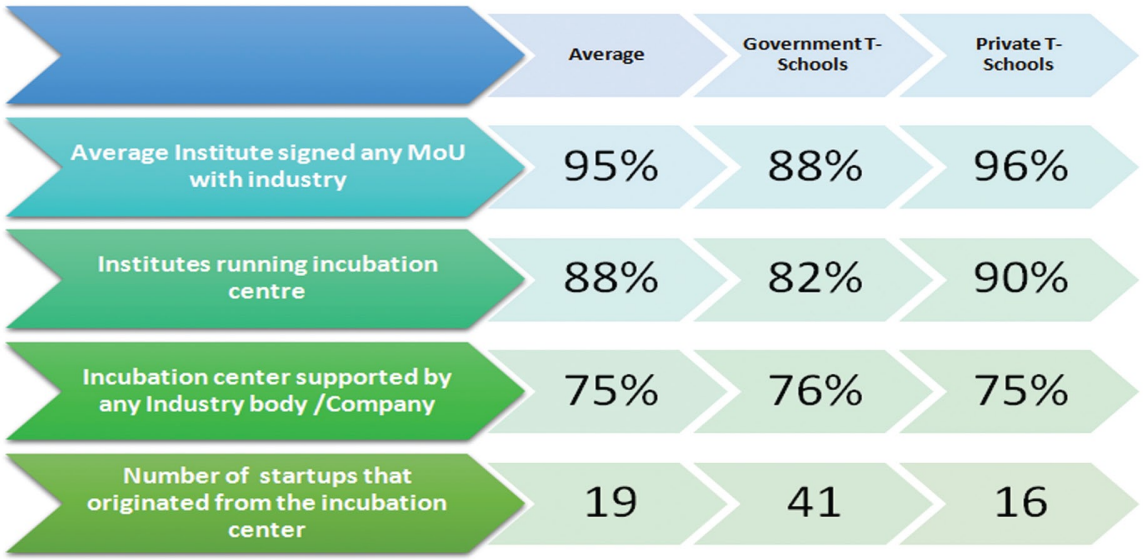
- **Industry interface:** As an internship serves as the first industry experience for students, every institute seeks it actively and, on an average, 63% of the students get trained in internships. In the last two years, the average number of students going for internships has been 1,113 spread over 117 companies. Furthermore, there is continuous support of people from the industry – an average of 108 industry experts per institute visited T-Schools in the last two years. On an average, 15 industry members were in the board and advisory council of the different T-Schools to guide them and 12 faculty members were on the board of companies last year.
- **Engagement with the industry ecosystem:** The industry engagement is a way for T-Schools fortuning themselves to industry needs, by enhancing existing teaching methods and most importantly, providing foundational training and exposure to students. Industry engagement provides a real-world experience to classroom learning, which helps students to make

Industry interface in perspective



Source: DQ-CMR T-School 2021 Survey

Industry interface in perspective



Source: DQ-CMR T-School 2021 Survey

their career path more confidently and in an informed manner.

Private-sector T-Schools are more proactive and dominate over government T-Schools in having MoUs. An overwhelming 95% of the T-Schools in the DQ-CMR T-School 2021 Survey reported having MoU with an industry partner.

According to the DQ-CMR T-School 2021 Study results, 88% of the T-Schools surveyed had setup an incubation centre to facilitate entrepreneurship. It is heartening to note that 75% of these incubators enjoy industry support, and benefit from partnerships with players in the local ecosystem. On an average, 19 start-ups were incubated at T-Schools. By acting as a bridge between T-Schools and industry, the incubators are able to support students as well as faculty members with business inputs from commercial partners, charged with scaling up and marketing the innovations.

The key takeaways from this study is that T-Schools are adopting new methods and are getting themselves ready for any future uncertainties as the pandemic isn't over yet. Virtual classrooms, labs and libraries are being designed and implemented by many institutions to provide students education without any hurdle. The

> GOOD ACADEMIC TRACK RECORD, ADEQUATE INFRASTRUCTURE, INDUSTRY ENGAGEMENT AND PLACEMENTS ARE THE TOP SCORING PARAMETERS OF ALL THESE T-SCHOOLS

T-Schools today are able to prepare the industry-ready skilled workforce. On the other hand, the industry benefits from T-Schools' know-how and expertise, and the manpower therein – both faculty and students.

This year, government institutions have set a paradigm by securing the top four places in a row. Even out of the top 10 T-Schools in the country, seven are government owned while the remaining 3 are private institutions. The north zone heads the rankings with three out of the top five institutions. IIT Kanpur, IIIT Hyderabad, Netaji Subhas University of Technology, IIIT Delhi and BS Abdur Rahman Crescent Institute of Science and Technology were adjudged the top five T-Schools as per the research findings. Good academic track record, adequate infrastructure, industry engagement and placements are the top scoring parameters of all these T-Schools.

THE WAY FORWARD: FOUR RECOMMENDATIONS FOR T-SCHOOLS

The year 2020 posed a number of challenges for T-Schools owing to the pandemic. Some institutes were able to handle the situation quickly with help of technology while others took some time to adapt to the new normal. Below are some recommendations for preparing T-Schools for the future.

RESEARCH METHODOLOGY

The DQ-CMR T-School 2021 Survey was conducted in two phases:

Phase 1: Initial desk research and groundwork phase

In the initial preparatory groundwork phase of the T-School Survey, the Edutech Practice at CMR scanned its rich edutech knowledge base, and updated it via an exhaustive desk research. The objective of this phase was to identify and list all the tech schools in India. Government-run higher educational institutions and private institutes of learning were listed separately. Colleges that were established before 2017 and offered a B.E., B. Tech or similar-level graduate technical course were considered for the survey.

At the end of the desk research phase, an invitation was extended to all shortlisted institutions on behalf of DQ and CMR to participate in the nationwide survey.

Phase 2: Primary research

The T-Schools shortlisted in Phase 1 were approached by the Edutech Practice at CMR. Both online and face-to-face interviews were scheduled with the institutions. The information collected was covered under the DQ's proprietary PACE Framework. In this framework, Placement and Academics have been given a weightage of 30 each. Engagement has been given 25 points, while Campus Infrastructure has been given a weightage of 15 points.

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- Apeejay School, Tanda Road, Jalandhar, Punjab
- Apeejay School, Model Town, Jalandhar, Punjab
- Apeejay School, Panchsheel Park, New Delhi
- Apeejay School International (IB), Panchsheel Park, New Delhi
- Apeejay School, Saket, New Delhi
- Apeejay School, Pitampura, Delhi
- Apeejay School, Noida, U.P., Near Delhi
- Apeejay International School, Greater Noida, U.P.
- Apeejay School, Faridabad, Haryana
- Apeejay Svrán Global School, Faridabad
- Apeejay School, Charkhi Dadri, Haryana
- Apeejay School, Kharghar, Navi Mumbai
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> TO CONTROL LOW EMPLOYABILITY AMONG ENGINEERING GRADUATES, THERE IS A NEED TO CONVERT CURRENT CAPACITY IN TRADITIONAL DISCIPLINES TO EMERGING NEW TECHNOLOGIES

#1
GO VIRTUAL
Amid the pandemic, going virtual has become a need. Online lectures, whether live or recorded sessions, helped students to not only continue their studies during lockdown but also stay motivated to prepare for exams. Virtual interactions with parents assured them of their child's academic progress, thus easing out their initial stress. Virtual study material is a repository that can help students in any unforeseen situation.

#2
LIBRARY AND LAB ACCESS
Library is a place where a student can refer to different books as it is not possible for a student to purchase all the books. But in recent times, we have seen students struggling to find different books relevant to their course. An online portal that can provide the content of a book of a particular author can be of great help. Through this initiative, students will be able to refer to different books even during holidays. Furthermore, it can enable a student to study remotely – the new normal. Similarly, usage of apps such as LabView can provide experience of a working lab when the student is unable to be present physically in the lab.

#3
FUTURE-READY STREAMS
In a recent study, it was observed that during 2016-17, more than 50% of the seats were vacant, resulting in glaring gaps in regulation. To control low employability among engineering graduates, there is a need to convert current capacity in traditional disciplines to emerging new technologies such as artificial intelligence, blockchain, robotics, quantum computing, data sciences, cybersecurity and 3D printing and design.

#4
ENCOURAGE ENTREPRENEURSHIP
Technology should go hand in hand with innovation and nurturing entrepreneurship skill of students. Self-reliant engineers are the need of the hour which will be in sync with fulfilling the dream of Prime Minister Narendra Modi of Aatmanirbhar Bharat. Entrepreneurship needs to be taught as an elective in engineering colleges and students should be involved in live projects. The supporting infrastructure and guidance from the faculty should be aligned with handling all the initial hiccups for new start-ups.

Mohanty is Head, User Research Practice at CMR

Top T-Schools in **India 2021**

Top 100 T-Schools (overall): government and private sector

INSTITUTE NAME	CITY	RANKING
Indian Institute of Technology, Kanpur	Kanpur	1
International Institute of Information Technology, Hyderabad	Hyderabad	2
Netaji Subhas University of Technology	New Delhi	3
Indraprastha Institute of Information Technology, Delhi	New Delhi	4
B.S.Abdur Rahman Crescent Institute of Science and Technology	Chennai	5
Koneru Lakshmaiah Education Foundation	Vaddeswaram	6
College of Engineering Pune	Pune	7
Bannari Amman Institute of Technology	Sathyamangalam	8
Maulana Abul Kalam Azad University of Technology	Haringhata	9
ABV- Indian Institute of Information Technology and Management, Gwalior	Gwalior	10
National Institute of Technology, Silchar	Silchar	11
Amity School of Engineering & Technology, Raipur	Raipur	12
Bharati Vidyapeeth College of Engineering	Pune	13
National Institute of Technology, Goa	Ponda	14
Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology	Chennai	15
Amity School of Engineering & Technology, Lucknow	Lucknow	16
Amity School of Engineering & Technology, Jaipur	Jaipur	17
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Jalandhar	18
G L Bajaj Institute of Technology and Management	Noida	19
Velagapudi Ramakrishna Siddhartha Engineering College	Kanuru	20
R.M.K. Engineering College	Chennai	21
International Institute of Information Technology, Naya Raipur	Raipur	22*
Maharaja Agrasen Institute of Technology	New Delhi	22*
Army Institute of Technology	Pune	23
Galgotias College of Engineering and Technology	Greater Noida	24*
Thiagarajar college of Engineering	Madurai	24*
Chitkara University Institute of Engineering and Technology	Rajpura	25*
N M A M Institute of Technology	Udupi	25*
The NorthCap University	Gurugram	26

INSTITUTE NAME	CITY	RANKING
Chhatrapati Shivaji Institute of Technology	Durg	27
VNR Vignana Jyothi Institute of Engineering and Technology	Hyderabad	28*
KCG College of Technology	Chennai	28*
Vel Tech Multi Tech Dr.Rangarajan Dr.Sakunthala Engineering College	Chennai	29
The Oxford College of Engineering	Bengaluru	30
Dr. NGP Institute of Technology	Coimbatore	31
GMR Institute of Technology	Rajam	32
Rungta College of Engineering & Technology	Bhilai	33
Panimalar Engineering College	Chennai	34
Yeshwantrao Chavan College of Engineering	Nagpur	35
MVJ College of Engineering	Bengaluru	36
Maharaja Surajmal Institute of Technology	New Delhi	37
D.K.T.E.Society's Textile & Engineering Institute, Ichalkaranji	Ichalkaranji	38
Sri Sai Ram College of Engineering	Bengaluru	39
Chandigarh Engineering College	Mohali	40
RNS Institute of Technology	Bengaluru	41
CVR College of Engineering	Hyderabad	42
S J C Institute of Technology	Chikkballarpur	43
Ecole Centrale School of Engineering, Mahindra University	Hyderabad	44*
Hindusthan College of Engineering and Technology	Coimbatore	44*
GITA Bhubaneswar	Bhubaneswar	45
Reva University	Bengaluru	46
Erode Sengunthar Engineering College	Erode	47*
Sri Manakula Vinayagar Engineering College	Puducherry	47*
Sir M Visvesvaraya Institute of Technology, Bangalore	Bengaluru	48
BNM Institute of Technology	Bengaluru	49
Prasad V. Potluri Siddhartha Institute of Technology	Vijayawada	50
Shri Ram Institute of Technology	Jabalpur	51
M. Kumarasamy College of Engineering	Karur	52

