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It won’t be far-fetched to say that something of a revolution is said to have taken place in higher education in the past half century. The word “revolution” is used because the transformations are extraordinary in scope and diversity. Understanding these ongoing, dynamic developments, while being in the midst of them is a challenging task. As we look into the future, we see a fundamental re-configuration of the concept of university.

Universities of the future must be prepared for both unprecedented challenges, as well as unparalleled opportunities for innovation. Knowledge is poised to gain prominence as more and more countries move towards the “knowledge economy” model of development. In the years to come, universities will have to outgrow their traditional status of standalone academic institutions, as higher education becomes ever more integrated into the economy and the larger community. As globalization and technological advances gather momentum, education policy must encourage universities to assume an active leadership role in the global and local realms.

An important transformation in higher education is the evolving nature of the learner. The traditional learner is young, has a domestic status, and is enrolled in on-campus, lecture-based programs. This learner profile is changing rapidly. Institutions, the world over, are witnessing a phenomenal increase in enrolment of older, working adults, who have unique learning requirements. Higher education must also respond to the changing job market by arming students with transferable skills that will stand them in good stead through the entire span of their work-life. The number of internationally-mobile students too is projected to grow by leaps and bounds. As higher education systems become inter-connected across the globe, universities must be encouraged to include more global components and contexts in curriculum and teaching.

There is an increasing thrust towards a “learner-centered” environment, which includes real-world problem-solving and multidisciplinary approach to curriculum. It is for educationists to pave the way for learning to become more interactive for students. The newer learning models that capture the totality of student engagement such as peer-to-peer interaction and one-on-one counselling hold great promise for students. Universities must become open-learning spaces, and teachers must aim at incorporating wider mentoring roles. Most importantly, teachers must learn to model the value of an on-going education—they must become exemplary models of the significance of life-long learning.

Studies on future projections for higher education suggest that technological advances are considered amongst the top influential factors. Technology will continue to shape and re-shape the learning process; therefore, universities must be prepared for a technology-enabled future. In fact, technology has already fundamentally changed post-secondary teaching and learning. Education has once and for all become accessible and will continue to become more readily available in the future. Perhaps the most important way that technology has altered higher education is with respect to instructional delivery, for instance the growing importance of open source content and the combination of digital training and traditional classroom teaching.

Education 4.0 is a response to Industry 4.0 and places the student at the center of the higher education ecosystem. This report discusses how universities should adopt to Education 4.0 and discusses the shift of higher education delivery to a student-led model. The report also derives case studies of various universities that have transformed themselves to address Education 4.0.

We can all agree on the pivotal role of higher education and the need for robust universities to support the knowledge economy as well as to provide the knowledge necessary for the social mobility and economic progress essential to societies across the globe. The contribution of universities to collective welfare will only strengthen in the future, as universities assume leadership role in guiding national and world leaders on the path of peace, co-operation and prosperity.

The Approach Paper will further be developed into a “Knowledge Paper” with an aspirational and futuristic vision, highlighting new models of teaching and learning practices which would re-define the “Universities of the Future”. It will also cover an implementation framework with recommendations for all the stakeholders.

We would also like to extend our gratitude to Dr Rajan Saxena, Honorary Advisor and Past Chair - FICCI Higher Education Committee, for his vision that steered the concept of Education 4.0 and his continued guidance throughout.

FICCI

Foreword
We are at the cusp of a massive transformation in education systems today, graduating from Education 3.0 which is focused on the creation of digital content and automation of processes, to Education 4.0 which firmly places students' learning path at the vortex of these rapid changes.

Education 4.0 is riding on the massive advancement in education technologies, with the building blocks of education across the entire educational spectrum being morphed rapidly. Every nation is endorsing these changes as not just solutions for better learning outcomes but answers to the ever evolving needs of 21st century learner whose characteristics and learning needs are distinctly different from the 20th century learners around whom the universities of yore were built.

Combined with internationalization of education, academic systems globally are seeking to graduate to the new education paradigm unfolding today. This is also spawning fervent reorganization of higher education systems focused towards defining and scaling these transformations. This is accelerated by penetration of emerging technologies across any and all possible categorization of universities foretelling the imminent transformation.

Our research highlights that such shifts are being anchored with an entrepreneurial zeal and vigor spirit along with four identifiable vectors - employability (and not employment), student experience (with customized learning paths), research excellence (breaking the silos of academic boundaries) and society (as characterized by universities and industry). Each of the vectors are witnessing development of unique frameworks and implementation strategies across the world.

These actions manifesting in different sizes and shapes, carefully nurtured, are channelizing these transformation and creating a significant impact for all the stakeholders in the education ecosystem. It is in these exciting times that this report takes an initial step towards decoding these trends and their impact on higher education system and all connected stakeholders today.

This report also profiles some good practices of countries and institutes that we consider are ahead of the curve in their intent and execution. The report takes a holistic view of all the transformations and connects various dots across the individuals, institutions and industries of present and future to provide its readers with insights that not only excite but also provide a scaffolding to these transformations.

We hope you enjoy reading the report.

Amitabh Jhingan
Leader and Partner,
Education sector
Ernst & Young LLP
Executive Summary

In the last decade, technology has impacted us in all walks of life and education is no exception to this. While these changes were not very disruptive and were mostly limited to the use of technology in expanding an access to education, today we are at the cusp of a greater change where education system is being redefined placing learner at the center and shifting the focus from teaching to learning.

This phenomenon, referred to as “Education 4.0”, has arisen from different factors such as rise of non-traditional learner, increasing demand for competency-based skills and advancement in technology.

With the evolving concept of lifelong learning, today’s learner is no longer a student after high school but may be working part time or looking to pursue education after taking a break from work. A student who is willing to experiment with program structure, delivery, assessment or credential instead of conforming to present instructor led model for teaching. Technologies such as learning analytics, open source digital content, mobile-based learning platforms, etc. have made this personalization of learning possible.

Education 4.0 is primarily driven by four key levers that would help redefine the present higher education system: employability, student experience, research excellence and society.

With rapidly-changing industry environments, there is even a greater need for academia to match students learning outcomes with industry demands. Learners today need to be equipped with employability skills that are transferable across a broad range of job opportunities and help them modify their approach to solving business problems in dynamic industry environments. While many higher education institutions (HEI) have started working together with industry by incorporating these skills in their curriculum, there is a huge influx of employers as well, who are now partnering with HEIs and content platforms to develop customized learning programs for their employees to train them for new job opportunities.

A learner in Education 4.0 is looking for freedom to choose courses even outside of a program and is flexible to define his pace of learning, access to faculty and content worldwide, irrespective on his physical location. Driven by a learner’s needs and supported by technology, the education delivery model has changed from being instructor-led to interactive model. To further enrich students’ experience, many universities are developing stackable degrees to give lifelong learners multiple entry and exit options and also using technology like data analytics to develop customized learning paths for each learner.

Supported by technology, collaboration has been a central theme in the way research is conducted at some of the leading HEIs. Academia (students, faculty), industry and government are collaborating together to research and develop innovative solutions to solve business challenges. Apart of commercialization of research by industry, such collaborations exploit synergies and complementarities of scientific and technological capabilities and simulate additional funding for research. Supported by technology advances, researchers are able to network with each other through virtual groups and use data analytics to mine huge amounts of open source data that is available in different countries for their research outputs.

Society at large needs to accept this paradigm shift in education ecosystem. With increased collaboration between different stakeholders and digital sharing of data, to address issues involving intellectual property and ethical use of technology, HEIs need to inculcate a strong ethical foundation amongst its students.
For Education 4.0 to succeed and sustain, there is a need for universities to be future ready and facilitate the adoption of this phenomenon across all these levels. Besides this, it is also essential for all universities to transform their leaders, who are also far behind from imbibing the changing paradigm.

Guided by themes such as agility and adaptability, universities would charter their own paths towards this futuristic transformation factoring budgetary constraints, faculty issues, local issues and socio-economic considerations.

- Apart from exposing students to industry environments through apprenticeship models, universities would need to develop deeper symbiotic partnerships with industry to collaborate on the development of curriculum. They could utilize technology to develop short-term online programs that focus on expanding the learning objectives to include new-age skills such as problem solving, analytics, reasoning, communication, etc.

- Universities could focus on transforming into a platform that enable learning from multiple sources such as faculty, open source content, industry professionals, alumni, etc. and develop a culture of innovation and inquisitive attitude amongst its students. With limitations on opportunities to experience real-life working scenarios, universities could use emerging technologies such as AR and VR to simulate environments where learners can apply their knowledge.

- With online content providers offering learning programs, research will be one of differentiators for universities in future where they can stay ahead of open source content by enriching their curriculum with the latest research findings and outcomes. They may need to collaborate extensively amongst its various departments and other universities to drive multi-disciplinary research and externally with industry to quickly fundamental research outputs into real life applications.

- Enabling regulatory frameworks across the countries need to recognize the changing education ecosystem and support universities to be agile and flexible in rapidly changing industrial and employer demands. Regulators would need to reduce focus on inputs and create monitoring and accreditation systems based on the outcomes. Industry and society at large may need to accept the new ways of learning and provide equal opportunity to non-traditional leaners who have taken up stackable programs in classroom, blended or purely online models.

Our report explores how the current university model is evolving to keep pace with the changing paradigm of Education 4.0 across key levers of employability, student experience, research and society and what are some of key steps universities need to take on their journey to imbibe Education 4.0.
The advent of use of technology in education ushered in the era of Education 3.0. It was primarily categorized by digitization and automation. However, recently, a far more disruptive change is gaining momentum, which goes beyond just technological advances and is rather driving a paradigm shift in how we view the education system.