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Department of Computer & Information Technology (Estd. 1992)

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Department of Production Engineering & Industrial Management (Estd. 1994)

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INSTITUTE NAME	CITY	RANKING
Rajagiri School of Engineering & Technology	Kochi	53
Gandhi Institute for Education and Technology	Khordha	54
Vignan Institute of Technology and Science	Pochmapally Mandal	55
Muthayammal Engineering College	Rasipuram	56*
K. Ramakrishnan College of Engineering	Trichy	56*
Rajarambapu Institute of Technology	Islampur	57*
Rajshree Institute Of Management & Technology, Bareilly	Bareilly	57*
K K R And K S R Institute of Technology and Science	Guntur	57*
Govt. College of Engineering Karad	Karad	58
Institute of Aeronautical Engineering	Hyderabad	59
CMR Institute of Technology	Hyderabad	60
Modern College of Engineering, Pune	Pune	61
Velalar College of Engineering and Technology	Erode	62
Aditya Engineering College, Surampalem	Surampalem	63
Vaagdevi College of Engineering	Warangal	64
Nandha Engineering College	Erode	65
Institute of Technology, Nirma University	Ahemdabad	66
Vidyavardhaka College of Engineering	Mysuru	67
Hindusthan Institute of Technology	Coimbatore	69
Lakireddy Bali Reddy College of Engineering	Myalavaram	70
Pranveer Singh Institute of Technology	Kanpur Nagar	71
CMR Engineering College	Hyderabad	72
Acropolis Institute of Technology and Research	Indore	73
Annamacharya Institute of Technology & Sciences, Tirupati	Tirupati	74
Trident Academy of Technology, Bhubaneswar	Bhubaneswar	75
R. C. Patel Institute of Technology	Shirpur	76
SCMS SchooL oF Engineering and Technology	Ernakulam	77
Gandhi Engineering College	Bhubaneswar	78

INSTITUTE NAME	CITY	RANKING
Sri Vasavi Institute of Engineering and Technology	Nandamuru, Near Machilipatnam	79*
PSIT College of Engineering	Kanpur	79*
Sasi Institute of Technology & Engineering	Tadepalligudem	80
Govt. Model Engineering College, Kochi	Kochi	81
Malnad College Of Engineering	Hassan	82*
Annamacharya Institute of Technology & Sciences, Rajampet	Rajampet	82*
Er. Perumal Manimekalai College of Engineering	Hosur	83
Faculty Of Engineering, Teerthanker Mahaveer University	Moradabad	84
Aditya College of Engineering, Peddapuram	Peddapuram	85
Kanpur Institute of Technology	Kanpur	86*
G H Patel College of Engineering and Technology	Vallabh Vidyanagar	86*
G. Pullaiah College of Engineering and Technology	Kurnool	87
Shri Ram Murti Smarak College of Engineering & Technology	Bareilly	88
Shri Sant Gajanan Maharaj College of Engineering	Shegaon	89
BVRIT Hyderabad College of Engineering for Women	Hyderabad	90
Sri Venkateswara Engineering College	Tirupati	91
School to Engineering, Cochin University of Science and Technology	Kochi	92
Model Institute of Engineering and Technology, Jammu	Jammu	93
Chettinad College of Engineering & Technology	Karur	94*
Ravindra College of Engineering for Women	Kurnool	94*
Sri Venkateswara College of Engineering Tirupati	Tirupati	95
Srinivasa Ramanujan Institute of Technology	Anantapur	96
Mohandas College of Engineering and Technology	Trivandrum	97
Aditya College of Engineering & Technology, Surampalem	Surampalem	98
SB Jain Institute of Technology Management and Research	Nagpur	99
C K Pithawalla College of Engineering & Technology	Surat	100

* These institutes share the same rank due to identical scores
Source: DQ-CMR T-School Survey 2021

Top T-Schools in India 2021 **(Government)**

INSTITUTE NAME	CITY	RANKING
Indian Institute of Technology, Kanpur	Kanpur	1
International Institute of Information Technology, Hyderabad	Hyderabad	2
Netaji Subhas University of Technology	New Delhi	3
Indraprastha Institute of Information Technology, Delhi	New Delhi	4
College of Engineering Pune	Pune	5
Maulana Abul Kalam Azad University of Technology	Haringhata	6
ABV- Indian Institute of Information Technology and Management, Gwalior	Gwalior	7
National Institute of Technology, Silchar	Silchar	8
National Institute of Technology, Goa	Ponda	9
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Jalandhar	10
International Institute of Information Technology, Naya Raipur	Raipur	11
Thiagarajar college of Engineering	Madurai	12
Vel Tech Multi Tech Dr.Rangarajan Dr.Sakunthala Engineering College	Chennai	13
Govt. College of Engineering Karad	Karad	14
Govt. Model Engineering College, Kochi	Kochi	15
Malnad College of Engineering	Hassan	16
School to Engineering, Cochin University of Science and Technology	Kochi	17

Source: DQ-CMR T-School Survey 2021

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- RANKED AAA+ — INDIA'S BEST ENGINEERING COLLEGES 2020 in SOUTH ZONE — CAREERS360
- RANKED 10 AS PER TIMES ENGINEERING RANKINGS IN AP 2020 — TIMES ENGINEERING
- siliconindia — RANKED 15 AMONG TOP 100 ENGINEERING COLLEGES IN INDIA 2020
- RANKED 60 SOUTH ZONE — THE WEEK — RANKED 100 ALL INDIA — BEST PRIVATE ENGINEERING COLLEGES 2020 as per THE WEEK HANSA RESEARCH SURVEY 2020
- THE 10 BEST AGRICULTURE INSTITUTES IN INDIA 2020 — KNOWLEDGE REVIEW
- RANKED AAAA — TOP ENGINEERING INSTITUE RANKING 2020 IN SOUTH INDIA — ENGINEERING INSTITUTES OF INDIA RANKING 2020
- DATAQUEST — TOP 100 T-SCHOOLS IN INDIA 2020 RANKINGS IN GOVERNMENT AND PRIVATE COLLEGES — RANKED 82

COURSES OFFERED

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Management
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Top T-Schools in India 2021 **(Private)**

INSTITUTE NAME	CITY	RANKING
B.S.Abdur Rahman Crescent Institute of Science and Technology	Chennai	1
Koneru Lakshmaiah Education Foundation	Vaddeswaram	2
Bannari Amman Institute of Technology	Sathyamangalam	3
Amity School of Engineering & Technology, Raipur	Raipur	4
Bharati Vidyapeeth College of Engineering	Pune	5
Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology	Chennai	6
Amity School of Engineering & Technology, Lucknow	Lucknow	7
Amity School of Engineering & Technology, Jaipur	Jaipur	8
G L Bajaj Institute of Technology and Management	Noida	9
Velagapudi Ramakrishna Siddhartha Engineering College	Kanuru	10
R.M.K. Engineering College	Chennai	11
Maharaja Agrasen Institute of Technology	New Delhi	12
Army Institute of Technology	Pune	13
Galgotias College of Engineering and Technology	Greater Noida	14
Chitkara University Institute of Engineering and Technology	Rajpura	15*
N M A M Institute of Technology	Udupi	15*
The NorthCap University	Gurugram	16
Chhatrapati Shivaji Institute of Technology	Durg	17
VNR Vignana Jyothi Institute of Engineering and Technology	Hyderabad	18*
KCG College of Technology	Chennai	18*
The Oxford College of Engineering	Bengaluru	19
Dr. NGP Institute of Technology	Coimbatore	20
GMR Institute of Technology	Rajam	21
Rungta College of Engineering & Technology	Bhilai	22

INSTITUTE NAME	CITY	RANKING
Panimalar Engineering College	Chennai	23
Yeshwantrao Chavan College of Engineering	Nagpur	24
MVJ College of Engineering	Bangalore	25
Maharaja Surajmal Institute of Technology	New Delhi	26
D.K.T.E.Society's Textile & Engineering Institute, Ichalkaranji	Ichalkaranji	27
Sri Sai Ram College of Engineering	Bangalore	28
Chandigarh Engineering College	Mohali	29
RNS Institute of Technology	Bengaluru	30
CVR College of Engineering	Hyderabad	31
S J C Institute of Technology	Chikkballarpur	32
Ecole Centrale School of Engineering, Mahindra University	Hyderabad	33*
Hindusthan College of Engineering and Technology	Coimbatore	33*
GITA Bhubaneswar	Bhubaneswar	34
Reva University	Bengaluru	35
Sri Manakula Vinayagar Engineering College	Puducherry	36*
Erode Sengunthar Engineering College	Erode	36*
Sir M Visvesvaraya Institute of Technology, Bangalore	Bangalore	37
BNM Institute of Technology	Bangalore	38
Prasad V. Potluri Siddhartha Institute of Technology	Vijayawada	39
Shri Ram Institute of Technology	Jabalpur	40
M. Kumarasamy College of Engineering	Karur	41
Rajagiri School of Engineering & Technology	Kochi	42
Gandhi Institute for Education and Technology	Khordha	43
Vignan Institute of Technology and Science	Pochmapally Mandal	44

INSTITUTE NAME	CITY	RANKING
Muthayammal Engineering College	Rasipuram	45*
K. Ramakrishnan College of Engineering	Trichy	45*
Rajshree Institute Of Management & Technology, Bareilly	Bareilly	46*
K K R And K S R Institute of Technology and Science	Guntur	46*
Rajarambapu Institute of Technology	Islampur	46*
Institute of Aeronautical Engineering	Hyderabad	47
CMR Institute of Technology	Hyderabad	48
Modern College of Engineering, Pune	Pune	49
Velalar College of Engineering and Technology	Erode	50
Aditya Engineering College, Surampalem	Surampalem	51
Vaagdevi College of Engineering	Warangal	52
Nandha Engineering College	Erode	53
Institute of Technology, Nirma University	Ahemdabad	54
Vidyavardhaka College of Engineering	Mysuru	55
Hindusthan Institute of Technology	Coimbatore	56
Lakireddy Bali Reddy College of Engineering	Myalavaram	57
Pranveer Singh Institute of Technology	Kanpur Nagar	58
CMR Engineering College	Hyderabad	59
Acropolis Institute of Technology and Research	Indore	60
Annamacharya Institute of Technology & Sciences, Tirupati	Tirupati	61
Trident Academy of Technology, Bhubaneswar	Bhubaneswar	62
R. C. Patel Institute of Technology	Shirpur	63
SCMS SchooL oF Engineering and Technology	Ernakulam	64
Gandhi Engineering College	Bhubaneswar	65

INSTITUTE NAME	CITY	RANKING
PSIT College of Engineering	Kanpur	66*
Sri Vasavi Institute of Engineering and Technology	Nandamuru, Near Machilipatnam	66*
Sasi Institute of Technology & Engineering	Tadepalligudem	67
Annamacharya Institute of Technology & Sciences, Rajampet	Rajampet	68
Er. Perumal Manimekalai College of Engineering	Hosur	69
Faculty Of Engineering, Teerthanker Mahaveer University	Moradabad	70
Aditya College of Engineering, Peddapuram	Peddapuram	71
Kanpur Institute of Technology	Kanpur	72*
G H Patel College of Engineering and Technology	Vallabh Vidyanagar	72*
G. Pullaiah College of Engineering and Technology	Kurnool	73
Shri Ram Murti Smarak College of Engineering & Technology	Bareilly	74
Shri Sant Gajanan Maharaj College of Engineering	Shegaon	75
BVRIT Hyderabad College of Engineering for Women	Hyderabad	76
Sri Venkateswara Engineering College	Tirupati	77
Model Institute of Engineering and Technology, Jammu	Jammu	78
Chettinad College of Engineering & Technology	Karur	79*
Ravindra College of Engineering for Women	Kurnool	79*
Sri Venkateswara College of Engineering Tirupati	Tirupati	80
Srinivasa Ramanujan Institute of Technology	Anantapur	81
Mohandas College of Engineering and Technology	Trivandrum	82
Aditya College of Engineering & Technology, Surampalem	Surampalem	83
SB Jain Institute of Technology Management and Research	Nagpur	84
C K Pithawalla College of Engineering & Technology	Surat	85

* * These institutes share the same rank due to identical scores
Source: DQ-CMR T-School Survey 2021

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SAP Labs, Infosys, Mphasis, Wipro Ltd., Zensar Technologies, TIAA, Yash Tech. TEKsystems, Legato Health Technologies, Piaggio Vehicles Pvt. Ltd. , CEAT Tyres Ltd. are some of its regular recruiters. Consistently Bhopal's 2nd largest placement provider group from last 8 years. About 80% placements for 2019 & 82% in 2020 Batch placed in top MNC's. For 2020 batch students 42 Companies, 535 offers, with maximum package of 21 LPA and 25+ students having multiple job offers from various companies till Feb., 2021.