Education 4.0 is a phenomenon that redefines the education landscape by placing the student at the center of the ecosystem and shifting the focus from teaching to learning. Learners are now willing to experiment with how they receive their education, where they learn from and how they assess their progress, rather than conform to the existing system of credentialing, credit-hours and standard assessment.

While Education 3.0 revolved around new and improved ways to teach students by leveraging technological developments, Education 4.0 seeks to empower students to structure their paths individually, keeping in mind their learning objectives.

With ever-evolving skill requirements, innovation in pedagogy, dynamic work environment and demand for an enhanced learning experience, the onus of learning has shifted from a traditional instructor-led model to a student-led model.

Technology has helped in the pursuit of personalized learning, providing the flexibility and the comfort of remote learning at an adaptive pace and convenient time.

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**Shifting to a student-led model**

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<tr>
<th>Parameters</th>
<th>Education 3.0</th>
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<tbody>
<tr>
<td>Faculty</td>
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<td>In addition to full time faculty, industry participants act as part-time faculty for classroom and online courses</td>
</tr>
<tr>
<td>Curriculum and pedagogy</td>
<td>Minor flexibility in pedagogy; massive learning</td>
<td>Subject matter decided by the learner; personalized learning</td>
</tr>
<tr>
<td>Research</td>
<td>Transition towards collaborative research using technology</td>
<td>Ease of data sharing has removed the geographical barriers to collaboration</td>
</tr>
<tr>
<td>Funding</td>
<td>Fee-based funding systems at degree level</td>
<td>Fee-based funding systems in both online and classroom program</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>Majority of investment in physical infrastructure</td>
<td>Investment in technological infrastructure to support blended learning</td>
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Competency-based learning models are transforming the education landscape to address differing learning objectives across student groups

Rapid changes in industry requirements have widened the traditional mismatch between what conventional higher education (HE) provides and what employers now demand. This intermixed with the learning needs of different types of students is compelling HEIs to offer innovative models of learning, giving rise to the competency-based learning models.

Competency-based learning allows students to progress at an individual pace, taking their own time to attain proficiency in the relevant skills. Such models provide a greater autonomy to learners and are able to cater to students across the various levels of learning.

As defined at the Competency-based Learning Summit, held in Colorado, the US, competency-based learning is characterized by five key principles:

1. Students advance upon achieving mastery

2. Competencies include explicit, measurable and transferable learning objectives that empower students

3. Assessments are meaningful and offer a positive learning experience for students

4. Students receive timely, differentiated support based on their individual learning needs

5. Learning outcomes emphasize on competencies that include application and creation of knowledge, along with the development of important skills and dispositions

The core value of competency-based learning is to grant program credits to students based on their actual mastery of the subject instead of evaluating students’ progress based on lectures attended or time spent in the classroom.

Case in point

Southern New Hampshire University (SNHU) – Competency-based courses

- College for America, a program at SNHU provides degree programs that are competency-based, project-based and are directly applicable in the workplace. They are engineered to meet labor market needs and are validated by employers nationwide.

- The competency-based degree programs help students master specific skills (not just accumulate credit hours) to achieve their degree. These degrees are online and flexibly paced to fit into the demands of busy students who are also holding full-time jobs.

- Students receive full college credit at a much more affordable price than traditional degree programs. Graduates earn an Associate of Arts or Bachelor of Arts degree from Southern New Hampshire University, a fully accredited, non-profit university.

- The college partners with firms all over the US, to bring a competency-based degree program to their employees at a low cost, and helps firms build talent as well as recruit, retain and engage their workforce.
Recent socio economic trends coupled with dynamic industry movements have given rise to “non traditional” students

With social and economic trends evolving across the globe in recent years, the traditional profile of a student ready for college right after high school and enrolled in full-time classes to complete a degree, has given way to the new “non traditional” students with varying attributes.

The new-age learner may already be working or have a family and may be seeking flexible schedules and program structures that allow him to progress at his/her own pace, depending on work or family obligations.

“Non traditional” students in higher education

74% of undergraduate students have at least one non-traditional characteristic

66% Shift between universities prior to completion

28% have at least one dependent

62% work either full or part time

35% Are enrolled in two-year colleges

43% Attend part time

63% Are first-gen students


Who is a non-traditional student?

Delaying post secondary enrolment

Employed full time, hence looking for part-time options

Independent of financial aid

One or more dependents, single caregiver

Does not have a traditional high school diploma

What does non-traditional student demand?

- Affordable learning solutions with a quick return on investment
- Courses offering flexibility and multidisciplinary options
- Course availability in multiple formats and days/times
- Career counselling support – Getting a better job is their top objective
- Clear proactive communication/ information about services offered

This paradigm shift is redefining the target segment of learners and is driving the demand for flexibility and customization of learning curricula, emphasizing on modularized content and personalized learning paths.
Dynamic technological innovations have advanced the reach to a new generation of learners through various platforms with SMAC reorganizing higher education.

Innovation in technology is impacting education, as can be seen in evolving teaching and pedagogical methods. Demand for a flexible and personalized learning experience coupled with the availability of varied course delivery models, have been the primary driving force for a student-centred education ecosystem.

**Case in point**

**Georgia State University – Predictive analytics**

Georgia State University uses predictive analytics and a system of over 800 alerts to track all undergraduates daily, identify at-risk behaviors and have advisers respond to alerts by intervening in a timely manner. This ensures a personalized attention to students, who may be at risk of dropping out.

Over the last 10 years, the university has tracked more than 1,40,000 student records and 2.5 million grades to identify 800 different factors that put students at risk of dropping out. Some of these risk factors include enrolling in the wrong course for their major or low grades in an introductory course.

Based on the insights from the model, Georgia University undertook multiple initiatives:

- Conducted over 51,000 one-on-one interventions in 2016
- Added dozens of academic advisors
- Centralized operations and information sharing
- Expanded on current resources such as peer tutoring

The project led to major milestones for the university:

- Graduation rates increased over the last decade by 22%
- USD 15 million savings in tuition and fees for graduating class of 2016 compared to 2012, as students could complete degrees half of a semester sooner on average
- Most improvement was seen with at-risk minority, first-generation and non-traditional students, who were previously falling through the cracks. The insights gained from predictive models enabled them to anticipate students at financial risk and student demand for specific courses, which helped make scheduling processes more efficient.

For HEIs to keep pace with changing student preferences and to continue providing them with personalized options to learn, it is crucial for them to constantly innovate. This has been made possible by emerging technologies particularly social media, mobile, analytics and cloud computing (SMAC).
Signaling a new era of Education 4.0 which is revolutionizing the education ecosystem

By placing the student at the center and focusing on experiential learning, Education 4.0 is revolutionizing the way we look at HE providers today.

The traditional HE system puts forth multiple constraints:

- Plateauing enrolment due to limitations on infrastructure and faculty
- Rigid learning structure often forcing students to study programs outside their field of interest
- Inflexible delivery method and schedules with no room to accommodate students with other commitments
- Rising cost of quality HE increasing the pressure of student debt on learners

Education 4.0 has a potential to overcome the constraints of the traditional education system and target the new-age learner cohort.

This revolutionizing phenomenon calls for customizable and flexible program structures delivered across technology-enabled and affordable platforms and a real time integration with the industry.

Real tuition fees for HEIs vs. real median household income

<table>
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<tr>
<th>Year</th>
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<th>All colleges</th>
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CAGR (‘90-’03) CAGR (‘03-’16)

- Median income: 4.4% 3.0%
- All colleges: 3.6% 2.7%
- Public 4-year: 2.7% 1.9%
- Private 4-year: 0.4% 0.3%
Education 4.0 is transforming the way HEIs address the challenges posed by traditional mode of education.

Supported by technological advances, HEIs can now develop personalized learning paths and help students maximize the learning they derive from each course.

Case in point 1

Deakin University - Artificial Intelligence (AI) and Machine Learning (ML)

- Deakin University in Australia implemented IBM Watson on campus to help students find information easily and quickly. Called ‘Deakin Genie’, the platform uses AI and ML to provide students with answers to questions on a range of topics such as admissions, enrolment in courses, tuition and fees, financial assistance, students housing, job skills assessments, extracurricular activities and academic help.
- Being the first university in the world to introduce IBM Watson cognitive computing technologies, Deakin is progressing its use of Watson, expanding its capabilities and teaching the system to understand new sources of information.
- Watson can now tailor its answers based on the profile of the student such as nationality and allotted university campus. It provides customized information to students in an accessible, accurate and immediate manner, making the students’ experience smooth and simple.

Case in point 2

Temple University - Predictive analytics

- Similar to Georgia State University, Temple University in Philadelphia, Pennsylvania has implemented its own version of an early alert system, to help identify students who are at-risk of dropping out.
- The project uses data to run via a predictive model to identify signs of risk and provide students with personalized counselling and advise.
- Since the introduction of the system, retention and graduation rates for the university have significantly improved.
It is imperative for HEIs to redefine the education ecosystem by enriching student learning experience, focusing on employability and providing opportunities for research excellence.

Responding to the evolving student needs coupled with rapidly changing industry demands, HEIs now have a greater onus to develop an ecosystem that will provide a high-quality educational experience.

It is imperative for HEIs to redefine the education system that caters to the differing needs of students and equips them with the credentials needed to remain relevant in the industry and add value over time.

While technology remains the key catalyst that enables innovations in the education arena, Education 4.0 will be driven by four key levers uplifting this ecosystem.

**Employability**

With industry demands rapidly changing, it is crucial for HEIs to address employability challenges by matching students’ learning outcomes with evolving labor market needs.

This calls for a strong university-industry connect to expose students to the business environment in real time. Employability in education is further bolstered by imparting students with the required employability skills and credentials to remain relevant in the industry and fungible across sectors.