The Institute has signed MOU with IBS International Business School, Hungary, with the intention of developing academic and business opportunities for both the Universities; Synergy University, Russia, to recognize and conduct Student Exchange and Twinning programs, Research Collaborations, Conferences and seminars, workshops and training sessions for the students and faculties of IES University. IES Group has also signed MOU with Infrastructure University, Kuala Lumpur, with the objective of promoting quality education; Universidad Empresarial Siglo 21, Argentina for exchange of academic material & information, student exchange programs; Russia New University, Russia with the aim to conduct joint educational, cultural and research activities, promotion of International grants and Research laboratories; University of Muhammadiyah, Jakarta with the intention to promote International Academic standards.

The group has got Corporate Tie Ups for Industrial training with Companies Microsoft Innovation Center, IBM Center of Excellence, Redhat Academy to train our Students and to develop the skills required at the corporate level. Apart from Training of Students, IES professors & faculty members have been actively participating in various Workshops & Training Programs conducted by TCS, IBM and IIT Bombay.

IES students got many prizes for their outstanding performance in the various national level competitions. IES student reached to the Grand Finale of the biggest Technical Contest of the country 'Accenture innovation Challenge' and won most popular Idea award in season 5, IES Team also won first position at Accenture Innovation Jockeys season 4.The winning team are rewarded a trip to San Francisco, Silicon valley, USA, an Apple I Phone 6, an Apple I Pad, and an opportunity to work with Accenture. Recently IES Engineering students winners at Article writing competition organized by World Wildlife Fund & honoured by Shri Sajjan Singh Verma, Hon'ble Minister, PWD & Environment, Govt. of M.P.

The group got many honors by esteemed organizations. IES University has been awarded with the title of Emerging University of the Year 2021 by ASSOCHAM in its 14th National Education Summit. Prestigious magazine India Today Rank #1 for best value of money & Rank # 54 Outlook, Career 360, Data Quest, the Week Survey and Digital Learning ranked IES College of Technology among Top 100 Engineering colleges in the country.

IES has installed a 100 KWs Solar Power plant in the Campus which was inaugurated by the Hon'ble Governor of M.P Smt. Anandiben Patel. IES University has been rewarded with the title of Most Promising University of Central India felicitated by the Hon'ble Governor of M.P Smt. Anandiben Patel. IES Group of Institute received the "Gold rated Green Building Award" from IGBC Hyderabad, Clean Campus Award by AICTE, New Delhi, and it is also got the privilege of having first Tobacco Free Campus of M.P. by M.P. Government.

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Top T-Schools in India 2021 **(Zone Wise)**

East

INSTITUTE	CITY	RANK
Maulana Abul Kalam Azad University of Technology	Haringhata	1
National Institute of Technology, Silchar	Silchar	2
Amity School of Engineering & Technology, Raipur	Raipur	3
International Institute of Information Technology, Naya Raipur	Raipur	4
Chhatrapati Shivaji Institute of Technology	Durg	5
Rungta College of Engineering & Technology	Bhilai	6
GITA Bhubaneswar	Bhubaneswar	7
Gandhi Institute for Education and Technology	Khordha	8
Trident Academy of Technology, Bhubaneswar	Bhubaneswar	9
Gandhi Engineering College	Bhubaneswar	10

West

INSTITUTE	CITY	RANK
College of Engineering Pune	Pune	1
ABV- Indian Institute of Information Technology and Management, Gwalior	Gwalior	2
Bharati Vidyapeeth College of Engineering	Pune	3
National Institute of Technology, Goa	Ponda	4
Army Institute of Technology	Pune	5
Yeshwantrao Chavan College of Engineering	Nagpur	6
D.K.T.E.Society's Textile & Engineering Institute, Ichalkaranji	Ichalkaranji	7
Shri Ram Institute of Technology	Jabalpur	8
Rajarambapu Institute of Technology	Islampur	9
Govt. College of Engineering Karad	Karad	10

North

INSTITUTE	CITY	RANK
Indian Institute of Technology, Kanpur	Kanpur	1
Netaji Subhas University of Technology	New Delhi	2
Indraprastha Institute of Information Technology, Delhi	New Delhi	3
Amity School of Engineering & Technology, Lucknow	Lucknow	4
Amity School of Engineering & Technology, Jaipur	Jaipur	5
Dr. B R Ambedkar National Institute of Technology, Jalandhar	Jalandhar	6
G L Bajaj Institute of Technology and Management	Noida	7
Maharaja Agrasen Institute of Technology	New Delhi	8
Galgotias College of Engineering and Technology	Greater Noida	9
Chitkara University Institute of Engineering and Technology	Rajpura	10

South

INSTITUTE	CITY	RANK
International Institute of Information Technology, Hyderabad	Hyderabad	1
B.S.Abdur Rahman Crescent Institute of Science and Technology	Chennai	2
Koneru Lakshmaiah Education Foundation	Vaddeswaram	3
Bannari Amman Institute of Technology	Sathyamangalam	4
Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology	Chennai	5
Velagapudi Ramakrishna Siddhartha Engineering College	Kanuru	6
R.M.K. Engineering College	Chennai	7
Thiagarajar college of Engineering	Madurai	8
N M A M Institute of Technology	Udupi	9
VNR Vignana Jyothi Institute of Engineering and Technology	Hyderabad	10*
KCG College of Technology	Chennai	10*

Source: DQ-CMR T-School Survey 2021

New Entrants: **T-School 2021**

INSTITUTE NAME	CITY	ZONE	CATEGORY
Indian Institute of Technology, Kanpur	Kanpur	North	Govt.
ABV- Indian Institute of Information Technology and Management, Gwalior	Gwalior	West	Govt.
National Institute of Technology, Goa	Ponda	South	Govt.
Amity School of Engineering & Technology, Raipur	Raipur	East	Private
Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology	Chennai	South	Private
International Institute of Information Technology, Naya Raipur	Raipur	East	Govt.
Galgotias College of Engineering and Technology	Greater Noida	North	Private
VNR Vignana Jyothi Institute of Engineering and Technology	Hyderabad	South	Private
KCG College of Technology	Chennai	South	Private
RNS Institute of Technology	Bengaluru	South	Private
Ecole Centrale School of Engineering, Mahindra University	Hyderabad	South	Private
Hindusthan College of Engineering and Technology	Coimbatore	South	Private
GITA Bhubaneswar	Bhubaneswar	East	Private
BNM Institute of Technology	Bangalore	South	Private
Muthayammal Engineering College	Rasipuram	South	Private
K. Ramakrishnan College of Engineering	Trichy	South	Private
Rajarambapu Institute of Technology	Islampur	West	Private
Modern College of Engineering, Pune	Pune	West	Private

INSTITUTE NAME	CITY	ZONE	CATEGORY
Vaagdevi College of Engineering	Warangal	South	Private
Institute of Technology, Nirma University	Ahemdabad	West	Private
Hindusthan Institute of Technology	Coimbatore	South	Private
CMR Engineering College	Hyderabad	South	Private
Annamacharya Institute of Technology & Sciences, Tirupati	Tirupati	South	Private
R. C. Patel Institute of Technology	Shirpur	West	Private
Sasi Institute of Technology & Engineering	Tadepalligudem	West	Private
Malnad College Of Engineering	Hassan	South	Govt.
Er. Perumal Manimekalai College of Engineering	Hosur	South	Private
Faculty Of Engineering, Teerthanker Mahaveer University	Moradabad	North	Private
Shri Sant Gajanan Maharaj College of Engineering	Shegaon	West	Private
Sri Venkateswara Engineering College	Tirupati	South	Private
School to Engineering, Cochin University of Science and Technology	Kochi	South	Govt.
Chettinad College of Engineering & Technology	Karur	South	Private
Ravindra College of Engineering for Women	Kurnool	South	Private
Srinivasa Ramanujan Institute of Technology	Anantapur	West	Private
Mohandas College of Engineering and Technology	Trivandrum	South	Private
SB Jain Institute of Technology Management and Research	Nagpur	West	Private
C K Pithawalla College of Engineering & Technology	Surat	West	Private

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MILLIONS OF STUDENTS ARE TRYING TO BRIDGE THE DIGITAL GAP

A marketplace for teaching and learning, Udemy helps students acquire the skills they need to succeed. It also helps organisations of all kinds to prepare for the ever-evolving future of work. The curated collection of business and technical courses gives companies, governments, and non-profits the power to develop in-house expertise, and satisfy employees' hunger for learning and development. ***Irwin Anand,*** *MD, Udemy India, talks about how they have dealt with the country's digital divide in education. Excerpts:*

How are you dealing with the country's digital divide in education during the pandemic?

The pandemic has accelerated the global movement towards online learning. We've entered an era of continuous change, and companies and individuals need continuous learning to thrive. The education systems have changed drastically, and today, we see millions of students trying to bridge the digital gap. This was coherently visible as students flocked to online sites on their mobile phones to upskill themselves. Indian students who have a basic understanding of English were seen enrolling in online lectures to try and learn virtually, to upskill themselves while at home.

Additionally, to help students deal with the pandemic, we released the Udemy Fee Resource Center, a curated collection of free Udemy courses to help them learn new skills during the lockdown. This resource center is an excellent place for individual learners and leaders to find key resources and courses about adapting to working from home, searching for a job, staying active and maintaining balance while spending time at home.

Besides the disparity in students' access to basic internet infrastructure, students at home have to battle many socio-political differences. How is this issue being addressed?

There are so many students who have been subjected to the digital divide. In fact, internet access has been a major issue in many parts of the country, not to mention the disparity at home and access to modern resources. I feel that all students are trying to make the most of the resources available to them. We have seen a major shift to edtech platforms during these times, to battle the pandemic, and workplaces as well as institutions have started adopting the online programmes.

Without understanding the way in which a student learns, it is unrealistic to expect good returns. Does an edutech company need to hire educators?

Every education company needs to work with subject matter experts in their fields. We have a strong base of 57,000 instructors who are global experts in their respective fields. It is not an education portal, but more so a marketplace, with thousands of courses suited to our students' needs. We have a wide array of courses in various spheres and students can choose a course that is well-suited to their requirements.

We also cater to individuals who are out of school and in the workforce. Our platform allows anyone to take a course and become better at their job, excel at a project or change jobs successfully. As such, good returns equate to learning the latest skills from real-world practitioners, which is what Udemy provides.

In India, we have seen a 200% growth in overall enrolments for our courses. Looking at our instructor base, we've seen a 125% year-over-year increase in new instructors creating courses on our platform as everyday experts look to share their knowledge with the world and find new sources of income.

Poor user engagement is often seen as a major hurdle in the way of success. How do you address such issues?

We firmly believe in the power of knowledge. Even our courses are designed in the most optimum, comprehensible way so that the level of retention of our courses does not suffer. Being a marketplace, we have structured an algorithm to make sure that the highest rated courses appear at the top, while a student searches for any particular course he/she wants to enrol in, thereby increasing the user engagement for that particular course.

Aanchal Ghatak
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ARJUN NAIR
Co-founder, Great Learning

WE USE TECHNOLOGY AND COMMUNITY TO AID COURSE COMPLETION

Great Learning is one of India's leading ed-tech companies for professional and higher education. It offers career-relevant programmes from world-class universities in the most in-demand domains. As one of the largest professional learning companieswith a global footprint in 140+ countries, Great Learning is on a mission to make professionals around the world proficient and future-ready. ***Arjun Nair,*** *Co-founder, Great Learning, tells us more. Excerpts from the interview:*

How are you dealing with the country's digital divide in education during the pandemic?

While a lot of educational institutions have struggled to provide education online in the last year, we believe that it's possible to derive the effective learning outcomes through virtual learning. Therefore, to overcome this education crisis and enable Indian institutions to seamlessly deliver a world-class, high-quality, and engaging online learning experience to its learners, we offered our sustainable learning management system, 'Olympus Digital Campus',to them amid the pandemic.

Built and perfected over the last 7 years, the platform enables all aspects of learning, including live learning, timetabling, proctored exams, assessments, grading, student collaboration, attendance, content development, progress/engagement tracking, and faculty feedback. So far, it has helped over 150 Indian colleges across towns and cities such as Coimbatore, Visakhapatnam, Hyderabad, Bengaluru, Goa, Tenkamijar (Mangalore), Nandyal (AP), and Moradabad (MP) to get them 'digitally ready', and has supported over 1,00,000 students in their education continuity.

Besides the disparity in access to basic internet, students also have to battle with many socio-economic challenges. How are you addressing this issue at your end?

The pandemic has posed tough times for a lot of students and professionals, who have not only suffered physically and mentally, but also economically, owing to the massive slump in the job market. Despite this black swan event, millions of learners across the country have turned this downtime into an opportunity to begin their upskilling journey.

We, at our platform, aim to bridge the gap of such socio-economic differences by offering high-quality programmes to cater to the needs of learners from every kind of background and help them move ahead in their careers. Last year, we launched Great Learning Academy and Great Learning Corporate Academy to provide free programmes in the emerging fields of data science &analytics, machine learning, artificial intelligence, digital marketing, cloud computing,andcybersecurity to help our learners attain fluency in these career-critical concepts.

Students who then wished to take a deeper dive into such skills and chart a career path in a particulardomain, opted for our paid programmes starting from Rs. one lakh. The programme curriculum enables learners to gain an in-depth understanding of the fundamentals of the technology, and various tools and techniques that help them develop the required skill set for desired roles. As a part of our offering, we also provide career support to our learners and connect them to the right job opportunities through our placement assistance platform, GL Excelerate. We also present them with easy EMI options that help them continue their education without the pressure of financing.

The integration of technology at the school/district level may compromise the integrity of student data and pose serious concerns. What are your thoughts?

Technology has become imperative in every aspect of life.Therefore, it becomes essential for educational institutions to introduce their learners to different applications of the new-age skills to make them future-ready and employable professionals. According to a report by the World Economic Forum, 133 million new jobs will be created in the information technology domain by 2025.

Early exposure to technology will help kids think and process information differently. That said, it is equally important to safeguard the integrity of sensitive data of learners without compromising on the quality of education being imparted to them. The institutions need to manage these risks, be transparent and make

> OUR OLYMPUS DIGITAL CAMPUS PLATFORM HAS HELPED 150+INDIAN COLLEGES TO BE DIGITALLY READY AND SUPPORTED OVER 1 LAKH STUDENTS IN THEIR EDUCATION CONTINUITY.

the parents more comfortable with the collection and analysis of personal information for specific purposes so that the risks of using data don't stand in the way of realising the tremendous benefits it can bring.

Without understanding the way in which a student learns, it is unrealistic to expect good returns. Does an ed-tech startup need to hire educators? What are your thoughts?

While the importance of learning career-critical competencies is known to everyone, the biggest challenge we face in our current education system is the shortage of high-quality faculty to teach such skill sets. It is hardly possible for majority of the Indian institutions to deliver world-class education in fields such as AI, analytics, machine learning, and cloud computing in the absence of high-quality teaching resources in these domains. This is the gap that organisations like ours are trying to bridge.

We are trying to solve this problem in multiple ways by enabling learners to learn from the best global and Indian faculty in addition to industry practitioners. We work with the best of the educational institutions, faculty, and industry experts and offer access to robust career support and placement opportunities through Great Learning's extensive career services and corporate network. It is this high-quality education that helps students and professionals to power ahead in their careers.

Poor user engagement is often a major hurdle in the way of success for startups? How does your organisation address such an issue?

When it comes to online learning today, the central challenge among learners is not joining the programme,but finishing it. Great Learning has been able to leverage a mix of technology and community to solve this challenge. We use a mix of predictive analytics and community participation to improve our completion rates. Our programmes are conducted in batches and the content involves community tasks, as well as group mentoring from industry experts. We have also developed an algorithm to identify students who are likely to face difficulty in completing a programme.

The system allows for a timely intervention from the Great Learning team, which then mentors and motivates students to finish the tasks and improve their grades. This has ensured a completion rate of almost 91% for the platform which is unheard of in the e-learning space, globally.

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Relax, a better **future awaits**

Students today seem burdened by the pandemic. But a few simple changes in daily life and engagement in tech-related contests can take most of their worries away

"The best way out is always through" goes a saying by Robert Frost which always bewildered me until the onset of the COVID-19 pandemic as I could see this saying coming true.

In these tough times, I see students enduring delayed start of courses, online lectures and labs, multiple parallel pressures to get to the end of the semester and make up for the time lost when no classes were held. If you are a student and reading this, have you stopped to think why is it even needed to become part of a race and take everything head on? Culturally, we are groomed to follow the herd and race against timelines right from the start, which does help when we get onto jobs or take on anything later in life. But what we don't realise is that there are times when we need to sit back and think before we start to follow what everyone else is doing. I certainly have been guilty of being one of those who race against time to finish everything that is expected of them. Though late, I did make some really simple shifts which have helped

> CULTURALLY, WE ARE GROOMED TO FOLLOW THE HERD AND RACE AGAINST TIMELINES. BUT WE MUST REALISE THAT AT TIMES WE NEED TO THINK BEFORE FOLLOWING EVERYONE ELSE.

me and I will cover some of those in this article. I will also share my experiences of what I see has helped students around me in getting prepared for a better future. So here are my top five picks on what could help.

#1

Prioritise: Every morning, I prioritise 2-3 most important actions that I want to perform in the day. I put them on a to-do list and strike off as I complete them. That helps me stay focused on what I want to achieve rather than just going with the flow. Moreover, striking off every action once it gets done gives me a great sense of achievement.

#2

Get your time off: I accepted the fact that I am no machine and need my breaks. I began marking brief breaks on my calendar and though I miss many, the good thing is I still get a few of them. I even plan what I could do in the short 10-minute breaks, right from sipping tea to listening to music.

#3

Do what you enjoy: While everyone says learn something new, I realised that keeping a goal of learning something 'theoretically' new all the time creates pressure. It really is not important to keep a hard goal such as this one dangling on us. I also realised that learning new things, sans any goals, was giving me a feeling of relaxation or distraction from high pressure. So, I signed up for short learning programmes that were driven live online and learnt some things that I liked, right from technology to painting. I believe that learning should never stop, even if it means reading a paragraph a day. We should always keep on learning but not with the pressure or hard goal of doing it, but for just enjoying it.

#4

Focus on physical and mental well-being: The one thing that also helps me stay calm is my yoga class and meditation that I try to weave into most of my days. This has intangible and amazing benefits that saved me from gloom during the lockdown times.

#5

Future-proof yourself: One of the key questions that bothers students is how do they get ready for a better future, especially given the uncertainty that the pandemic

> DID YOU KNOW THAT MAHATMA GANDHI ACTUALLY ANNOUNCED A DESIGN COMPETITION WAY BACK IN 1929? HE EVEN ANNOUNCED ONE LAKH RUPEES AS THE PRIZE MONEY!

has brought about. So I am sharing some ideas that I saw help students prepare for a better future.

Have you ever wondered why many people like solving jigsaw puzzles? One of the reasons is that at the end of working on fixing each piece, the whole picture emerges, which is truly satisfying. There is a lot in common between solving jigsaw puzzles and participating in coding challenges or hackathons. What is even better with coding challenges and hackathons is that they help you solve the world's problems and that feels like a small give-back to the society in which we live, not to forget the immense learning experience from them.

To share some history trivia, did you know that Mahatma Gandhi actually announced a design competition way back in 1929? He even announced one lakh rupees as the prize money! He wanted to encourage people to take up the spinning wheel and was looking for engineers who could come up with a machine that would take in raw cotton as input and produce yarn as output. Gandhiji recognised what technology could do and was way ahead of his times.

Coming back to hackathons, let me tell you the story of how they came about before we get to how they help. The word 'hackathon' is a combination of the words 'hack' and 'marathon', where hack is used to mean exploratory programming. Speaking of programming, competitive programming grew with the internet and one of the oldest competitions is the ACM International Collegiate Programming Contest (ICPC), which required coders to write programs to solve a given set of problems. In 1975, an informal hobbyist society called the Homebrew Computer Club was formed with the objective of exchanging technological knowledge and ideas, as well as collaborating on projects. Later in the 1990s, LAN parties brought together programmers and gamers and are often credited as an early form of hackathons.

Hackathons or coding contests give programmers the opportunity to learn, create and network. Just like nearly everyone has participated in a physical education class or some form of athletic activity, in the future, programming will become just another standard aspect of a well-rounded education.

Till then, I would urge each student to focus on their mental well-being, and manage their multiple activities well, possibly from some of the suggestions I have made earlier in this article, before they make the best of all the offerings for better employability and future-proofing. Last but not least, I would like to conclude by saying that let the world not baffle you with any unpleasantness; counter it with your calm and wisdom.

Bharadwaj is Global University Programs Leader-India, IBM India

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Changing the education landscape with deep tech

Learning platforms based on AI and ML allow students to learn at their own pace, making the process experiential and stress-free

Almost every industry today relies on technology to thrive and evolve, leading to increasing interest and investment to help companies make smarter and faster decisions and products. Artificial intelligence (AI) has established itself in recent years as one of the most exciting technologies to watch for. This emerging technology has already become an important component of many industries such as healthcare, education, defence, transportation, logistics and farming.

Artificial intelligence and machine learning (ML) are still in the nascent stages in the field of education, but their potential to revolutionise learning cannot be overstated. There are many ways of introducing new forms of learning, especially beyond the constraints of textbooks and typical classroom settings. Here is an example: Children are naturally found to be more curious when they are closer to nature –say while walking in a park or zoo, or leisurely staring at the night sky. Now, imagine an AI-based personal tutor available in their pocket to answer all their questions. More specifically, this tutor precisely knows what the child already knows or does not know based on the previous interactions and answers in appropriate detail. This is the future of personalised learning driven by AI.

The ongoing pandemic has challenged every school and college to relook at the contemporary process of imparting education and embrace more emerging technologies and novel pedagogy models into the overall learning ecosystem. While large-scale standardised tests based on multiple-choice questions are prevalent, there is increasing interest in leveraging AI in more sophisticated applications such as remote exam proctoring and evaluation of subjective answers. As deep tech learning contents using virtual reality (VR) and augmented reality (AR) emerge, teachers are increasingly adopting blended learning models such as flipped classrooms, where new contents/concepts are introduced at home and the classroom sessions become more productive and interactive.

Though the pandemic has contributed to the shift towards blended learning, the approach as such is largely driven by technology and proven pedagogy models. This trend is expected to continue and evolve beyond the pandemic.

Currently, many institutions are opting for AI-assisted, chatbot-based learning platforms that allow students to learn at their own pace and time. As cities become more cosmopolitan, it is common to see students with varying skills and expertise sitting together in a traditional urban classroom –making it challenging for the teachers to engage effectively across such a diverse set of students. This is where edtech companies powered by AI address

> TEACHERS ARE ADOPTING BLENDED LEARNING MODELS SUCH AS FLIPPED CLASSROOMS, WHERE NEW CONCEPTS ARE INTRODUCED AT HOME AND CLASSROOM SESSIONS BECOME INTERACTIVE.

the need for customised learning solutions that adapt to an individual student's learning style and need. For example, technology- and AI-based learning apps can offer individualised lessons in the form of deep tech contents, adaptive quizzes, live classes, and interactive gamified simulations.

For students, AI and ML can help make learning more experiential and stress-free. Specifically, AI-based tools such as personalised learning paths help students meet their individual learning objectives, by guiding them through a sequence of effective learning contents and matching their learning style. Personalised learning paths and deep tech learning contents such as VR and AR form a great combination that not only makes learning fun, but also improves the retention and learning outcomes. These set of tools go beyond the traditional assessment and progress reporting, making learning a continuous journey, avoiding stress and anxiety.

As AI-based educational solutions grow, they can fill more gaps in the traditional learning and teaching process. Another area where AI and ML have already begun influencing is in performance assessments and analytics. AI has made it easier to create and analyse progress reports, a task normally performed by instructors. By automating these tasks, faculty can spend more time with students on enhancing the creative and applied aspects of learning. Tools such as attentiveness index help teachers improve the experience of online classrooms.

Besides leveraging AI and ML as part of the education landscape, their study as a course right from high school education can put one at the forefront of future jobs and help develop better cognitive abilities. The Government of India's New Education Policy (NEP) 2020 has acknowledged the importance of AI and AI education in schools. These are being planned to be seamlessly integrated into the curriculum and pedagogy as well.