**Student experience**

With “student as center”, HEIs are focusing on enriching the student experience.

This encompasses creating customized and flexible learning environment, providing students with opportunities of self paced and experiential learning, and supporting life-long learning via multiple entry and exit options.

**Research excellence**

In order to keep up with rapid advances in the field of science and technology, HEIs need to integrate research with industry needs and create an ecosystem of collaboration to maximize the utilization of research output.

**Society**

With Education 4.0 introducing a revamped model for university education to eliminate the constraints of location and rigid program structure, it is crucial for the broader society to fully accept this new wave and acknowledge the validity of remote and flexible university degrees.
HEIs need to focus on “employability” and not “employment” for the learner segment to successfully transition into a sustainable workforce

Due to the new emerging technologies in different sectors, the business environment is evolving faster than before leading to a constant transformation of industry requirements. Existing jobs are fast evolving and paving the way for new roles requiring flexible skills.

The need of the hour for students is to remain relevant despite the constant flux in the industry and it has become more crucial than before for HEIs to match the students’ learning with the industry demands.

Students need to be equipped with employability skills that are transferable across a broad range of job opportunities. In addition to hard technical skills, education curricula needs to be redesigned to polish individuals with thought leadership and complex problem solving skills so they can modify their approaches as business dynamics transfigure.

Case in point

Germany – Dual education system

Germany has been pioneer in dual education model which has now been adopted by other European countries as well as globally by other nations such as China, Indonesia, Colombia, Ecuador and Peru.

In German system of dual education, young adults who have completed their schooling pick from a list of over 350 practical professions which are highly specialized and technical in nature. Over the next two to three years, they divide their time between attending a vocational college and learning on the job where they are also paid a minimum stipend for their work. In a typical arrangement, they spend three days a week at a business and two days a week at their local chamber of commerce or a participating college for theoretical instruction.

Since the courses are standardized across Germany, there is no location constraint on the college an apprentice attends or the firm they work at. Upon completing the course and two exams, the student is certified by the chamber of commerce.

By being embedded in companies, apprentices are exposed to the actual working environment and can also make informed career choices basis their interest. It is also beneficial for the employer to observe the apprentices for longer durations and hire them permanently once their training gets completed. Apprentices, on becoming full-time employees, already have the bespoke practical skills useful to their employer and also imbibed the corporate culture during their apprenticeship.

The North West University Graduate Employability program was conducted with eight participating institutions in the North West of England to identify the most successful approaches to improve employability among the graduates and take those approaches forward at the participating institutions.

1800 participants highlighted the following activities as most helpful in improving graduate employability:

- Help with CVs
- Mock interviews
- Identify skill gaps
- Confidence building
- Industry exposure
- Shadow internships

Job market research
Some exemplary universities have already begun to drive this phenomenon forward

Designing employability into the HE curriculum is beginning to gain traction across the education circuit as can be observed with the Quacquarelli Symonds (QS) Graduate Employability Rankings. The QS Intelligence Unit publishes the QS Graduate Employability Rankings, where it ranks 300 university institutions in terms of graduate employability outcomes and prospects. The rankings are based on five key factors:

1. Employer reputation
2. Employer partnerships
3. Graduate employment rate
4. Alumni outcomes
5. Employer-student connections

The 2018 rankings have been topped by Massachusetts Institute of Technology (MIT), Stanford University, University of California, Los Angeles (UCLA), Harvard University and The University of Sydney.
Real time exposure to industry and a tighter student-industry connect are imperative to develop employability skills in today’s student cohort

Some universities across the globe have begun to incorporate employability as part of their curriculum with the aim to supply its students with opportunities to develop industry relevant skills and provide real time exposure to the business environment.

HEIs are increasingly adopting industry focused programs such as shadowing business leaders, business simulations, internships and alumni mentorship. In fact, HEIs and business partners are forging more and more international alliances, giving students abundant opportunities to experience real world business dynamics across the globe.

Case in point 1

National University of Singapore (NUS) – Real time industry exposure

- Every year, the National University of Singapore sends 200 of its most entrepreneurial students to spend six months or a year abroad. These students work at a start-up firm across Silicon Valley, New York, Stockholm, Beijing, Shanghai or Israel and attend classes in technology entrepreneurship in the evening.

- Upon their return to the NUS, the students are accommodated in an entrepreneurial-themed campus residence where they share their experiences and create their own businesses and products. These NUS students are said to have founded ~350 companies since 2001.

- “Every year, employers look out for these graduates, and they are usually offered much higher salaries (than other graduates). The nice thing is many of them become mentors to junior students here and add to the ecosystem.” - Tan Eng Chye, Deputy President for Academic Affairs, NUS.

Case in point 2

Mines ParisTech University - Internships and business simulations

- The Mines ParisTech, France has established strong ties with the industry and ensures that its faculty and students understand which are the areas of interest to businesses. The college requires its students to spend at least 560 hours doing internships in their three years of study.

- Additionally, the students must also develop class projects where each student has a role, as they would in a working environment. They receive one-on-one mentorship to assist them in deciding which jobs to pursue, build applications and prepare for interviews.

- “When students do projects in the lab, they are aware of the present research and development at companies. It means they do not only speak correctly in interviews but they can also integrate relatively easily. Typically, before leaving the school, each student receives six job offers, and half of the students sign their first work contract.” - Jérôme Adnot, Academic Dean, Mines ParisTech.
Employability as the cornerstone of HE is also reinforced by multiple third party organizations focused on improving the quality of education.

While the notion of incorporating employability as one of the focal points of the HE curriculum is still nascent and largely being adopted by individual university initiatives, multiple not-for-profit and other third party organizations are also promoting employability in HE.

Case in point 1

**Higher Education Academy - Employability in HE**12 13

- The Higher Education Academy (HEA), an independent and not-for-profit organization works with governments, ministries, universities and individual academics in the UK and around the globe to improve approaches to teaching and provide strategic advice to the higher education sector, government, funding bodies and others on policies and practices that will impact the student experience.

- They are leading the “Framework for Embedding Employability in Higher Education” program which focuses on employability as the center of their curriculum.

- As defined by the HEA, the program focusses on “developing knowledge, skills, and attributes to enable graduates to make successful transitions and contributions”.

Case in point 2

**Push - Outreach Programs**14

- Push, a UK based not-for-profit organization conducts school and college outreach initiatives and live engagement sessions to inform student groups about education and personal development opportunities.

- Their key focus areas include careers and education choices, employability, study skills and public speaking.

- Over the last 5 years, push visited 339 different schools/colleges.

- In 2016-2017 push visited over 18,500 students in more than 120 schools and colleges across the UK.

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The employability framework is based on:

- **Inclusivity** of all students, regardless of location, situation, program or mode of study

- **Collaboration** between HE and business provides opportunities

- **Engagement** of staff, employer and student to develop a shared understanding of employability
With the booming start-up ecosystem globally, many HEIs have set up their incubators and accelerators to help students with financial and technical support. Not only do these campus spaces help students brainstorm and network, they often serve as networking locations where students can meet interested financiers for a potential long-term collaborations.

Incubators help start-ups with professional mentorship, education and access to knowledge, networking, financing, technological and facility-based support and brand building in their initial stages.

**Case in point 1**

**Centre for Innovation Incubation and Entrepreneurship (CIIE) - Virtual incubation**

- Set up in 2002, CIIE was set up by IIM Ahmedabad and the Government of Indian (GoI) with the goal of promoting entrepreneurship and bridging gaps in the ecosystem.
- Apart from backing entrepreneurs with tech-based solutions to indigenous problems, CIIE runs a virtual incubation model thus allowing for remote set up of start-ups. The center provides prototyping grants, stipends, acceleration support and technical aid to the start-ups.
- The center has incubated/trained more than 500 start-ups over the course of its existence.
Set up in 2010, IIT Madras Research Park has created a knowledge and innovation ecosystem where industries can collaborate and tap into the research wealth of one of India’s leading technology institutes. The Research Park enables its tenants to leverage the specialized expertise of the faculty and utilize their research facilities, while simultaneously providing part-time employment and experience to the students of the institute. Some of marquee clients include Ashok Leyland, BHEL, Forbes Marshall, Saint-Gobain, etc.

The Research Park further encourages innovation and entrepreneurship led by IITM Incubation Cell and supported by sector specific incubators such as IITM’s Rural Technology and Business Incubator, Bio-and Med-Tech incubators that are situated in the park.

130 tech start-ups incubated till date in the research park, out of which 37 have IITM Faculty as co-founders or minority shareholders. Only 20% of these companies are inactive. This low mortality rate is attributed to the presence of deep technology-oriented companies like Tata Consultancy Services, Cognizant, etc. in the park.

On financial front, cumulative funds raised by these companies has gone up to INR 800 crores and the companies generated a cumulative revenue of INR 135 crores during FY 2017-18.

DMZ, Ryerson University Canada - Accelerator

Set up in 2010, the Digital Media Zone (DMZ) Accelerator has become one of the top university incubators in the world, having supported more than 350 start-ups. Ventures from the DMZ have raised more than US$500 million in capital.

The program is an intensive four-month sales execution program designed for high-potential tech start-ups looking for growth capital. It features an access to world-class mentors, result-driven programming and designated workspace in the city.

It also ensures an access to the dedicated mentorship team of entrepreneurs-in-residence, who act as great sounding boards for business advice.

IIT Madras (IIT M) - Research Park and Incubator

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Business organizations with their changing recruitment styles are..