It is clear that both students and educators are immersed in technology, making the education industry ripe for further disruption. As edtech is focusing on harnessing technology to improve educational processes and outcomes for learners and teachers, AI and ML are becoming cornerstones of the overall education ecosystem.

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Learning from home: the new road to empowerment

Technology, today, has enabled students to steer the direction of their learning, in terms of course and faculty, by providing a plethora of options online

Even as economic models undergo a sea change, and technology advances at an exponential rate, what constitutes education remains just the same. Its role too has not changed. At the most fundamental level, education imparts the knowledge of how things in the natural, social, and physiological domains work – and enables people to solve problems and create value.

But as the economy and the society evolve, the subjects of education can change. And as technology evolves, it can give us new ways of imparting knowledge that would make its comprehension and reproduction much better.

No two people acquire knowledge the same way. This learning limitation, however, is conveniently ignored in traditional classrooms. In this context, the entry of digital technology and artificial intelligence is considered a boon as they promise to customise teaching to suit the unique learning styles and paces of students. Once online, students have the choice to pick up any form of presentation – visual, auditory, reading, writing, or kinaesthetic, on any idea related to any subject, whatever works best for them.

MOOC AND PHYGITAL CLASSROOMS

Consider the avalanche of quality content from the portals of what is now known as massive open online courses (MOOCs). It was in 2001 when Massachusetts Institute of Technology (MIT), USA, a pioneer in MOOCs, announced the launch of its OpenCourseWare project. The goal was to put all its educational materials of undergraduate- and graduate-level courses online, and make them available for free for anyone, anywhere.

MIT, thus, set the floodgates of open courses. Every higher educational institution worth its salt followed suit. Today, the web is a learner's paradise, awash with world-class lectures, presentations, demonstrations, quizzes for self-assessment, tests, and forums for doubt clarifications. Like MOOCs, the phygital mode of classrooms that fosters blended learning, combining physical and digital platforms, is here to stay. The recent COVID-19-led restrictions on physical movements and meetings accelerated the pace of the adoption of the phygital revolution, which otherwise was always the writing on the wall for educational institutions ever since the explosion of the web.

> MOOCS WERE LARGELY INTRODUCED BY MASSACHUSETTS INSTITUTE OF TECHNOLOGY IN 2001, WHEN IT DECIDED TO PUT UP ITS UNDERGRADUATE- AND GRADUATE-LEVEL COURSES ONLINE.

EDUTECH DEVICES

The phygital concoction is aided by connected devices such as smart boards that give instant access to subject materials in multimedia, and help in the digitalisation of the entire process of teaching, besides providing metrics on the effectiveness of teaching. Though the online space is a big source of distraction for students, devices such as ebook readers can help students attend uninterrupted sessions of focused learning.

TECH FOR COMPASSION AND REALITY

Artificial intelligence (AI) can simply mean a personal teaching assistant, as the technology stays with every student until his or her understanding blossoms, before taking the student to the next level in the endless pursuit of knowledge. This must be what compassion in teaching is all about for a student, who otherwise misses the bus often as his or her human teachers rush through their lectures, under the pressure to cover portions and the sway of front benchers, who are ever ready to nod their heads.

An offshoot of visual communication that has caught the imagination of the teaching world is the presentation of content using virtual or augmented reality. Be it a solar system or a human heart, it comes alive for students. Once the headsets are on, the subjects are within the grasp of senses to explore in real-world dimensions.

STUDENT-CENTRICITY

The broad outcome of the adoption of these, and many other, educational technologies is that the student is now at the centre stage. To denote student-centricity of classrooms, people term the current functioning of tech-enabled education as 'studentskul', instead of gurukul, where students can change teachers, to use the cliché, at the click of a button.

However, one must not get carried away with technological breakthroughs. For sure, from the perspective of educators, the only value created in a classroom is the lucid presentation of knowledge. Technology is there primarily for the reach and effectiveness. Otherwise, the fountainhead was, is, and will be the venerable teacher who knows how to present effectively.

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Rethinking video surveillance **beyond security**

Several industries including education, retail and manufacturing are adopting video surveillance solutions to improve their business strategies and operations

In the wake of the COVID-19 crisis, customers' rapidly changing work and home environments present new demands for surveillance systems. Once viewed as a way to monitor street conditions, or for managers to monitor factories to spot faulty equipment, video surveillance is now a powerful tool to support thinly staffed offices and provide security for work-from-home (WFH) environments.A 2020 report by IDC states that the worldwide video surveillance camera market will grow to USD 44 billion by 2025, up from USD 23.6 billion in 2019, at a five-year CAGR of nearly 13%.

Most of the video surveillance data comes from cameras, which can generate terabytes (TB) of data.All of that data has to be stored, accessed, and analysed to find the 'patterns in the data' – and respond by taking business actions. That is why increased scalability of storage systems, combined with advanced video management software (VMS), license plate recognition (LPR), artificial intelligence (AI), and video analytics software, takes video surveillance systems to a new level of flexibility and efficiency in the age of the COVID-19 security measures.

Customers are finding many new ways to deploy video surveillance systems like cameras, storage, and software, which vary according to the environment being monitored and the ability of these systems to search the video surveillance data. For many years, the primary purpose of video surveillance systems was to monitor break-ins or disturbances in the office or home environment. Today, video surveillance technologies are being deployed – across several industries – for a much wider range of reasons. Sectors such as retail, manufacturing, and education, among others, are leveraging remote sensing and powerful remote internet of things (IoT) devices that run continuously.

RISE IN DEMAND OF VIDEO SURVEILLANCE SYSTEMS ACROSS INDUSTRIES

- **Education:** Many educational institutions have campuses and classrooms that may be mostly empty as students and staff members have been working fromhomesince the onset of the pandemic. This has increased the focus on greater security to protect electronic equipment, lab equipment, and classrooms that are housed at the university site. As large amounts of data are stored daily, on-campus videosurveillance systems must rely on high-capacity storage systems that can support many terabytes of data. That is why the ability to scale up storage capacity and the software to manage the data being stored and accessed, are vital in maintaining video surveillance systems at educational institutions.
- **Retail:** In the new normal, most retail operations are looking to their online or hybrid channels over brick-and-

mortar stores – forramping up sales and promotions. For a hybrid operation model, video technology is useful in retail scenarios to monitor in-store traffic patterns, to reduce shrinkage, and in decision-making for better merchandise offerings. To protect consumers' health, many retailers support delivery of store merchandise to consumers' homes, and curbside pick-ups. Others allow small groups of consumers to enter their brick-and-mortar stores, but they must monitor the number of shoppers inside the store at a time. Overall, retail stores use video surveillance systems to safeguard the items that are stocked on grocery, pharmacy and hardware shelves inside the physical stores – and protect store personnel.

- **Factory systems:** Far away from corporate headquarters, factory systems are often seen as 'edge' systems that must be monitored remotely 24/7. Video surveillance systems play a vital role in monitoring and protecting these valuable remote equipment – and for alerting managers when a factory system fails or faces mechanical difficulties.In recent years, the number of sensors on remote factory equipment has been multiplying, generating more data than ever before. That data must be stored, and analysed to provide feedback on local factory conditions. Before this data can be analysed by artificial intelligence and machine-learning (AI/ML) software, it must be protected byin-house staff or remote systems.Video surveillance systems serve a company's 'eyes and ears' in the field and remote locations to keep things running smoothly and safely.

VIDEO SURVEILLANCE SYSTEMS SHOW THE BUSINESS VALUE OF DATA

Data is at the heart of video surveillance – from the conception and creation of new solutions and applications to the implementation and analysis of systems. Seagate's Rethink Data report, published in 2020, shows the connection between high-capacity data and more efficient business operationsacross a variety of industry solutions.

From simple security-related services to AI-driven uses, video surveillance has a lot to offer. For example, sensors used by autonomous vehicles (AVs) generate massive amounts of data – between 5TB and 20TB per vehicle per day. Car companies can use this insight in real-time, to avoid accidents. That is why efficient and intelligent data infrastructure for video surveillance systems is so important.

Enabling access to data and encouraging innovation are important steps to be taken right now. Looking ahead to the future, improving the accuracy, efficiency and resilience of video surveillance systems is an important priority for surveillance system vendors and their customers as theydesign next-generation 'new data economy'systemsthat protect people, their workplace and public spaces.

VIDEO SURVEILLANCE SYSTEMS: A CALL TO ACTION

Video-based surveillance is essential in informing customers about security flaws, preventing future break-ins and loss of physical equipment, and identifying inefficiencies in business processes,for both on-premises and off-premises locations.The time is ripe for enterprises, small- and large-scale, to reviewand upgrade local datastores for capacity, density, and power purposes. Enabling access to data, encouraging innovation, and constantly improving accuracy, efficiency, and resilience of video surveillance are important steps to safeguard offices and homes in 2021 and beyond.

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How agritech initiatives brought **digital transformation**

Businesses across India, both large and small, have taken several measures to address issues faced by farmers and transform their approach to agriculture

Recently, the United Nations stated that rising population, increased wealth creation, and urbanisation are perceived threats to global food security. This means that the agriculture sector will have to undergo a shift in approach just like in the past when steps such as mechanised farming and green revolution brought significant productivity improvements.

The agriculture sector must be able to recognise these emerging challenges and should have in place transformational perspectives for solving them. The accelerated and evolving growth of technology is offering new possibilities to agriculture in improving both productivity and farmer's income.

There is a new tribe of Indian entrepreneurs, who are keen on leveraging this opportunity offered by technology in solving age-old problems in agriculture. These agritech companies come with a long-term commitment to address concerns and issues faced by the farmer and seek to seamlessly transform a traditional farmer's approach to agriculture. They believe, with the incorporation of new technologies, that Indian farmers will be able to match their global counterparts.

This article attempts to understand the initiatives taken by existing digital technology companies that have brought transformation in agriculture.

COMPANIES TRANSFORMING AGRICULTURE

In this article, we are focusing on specific technologies that have brought significant shifts in agriculture. Here, we are citing specific companies and their initiatives that have made transformational changes to agriculture and the life of the farmer in general.

e-Choupal by ITC: This company, which was largely known for manufacturing tobacco products, surprised everyone with its foray into FMCG, especially food products. To accentuate its supply chain, ITC created a comprehensive digital knowledge hub for farmers with 6,100+ installations of internet kiosks covering 35,000 villages to serve over 40 lakh farmers. Since its inception in 2000, the initiative has not only benefitted the farmers doing business through the network but also

> UNDER ITC'S E-CHOUPAL INITIATIVE, 6,100+ INTERNET KIOSKS HAVE BEEN INSTALLED ACROSS 35,000 VILLAGES TO SERVE OVER 40 LAKH FARMERS ACROSS THE COUNTRY.

compelledpublic-sector-managed food grain corporations to upgrade their existing systems.

Trringo by Mahindra & Mahindra: This company is a familiar name in agricultural circles as the manufacturer of tractors and farm equipment and to stay ahead of the curve, it is keen on exploring existing tech-based opportunities in the agriculture sector. Towards this endeavour, the company has developed a mobile-based app called Trringo that allows farmers to rent out tractors and other farm-related equipment. This enables other farmers to utilise farm equipment without making a sizable investment. With Trringo, farmers benefit from the latest machines, that directly translates to reduced dependence on manual labour, eventually leading to improved productivity and good crop quality.

mKrishi by Tata Consultancy Services: Commonly known as TCS, Tata Consultancy Services is an IT bellwether and is known around the world for its expertise in information technology. TCS has started offering personalised advisory services in audio and visual formats through its mKrishi platform on communication devices such as mobile phones. In general, it is not surprising that a whole lot of government departments and entrepreneurs are trying to leverage the increased penetration of mobile phones in India through mobile-based apps.

OTHER TECH-BASED INITIATIVES IN AGRICULTURE

Apart from these big companies, there is a host of new-age entrepreneurs who are keen on providing technological solutions in agriculture. The main thrust of all these ventures is to reduce the duration of crop cycles, save water and energy, and reduce dependence on agro-chemicals. Besides this, some of these ventures are focused on increasing efficiency in farm management, strengthening farmer-market linkages, and improving coldchain logistics for value addition. Here is a list of some notable ventures.