The debate between skills over qualifications can be best addressed by the shift in company recruitment that is slowly gaining momentum. Companies are moving beyond screening candidates only on the basis of qualifications but are rather assessing other skills like critical thinking, problem solving, data analysis, analytical reasoning and communication abilities that candidates may possess.

**Case in point 1**

**Aspiring Minds - Employability test**

Aspiring Minds is one of the world’s leading assessment companies democratizing the employment ecosystem by helping organizations, governments and institutions measure and identify talent via a three-pronged approach:

1. **Companies**
   - Bolster an assessment driven recruitment marketplace.

2. **Job seekers**
   - Assess job applicants and current employees on language, cognitive, functional and soft skills.
   - Develop the right hiring benchmark.

3. **HEIs**
   - Helps HEIs test industry-readiness of their students, get feedback and job credentials.

Candidates take the Aspiring Minds Computer Adaptive Test (AMCAT), a job readiness test, to demonstrate their skills and get personalized feedback and interview invites by companies.
per Scholas, a US-based non-profit organization, offers tuition-free technology training, career mentorship and placement programs for individuals in under-privileged communities. It collaborates with companies to design industry- and job-specific courses based on employers’ information technology (IT) needs. Companies identify a targeted skill set needed to fill their job openings and partner with Per Scholas, which provides free training to qualified applicants.

In 2017, Per Scholas announced a new Customized Training Partnership with Cognizant Technology Solutions.

World Economic Forum – Closing the skills gap

The World Economic Forum’s runs an initiative called “Closing the Skills Gap” which aims to create global and national platforms to close the existing skills gaps and reshape education and training for the future.

The project brings together industry, government, society and academia to address skills gaps through multi-stakeholder collaboration at the global and national levels.

With 26 companies already on board, the project is supported by an online platform developed by Tata Consultancy Services, a leading IT service multinational company based out of India.

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Employability does not culminate with the completion of higher education but needs to be consistently addressed throughout the professional career.

The core value of “Employability” is to constantly evolve as an employee, enhance and alter skills to changing job scenarios and add value to business in a sustainable manner.

The emphasis on remaining relevant is propelling individual employees to increasingly engage in upskilling and reskilling courses. Companies are reinforcing a similar ideology by partnering with educational institutes to develop customized training courses for their employees.

There has been an upsurge in education technology (EdTech) and online education course providers who are addressing the need for reskilling and upskilling at a low cost with flexible learning pace and personalized course structures.

Case in point 1: Ericsson - Upskilling and reskilling

In 2016, ~3,500 employees of Ericsson, India undertook online courses to upskill themselves. Additionally, the company has formed learning communities to explore new and upcoming technologies and has partnered with online education providers including Stanford and Coursera to provide its employees access to courses via the company’s learning management system.

Case in point 2: Udemy - Customized training for professionals

Udemy, an online course provider, offers over 80,000 online courses which individuals can pursue at their own pace. It also provides packages for businesses looking to leverage their content and allows companies to build their own training content in a customized learning account.

Case in point 3: Coursera for business

In 2016, Coursera, a large online education provider, initiated “Coursera for Business”, an enterprise platform for workforce development at scale. The platform assists companies in curating learning programs which can be delivered to its employees via an online learning experience on both desktop and mobile.

Case in point 4: Udacity - Specialized online upskilling courses

Udacity provides online programs built by industry experts and has partnered with organizations such as Nvidia, AWS, Google and Facebook, among others, to develop many of its courses. It offers two distinct types of learning pathways - normal short courses/certificates that can take a couple of weeks, and “Nanodegree” which is six to twelve months comprehensive course focusing on specialized skills in a particular area.
This ideology can be impactful when embraced by learners who would continually upskill/reskill themselves to remain relevant with constant industry transformations.

While HEIs and business organizations are key stakeholders in promoting employability as an anchor in higher education, the success of this ideology will be largely shaped by the involvement of the learners themselves.

While pursuing education, students should engage with stakeholders and involve themselves in programs such as career counselling and placement drives to ensure they are headed in the career track that is most suited to their interests and abilities.

Furthermore, the need to diversify one’s skill sets and ensure flexibility to maneuver across changing job scenarios cannot be emphasized more. As is evident in the IT industry, traditional roles are facing redundancy or extinction while new roles such as data scientists, mobile app developers, social media architects, cloud integration specialists and many more are emerging in greater demand. A report by the Bureau of Labor Statistics in 2017 revealed that an average baby boomer in the US changed 12 jobs by the age of 50, thus buttressing the need for constant reskilling for today’s employees.

With new emerging technologies and new skills being sought by employers, some of leading career focused institutions in India are moving fast to offer industry linked curriculum, flexible program structures and blended learning models to suit the needs of new-age learners as well meet the requirements of employability of the industry.

Many universities are partnering with online learning providers to offer structured programs in new age areas such as data science, AI, etc. where students can learn at their pace and accumulate credits that are recognized by university as well.

**Case in point 1**

Growing market for Coursera

India is the second largest market after the US for online providers Coursera and edX with the latter getting 11% of all its users from India (as of 2017), against 30% from the US.

India constitutes over 1.8 million users for Coursera out of a total of ~25 million, and is one of its fastest-growing markets.

**Case in point 2**

UpGrad – Working with Indian universities to offer online programs

BITS Pilani partnered with UpGrad to offer 11 month-long online program in Big Data Engineering that was designed by subject matter experts at BITS Pilani and offered from UpGrad.

Similarly, IIIT-B in partnership with UpGrad launched 11 month program in ML and AI focusing on a strong understanding of evolving areas of ML and other latest developments in the field.
By placing the learner at center of the ecosystem, Education 4.0 is enabling...

Education 4.0 puts the learner at the center of the ecosystem and empowers him or her to structure individual paths to achieve their learning objectives.

Learners are able to tailor their learning experiences on the basis of their needs and ambitions. They can choose from a variety of content delivery methods, subjects, skills, degrees and credentials.

In certain universities, learners can create their own curriculum according to their learning needs.

At the center of Education 4.0 lies the flexibility component, which allows students to make an efficient use of the resources at their disposal to maximize the learning they can derive.

1. Freedom to choose the specific skillset-based course or a bundle of courses, some of which may even enable the user to work towards a degree/certification

2. Flexibility to define the pace to work on the degree, thereby allowing the learner to gain mastery in the subject without having to compromise due to time constraints

3. Access to education across the globe irrespective of university-student location, enabling students to get quality education remotely from international universities

Case in point 1

Harvard Extension School – Customized education

Harvard Extension School, a fully-accredited Harvard school offers part-time, online and non-residential courses, and enrolls nearly 2,000 degree candidates and over 13,000 non degree students who take classes online, on campus or a mix of both.

The program ideally serves non-traditional students, like working professionals who want to complete a part-time degree to advance their career or pursue an academic passion. Interestingly, a vast majority of those who enroll don’t get a degree, rather they are students who are seeking to customize their own education by looking for specific courses to learn from.

Besides this, students can earn a Bachelor of Liberal Arts degree in extension studies, which provides students with a four-year degree at around a quarter of the cost of the on-campus equivalent.
.. personalization of learning experience with programs facilitated through technology

**Case in point 2**

**Austin Peay University - Personalized course recommendations**

Students now have a wide variety of options ahead of them in course selection and they even choose courses outside their field of study. Modern universities understand that this might create confusion among the students, who may not be able to pick the right courses.

To help students make more informed decisions while picking their subjects, Austin Peay University, in Clarkson, Tennessee developed a course recommendation system called “Degree Compass” that uses predictive analytics techniques based on enrolment data, grades and students’ transcripts to make individualized recommendations.

**Case in point 3**

**VIT University - Offers fully flexible credit system**

Students can register for courses of their choices and alter the pace of learning within the broad framework of academic course and credit requirements to gain an inter-disciplinary exposure.

The course flow charts, slot-based timetable and online registrations for courses each semester, helps students to understand prerequisites for each course, choose their courses, time of attending a class and the teacher.

Students can chose from four types of courses - University Core, University Electives, Program Core and Program Electives to meet defined credit requirements.
Driven by learners’ needs, the mode of delivery of education has evolved from an instructor-led model to interactive learning

New technological developments and increase in student awareness about various modes of study have completely transformed how education is delivered to the learner. While the traditional on-campus university education majorly remains the norm, several HEIs are keeping up with the changing needs of students and the clamor for flexible learning options, by offering blended learning and online learning options.

**Blended** learning has become increasingly popular as universities seek to experiment by adding online components to their classes.

Research has also shown that blended education is as effective a delivery method as traditional in-person classes.

**Flipped** classroom is becoming more popular as a means to support student learning in HE by preparing students before lectures and actively engaging students during lectures.

Students acquire knowledge before the class, via assigned reading or videos and use classroom time to practice and apply concepts through interaction with peers and teachers, using class time for targeted additional instruction.

Harvard professor Peter Galison flips his course on the Einsteinian revolution by creating online lessons with interactive components.\(^{30}\)

**M-learning:** With increased penetration of mobile devices and internet, more learners are considering using their mobile devices as a platform for learning.

M-learning provides students with multiple benefits including on-demand class recordings, live streams, publishing their own recordings and discussing video content with instructors and peers.

**Interactive and experiential learning:** Due to the developments in online computer-assisted education, several universities have taken up technology such as virtual reality or extended reality, in order to improve the learning experience.

A study published in the peer-reviewed journal, Astrobiology, found that a student-centered exploration focused design resulted in improving the course grades and demonstrating mastery of content.

Yale Professor Kyle Jensen flips his lecture on economics to enable more discussion. Yale’s Anesthesiology department offers flipped course content through video resources and lists of other resources.\(^{30}\)

Case Western Reserve University (CWRU) and the Cleveland Clinic have partnered to use Microsoft HoloLens, a virtual reality platform. CWRU is building a health education campus that will use latest technologies to allow medical students to use virtual cadavers.\(^{31}\)
With blended learning coming to the fore, pioneer institutions have led the adoption through introduction of stackable degrees and adaptive assessment techniques.

Credit stacking has recently gained traction and offers an added dimension for students to choose their subjects and credits and enables them to take online courses. These course credits can later be used if the students decide to join the corresponding on-campus course.

**Case in point 1**

**Massachusetts Institute of Technology (MIT) EdX MicroMasters - Stackable degree**

MicroMasters is a professional and academic credential for online learners from anywhere in the world. Learners who pass an integrated set of MIT graduate-level courses on edX.org, and one or more proctored exams, will earn a MicroMasters credential from MIT, and can then apply for an accelerated on-campus master’s degree program at MIT or other top universities.

Since the credits earned will count towards the total credits, if the student decides to join the full time on-campus university program, it gives students the option to take available courses in the fields of their interests and explore their interest areas before committing full time to an on-campus degree.

Apart from credit stacking, the acceptance of professional certifications as certain hours of university credit is a practice which is increasingly gaining acceptance. The American Council of Education (ACE) recommends college credits for select Microsoft certifications for its 400+ partner universities.

With the focus on improving the student learning experience, even the assessment system has been revolutionized, with efforts being put into identifying weaknesses quickly and addressing them swiftly.

**Case in point 2**

**Southern New Hampshire University (SNHU) - College for America’s JUICE Program**

Just-in-time Contextualized and Empowering (JUICE) Program, implemented by College for America (under SNHU), which gives just-in-time feedback, enables teachers and students to identify who is failing behind in the system and to identify problem topics so that remedial modules can be created. The program has successfully helped even adult learners and lifelong learners.

JUICE is an online learning platform with self-guided modules that are relevant and engaging within the context of project-based learning. The platform also uses research as well as best practices for helping weak students become successful college students and graduates.

Moving away from the commonplace post-facto assessment, which focusses only on grading and scores, universities and online course providers have created assessment systems that test the overall proficiency and knowledge of subjects, rather than just academic scores. The onus is on finding out the areas where students lack understanding, and target those areas with remedial courses.

Real time adaptive assessments with course correction feedback have been employed by some providers.
Academic research in the era of Education 4.0 is an enormous interconnected web of students, faculty, independent researchers and industry.

In order to keep up with the rapid advancements in the field of science and technology, it is imperative for HEIs to integrate research with industry needs and create an ecosystem of collaboration to maximize the utilization of the existing research.

In today’s technology-driven world, research, which has been one of the cornerstones of the HE system, has undergone a remarkable change. With HEIs and research centers being inter-connected via technology, it is critical that HEIs across the globe collaborate with one another to achieve research excellence. This trend of collaboration, has quickly become a central theme of how research is conducted at leading institutions.

The enhancement in international collaboration is clearly reflected in the growth of number of papers with international collaborations, which have more than doubled during 1990-2015.

International collaboration has been further enabled by:

- Improved access to collaborators and research field pioneers all over the world
- Availability of large piles of open source data
- Easier and quicker transfer of knowledge and sharing of data
- Sharing of computing power and availability of powerful analytical tools

Percentage of publications done with international collaboration

![Graph showing percentage of publications done with international collaboration from 1990 to 2016 for Japan, US, Germany, and UK.](chart.png)
Universities are where bright minds come together to push the frontiers of research, which necessitates that knowledge and expertise be shared between universities.

Higher education leaders recognize the value of university collaboration. Faculty members regularly collaborate with their colleagues from other institutions to make new advances across disciplines. Universities today are leveraging partnerships to increase their institutional visibility and profile and extend their global impact.

To engage faculty and students in joint research initiatives, many universities are promoting academic exchange programs, joint degree programs, joint classroom projects and joint events like conferences and symposia. Other motivations for collaborative international partnership include international funding opportunities and the potential to increase international student enrolments.

International university partnerships facilitate student research in two ways:

1. For domestic students, the opportunity to travel internationally via any programs which may have been set up to work on specific research topics - and vice-versa for students at partnered universities are offered.

2. Institutions facing financial constraints can pool their resources and their faculty and learners can access varied digital course materials, data, and technologies what might be unavailable locally.

Institutions are also joining forces to combine their intellectual capital or to align themselves strategically with innovative efforts in the field.

Discussion around the international mobility of researchers has shifted considerably from the 1950s view of a “brain drain” phenomenon - coined to describe the net outflow of research talent - to the more nuanced concept of “brain circulation”. In this view, the skills and networks built by researchers globally accrue benefits to their home country’s research base when they eventually return, or through collaborative projects.

Case in point

Worldwide Universities Network – Global research

The Worldwide Universities Network (WUN) is a leading global higher education and research network made up of 23 universities, spanning 13 countries across six continents.

WUN focuses on conducting research on four globally significant themes – responding to climate change, public health, global higher education and research, and understanding cultures. It is supported by supra-national organizations such as the United Nations, the World Bank, Organization for Economic Cooperation and Development (OECD), etc.

To foster next generation of global researchers, WUN has a research mobility program ensuring enhanced collaboration among early-career researchers while ensuring an access to ideas and supporting tools from across the globe.
Supported by technology advances, virtual groups and discussion forums are paving way for peer-to-peer research collaboration across geographical boundaries.

New ways of networking are emerging which can help academia find new partners and enrich existing relationships through an easy and a quick exchange of ideas and information. In today’s well-connected world, even social media or networking sites like LinkedIn and Skype, as well as portals like Academia.edu are igniting a new way for faculty and students to connect remotely, breaking geographical barriers, to share ideas and initiate discussions.

Virtual research and discussion groups have revolutionized the process of idea dissemination and informal peer review. These informal research groups can connect researchers working on different continents and bring together people who are focussed on a particular area of research. These research groups serve as a place for ideation, crowdsourcing of funds, and sharing of data and analysis.

**Case in point**

**University of Hong Kong – Connect Ed Program**

Connect Ed is a social collaborative space to connect learners with a community of peers and help them make sense of their unique learning experiences by connecting people with similar professional and educational goals. It provides a virtual space where individuals can chat, share, discuss, enlighten, think out loud and add to the collective wisdom of the group, which helps to build a community of learning that coalesces around shared experiences and common goals.

Project Connect Ed is a cross-institutional collaboration, bringing together medical students from the University of Hong Kong (HKU) and English education students and other students on exchange or field experience from the Education University of Hong Kong (EdUHK).

The project leverages popular social media applications to create dynamic virtual communities of learning where students share their experiences across a variety of health disciplines in efforts to advance cultures of professionalism through sharing knowledge about prevalent best practices.

Technology has also enabled transparency in journal and publication reviews. With ever-increasing research collaboration, it becomes imperative for the quality parameters to be standardized across and accessible to institutions and individual researchers, alike and technology is playing an enabler in this transition.
Education 4.0 fortifies a tightly integrated research collaboration between HEIs and the industry, who are the prime users of the research output.

Historically, there has been a significant lag between research output and actual industry adoption, rendering a lot of innovations obsolete in today’s dynamic environment. Thus, the Education 4.0 system calls for HEIs to be closely integrated with the industry, to create real-time industry-relevant research output.

University-industry collaboration can also expand the relevance of research carried out in public institutions, foster the commercialization of public R&D outcomes, and increase the mobility of labor between public and private sectors.

**Case in point**

**Peking University (PKU) – Cross country collaboration**

China’s Peking University has partnered with Germany-based pharma company, Boehringer Ingelheim to advance research and spur medical discoveries.

The partnership will implement a multifaceted collaboration model that will cater to the specific needs of the firm as well as the involved research groups. It will comprise of project-based research, a joint post-doctorate fellowship program and a number of Boehringer Ingelheim endowed investigators.

Research teams at PKU will work closely with their counterparts at Boehringer Ingelheim to leverage the company’s expertise in pharmaceutical research and development with their novel approaches and insights to identify novel targets and medicines within and beyond the company’s key therapeutic areas.

The benefits of university-industry linkages are wide-reaching: they can help coordinate R&D agendas and avoid duplications, stimulate additional private R&D investment (additionality effect), and exploit synergies and complementarities of scientific and technological capabilities.

**Industry-university collaboration comes in different forms:**

- **Research partnership agreements**: Company or a group of companies working with researchers at HEIs to solve industry-wide issues.
- **Sponsored research projects**: Includes research activities which are commissioned to HEIs by industrial clients (consulting, certification, testing, quality checking, etc.).
- **Tech parks and university incubators**: Collaboration where HEIs make use of advanced labs and equipment, situated at tech parks or incubators.
- **Intellectual property commercialization**: Transfer of intellectual property, such as patents which are developed at university, to industry participants (for e.g., licensing).
HEIs are increasingly collaborating with government organizations to undertake ground-breaking research through shared infrastructure and intellectual property.

The value of collaborative research projects is also being recognized by government organizations, which are partnering with HEIs to undertake research projects and promote innovation. In this win-win situation, the government and HEIs collaborate to exchange the right talent and share lab facilities, access funding, intellectual data and a wide network of potential users as well as partners.

**Case in point 1**

**Indian Institute of Technology (IIT) - ASSISTECH**

AssisTech is an inter-disciplinary group, under the IIT, Delhi, consisting of faculty, research staff and students engaged in using modern technology for finding affordable solutions for the visually impaired. It collaborates with various partners including industry and government organizations through collaborative translational research, ideating, prototyping and field testing.

One such project is the Centre of Excellence on Tactile Graphics. Funded by the Ministry of Electronics and Information Technology (MEITY), Government of India (GoI), the project aims at empowering visually impaired students by providing an access to figures and diagrams in a tactile form. The center has developed a technology for producing high-quality yet very affordable tactile diagrams using three-dimensional printing.