Stellapps Technologies: This is a new-age venture with a focus on providing dairy farm optimisation and monitoring services, especially for small- and medium-herd farms. Its tech tools and applications are known for leveraging Internet of Things (IoT), big data, cloud mobility, and data analytics to improve milk procurement and production, increase cold chain usage, improve animal insurance and regularise farmer payments.

Ekgaon Technologies: This is an IT-based network integrator offering a range of services to farmers, rural businesses, and women. It has created a network with mobile communication technology to encourage the sustainable development of womenself-helpgroups (SHGs) and marginal farmers across the country. Presently,

> MAHINDRA & MAHINDRA'S MOBILE-BASED APP TRRINGO ALLOWS FARMERS TO RENT OUT TRACTORS AND OTHER FARM-RELATED EQUIPMENT, THEREBY REDUCING DEPENDENCE ON CAPITAL.

its network comprises over 900,000 women and 300,000 farmers across numerous villages in India.

AgNext Technologies: This is a Punjab-based start-up that uses drones, among other digital technologies, for creating hyperlocal farm data collection and crop analytics platforms. Apart from drones, it utilises computer vision, spectral analytics, and IoT to analyse and provide results on food quality to enable farmers to effectively trade their produce. Currently, it is leveraging technologies such as artificial intelligence and advanced data science for providing better services to its customers in agribusiness.

Skymet Weather Services: As the name suggests, this company provides agri-risk solutions by monitoring and predicting the weather. The company can measure and predict yield at the village level for any crop with a high level of precision. It can even predict the weather in the short-, medium-, and long-term.

EM3 Agribusiness: There are some companies in the field of agriculture that have grown quickly to operate as medium-scale businesses. A perfect example is EM3 Agribusiness, which is a pioneer in providing Farming-as-a-Service (FaaS). The company runs agricultural centres that offer machines needed for critical farm operations on a pay-for-use basis. At these centres, the company deploys agro-professionals who are conversant about agronomy and associated aspects.

TECHNOLOGY LEADS THE WAY

India's present-day agricultural policy is focused on encouraging innovation, entrepreneurship, and out-of-the-box thinking for achieving high growth and income security for farmers. After PM Modi's announcement about his government being keen on doubling farmers' income, the urgency to attain better productivity is no longer an option but a necessity.

The start-ups highlighted in this article are in alignment with the aforementioned policy goals. Having said that, there are visible bottlenecks when it comes to access to finance for scaling and commercialising potentially valuable agri-technology. Furthermore, there are impediments to accessing farmer networks for implementing pilot projects by start-ups.

These gaps can be bridged if the government takes a proactive approach towards improving funding deficiencies and technology infrastructure in India. Once there is consensus in the government about the immense potential of agritech, an amicable business environment would be the need of the hour where agriculture start-ups are able to grow and flourish.

Das is Founder, Agdhi

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CROPDATA IS A PLATFORM BUILT TO EMPOWER FARMERS IN INDIA

CropData is a data-driven platform that provides an ecosystem with a cluster of services for the agriculture supply chain, aggregating aggregators, with primary focus on the first-mile interface. The platform's agriculture e-marketplace allows farmers to connect directly with buyers with the primary focus on neutrality. This aids in impacting the lives of the small and marginal farmers, increasing their income and managing their core risks, by providing access to customised knowledge, fair markets, and essential services. The company's Managing Director ***Sachin Suri*** *tells us more about the initiatives. Excerpts:*

How can technologies like artificial intelligence, blockchain and cloud help improve agriculture, especially small farmers in India?

Every farmland in the country is different from the other. With the help of our data analysis, we have found that even adjoining farms can have significant variations in farm health parameters. In addition to environmental challenges such as drought, government schemes such as insurance, subsidies, and even minimum support prices being uniform for farmers across the nation pose great challenges for them. CropData's mission is to help the smallest farmer in the remotest part of India make a viable living.

> ONE OF OUR BIGGEST DISCOVERIES IS THAT THERE ARE SEVERAL FARMS WHICH ARE NOT ADJACENT TO EACH OTHER, BUT THEY DEMONSTRATE THE SAME PARAMETERS

SACHIN SURI
Managing Director, CropData

> ALL OUR TRAINING FOR EMPLOYEES NOW OCCURS ONLINE VIA MICROSOFT COMMUNITY TRAINING. THEY CAN GO THROUGH THE TRAINING VIDEOS ON THEIR OWN AND REVISIT ANY VIDEO

Using the capabilities of Microsoft Azure, we have built a platform to empower farmers in India. The platform is designed to solve some of the pressing challenges faced by farmers of the country with the help of cloud, AI and machine learning algorithms, and blockchain technologies.

Once we onboard a farmer on the platform, we perform several diagnostics on the farm. These include crop health assessment with weather correlations, aerial imagery, analysis on the kind of seeds that are planted, how they are planted, the stress levels, and much more. This is called the Dr. Krishi module. After the completion of our on-ground diagnostics, our machine learning algorithms take over, which help us understand the health of the farm and the expected yield and quality.

It also helps us club together farms that are similar in terms of their risks, crops, quality, and other health parameters. This is one of our biggest discoveries. There are several farms which are not adjacent to each other, but they demonstrate the same parameters.

By clubbing small farmers with large farmers, we provide these small farmers the economies of scale and fair price that a large farmer would get. This also helps us provide farmers access to institutional credit at favourable rates. We bundle farms by their risk profile and assign them a credit rating, which helps financial institutions assign loans with confidence.

How has Microsoft helped the company?

Microsoft has provided immense support and hand-holding in successfully deploying the right solution for the farmers of India to dream big. In the beginning, we were a part of the Microsoft for Agritech Startups programme. Our strong engagement has resulted in moving all of our platforms and services to Azure. We are also working closely with Microsoft's engineering teams to build our products, and incorporate some of the AI work that has been done on FarmBeats into our workflows during the diagnostics process.

Considering the current COVID-19 situation, we had to rethink about training people on the ground and Microsoft Community Training (MCT, erstwhile Project Sangam) came as a godsend. All our training for employees is now happening online via MCT. A major benefit is that they can go through the training videos on their own, when they want to, and have the option to revisit any video.

We release our videos on the platform, unlike sharing it over messaging apps or email, where we know they are secure, and can't be misused. Another advantage is that we are able to roll out videos to employees based on their position and role in the company, so the learning module is customised for them. Working with Microsoft has felt like working with a partner, and it has been an incredible journey.

> OUR TECHNOLOGY GIVES FARMERS AN EARLY VISIBILITY INTO THEIR INCOME AND ENSURES THEY HAVE THE INCENTIVE TO PUT IN ALL THE EFFORT THAT GOES INTO A CROP CYCLE

Talking about platforms, is CropData also working towards creating e-marketplace?

Till now, farmers in India had to wait till their crops were harvested to get a sense of the income they would make or they could go for advance trading on an individual basis that relies mostly on guesswork. We have converted that into a scientific trade to help farmers get better price on advance trading.

With our technology, we connect farmers to bulk buyers on our e-marketplace, where their harvest is hedged very early in the crop cycle according to the predicted quality and yield from their farm. This gives farmers an early visibility into their income and ensures that they have the incentive to put in all the effort that goes into a crop cycle.

This is where Agriota, the e-marketplace that we have created, comes in. This e-marketplace built on Microsoft Azure connects all stakeholders with a focus on providing utmost transparency with the use of blockchain. We have partnered with UAE's Dubai Multi Commodities Centre (DMCC) for the platform. It's an open auction process where we represent the farmers and all that a farmer has to do is work on his field diligently to get the best possible yield and quality.

Could you elaborate more on the Agriota e-marketplace?

The Agriota e-marketplace is a blockchain-based, advanced agricultural commodities marketplace platform with a range of services for contract, bid and money management, entity management, accounting, billing, reconciliation, analytics, fraud, risk and regulatory compliance management, etc. It is a multi-tier escrow banking system for money management and connects bulk buyers directly with farmers' ecosystem, while providing neutrality, traceability and trust.

We now have a footprint in 30 districts across eight states, with over 50,000 farmers already on the marketplace. We are ramping up our presence despite the current restrictions due to COVID-19 by using a prioritisation algorithm that we have created. We have launched Agriota with 18 commodities, and each commodity can have anywhere between 5 and 10 varieties.

Our data platform, called Geo-Spatial Tile Management, will continue to aggregate more data to provide insights at an even more granular level. Currently, we provide analytics up to the village level and soon our buyers will be able to zoom all the way up to farm-level data. Overall, we aim to have 150,000 farmers on the marketplace in the first year and touch over five million farmers in five years. This, we estimate, will translate into a gross merchandise value of transactions of USD 250 million in the first year and USD 8.5 billion in five years.

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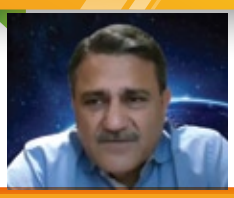

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Sanjay Kaul
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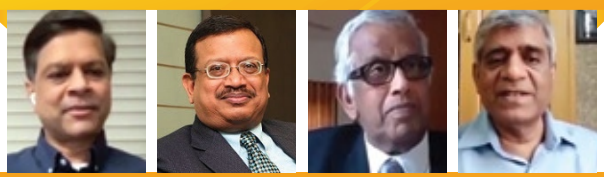
Keynote Address

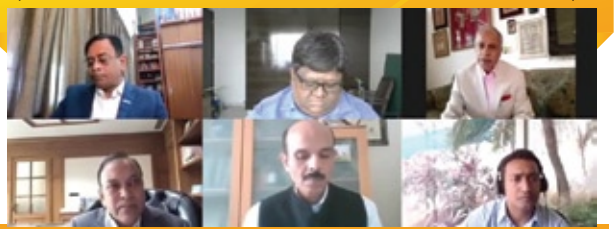
Anshu Prakash
Chairman DCC & Telecom Secretary, DoT

Fireside Chat:
Creating the 5G Balance for Human, Machine & Data



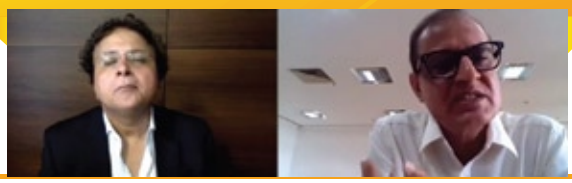
5G Enterprise:
The next frontier for Business

Supporting the Digital India dream: How ready is the telecom sector (regulatory challenges, competition and the evolving customer needs)



How enterprises and hyperscalers can benefit from 5G edge and network slicing ecosystem?

Can Made in India disrupt the global Telecom market: Where we are, what is missing, and what needs to be done?



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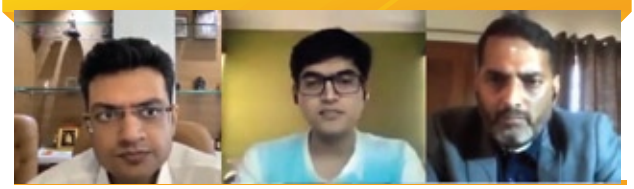
Mobile cloud architectures and models

How to build the OTT ecosystem: Can telcos do the tango? (including the impact of notification bringing OTT under I&B)



SD-WAN, SASE, and intelligent automation: Where is enterprise networking technology headed?

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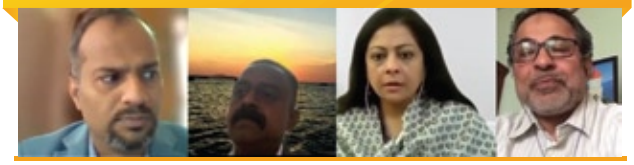

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An obituary to ERP in an AI world

ERP is gone – and for good. AI takes the centre stage now, opening a room full of opportunities to perform tasks and drive innovation, beyond automation

Over the last few years, Enterprise Resource Planning (ERP) silently took its last few breaths. Some want to believe this is not true. The naysayers are adamant that autonomous systems are yet to overtake or replace traditional ERP – and they may not be entirely wrong, figuratively.

ERP continues to live in our hearts. After all, it continues to be a hurdle for IT leaders and businesses, irrespective of design, implementation, lifecycle management or value realisation. ERP, in its youth, failed miserably to solve the problems for which it was designed. But it was not ERP's failure alone. Perhaps, we also failed to utilise its full potential. To add to ERP's perplexity, advancements in business models meant more complex systems and processes that required data camaraderie, which just was not in its design. Furthermore, ERP implementations remain challenging, especially when an organisation's goals and software quality do not match. In a nutshell, the marriage was not meant to be.