They have collaborated with the National Council of Educational Research and Training (NCERT) to convert diagrams and maps into tactile form for its secondary and higher secondary course curriculum.

**Case in point 2**

**IIT Research collaboration - AIIMS**

The All India Institutes of Medical Sciences (AIIMS), Delhi, signed a Memorandum of Understanding (MoU) with IIT, Kharagpur, in July 2018, to carry out joint academic and research programs, along with joint supervision of masters and doctoral students. The partnership will also focus on coordinated internship programs for students from AIIMS and IIT Kharagpur and explore opportunities of joint research projects, which may be funded by external organizations.

As part of the alliance, the two institutions will explore the use of each other’s facilities for exchange and analysis of data for education and research purposes.

**Case in point 3**

**IIT Madras - Use of data analytics and AI in governance**

IIT Madras is supporting Tamil Nadu State Government in enhancing data-driven governance in education, healthcare and agriculture sectors using emerging technologies like artificial intelligence and block chain technology.

The collaboration seeks to take up research relating to data science for government and e-governance, capacity building in the areas of data science, information and communication technology, among others.

The government will provide IIT Madras with present digital data in various departments which can be further mined by researched in IIT Madras to produce recommendations and create data science framework that can assist an effective governance.
Collaboration between students, universities, governments and the industry has been facilitated by enablers like shared/open source data and analysis tools.

There exist massive reserves of open source data, both in the form of educational and governmental data libraries that is making quality data accessible to anyone who wants to pursue research, moving away from traditional research approaches that were limited to restricted data sources.

Case in point 1

Prominent educational/research datasets

- Amazon Web Services Datasets: It contains huge resources of public data, with the 1000 Genome Project (an attempt to build the most comprehensive database of human information) and NASA’s satellite imagery data stored on it.
- Buzzdata: It is a social data sharing service that allows users to upload their own research data and connect with other uploaders.
- Google Books Ngrams: This allows users to search and analyze the full text of books which have been digitalized as part of the Google Books initiative.
- UCI Machine Learning Initiative: It is a dataset specifically pre-processed for machine learning.
- Broad Institute: The institute provides datasets related to cancer, which are used by researchers around the world.
- DBPedia: DBpedia is a crowd-sourced community effort to extract structured content from the information created in various Wikimedia projects. This structured information resembles an open knowledge graph (OKG) which is available for everyone on the web. A knowledge graph is a special kind of database which stores knowledge in a machine-readable form and provides a means for information to be collected, organized, shared, searched and utilized.

Case in point 2

Popular open government data sources

- Data.gov.us: This site is part of the US government’s pledge to make all government data freely available and provide a large database.
- Open-data.Europa.eu/en/data: Data from European Union institutions, made available for general public.
- Data.gov.in: This is an open government data platform of India. The portal is used by GoI’s ministries/departments to publish datasets, documents, services, tools and applications for public consumption.
Shared data repositories in the form of computing clusters located in institutions are facilitating sharing of enormous data, processing power across a shared group of computers and leveraging pooling of infrastructure and knowledge resources.

**Case in point 1**

**Boston University - Shared computing cluster**

The Shared Computing Cluster (SCC) is a heterogeneous Linux cluster, which is suitable for conducting research in most areas of research across disciplines. It is a high performance computing resource, and is located outside Boston University, at the Massachusetts Green High Performance Computing Centre. The system currently includes 6900 shared CPU cores, a combined 240,000 GPU cores and 4.2 petabytes of storage for research data. In its first five years, researchers have done over 161 million hours worth of computation, on 725 projects across 80 disciplines. The SCC is available to students, faculty and researchers at Boston University, as well as external research collaborators and industrial partners. The fully shared resources are available at no cost to all Boston University researchers, while individual usage via the Node Buy-in program is attractively priced.

**Case in point 2**

**IIIT Hyderabad - Use of open source data for Language Processing Lab**

IIIT Hyderabad is working with a consortium of 12 universities to develop Computational Paninian Grammar (CPG) framework for Indian languages which would serve as a rich testbed for studying and understanding the language in actual use, and are also used for developing parsers using machine learning.

The framework has been developed basis on an open source data available as well as digital data provided by MeitY, GoI. Sentences in these documents were analyzed to create a multipart machine translation system - “Sampark”.
..enable processing of enormous data for high quality research

In addition to these large troves of data, there are several open source analytics tools that have been developed to help researchers with complex analysis of datasets.

**Case in point 3**

**CERN\(^{45}\)**

CERN, the European organization for nuclear research, one of the world’s foremost research organizations, generates massive amounts of data when analyzing particle collisions, making storage and processing capability a major challenge.

Today, CERN is a heavy user of several open source projects like OpenStack, CentOS, Puppet, Grafana and influxDB. The OpenStack Foundation promotes the global development, distribution and adoption of open infrastructure with more than 82,000 community members from 187 countries around the world.

The goal of the foundation is to serve developers, users and the entire open infrastructure ecosystem by providing a set of shared resources to build community, facilitate collaboration and support integration of open source technologies.

As collaboration across universities and countries increase, there have been an increase in the number of papers that have been co-authored by academics from different countries. Some papers even have over a thousand authors, a phenomenon known as hyper-collaboration. The most multi-authored research paper of all times was published in April 2010 and has 3,222 authors from 37 countries, reporting results from the ATLAS experiment at CERN’s Large Hadron Collider in Switzerland.
It is crucial for the society to accept the new-age education model to ensure its success and realize its true value

While this new wave of Education 4.0 eliminates the location constraints to education, allowing a learner to access university education remotely and flexibly, it is vital for the broader society to accept this phenomenon and acknowledge the validity of online university degrees.

The success of this new ecosystem calls for support from two key stakeholders:

**Industry**

While employers largely prefer full time traditional education, employers are starting to recognize the value of online degrees and are more willing to extend an offer to such applicants.

“In our experience, degrees that are earned online can work in the job seeker’s favor. As long as the programs are accredited, earning a degree online can speak to the work ethic and dedication of the individual.”

Staffing firm Robert Half’s, Washington, the US

**University**

Universities have also begun blurring the line of distinction between online and classroom education, though there remains a long way to go for universities to fully accept an online degree.

Stanford University provides its students the option of going online or taking an in-classroom or blended education but provides a “Stanford degree” to all students without any distinction.

Likewise, a degree earned from New York University (NYU) and University of Michigan, does not indicate whether it was earned online or on campus.
As different stakeholders join hands to promote research advances, HEIs need to step-up the teaching of ethics to keep pace with technological innovations.

With the increased academic and research collaboration of universities, industry and government, there is a significant level of resource sharing among the stakeholders. Partners now have an access to each other’s resources, including intellectual property and valuable data sources.

This, in turn, increases the onus on each party to be ethical in their dealings as they move closer to technological innovations. While university course subjects including medicine and even business increasingly offer ethics as part of their curricula, engineering and computer science remain focused on technical issues.

Given the rapid developments in the technology sector and the increasing demand for skilled workforce, the key is to give an equal if not significant importance to the ethical use of technology. The catalysts here are universities who need to focus on inculcating a strong ethical foundation among students who will later transition into business leaders.

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**Case in point 1**

**Stanford University – Ethics in technology**

Stanford University recently announced to increase its focus on ethics into its technology teaching and research, to counter the misuse of technology innovations in the recent times. Given the university trains many students and staff, who further advise or join the technology sector, the university is stepping up its focus on ethics in technology. The board of Stanford University plans to implement a new initiative focused on “ethics, society and technology”.

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University of the Future

IIM Ahmedabad – Support to state government in Swachh Bharat

In 2016, over more than 20 teams of students from the Indian Institute of Management (IIM), Ahmedabad studied sanitation and toilet behavior among people in at least 15 taluks in the state and came up with recommendations to the state government to reach its “Swachh Bharat” target and end the practice of open defecation. The team along with the state government, also piloted a “star house” project in 10 villages where houses with toilets are marked with a star and honored at the panchayat level.

Gujarat Government, based on the suggestions given by the students, ran information campaigns to change the perception of government toilets as being “dirty and dingy”, involved teachers and students together to maintain school toilets, assisted in the formation of women’s groups to discuss on health issues, and appointed volunteers to conduct weekly “Swachh Gaon” meetings.

Rural Technology Action Group – Technology development for rural use

This project was initiated in 2003 by Office of the Principal Scientific Adviser, GoI whereby seven rural action groups were formed in IIT Chennai, Guwahati, Kharagpur, Roorkee, Delhi, Mumbai and Kanpur. The aim of these action groups was to innovate and create state-of-the-art technologies for rural areas primarily for the non-farm sector that could be further taken up by local entrepreneurs for production at village level.

The groups have been working on projects across multiple sectors and themes such as water conservation, transportation in hilly areas, food processing, textiles, health and sanitation, generation and use of renewable energy such as solar and wind, electrification of villages, regional handicrafts, etc.

For example, IIT Roorkee collaborated with Bhabha Atomic Research Centre (BARC) to use isotope hydrology technique for identification of recharge zone to drying springs in hilly regions of Uttarakhand. Post the success of first project in Gauchar, Uttarakhand, it is being replicated at 10 locations in Uttarakhand, Jammu and Kashmir and Himanchal Pradesh.

IIT Kanpur helped food processing sector in Uttar Pradesh by developing manually-operated amla pricking machine that can process 40 to 50 kgs amla per hour, as compared to 3 to 4 kgs per hour with manual pricking. Post design of the machine, the Council of Science and Technology in the state has taken up the project and would be partnering in dissemination of technology. Tie-up with Nu-Tech Industries, Ambala has been done for fabrication and marketing of machine.

Similarly, IIT Kharagpur also helped the rural food processing sector in east India by developing rice puffing machine for smoking and hardening of rice that increases the productivity to the tune of about 1.5 times as compared to conventional method. This machine has been installed at Bamumara village, Lodhasuli, Suchetana, Jhargram and Ghagrisole, Nayagram and Paschim Medinipur in West Bengal.

Academia today is working on research and consulting projects that can help solve some of societal challenges

Traditionally, academia was criticized for focusing on research projects that were narrow and detached from real work and could find limited application in solving real world problems. However, recently, a new wave of research has emerged out of HEIs that concerns how governments, academia and industry can work together to solve various societal and economic challenges.

Education is evolving to teach students the techniques that will help them as well as others, while at the same time, generating revenue for their organizations. Most of universities include projects and experiences as part of their curriculum, giving students the business skills, technology and sociological know-how to help them succeed in their careers as well as making a difference to those in underserved communities.

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Both central and state government’s regulatory bodies are taking up initiatives and making changes in policies so as to increase the adoption of Education 4.0

The Ministry of Human Resource Development (MHRD) have undertaken policy changes recently that can transform the HE landscape in the coming years and increase the pace of adoption of many facets of Education 4.0.

**Example 1**

**New regulations on online learning**

In 2018, University Grants Commission (UGC) approved new regulations on online learning. Under the new regulations, HEIs can offer certificate, diploma and degree programs in full-fledged online mode in those disciplines in which it has already been offering the same or similar programs/courses at graduation level in regular mode (of classroom teaching) or in open and distance learning mode and from which at least one batch has been graduated and approved by the statutory councils, as applicable.

This excludes the programs requiring practical/laboratory courses as a curricular requirement. The online learning shall have minimum of four quadrants: video lectures, e-content, self-assessment and discussion forum to clarify doubts.

The learners’ engagement will be monitored via participation in asynchronous/synchronous discussions, assignment activity and program involvement through online data from learning management systems.

**Example 2**

**Implementation of Choice Based Curriculum (CBCS)**

In 2015, UGC approved the implementation of CBCS by all public central and state universities to allow “seamless mobility” across HEIs and transfer the credit earned by students. UGC had developed guidelines on CBCS and also the detailed syllabi in consultation with various stakeholders in as many as 109 undergraduate courses as a template which gives a broad framework of uniformity as well as in-built flexibility. All the universities were requested to adopt the CBCS and also revise the curriculum.

CBCS makes learning system more student centric as it will allow them to choose interdisciplinary, intra-disciplinary courses, skill-oriented papers (even from other disciplines according to their learning needs, interests and aptitude) and provide more flexibility for students in learning. CBCS offers flexibility for students to study at different times and at different institutions to complete a course, thereby providing an ease of mobility to students. Credits earned at one institution can be transferred to another institution as well.
In a differentiated academic system like India, universities and HEIs are at different stages of adopting various facets of Education 4.0

India has gradually moved to a differentiated academic system with different categories of HEIs serving different needs of country.

There are very few research intensive institutions that cater exclusively to furthering India's intellectual capital. They are centers of excellence for the creation of new knowledge, set up with the vision to emerge as national and international leaders in research output and intellectual property.

There are several career focused institutions that cater to delivering economic value. They are industry-aligned professional education institutions focused on quality teaching and producing highly employable graduates for white-collar jobs in a knowledge economy.

The last cluster of broad-based highly-accessible universities and colleges is designed to expand the reach of HE by offering a wide range of courses aimed at providing a holistic education to India’s masses.

Each category of institutions are at different stages of adoption of concepts from Education 4.0.

Leveraging their cost and competitive advantage, Indian research institutions are collaboratively producing cutting-edge research with leading international universities around the world and also going beyond traditional scientific and applied research to work on application of emerging technologies to solve social and economic challenges.

With new emerging technologies and new skills being sought by employers, some of leading career focused institutions are moving fast to offer industry linked curriculum, flexible program structures and blended learning models to suit the needs to new-age learners as well meet industry requirements of employability.

Many foundation institutions in India are working on addressing employability challenges for their students through implementation of choice-based curriculum, professional coaching on soft skills such as communication, problem solving, critical thinking, etc., providing personalized mentoring to students, setting up career assistance centers in universities and affiliated colleges and collaborating with other universities to set up job fairs.
For Education 4.0 to succeed and sustain, universities need to be future ready and facilitate the adoption of this phenomenon across all levels.

While universities would be guided by the central principal of agility and keeping pace with the ever-changing economy - the route to the end state would differ. The path to transformation for each university is bound to be different with their different start points.

Every university needs to transform - The leaders are far from being ready to fully imbibe the Education 4.0 paradigm. The starting point for the journey towards the vision may be different, but even the top universities, research and teaching institutes have a fair distance to go where the basic tenets of core transformation agenda remains similar.

The future roadmaps of every university have to consider local issues and the socio-economic considerations would dictate local actions in addition to the core and category roadmaps. The future roadmap of universities to get closer to the Education 4.0 tenets may look at budgetary constraints, unique demographic and faculty constraints, and the maturity of the institutes across teaching and research outcomes.
Apart from enriching their curriculum from industry inputs, universities need to provide students with career counselling, opportunities for industry interfacing and online courses for skill set upgradation.

### Career counselling and employability interventions

With the changing industry requirements and emergence of new jobs, career counselling becomes important to develop a well-trained workforce which can appreciate the nuances of the industry requirements and the way they are imbibed through the curriculum. The career counselling frameworks would also ensure that the prospective students are aware of the various ways of teaching – in-campus, online, blended or through self learning – thus providing different pathways to employment.

### Curriculum partnerships

With ever-evolving skill demands, it is difficult for individual universities to develop content and curriculum across all new domains by themselves. If attempted, it would lead to sub optimal quality of curriculum and content.

Universities need to work with each other, with open learning platforms and with industry partners for strategic and collaborative curriculum development in a hub-and-spoke model. The leading institutes in each state or domain could be a hub to interact with the industry while working back with other institutes as spoken in the curriculum development process.

### Career counselling systems by non-partisan third party providers

A consortium of universities, the regulators or the government could be created that could alleviate any bias by the individual university towards promoting only the programs that they offer. While some of the startups in India have attempted this at various levels, there is a need for standardized and information intensive career counselling systems at scale accessible through both physical centers and online.

### Focus on 21st century and higher order skills

The learning objectives need to be expanded to include the new-age skills in addition to the technical and academic skills – these include problem-solving skills, analytical and reasoning skills, and soft skills and communication skills. With the jobs of the future still evolving, these skills would enable the students to remain relevant to any new jobs and industries that may emerge in future.

### Apprenticeship and in-curriculum industry interface

There is an enhanced need of having job ready graduates from the HE system.

Providing real world on-the-job experience is critical to make students more employable. Better apprenticeship models at institutional levels and their tighter integration with the industry through industry mentors, live projects and internships would allow faculty and students to appreciate the needs of the industry in a better way.

### Leveraging online teaching models

Many of the common skillsets required could be delivered through short online programs – more so the soft and communication skill programs. This would ensure that the students enrolled at the faraway institutes with a shortage of faculty are also able to learn from the best of faculty and curriculum.
To enrich students’ experience, universities could use technology to provide experiential and collaborative learning...

### Experiential learning for better appreciation of the application of learning curriculum

Teaching models need to shift to learning by doing, and the simulators and industry connect allow for developing such models of experiential learning. With such models, students can better appreciate the application of the knowledge imparted, and also relate it to the real world challenges. Use of technology like augmented reality (AR), Virtual Reality (VR), simulation, etc. may be utilized to give a real life like exposure.

Universities need to follow the exemplary examples of using latest technology advances to improve overall student learning experience, giving equal importance to alternate mentoring techniques like AI, machine learning, Chat bots and usage of data analytics.

### Celebrate and promote out of box thinking

Most HEIs today have a unidirectional learning process with a teacher delivering the curriculum to a cohort of students, and deviations from the same are not appreciated or rewarded.

In a world where innovation is the driver of economy and industry, there is a growing need to facilitate experimentation and celebrate out of box thinking without stigma of failure. Universities of the future will have to develop a culture of innovation among its students by facilitating an inquisitive attitude among students, and rewarding out of the box thinking and experimentation.

Another equally important facet of inculcating this innovation culture is by removing the stigma of failure while attempting something new and ensuring that any out of box approach to learning is adequately compensated in the assessment process.

### Offering a bouquet of multi disciplinary programs

With lack of counselling systems at the pre-HE levels in India, most of the students who enroll in programs have limited awareness about the real world linkages of the programs they are studying. Also, the rapid shifts in the job skill demands make some of the existing courses redundant.

It is therefore important for the university of the future to offer ample degree of flexibility to move between programs of study, and to develop multidisciplinary programs for the new-age students. While the current CBCS program is developed with a similar intent, there is a need for better implementation of the same in both the word and the spirit of flexibility and multidisciplinary learning.

### Platform approach to learning

In the coming age of digital outreach across channels, universities may look at redeveloping into a platform of learning through various sources. University of the future would enable learning from teacher-facilitator, open source knowledge sources, industry professionals, alumni and other peer group of students. This would foster a culture of peer learning, social learning and mentoring by seniors, faculty, peers and industry professionals.