It would be unfair to paint ERP as the problem child alone. Part of the blame resides on organisations that failed to acknowledge and adapt to newer technologies and solutions, further compounding the digital incertitude. This had to be fixed. From an enterprise perspective, both human and technology will be critical as they move towards business models that favour reduced human density.

THE COMING OF AGE

There is no denying that we have entered the age of artificial intelligence (AI); everyone recognises that AI and machine learning (ML) are key to success in the business marketplace. Before the age of AI came the age of Big Data; this advancement opened the door for the growth of data lakes and on to intelligent technologies. AI can be further classified into automated, assisted, augmented and autonomous intelligence.

There is no repudiating that unified and autonomous enterprise systems will take the world by storm, where enterprises will quickly realise the potential of true enterprise democracy, enhanced operational efficiency, remote working, network flexibility, access elasticity, and on-demand service, which would all be decentralised, distributed and most importantly, real-time.

According to a recent report published by Allied Market Research, the global enterprise AI market was valued at USD 4.68 billion in 2018, and is projected to reach USD 53.06 billion by 2026, registering a CAGR of 35.4% from 2019 to 2026.

THE EPITHET

The beginning of unified, autonomous and real-time systems was the final nail in ERP's coffin. With its departure, ERP also takes several associated problems to the grave – broken employee and customer journey, adulterated data collection, no real-time data connectivity, piecemeal applications, and rule-based automation.

TOWARDS A BRIGHT FUTURE

The greatest business possibility of autonomous systems is doing things that have never been done before, rather than merely automating or fast-tracking existing capabilities. Businesses have to take the leap of faith, the prize being the possibility to enhance personalisation, quality and consistency, ability to save time for consumers and last but not least, accessibility of data to make these gains possible.

One needs to understand that innovation, collaboration and decision-making within an organisation can all be empowered. Once realised, organisations will have the potential to comprehend customer behaviour and predict and respond to their individual needs with exactitude and sagacity that were never possible before.

We are already witnessing social integration, customisations, greater cloud accessibility and intelligent systems. The global shift suggests a new and improved way of working that allows inclusion of UI overlays, IoTs, ML, deep learning, NLP, collaborative systems, image analytics, algorithmic game theory, computational social choice and robotic process automation.

The possibilities are indeed infinite.

Raju is Founder Director, Grene Robotics.

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Establish expertise to excel in your **transformation journey**

Domain expertise is the key to secure success in the digital technology sector, especially when delivering niche services

Today, Google search is a commodity, or that is what we believe. The success of Google in a product category as sophisticated as 'search' is underscored by the extreme nuancing it brings from the multiple domains of – data structures, algorithms, semantics, natural languages, and statistics, all synthesised into a user-friendly solution. Likewise, Amazon has addressed the complex problem of multi-product supply chain and condensed the procurement jigsaw into apps on hand-held devices.

Thus, in order to excel today, it is imperative that domain nuances are well-understood.

Furthermore, in any ecosystem, all players, no matter how small their role might be in the product, service, or solution continuum, need to demonstrate a top-notch understanding of the domain that buttresses their respective industries.

Primarily, the specific value that domain experts bring is to contextualise the technical components. For instance, given a bunch of data on consumers, it is possible to run various algorithms to segment them in a desired manner. What happens next – such as how best to harvest the information, what 'sweet-spot offers' to generate, and the consequent consumer behaviours – all form part of domain knowledge.

EXPERTISE IS THE UNDERSTANDING ONE HAS OF ITS DOMAIN AS A SYSTEM, TO BE ABLE TO MAKE CHANGES TO IT MORE SECURELY AND PREDICTABLY AND WITH FEWER SIDE EFFECTS.

The key variable, which keeps leaders occupied as they evaluate the performance of their strategy in delivering long-term business transformation and innovative operating models, is Expertise.

Let us delve into this word's significance.

Expertise is a set of acquired factors that contribute to success in a domain; 'success' in this context points at results that are vastly superior to those obtained by majority of the population. There is another way to explain 'expertise': It is the understanding one has of its domain as a system, to be able to make changes to it more securely and predictably and with fewer side effects.

Simply put, the more detailed a domain's understanding, the more expertise the organisation has, and better are its chances to excel. However, the relationship between expertise and value is not straightforward.

A case in point is from the banking industry. The McKinsey Global Banking Annual Review 2019 tries to explain the difference between the 40 per cent of the banks that create value and the 60 per cent that destroy it – a development observed despite the fact that the online banking usage rates between 2013 and 2018 rose by 13 percentage points. So how did6out of 10 banks miss the plot? The answer, as the report points out, is predictable – due to scale, geography, business model and differentiation.

In the real world, however, there is another variable: Expertise.

This is how it pans out: Banks that have invested millions of dollars in buying, deploying and managing their IT assets have unwittingly become IT shops. The result is higher costs, and more resources, often being totally unproductive. This is where niche financial technology companies step in. A deep understanding of the lifecycle of money, and the role of technology players in creating value – Polaris, i-flex, and Maveric to name a few – bring scalable intellectual capital and a transformative solutions mindset.

As more banks and financial organisations embrace digital for competitive advantage, the goal remains the same – 'provide customers the same experience at every touch point'.

The domain technology providers following the above mentioned principles, no doubt, realise that customer value – even though it incorporates elements that make experiences simpler, faster, safer, and more personalised – does not override the fact that each transformation journey is unique.

Appreciation of that nuance is what underscores domain expertise.

Ramapai is Executive Director, Maveric System

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Embrace digitalisation to be future-ready

The pandemic has set off alarm bells for businesses to deploy technology if they wish to remain relevant and resilient in the 'new normal' environment

The COVID-19 pandemic and the ensuing lockdown to curtail it is not something the world is going to forget anytime soon. The health crisis has been unlike any other witnessed in recent history, which subsequently triggeredan unprecedented economic crisis.

Naturally, in the wake of such a fatal pandemic, businesses all over were driven to implement equally extraordinary measures to safeguard their operations and people. Now with the vaccines slowly rolling out, businesses have begun efforts to resume and restart. For most enterprises and industry sectors, the dawning and ongoing Industry 4.0 (also known as the Fourth Industrial Revolution) is playing a vital role in keeping them afloat. The companies that had already adopted the digital transformation found themselves betterequipped to be resilient. For the companies that had not started scaling, 2020 served as a stark wake-up call.

With the global economies restarting, we are already seeing companies and organisations heeding the said wake-up call, beginning their journey to a digital recovery. Experts agree on four critical areas that need to be addressed immediately if companies want to be better prepared for establishing the 'new normal'in the post-pandemic times.

#1

REIMAGINING THE ORGANISATION

We saw a true adaptation of the power of humanity – which extended to even businesses. We saw apparel brands taking up manufacturing masks and stepping up to fulfil public-health needs. Perfume manufacturers, breweries, and distilleries adapted to manufacture sanitisers. We saw local retailers and vendors setting up a store online to meet their customers who had migrated there. And the

> THE PANDEMIC FORCED APPAREL BRANDS TO MANUFACTURE MASKS; PERFUME COMPANIES AND BREWERIES TO MANUFACTURE SANITISERS; AND LOCAL RETAILERS TO SET UP STORE ONLINE.

unprecedented shift to remote working developed the 'work-from-anywhere' culture where productivity does not seem to get affected.

When the crisis struck, companies globally quickly realised the importance of strategising, clear goal-setting, and agile leadership. Going forward, businesses in diverse sectors must remember that the future would have technology as the key ingredient of their business model. Therefore, it is imperative to encourage skill development or upskilling that addresses this shift. Additionally, where business operations ride on data, the way ahead would involve leveraging data insights and data analytics to be better prepared for the upcoming unpredictable consumer and user patterns.

#2

REIMAGINING CUSTOMER STRATEGIES

With all the operations grinding to a halt, there was a sudden and never-before-seen shift in consumer patterns worldwide. While the demand is expected to increase, the process shall be gradual, and it is unlikely to reach the 2019 levels at least for the next few years.

Businesses will need to deploy remodelled digital solutions that take into consideration the shifting user expectations and work on their user experience accordingly. As mentioned before, their customer strategies need to be embedded with relevant technology integrations as they remodel their consumer solutions. Data, internet of things (IoT), and artificial intelligence (AI) can be deployed to stay on top of fluctuating demands and to also catch and resolve any glitches in the demand-supply chain. It is an opportunity for businesses to drive the acceleration of digital adoption and tech modernisation. We are set to see new needs and expectations that are unique to the post-pandemic world across all sectors – namely contactless service, the ability to do everything online, and prioritising human health and safety at every turn. Rapid digital reinvention is the best bet organisations have if they wish to stay ahead in the competition.

#3

REIMAGINING OPERATIONS

A shifting consumer pattern demands a shifting operation strategy and industrial models. Traditional educators had no option but to embrace eLearning. Retailers and local sellers – irrespective of their digital literacy – had no option but to adapt to e-commerce stores. Employees far and wide had no option but to learn to work remotely

> SPEED WILL BE OF THE ESSENCE FOR COMPANIES TO SUSTAIN THEIR PROGRESS RATES IN THE POST-PANDEMIC WORLD AND THE WAY TO DEPLOY IT IS DIGITAL.

without compromising on their productivity.

2020 challenged and upended the digitalisation rates. We not only reimagined our operations but also performed them with a radical level of agility, visibility, scalability, and productivity. The objective now is to retain this performance. The way forward will need to be dominated by remodelled operations that are resilient as well as flexible. Lowcost and high flexibility shall need to be the norm for businesses to remain successful. One of the methodologies that is quickly gaining popularity to turn fixed capital costs into flexible ones is harnessing the benefits of 'as a service' operation model. Speed will be of the essence for companies to sustain their progress rates in the post-pandemic world and the way to deploy it is digital.

#4

LEVERAGING REVENUE, TECHNOLOGY FOR BUSINESS RE-IMAGINATION

COVID-19 was the biggest stresstester for IT operations globally. The world changed the way it interacted, communicated, shopped, sought healthcare and entertainment, and ran all those errands which were both a necessity and luxury. Rising to meet these demands were technologies and IT solutions repurposed or newly designed and deployed at impossible speeds.

And now, as the value and importance of technology is re-emphasised, the IT industry is going to be further leveraged like never before. Businesses need to be ready with advanced analytics to foresee the surge in offline demand as less essential sectors open up to be equipped at making decisions. They need to be prepared to expect and understand what will be valued post-COVID-19 and design solutions accordingly. And above all, businesses need to continue being humane at the core.

Going forward, the future of businesses will not only be guided by their radical technology implementations and digital integrations but also be dependent on how their operating models and technology strategies address their people. Better connectivity solutions, productivity tools, sensitised upskilling programmes, and rebuilding their talent pool would play a vital role in the future of businesses.

The world has transformed, and its effects are going to permanently alter how we all function. We stand to see new user preferences, consumer patterns, enterprise operating models, and an overall novel way of working. The impact of the lockdown will surely be different in kind and scale for different industrial sectors. But the tool for assured revival and the path towards certain success in the coming future will remain common for all, which is digital.

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Are we expecting too much from artificial intelligence?

Organisations planning to hike their AI investments need to have more realistic expectations

Over the years, the use of artificial intelligence across different business functions has been increasing. From bots and digital assistants performing routine tasks to online recommendation engines, high-end data aggregators and customer-focused tools enabling critical business decisions, AI apps are seen all around. Therefore, it is not surprising to witness a sudden spurt in AI investment as the COVID-19 pandemic gradually recedes. A recent Gartner poll of business and IT professionals reveals that 24% of the respondents have increased their AI investments, while 75% respondents will continue or start new AI initiatives over the next few months as they move into the post-pandemic and renew phase. "Enterprise investment in AI has continued unabated despite the crisis," says Frances Karamouzis, Research Vice President at Gartner.

"However, the most significant struggle of moving AI initiatives into production is the inability for organisations to connect those investments back to business value," adds Karamouzis. Clearly, the investments in artificial intelligence have not been able to meet the expectations. McKinsey's Global AI Survey report also shows that many companies plan to invest even more in AI in response to the COVID-19 pandemic and its acceleration of all things digital. However, when it comes to mitigating the risks of AI, most companies still have a long way to go.

While AI-based apps have performed exceedingly well in certain aspects of business, there are many areas where they can play only a limited role. Therefore, it would be

> IN SEPARATE REPORTS, GARTNER AND MCKINSEY POINT OUT THE MARKET TREND OF INCREASING INVESTMENTS IN ARTIFICIAL INTELLIGENCE IN RESPONSE TO THE COVID-19 PANDEMIC.

naïve to expect artificial intelligence to provide a magical solution for all critical business issues. Business and IT leaders must clearly understand the limitations of artificial intelligence before making any large investments.

EXPECTATION VS. REALITY: THE BIG GAP

It is often seen that the expectations of top management driving the use of AI in an organisation are quite different from the understanding of end users implementing it. According to the McKinsey report, some of the biggest gaps between AI high-performers and others arenot only in technical areas, such as using complex AI-based modelling techniques, but also in the human aspects of AI, such as the alignment of senior executives around AI strategy and adoption. This poses the biggest hurdle in effective implementation of AI solutions.

Creating an effective AI strategy requires close collaboration with the business functions that are going to use it. Unless the end users are fully involved in building the solution, it may not be able solve real problems.

LIMITATIONS OF DATA

The accuracy or success of an AI solution is also dependent on the quality of information that is fed into it. For example, if customer data is not collected properly or does not clearly reflect a trend, it would be difficult to draw inferences or make market predictions. This, in turn, would impact business planning and decision-making.

The data provided should also be relevant to the specific needs of the organisation otherwise even the most sophisticated AI solutions will not be able to provide the desired outcomes. In such cases, expecting AI to wade through any type of data and do all the work is only going to cause further disappointment. Even in cases where appropriate data is available, some amount of manual processing, curation and expert intervention may be required.

NEED FOR SUPERVISION

For many years, the proponents of artificial intelligence made us believe that AI-enabled robots are going to take over the world. But the reality is far from it. Despite the advent of driverless cars, smart bots and other robotic tools, AI has not yet reached a stage where it can work without supervision. There have been cases in the past where AI bots picked up unethical or inappropriate words and used them in customer interactions. Therefore, it could be highly dangerous to leave them completely unattended.

In fact, many scientists maintain that despite AI's spectacular performance in many areas, it may never be possible for it to replace human-level intelligence. Even the most powerful data mining tools with great processing abilities need intervention of domain experts to interpret data and draw meaningful conclusions. Organisations that embark on digital transformation without the guidance and vision of experts often end up in confusion and frustration.

INTELLIGENT OR STUPID?

Apart from relevant data inputs, AI solutions depend on the frameworks and algorithms that drive them. If not set up properly, they could throw up misleading results or stupid recommendations that couldend up annoying the customers. For example, if you have once searched for some niche content,the search engine starts showing similar topics even if you are not interested. Haven't we all seen how shopping sites start recommending groceries or toiletries just after you

> THERE HAVE BEEN CASES WHERE AI BOTS USED INAPPROPRIATE WORDS IN CUSTOMER INTERACTIONS. THUS, LEAVING THEM COMPLETELY UNATTENDED COULD BE HIGHLY DANGEROUS.

have purchased them, without realising that you may not need them again for some time?

Similar is the case with chatbots or personalised digital assistants that are programmed to answer a limited number of questions. They may be able to handle a large number of simple inquiries made by customers, but can get quite frustrating if the customer have a slightly more complex problem.

THE WEAK SPOTS

Gartner predicts that by 2023, more than one-in-ten workers will seek to trick AIsystems used to measure employee behaviour and productivity. Whit Andrews, Research Vice President at Gartner, explains, "Just as we've seen with every technology aimed at restricting its users, workers will quickly discover the gaps in AI-based surveillance strategies. Some may even see tricking AI-based monitoring tools as more of a game to be won than disrespecting a metric that management has a right to know."

Moving towards the post-pandemic phase, many more organisations are looking at deploying AI-enabled systems to analyse employee activities the same way they were used earlier to understand customer behaviour. They could use login inputs, activity tracking, alerts or other sophisticated tools to measure employee productivity. As these tools become more prevalent, Gartner predicts that organisations will increasingly face workers who will seek to evade or fool AI systems by generating false or confusing data.

There is no doubt that artificial intelligence has tremendous potential and can be a great facilitator of digital transformation. AI tools can significantly cut down the time spent on monotonous and mundane tasks to free up more time for other critical business needs. However, it is equally important to set the expectations right and understand the limitations of AI. While artificial intelligence can be a great partner on the path to digitalisation, it should not be seen as a substitute or replacement for human intelligence and creativity. A clever bot can offer you good advice, but it will obviously lack kindness, empathy and human emotion!

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CDO, Genpact

WE SEE AI AS AUGMENTED INTELLIGENCE

*As we move into a new world dotted with new challenges and realities, it is interesting to see how we will grapple with AI bias, ethical cross-roads, sentient AI and a cloud-dominated outsourcing landscape. Genpact CDO **Sanjay Srivastava** talks about how core IP, cloud RPA, acquisitions and digital ethics officers are going to etch a new direction in the industry as we move forward.*

It has been surmised that the pandemic put digital process automation on a fast-track of as many as six years for many enterprises. Is that a good thing for the industry? What challenges or caution areas, if any, should we be alert about?

Prior to COVID-19, many companies had a five-year roadmap to digitise their operations. Now most of them want to go digital within just two years. In fact, we are seeing a 10x faster business acceleration to the cloud. Companies understand that they must accelerate their digital transformations or be left behind. However, digital transformation requires the intersection of three vectors. When all three don't come together, initiatives fail. These comprise deep understanding of domain, digital tools, and capabilities to architect the new business framework, and large-scale programme management to orchestrate people, process, technology and data. In that way, you can drive change and deliver business outcomes in a predictable-managed fashion.

Can you tell us something more about the next-generation drug safety project in the UK?

We are proud to work with and support companies in many parts of the global testing and vaccine value chain in the fight against COVID-19. This highly complex and connected ecosystem presents some of the greatest strategic, operational, and logistical challenges of our time, and technology innovation applied to specific pain points will be critical to how we solve them. This includes the work we do with major manufacturers in the healthcare and pharmaceutical industries.

The use of AI is critical in managing massive amounts of data in the fight against COVID-19, as evidenced by Genpact's work with the UK government surrounding planned adverse event reporting for the COVID-19 vaccine.

Can you elaborate on how the solution shaped up?

The UK Medicines and Healthcare products Regulatory

Agency (MHRA) needed an AI software tool to help process adverse events to a COVID-19 vaccine to ensure no details of adverse reports are missed. When a vaccine finally gets distributed at scale and speed, a technology solution will be needed to track batch and lot numbers to know where each dose is. This gets complicated at scale, but is a critical element to overall public safety.

Historic large-scale vaccination campaigns in the UK have resulted in large increases in suspected adverse event reporting. Without such a solution, MHRA may be unable to effectively process the expected high volume of vaccine adverse events received through its public website where such reactions are reported.

To facilitate a rapid solution, Genpact is implementing specific components of its AI software suite to integrate with the government's website where adverse events are reported. Technology solutions will enable the government to track reactions by batch, lot and location, and provide details on any potential issues or trends related to ethnicity, age, gender, and other demographic factors that are essential to public health.

The software suite is Genpact's Pharmacovigilance Artificial Intelligence (PVAI) – and we have utilised components from PVAI for providing the solution to MHRA.

What new considerations envelop AI today? Is ethical governance one of them?

AI is intrinsic and influential. As a result, there have been concerns regarding how organisations use it to make decisions. Concerns over bias in AI systems and lack of skills to design AI solutions are not new, but there seems to be an increase in board-level recognition of the pitfalls and the need for ethical frameworks. Our most recent study shows that while 67% of consumers worry about AI discriminating against them, and 64 per cent fear that AI will make decisions that affect them without their knowledge, companies that understand these issues and act accordingly can succeed. There is a need to establish ethical AI frameworks for effective decision-making without misuse of data as AI continues to increase its influence in business decision-making.

How can these concerns be addressed then?

With these frameworks, businesses can build trust with consumers, which support AI adoption, but also brand reputation. As part of ethical AI frameworks, business leaders must encourage diversity. The goal is to have complete and comprehensive data samples that can cover all scenarios and users to eliminate bias. Enterprises could see more positions like digital ethics officers with multiple responsibilities: implementing ethical frameworks to make appropriate decisions about new technologies; addressing considerations such as data security and bias; looking ahead to future technology challenges; building new standards of technology governance; and establishing new check-and-balance systems to ensure that preventative measures remain effective.

Is the landscape ready for adaptive/sentient AI? Should we be worried about any hyper-automation pitfalls?

Sentient AI has many different implications stretching from sensing the emotion in a conversation to being empathetic in the response that we provide, to making very complex decisions based on not only logic, but also emotions. Where we already see many successes is in the area of sensing and incorporating emotion. And sensing emotions has many applications. The effectiveness of AI is the highest around breadth as opposed to depth. AI has

a stronger application in getting a pulse on the emotions of 100,000 employees on a daily basis than understanding what a specific person is feeling.

AI is really good at prediction, and it is only getting better. But it needs to be combined with human judgement in order to deliver outcomes. We always see a pairing of machine and human intelligence in order to deliver these outcomes. We see AI not as artificial intelligence but as augmented intelligence.

Are you observing any new shifts in the market with respect to cloud RPA, rebadging, captives and multi-sourcing?

Genpact is seeing a significant acceleration to the cloud during COVID-19 as an increasing number of executives experience the availability, resilience, and performance of cloud-based applications. We are partnering with top cloud providers to bring strong cloud-based solutions in all our high-priority areas, such as finance and accounting, supply chain management, banking operations, and insurance operations, to name a few. For example, for a large industrial client, we are re-imagining their cash collections process to reduce errors in payments and improve regulatory compliance by re-platforming their collections application to Amazon Web Services in order to drive improved cash flows.

What are Genpact's future plans in terms of expansion through handshakes, like with Enquero, especially when almost every big player is on a cloud-native and AI spree?

We continue to identify new opportunities as well as build differentiation in existing offerings. Once prioritised, these are funded through an organic (R&D) or inorganic (alliances and M&A) process. This has enabled us to build some unique solutions that have helped us differentiate and grow at a much faster pace. This has also helped us deliver superior outcomes for our clients, be it meeting compliance, ensuring customer satisfaction, or generating top-line impact, e.g.by faster speed to close loans. We are focused on creating value beyond costs for our clients across industries. Data is rightfully a first-class citizen in enterprise architectures and a significant component of the value driver in digital transformations. The data stack is fast changing to a cloud infrastructure and Enquero is at the forefront of this shift. We are strong believers in the true value of digital at the intersection of data and domain. Enquero reinforces our already strong commitment to domain-led data and analytics and expands our capabilities in digital transformation.

Where do you see this industry in the next five years and what is your strategy on that horizon?

Every company in the world is a technology company. Some just don't know it yet. We at Genpact embrace technology at our core. It is important to build IP in digital. We are taking a thoughtful approach to where and how we build IP [and where we don't]. We have established a framework across services IP [including frameworks, playbooks and POV] and tech IP [reference architectures, domain data models, business rules and data labels]. We are not building IP in areas where we can leverage hyperscalers and tech providers.

Genpact Cora has now grown to become Genpact's IP around delivering domain-specific digital solutions to the market. This IP covers both services IP like frameworks, playbooks, benchmarks, and technology IPs like accelerators and composable services, as well as IP built on top of partner technologies like AWS or Microsoft.

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- Changing Customer Expectation in Crisis
- Cyber-Sanitize your business
- Proactive Sales Strategies for faster business recovery
- New IT Priorities 2020

CIOL
- CXO of the Week
- CiOL Live Video Series
- Start-Up Circle
- CiOL Cloud Burst
- CiOL Live Tech News

DQ Channels
- Are There any Make in India IT Products for Us to Use?
- Cloud Adoption in Digital World
- Govt to Harness IT to Empower MSME Sector

DATAQUEST
- DQ Tech Talk Series
- Business Continuity Planning Series
- Dataquest Digital Indexing
- DeepTech (India's largest Virtual Conference)

PCQUEST
- Secure Smart & Intelligent Network
- App Modernisation
- Collaboration in WFH environment
- DevOps
- CyberMedia Labs Product Review

VOICE&DATA
- Business After Covid
- TLF Dialogue Series
- 25 Years of Mobile Telephony India

and many more....

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RNI No. 40432/82. Published on 1st of every month. DL(S)17/3159/2021-23. Licensed to Post WPP. U(SE)26/2020.
Posting Date: 3&4 of every month. Posted at Lodi Road HPO.