More universities need to come on board to adopt innovative technology as a medium of instruction for course design and delivery, including trends like flip classroom, interactive and experiential learning, M-Learning, etc.
.. provide flexibility in program structures and encourage innovative ideas

**Designing Intuitive Learner User Interface (LUI)**

Intuitive LUIs could improve the learning outcomes for the vast cohorts of students who are accessing the curriculum and content in various formats such as in class, online or through blended means as well as allow adherence to learning outcomes. The user interface/modular curriculum design using bots, etc. could allow the universities to offer enhanced personalization of learning for the varied non traditional student base.
Universities need to develop research as fundamental differentiator, work on innovative models for collaboration.

**Focus on fundamental research**

While non HEI players are offering learning services to a wide variety of students, research could be the big differentiator for teaching and learning process innovations. Faculty would be able to enrich the curriculum with the latest findings built upon the core IP and research outcomes and stay ahead of the public knowledge. University of the future could differentiate itself through its fundamental research portfolios, that could then be licensed out to social and industrial enterprises thereby offering the universities a great platform to collaborate to develop its applications with industry.

**Shorten time for the application of basic research**

Traditionally, the time to market for research spans to years if not decades. This is unviable in an ever-changing industrial paradigm. Universities would need to have better co-ordination between fundamental research outputs to applied research which could be quickly developed into real life applications - thereby leading the Industry 4.0 as a knowledge incubator.

**Strengthening multi-disciplinary research**

Universities need to break the internal silos of research and work together with the best in the other schools within the university as also with other universities to force multiply the knowledge strengths. This would also drive multi-disciplinary research, which could lead to topical and society-friendly research.

**Fostering hub and spoke research ecosystem**

While it is difficult for different industries and governments to work together, the universities and HEIs can work closely and collaborate much easily with shared research goals. The multi-disciplinary centers of research located in HEIs are the best suited to discover innovative solutions for the grand challenges facing the society today such as environmental concerns, sustainability, food and water security, etc.

It may be prudent to create a hub-and-spoke research ecosystem with individual universities with strengths in specific domains working on modules of the grand challenge, with a group of strong research institutes working as hubs to lead and deliver solutions and work with the larger group of stakeholders.

**Regulations to enable wider collaboration between public and private HEIs**

The governments and regulators at state and center may also look at fostering close co-working culture between public research institutions and private universities - which is fairly low today. For example - Impacting Research Innovation and Technology (IMPRINT), the MHRD initiative is a Pan-Indian Institute of Technology (IIT) and Indian Institute of Science (IISC) collaboration, which has produced some stellar solutions through basic and multi-disciplinary research. The IP may be opened to other HEIs in India, to develop more solutions and on-board other institutions of repute to force multiply the impact of the program. Over the last few years multiple accreditation, ratings and rankings objectively measure the research output of the HEI, and the same could be used to identify the best suited partners for these initiatives.
.. and develop mechanism to safeguard their IP in the digital age

Promote culture of information leakage prevention to safeguard knowledge assets

Cloud-based compute and collaboration have allowed better and faster research and validations across universities. But it also exposes them to potential data and intellectual property right theft and infringements. Research focussed institutes therefore need to develop information security usage policies and ensure that the faculty researchers are well-versed with knowledge loss prevention and protection measures.

Build capabilities for a knowledge and IP-driven economy

There is a need among Indian research institutes to develop capability around legal, contractual and IP-related matters. This would allow them to work better with other researchers, international institutes and industries, while their interests are protected.
While universities would need to focus on solving societal challenges, regulators need to develop frameworks.

**Learning objective of character building than just skill building**

Universities of the future will need to have an increased focus on ethics in business and technology to appraise today’s learners in their transition into responsible business leaders of tomorrow.

**University of the future as an open system**

Universities would develop into open academic systems with local community and society at large becoming an integral part of university ecosystem. The interplay between university, industry and society has to grow into a living platform with diffusion of ideas, knowledge and needs of each of them being catered to by the other.

Universities would need to develop stronger relationships with society and industry - by offering real time solutions for the local issues, and also would have to open to feedback and made more accountable.

**Co-creation of knowledge and a knowledge economy incubator**

University of the future would be accepted as an ecosystem for providing solution for societal challenges. Innovations for solving these challenges would be carried out jointly by students, faculty, industry and community members. The university acts as the center of the innovation propelled by the IP and research outputs of the university. Social research would offer innovative solutions to the local economy challenges, allowing a better integration of the university with the society.

**Enabling shared and “fit-for-use” infrastructure**

Hard infrastructure may impede the ability to reuse or remodel the same for a new program. HEIs would need to focus and invest in modular and flexible teaching system and infrastructure. The enabling regulatory framework would have to recognize this need for agility and flexibility to be able to quickly respond to changing industrial and employer demands. The regulator will have to create monitoring and accreditation systems which are based on outcomes rather than excessive focus on inputs. Some of the areas where this could be quickly transformed are

- Faculty - For most new areas of study and imparting life skills, practitioners would be more effective, till such a time the existing faculty could develop their own learning and teaching pedagogy. In the university of the future, faculty will not just be full time and from an industry but a global faculty considering that geography and time cease are significant in academic planning. The faculty student ratio norms may be suitably redefined to include the teaching and learning through remote and industry faculty.

- Laboratory and teaching resources - With an increasing shift towards cloud oriented computing resources, HEIs may utilize resources, computing systems and simulators available on the cloud than setting up their own infrastructure. This would allow for equitable and most updated resources to all at a much lower cost. For example, MHRD through Inflibet have implemented an online library resources and databases successfully through “e-ShodhSindhu” project and may replicate the same for other resources.
Acceptability of omni channel stackable credentials

The regulator and industry needs to provide an equal opportunity for stackable programs, which could be obtained through any means of learning – classroom, blended or purely online, and would be assessed and credentialed through a robust standardized process. With accredited and standard credentialing, more industry employers will have to mainstream these new-age non traditional students based on their real world skill sets. Over time the industry acceptance would converge into societal acceptance – with parents and peers appreciating the learning outcomes than just the credentials.

Regulations keeping pace with pedagogical and technical advancements

Regulators need to develop and implement supportive policy interventions to promote flexible on-demand, online and remote education. While the recent acceptance by the regulators on online and distance education delivery is a welcome step, these regulations need to be agile with the changing times and may include acceptance of simulator driven learning and peer credentialing, etc. to keep up with the changing pedagogical and technological advancements.
2. Website of College for America, https://collegeforamerica.org/adult-education-degree-programs/
4. Website of Georgia State University, https://success.gsu.edu/approach/
5. Census; National Center for Education Statistics, USA, 2016
8. Improving Student Employability, jobs.ac.uk
12. Website of HEA, https://www.heacademy.ac.uk/
15. Website of Center for Innovation Incubation and Entrepreneurship, IIM Ahmedabad, http://ciie.co/
20. Website of Per Scholas, https://perscholas.org/
27. Website of Harvard University, https://www.harvard.edu/
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53. Website of HEFA, http://hefa.co.in/
About FICCI Higher Education

FICCI has been playing a proactive role in the higher education sector supported by the Higher Education Committee, comprising of key representatives from leading higher educational institutions/ universities, industry and the government with Dr Vidya Yeravdekar, Pro Chancellor, Symbiosis International University as the Chair and Dr Rupamanjari Ghosh, Vice Chancellor, Shiv Nadar University as the Co-Chair.

The committee’s focus is on:

- Providing a platform for policy advocacy and influencing reforms pertinent to the industry needs
- Creating sustainable linkages between industry and academia
- Facilitating networking and knowledge sharing
- Promoting collaborative ventures in academic exchanges, industry oriented research/ consultancy and value added services

Some of the FICCI Higher Education Committee’s ongoing initiatives:

- FICCI has been actively engaged in the National Thematic Consultative committee meetings for National Education Policy (NEP). FICCI has submitted its recommendations on the same.
- FICCI Vision 2030 for higher education in India has been very well received by central as well as state governments and other stakeholders in the country.
- FICCI has been pro-actively participating in the development process by initiating activities like creation of the National Functional Knowledge Hub (NKFH) to facilitate industry-academia linkages with an aim to improve the quality of graduating students. FICCI has partnered with UK’s Royal Academy of Engineering to executive industry-academia engagement in research under the Newton Bhabha Innovation Fund. Under the NKFH framework, FICCI has also launched a Centre of Excellence in partnership with S V University, Tirupati.
- FICCI is under the process of launching a Centre of Excellence with the Government of Andhra Pradesh on grassroots initiatives.
- FICCI plays a critical role in the internationalization of Indian higher education by organizing overseas missions and hosting foreign delegations in India. It facilitates campus interactions and seminars focused on one-on-one interactions with universities, think tanks, research organizations, etc.
- The FICCI Higher Education Summit is one of the most awaited international events. It brings together key policy makers, educationists and the corporate sector and serves as a networking platform for all stakeholders of higher education.
About EY’s Education Sector practice

Education is a focus sector for EY. We provide strong capabilities as advisors in this sector through a dedicated team of sector professionals. Our team combines deep insights with strong practical operational experience to provide implementable solutions that lead to tangible and sustained value creation.

EY’s education practice has successfully completed numerous assignments over the last several years, covering all aspects of the education sector in India. The firm’s clients include government bodies, reputed Indian and international educational institutions, industry bodies, private equity funds as well as corporate houses interested in the education space.

EY’s education-centric research and analysis is encapsulated in a range of education thought leadership reports that are widely quoted by sector professionals.

**Our services**

We provide end-to-end solutions to suit the requirements of clients from all segments of the industry. The following is a snapshot of our services:

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<th>Pre-entry</th>
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FICCI

Federation of Indian Chambers of Commerce and Industry (FICCI)

Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence, its industrialization, and its emergence as one of the most rapidly growing global economies.

A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies.

The chamber with its presence in 14 states and 10 countries, provides a platform for networking and consensus building within and across sectors and is the first port of call for Indian industry, policy makers and the international business community.

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